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Abstract

Inequality has often been cited as one of the leading sources of discontent in Egypt and one of the causes of the 2011 revolution. However, there is no consensus on how much inequality exists or what its root causes are. In this paper, we attempt to contribute to filling this gap by estimating the extent to which factors related to the circumstances a person is born into contribute to inequality of opportunity in earnings as well as in wealth or asset distribution. We use three rounds of the Egypt Labor Market Panel Survey (ELMPS), spanning the period 1998 to 2012, to conduct the analysis. Our results indicate that circumstances account for a lower bound of 9%-11% of inequality of opportunity in earnings and 30%-33% with respect to inequality of asset distribution. We also find that area of birth and father's education level are the two most important circumstantial factors contributing to inequality of opportunity. Our interpretation of the results is that the two measures are complementary in that earnings are associated with flows, and assets are the stock of that and other flows over a longer period of time. In that sense, inequality of opportunity in earnings gives a better indication of inequality in the short run, while inequality in the household assets distribution gives a better sense of inequality in the long run. This interpretation has important policy implications, suggesting the need for two courses of action to bring about a more egalitarian society: the first is to limit excessive variations in current earnings and the other is to narrow the degree of wealth concentration.

JEL Classifications: D31 and D63

Keywords: inequality of opportunity, Egypt, earnings, asset index

ملخص

كثيرا ما تعتبر عدم المساواة واحدة من المصادر الرئيسية للاستياء في مصر وواحدة من الأسباب التي أدت إلى ثورة عام 2011. ومع ذلك، لا يوجد توافق في الآراء بشأن حجم عدم المساواة وما هي أسبابها الجذرية. في هذه الورقة، نحاول المساهمة في سد هذه الفجوة من خلال تقدير مدى العوامل المتصلة بالظروف التي يولد فيها الشخص في المساهمة في عدم تكافؤ الفرص في الأرباح، وكذلك في الثروة أو توزيع الأصول. نقوم باستخدام ثلاث جولات من المسح التتبعى لسوق العمل في مصر (ELMPS)، والتي تمتد لفترة 1998-2012، لإجراء التحليل. تشير نتائجنا الى ان الظروف تستأثر بالحد الأدنى من 9٪ -11٪ من عدم تكافؤ الفرص في الأرباح و 30٪ -33٪ فيما يتعلق بعدم المساواة في توزيع الأصول. نجد أيضا أن مجالات مثل مكان ميلاد ومستوى تعليم الأب هما نوعان من العوامل الظرفية والتي تسهم في عدم تكافؤ الفرص. تفسيرنا للنتائج هو أن المجالان متكاملان في أن الأرباح ترتبط بالتدفقات، وأن الأصول هي مخزون ذلك والتدفقات الأخرى على مدى فترة أطول من الزمن. وبهذا المعنى، نجد أن مبدأ عدم تكافؤ الفرص في الأرباح يعطي مؤشر أفضل عن عدم المساواة في المدى القصير، في حين أن عدم المساواة في توزيع الأصول الأسرية تظهر منطقا أفضل لعدم المساواة على المدى الطويل. هذا التفسير له مضامين سياسية هامة، مما يشير إلى الحاجة لنوعين من الإجراءات لتحقيق مجتمع أكثر مساواة: الأول هو الحد من الاختلافات المفرطة في الأرباح الحالية، والآخر هو تضييق درجة تركيز الثروة.

1. Introduction

The demand for social justice and greater equality has figured prominently in Egypt since the January 2011 revolution. Inequality has also often been cited by news agencies and analysts alike as one of the leading sources of discontent and one of the causes of the 2011 revolution. This assertion is not consistent with available data, which suggests that inequality has been declining since the beginning of the early 2000s. According to both the Egyptian government and the Word Bank, Egypt's Gini coefficient has dropped from around 36% in 2000 to 31% in 2009 (World Bank 2007 and 2011). Simultaneously, Egypt has enjoyed growth rates of around 5% to 7% in the years before the 2011 revolution, which was associated with lower poverty. Bibi and Nabli (2010) survey the literature on the Arab World and conclude, on the basis of average Gini coefficients, that the region is a "medium inequality" region and that Egypt is among the most egalitarian of the group. These surprising observations suggest that there is more to the puzzle of inequality in Egypt than meets the eye, which may then explain the disconnect between what the figures say and how Egyptians feel. According to the World Values Surveys (WVSs, 2000 and 2008), Egyptians felt that they had been getting poorer and belonged to a lower social class. This could be due to the increased awareness of the affluence of others in a rapidly evolving political climate.

Another explanation is related to what is measured and how it is measured. It is well known that Gini coefficients in Egypt are based on household expenditure rather than income, and expenditures vary less than incomes. More generally, household surveys tend to miss top incomes. Both elements lead to the underestimation of inequality of income. Another explanation is that Gini coefficients do not address the issue of equality of opportunity, be it with respect to employment and earnings, services including education and health, let alone inherited wealth.

A number of recent studies might shed some light on this disconnect by looking at inequalities of opportunity in different outcome variables. Studies on Egypt focused on equality of opportunity in earnings (Hassine, 2012), health outcomes (Assaad et al., 2012), education (Assaad et al., 2012) and inequality of opportunity for children (Al-Shawarby et al., 2012; Krafft and El-Kogali, 2014). Hassine (2012) assessed inequality of opportunity in earnings in Egypt, using previous rounds of the Egypt Labor Market Panel Survey (ELMPS) for 1988, 1998 and 2006. Asset inequality in Egypt and the region has not been studied before, except for an unpublished study by El Enbaby (2012), who assessed inequality of opportunity in assets using ELMPS 2006.

The current paper builds on these recent studies. More concretely, our paper uses new labor market panel survey datasets to measure the contribution of circumstances an Egyptian is born into to the level of their earnings and wealth or asset accumulation. This is the first time in Egypt the two dimensions are evaluated at the same time. The idea behind combining both earnings and assets is that the two measures of inequality complement each other and together provide a fuller picture for the short- and long-term dynamics of inequality. Earnings is a measure of flow, while wealth is a measure of stock. Persistent inequalities in earnings can lead to increases in wealth inequality. Therefore, earnings are associated with the short-run welfare of individuals, while wealth captures the long-run stock of assets. Understanding the circumstances driving both measures also enables policymakers to devise remedies to bring about a more egalitarian society.

On the earnings side, the paper applies the parametric methods devised by Bourguignon, Ferreira and Menendez (2007) to estimate the impact of circumstances on earnings inequality. On the household assets side it relies on principal components analysis to create the asset index as proposed by Filmer and Pritchett (2001), to reflect wealth. To assess the role of

circumstances in determining household assets, it adopts a framework developed by Ferreira, Gignoux and Aran (2011).

The rest of the paper is structured as follows. Section 2 provides a literature review of inequality of opportunity across a variety of outcomes, with a special focus on Egypt. Section 3 reviews the methodologies adopted, namely the conceptual framework, parametric approach, the creation of the asset index using PCA, and the data used. Section 4 presents the findings of the paper, followed by concluding remarks and policy implications.

2. Literature Review

The origin of the concept of inequality of opportunity can be found in moral philosophy. Rawls' (1971) response to the "veil of ignorance" proposition was that social justice should uphold two principles, maximizing liberties and ensuring that everyone in society had the opportunity to become successful. His "difference principle," also known as his "maximin" principle, stated that a fair allocation of resources would be one that maximizes the opportunities of the least privileged group. Inspired by moral and philosophical theories on fairness and inequality, John Roemer (1998) and other economists decomposed the factors contributing to inequality into circumstances and efforts. Inequality of opportunity in income, education, health and other outcomes results from a multitude of factors that can be categorized under circumstances, effort and luck. Circumstances are beyond the individual's control, while effort is in the individual's hands. In that formulation, the equal opportunity principle is conceptually simple: circumstances at birth should not matter for a person's chances to succeed in life. The circumstances that an individual is born into, unsurprisingly, have major implications on the likelihood the individual will achieve certain levels of welfare. Differences arising from these circumstantial factors are inequitable compared to those from individual effort. Building on the above ideas, Peragine (2004: p.1) states that "according to the opportunity egalitarian ethics, economic inequalities due to factors beyond the individual responsibility are inequitable and to be compensated by society, whereas inequalities due to personal responsibility are equitable and not to be compensated."

Increasing concern for inequality both globally and within countries has led to an increasing body of empirical literature on the measurement of inequality of opportunity in recent years. The literature covers a variety of dimensions of inequality of opportunity in different countries and regions. Among the most important contributions to the theory and measurement techniques are Roemer (1998), Van de Gaer (1993), Bourguignon (2007); Ferreira and Gignoux (2011), Checchi and Peragine (2010) just to name a few.

By contrast, the literature focusing on the Middle East, including Egypt, is scarce. This is in part due to limited data availability, since information on geographic and socio-economic background is necessary to measure inequality of opportunity. But such studies are increasingly becoming available. One such study is that by Hassine (2012), who using both parametric and nonparametric techniques sought to assess the extent to which variations in earnings in Egypt are attributable to circumstances as opposed to effort. Depending on the estimation technique adopted, characteristics such as gender, region of birth, parents' education and occupation accounted for 11-20% of the deviation in outcomes. The most significant circumstance variable was father's education, which contributed to overall inequality of opportunity by 6% in 1988, falling to 1% in 1998, but rising to 4% in 2006. The second most significant contributor to inequality was region of birth, which was at 4% in both 1988 and 1998, and declined to 2% in 2006. The paper also measured equality of opportunity for specific subgroups, finding that for women, parental education was the most significant factor until 1998, but then father's occupation status and mother's employment became the most significant afterwards.

Another study by Assaad et al. (2012) looked into the level of inequality of opportunity in health outcomes. It showed that children in the Arab World and Turkey faced unequal

opportunities to accumulate factors of health such as height and weight based on circumstances that are entirely out of their control and lead to diminished capacity to have a healthy and successful life. The total inequality of opportunity for height in Egypt was between 4%-7%, and for weight was between 10%-12%. These results were similar for Jordan and Morocco with respect to height, and Jordan and Turkey with respect to weight. Overall, the countries with the worst outcomes were Yemen and Egypt, while Tunisia and Turkey performed the best. It was also found that inequality of opportunity in health in Egypt had been oscillating in recent years due to events such as swine flu, which inspired misguided policies to deal with its spread and contributed negatively to child nutrition.

The circumstances that were shown to contribute most significantly to inequality of opportunity in health outcomes were geographic factors. This could be due to an unequal distribution of public goods, like water and sewer infrastructure, health facilities and potentially food distribution networks. Overall, the level of sanitation in the community was more important than characteristics within the individual households. Of the total inequality of opportunity for height, geographic variables accounted for 37% in 1992, rising to 92% in 2008. For inequality of opportunity for weight, the increase was also significant, from 37% in 1995, rising to 81% in 2008 (Assaad et al., 2012). Factors such as familial characteristics including parental education, wealth and occupation played a small role.

Egypt, among other MENA countries, offers free public higher education to all those that qualify.[1] This policy embodies the principle of providing equality of opportunity in educational attainment. However, a paper by Assaad et al. (2010) revealed that this was not the case. The students that were able to benefit from free higher education were already from relatively affluent families. More specifically, individuals whose parents were university educated and who came from an urban governorate, had a 98.5% chance of accessing higher education, compared to a 5.5% chance for individuals whose parents are both illiterate and come from rural Upper Egypt.

Another study by Assaad et al. (2012) explored variation in inequality of education opportunities across MENA countries. It found that inequality of opportunities explained a significant part of inequality in educational achievements in most MENA countries. The most important variables were family characteristics and secondly community characteristics. They also note that despite the availability of free education, there is great variance in its quality leading to unfairness among students.

Focusing on children and youth, a study by Al-Shawarby et al. (2012) explored the distribution of opportunities for Egyptians during infancy, childhood, and adolescence. Its main findings were that most opportunities had improved since the early 2000s primarily due to improved access to essential goods and services (like sanitation and immunization). More specifically, it found that factors such as basic housing services and early childhood development had improved significantly, while improvements in opportunities for education, nutrition and hunger showed either modest improvements or had deteriorated. The distribution of the improvements in opportunities was unequal between worse and better circumstance groups. The factors that had the greatest gaps between groups were access to sanitation, completion of secondary education on time, non-overcrowded housing, and access to a telephone. Overall, the five most unequalizing circumstances are parents' education, income per capita, urban-rural location, number of siblings, and regional location (Al-Shawarby et al., 2012). These are at least twice as important as gender, presence of elderly family members, and presence of both parents in the household.

[1] For example, to access general secondary school, the cut-off score is 70. Assaad et al. (2010) demonstrate that mostly students from the highest quintiles of society achieve scores beyond this cut-off.

Last, a study by Krafft and El-Kogali (2014) assessed the state of early childhood development covering twelve countries in the MENA region, among which is Egypt. They quantify inequality in terms of health, nutrition, social-emotional development, early learning, and early work; decomposing inequality based on different circumstances. Findings suggest that inequality of opportunity starts early in life and is particularly high in early learning and in activities that support early cognitive development. Krafft and El-Kogali measure inequality of opportunity using a dissimilarity index (D-index), and show that Egypt had the next highest D-indices, for both prenatal care and skilled delivery. Additionally, they proved that for inequality of opportunity in access to iodized salt for instance, family wealth plays a large role (43.6%) in Egypt, while for stunting, urban/rural differences contribute the most to inequality. Wealth also plays an important role in early childhood care and education, where it contributes to 36.8% of inequality of opportunity.

Turning to wealth inequality, Ferreira and Walton (2006) assessed the effect of wealth distribution on overall output and efficiency, and argued that circumstances have a powerful effect on outcomes and that both development and growth are constrained by the existence of inequalities in opportunity in wealth. They looked at evidence from a number of developing countries and emphasized the importance of designing long-term projects and policies targeting greater equality of opportunity in wealth.

With respect to the Middle East, including Egypt, work on asset inequality is a rarity. In a recent paper, Alvaredo and Piketty (2014) point out that this is due to the limited availability of data on top income shares. Additionally, data on wealth is problematic since it requires the valuation of the assets that the household owns, which can be subjective for several reasons. First, it has been debated whether the analysis should be based on discounted present value of the assets or the purchase value. Second, the choice of the discount rate requires value judgment. El Enbaby (2012) assessed inequality of opportunity in wealth in Egypt in 2006 through a wealth index that was constructed by weighting the different assets owned by the household using principal component analysis. The study showed that the share of inequality of opportunity from total wealth inequality in Egypt is estimated to fall between 20% and 45% of total inequality in wealth, depending on the measure of inequality used.

3. Methodology

In measuring inequality of opportunity in earnings and assets and attributing their variations to circumstances versus effort, we adopt the following concepts, methods and data.

3.1 Conceptual framework

The theory of inequality of opportunity is built on the notion that *y*, a single advantage (or outcome), is determined by *C*, circumstances, and *e*, effort, as shown in eq. 1.

$$y = f(C, e) \quad (1)$$

Because vector *C* has a finite number of discrete variables, we can partition the population into fully homogenous groups based on different circumstances. The individuals in each group, called individuals of the same type, share identical circumstances and can only differentiate themselves by their level of effort exerted.

The framework described above enables measurement of the differences in advantage achieved by individuals with the same level of effort, but different sets of circumstances. Roemer, however, argued that the absolute level of effort exerted is not a fair means of comparison between individuals in different groups. Circumstances impact the amount of effort exerted, so those with adverse circumstances will exert less effort on average than those with positive circumstances. For example, a couple who are both highly educated doctors, would encourage or even force their child to work harder than another set of parents who themselves have not achieved a higher education or do not equally value education. Therefore, Roemer suggests

that a fairer means of comparison would be their relative level of effort within their own type (i.e., their percentile as ranked against all the other individuals with the same circumstances). Roemer describes this idea as, "individuals should be held accountable for their degrees of effort but not their levels of effort" (Roemer, 1998, p. 18).

3.2 Parametric approach

A parametric approach to measuring inequality of opportunity compares the degree of inequality in a population, to a counterfactual distribution if there were no differences in circumstances. The following method was used by Bourguignon et al. (2007). To begin with, the counterfactual distribution of outcomes where everyone has the same circumstances is $\tilde{F}(\tilde{y})$. The share of inequality of opportunity from total inequality, θ_p, is then defined as:

$$\theta_p = 1 - \frac{I(\tilde{F}(\tilde{y}))}{I(F(y))} \quad (2)$$

To calculate θ_p, one must first estimate an outcome function.

$$\ln(y_i) = C_i\alpha + E_i\beta + v_i \quad (3)$$

where $E_i = AC_i + \varepsilon_i$, v_i represents unobserved factors, α and β are coefficient vectors, A is a matrix of coefficients capturing the effects of circumstances on efforts and ε_i is an error term. This can also be expressed as:

$$\ln(y_i) = C_i\delta + n_i \quad (4)$$

where$\delta = \alpha + \beta A$ and $n_i = v_i + \varepsilon_i\beta$

To calculate inequality of opportunity, the counterfactual distribution can be estimated by calculating $\tilde{y}_i = \exp(\bar{C}\hat{\delta} + \hat{n}_i)$ where $\bar{C}$ equalizes circumstance for all individuals (giving all individuals the value of the average circumstance variable) and n_i is the new error term. Using this method, Bourguignon et al. (2007) show that by not equalizing all circumstances in the estimation, one can obtain the partial effects of certain circumstances while controlling for others.

The primary advantage of using the parametric approach is that it uses data efficiently. When using datasets that include a large number of individual characteristics, nonparametric approaches can lead to inaccurate results when there are insufficient observations in each type. In addition, parametric methods allow one to determine the partial effects of individual circumstances or a set of circumstances while controlling for others. However, since effort is measured as a residual, it can also include other statistical sources of error, such as omitted variable bias and specification errors. Also, the parametric approach assumes a particular functional form, which could lead to the omission of relevant circumstances that are correlated to the observed ones. This may cause residuals of the regression to be correlated to the regressors (Ramos and Van de Gaer, 2012).

Measuring circumstances is conceptually simple. Presumably, with a full and complete data set, one could choose exactly what conception of responsibility one subscribes to and pick the appropriate circumstance variables accordingly. However, full data sets are rare, and even when various sources are merged, there are still missing variables (Ferreira et al., 2011). If one is able to observe an accurate account of effort, but not all circumstances, the measure of inequality of opportunity represents a lower bound.

3.3 Asset index

Given that data on wealth is often inaccurate or unavailable, many researchers have resorted to creating an index to reflect household wealth. Accordingly, in order to measure inequality of opportunity in wealth in Egypt, we use an asset index that reflects socio-economic status of individuals. There are several ways to construct an asset index. The simplest method is to

allocate equal weights to all assets. However, this would equalize, for instance, the ownership of a car and a cell-phone, to the ownership of two cell-phones. This approach was previously analyzed by Montgomery et al. (2000), who concluded that the index failed to explain most of the variation in expenditure. Morris et al. (1999) proposed assigning to each asset a weight equal to the reciprocal of the proportion of households who own it. They assumed that households would be progressively less likely to own a particular item, the higher its monetary value (Morris et al. 1999), so assets that are owned by fewer households would have higher weights. However, this approach omits housing quality and gives a high weight to assets that may be owned by only extremely poor households (Morris et al. 1999).

Given the drawbacks in the previously discussed indices, we opted for Principal Component Analysis (PCA) to construct our wealth index. Filmer and Pritchett (2001) pioneered the construction of asset indices using PCA. PCA is a data reduction technique, whereby the first principal component of a set of variables is the linear index of all variables that captures the largest amount of information common to all variables (Filmer & Pritchett, 2001). Moser and Felton (2007) provide an intuitive explanation for the PCA technique; where the weight or coefficient given to an asset is related to how much it explains variations in other assets. An asset would take a high positive value if the household is more likely to own it along with many other assets. If owning an asset is correlated with owning other assets in the survey, then it should be correlated with owning more assets that might not have been recorded in the survey; and thus would take a high weight (Moser & Felton 2007). On the other hand, assets that are owned with few other assets, would take smaller coefficients or even negative values.

Filmer & Pritchett (2001) used the asset index on data from India to estimate the relationship between household wealth and children's school enrolment, and concluded that the asset index is a good proxy for a household's long-run economic status. They also used data sets from different countries that contain both asset and expenditure data, and showed that there is a reasonable correspondence between the classification of households based on the asset index and a classification based on expenditure (Filmer & Pritchett, 2001). Meanwhile, McKenzie (2005) was the first to use the same methodology to measure inequality. He constructed an asset index to measure inequality in living standards in Mexico and to assess the relationship between school attendance and state-level inequality. The study demonstrated that inequality measures based on asset indicators are found to have a high, positive, and significant correlation with inequality in non-durable consumption (McKenzie, 2005).

The wealth index is constructed using Principal Components Analysis. The index of household j owning N assets is given by the following function:

$$A_{1j} = f_{11} \times \left(\frac{a_{1j} - \bar{a}_1}{s_1}\right) + \cdots + f_{1N} \times \left(\frac{a_{Nj} - \bar{a}_N}{s_N}\right) \quad (5)$$

where $\bar{a}_1$ is the average of asset a_1 across households, s_1 is its standard deviation and f_{1n} is the scoring coefficient of the nth asset, from the first principal component. Different strategies could be applied to decide how many components or factor scores to include in the analysis. Each factor score explains part of the variation in the data, with the first one explaining most of the variation in the assets. Since we are using PCA to explain our dependent variable, then we are bound to choosing the first factor to construct the index.[2]

Following Filmer and Pritchett (2001), it has become standard practice to use PCA as a proxy for household wealth (Labonne et al., 2007; Gonzalez et al., 2010; Krishnan, 2010; Harttgen and Vollmer, 2011; Kasara and Suryanarayan, 2013). Ferreira, Guignoux and Aran (2011) were

[2]In other situations, the Kaiser criterion could be applied, where the factors with eigenvalues above 1 are used. We can also plot the eigenvalues by a "scree plot" and inspect where a break occurs, as the graph should be similar to an L-shaped curve. All components before the break would have relatively large eigenvalues.

the first to construct a wealth index to measure inequality of opportunity for Turkish ever-married women aged 30-49, using data from Turkey's Demographic and Health Survey. They estimated inequality of opportunity to account for about 31% of inequality in wealth, while it was estimated to be 26% of total inequality using consumption data. Ferreira et al. (2011) attributed this difference to the greater transitory or unexplained heterogeneity that is present in the consumption, but not in the wealth measure. EBRD (2013) also used data from 35 countries in Europe and Central Asia to estimate inequality of opportunity in household assets using PCA. The report concluded that circumstances at birth explain less than 1% of total variation in the asset index in some countries (Estonia, Germany and Sweden), but over 35% in others (Macedonia, Georgia and Tajikistan).

3.4 Data

The data used in the study is from the Egypt Labor Market Panel Surveys (ELMPS) for 1998, 2006 and 2012. The surveys have been conducted by the Economic Research Forum (ERF) and the Central Agency for Public Mobilization and Statistics (CAPMAS). ELMPSs are nationally representative and the data between the three rounds of surveys are comparable.

The sample used in this study was all individuals aged 15 to 65. For the analysis of inequality of opportunity in earnings, the sample includes all working individuals with positive earnings. Meanwhile, the analysis of inequality of opportunity in wealth will be based on household heads only. Focusing on household heads is justified since spouses and other adult household members often come from similar backgrounds, making inequality of opportunity for household heads a good proxy for overall inequality of opportunity (EBRD, 2013). Therefore, we will be looking at how the circumstances of household heads explain inequality in household wealth.

The circumstance variables used from the surveys include father's and mother's education and father's occupation and employment status, as well as father's employment sector when the individual was 15, region of birth and gender. Parents' education was converted into four dummy variables to represent their level of educational attainment. This was done to better reflect the nonlinear impact of having a parent that completed secondary school as opposed to university. More specifically, "illiterate" and "read and write" represented no education; "less than intermediate" represented primary and preparatory schooling; "intermediate" and "higher than intermediate" represented secondary and post-secondary schooling; and "university" and "post-graduate" represented university and above. Father's employment status and employment sector were combined into binary variables, namely: "private wage worker," "private employer," "private self-employed" and "unpaid / no job." Father's occupational status was converted into a dummy variable for non-agricultural. Region of birth for urban and rural as well as gender were binary variables.

3.4.1 Earnings

The earnings variable used in the study is total monthly wages from all jobs. This is defined as the sum of basic, supplemental, bonus, incentive, overtime, profit sharing and other wages. Inequalities between certain population subgroups are readily apparent when observing real monthly earnings for different population subgroups. Table 1 displays the mean earnings across the years 1998, 2006 and 2012 for the total sample, and separately for the categories of rural, urban, women and men. Real monthly earnings are consistently highest for the urban subgroup, followed by men, with women and rural with the lowest earnings.

3.4.2 Household assets

To measure the contribution of circumstances to inequality of opportunity in asset distribution in Egypt, we use PCA and data on the assets owned by the household from the three rounds of the ELMPS (1998, 2006 and 2012) to construct asset or wealth indices. The asset value

included in the index is obtained by multiplying the number of units owned of an asset by the ownership dummy. This method is used in order to include all available information on households' assets. The analysis will be based on household heads only, looking at how their circumstances explain inequality in household wealth.

The asset index for each year includes all assets owned by the household, registered in the data set. These include assets such as television, mobiles, cars, washing machines, etc. Productive and non-productive rural-related assets (such as trucks and water pumps, etc.) were also included, in addition to livestock (cows, camels, etc.), in order to prevent an urban-bias. Yet, the problem with this methodology is that most households save in more durable assets, such as financial assets, urban real estate, agricultural land, etc. These types of assets are not included in the survey, especially in earlier years. However, where available, we added asset indicators in the index, to give a more accurate estimate for household wealth. For 2012, information was available on the type of house, as well as the housing ownership, so we included owned houses with their types (apartment, villa, etc.) in the index. Additionally, there was information on the average value of interest earned per month on financial investments, which we included as a proxy for household financial savings. Meanwhile, for 2006, there was only information on the house ownership, so we included a dummy for owned households and another one for partially owned houses (where installments are still being paid). Last, the 1998 survey contains information on whether the household owns land or property, so these were included in the index. Rural-related assets were not recorded in 1998, so we construct the index based on the available assets only. The index also has other variables that reflect the socio-economic standard of the household members, namely house area in square meters per member, roof structure, floor and wall material. Apart from these differences, most of the other assets are included in all three years of the survey, with a few exceptions of assets that came to existence in later years such as laptops and mobile phones. We thus believe that the asset index is a good proxy for household wealth, for the three survey years, despite differences in the assets included in each. The full list of assets for all years is provided in Appendix 1, with their scoring coefficients for all three rounds of the survey.

Table 2 provides some summary statistics for the wealth index for different population groups. By construction, the index has a mean of zero for the full sample in each year. By looking at summary statistics for different sub-groups, we can deduce whether these groups of people are better or worse off than the overall sample average. It shows that the average index value for rural households is less than that of urban households, throughout the three years of the survey. Additionally, the table shows that the average index value for male-headed households is consistently higher than that of female-headed households.

4. Results

In this section, we first show results for inequality of opportunity in earnings and then assets, also discussing similarities and differences between both measures.

4.1 Inequality of opportunity in earnings

Results from an ordinary least squares (OLS) regression on the log of monthly wages as the dependent variable and the set of previously identified circumstance variables are shown in table 3. As expected, being male and from an urban environment and having educated parents has a positive impact on earnings. The male and urban dummy variables are positive and statistically significant in all rounds of the data. Age is also positive and statistically significant in all rounds. Where the coefficient for age squared is negative indicates decreasing return to earnings for older cohorts and the opposite when the coefficient is positive. For parents' education, in both categories the no education variable was omitted. For father's education, the coefficients are all positive and broadly statistically significant. Furthermore, the coefficients increase with higher levels of education, indicating an increasing and non-linear return to

parents' education. The results for mother's education are less consistent. Only in 2012 are all coefficients statistically significant and they also display the same increasing returns to higher education apparent in the father's education category. In the father's occupational status category, agricultural worker is omitted and the positive coefficient in all years indicates that having a father who is not an agricultural worker has a significant and positive effect on earnings. For father's employment status and sector, the public wageworker variable is omitted. Most coefficients in this category are not statistically significant, except for private employer, which is positive and statistically significant in the two latter survey rounds. Also, having a father who is a wageworker in the private sector has a negative and statistically significant coefficient in 2012.

The R-squared of the regressions is decreasing in each survey round from 24% dropping to 18% and again to 15%. However, this should not necessarily be interpreted as decreasing inequality of opportunity. Even though this set of circumstances seems to have less of an explanatory role on earnings, this could be due to the omission of other circumstance variables of increasing importance. For example, if the private sector is employing more of the labor force overtime relative to the government, they may be able to better assess the quality of the private sector being able to better identify the quality of individuals' education.

Inequalities are calculated using the mean log deviation, GE(0). Also the top 1% of observations have been removed in each round due to outliers that significantly skewed the inequality estimates. Figure 1 shows the trend in overall earnings inequality in each survey round, where inequality first increased from 1998 to 2006 and then fell in 2012.

Table 4 displays the results for inequality of opportunity in earnings estimates. Within-group inequality resembles the "morally justifiable" portion of inequality, that which cannot be attributed to circumstances. Between-group inequality represents the coefficient for inequality of opportunity. Inequality of opportunity as a share of total inequality is then calculated according to direct and residual methods.

Results using both calculations reveal that income inequality of opportunity is approximately between 8% and 11% in each round. Figure 2 displays the trend of the share of inequality of opportunity from total inequality in each survey round. The bars in the background are the 95% confidence intervals and the theta d and theta r estimates represent the coefficients of the opportunity share of overall earnings inequality. The opportunity share of inequality of opportunity, opposite to inequality, has declined in 2006 and then increased again in 2012.
In comparing these results with the only other study on earnings inequality of opportunity in Egypt (Hassine, 2012), beyond some methodological differences in the circumstance variable construction, our results differ in three major ways. Firstly, by cleaning up the data and removing top outliers, the level of income inequality is much lower than previously assessed. In her paper, Hassine (2012) found that earnings inequality rose from 0.219 in 1998 to 0.423 in 2006 using the GE(0) inequality measure. Our results also corroborate an increasing trend, but correct for the magnitude of change with a modern rise in income inequality from 0.182 in 1998 to 0.268 in 2006. The second major change is in the share of opportunity inequality. Hassine's paper shows a drop by over half from 11.7% in 1998 to 5.5% in 2006. Our results reveal a more modest decline in inequality of opportunity from 10.5% in 1998 to 8.67% in 2006. Thirdly, our study utilizes a fresh dataset with the ELMPS 2012.

4.2 Inequality of opportunity in wealth

Now that we have evaluated inequality of opportunity in earnings, we assess inequality of opportunity in wealth in order to contrast inequality in both welfare measures. The analysis is based on household heads only, between the ages of 15 and 65, looking at how their circumstances explain inequality in household wealth.

The same parametric model is applied, whereby circumstance variables are area of birth, gender, age, age squared, father and mother's education, father's occupational and employment status, as well as employment sector. Table 5 presents results from the OLS regression for the wealth index on the mentioned circumstances.

Many factors contribute to wealth inequality, so given that this is a reduced form regression, we shall interpret the results carefully, since they reflect correlations between circumstance variables and the wealth index, and not causalities. Results demonstrate that households with male heads born in an urban area, with more educated parents turn out to be "wealthier" households. Similar to the earnings regression, the male and urban dummy variables are positive and statistically significant in all rounds of the data. The regressions also show that household head's parental background affects their household wealth, as higher father's and mother's educational levels are associated with significantly higher wealth levels, which was not the case for earnings inequality throughout the three rounds of study.

For father's occupation, we make the distinction between fathers in agriculture and fathers in non-agriculture. Similar to the earnings regression, results show that household heads whose fathers worked in non-agricultural jobs tend to have a higher wealth. Meanwhile, for father's employment, we omit the variable public wage-working fathers, and results show that fathers working in private wage-work tend to be associated with lower wealth levels, compared to individuals whose fathers are in the public sector. Meanwhile, those whose fathers were private sector employers are wealthier, as the regression shows that the coefficients are positive and significant throughout 1998, 2006 and 2012. On the other hand, results for private self-employed and unemployed fathers are not significant for most years and are inconsistent.

In principle, regular inequality measures such as Gini, mean log deviation and Lorenz dominance can be used to measure inequality in wealth. Yet, the wealth index has a zero mean by construction, so all regular inequality measures are not suitable. We will thus consider the index's variance as our inequality measure, which is appropriate since it is decomposable and translation invariant. Figure 3 shows that inequality has been on a decreasing trend, between 1998, 2006 and 2012. This graph should, however, be interpreted with care since our inequality measure for wealth is the variance, which would change with the change in the dispersion of the assets distribution, as well as the change in the number of assets. We find it implausible that inequality in wealth or assets distribution has declined in Egypt in recent years. We thus account this decline to the fact that more recently households save in different forms of assets that might not be included in the survey (at least not in all rounds), such as land, real estate, gold, savings in foreign banks etc. Additionally, household surveys tend to underestimate inequality, since they fail to capture the top percentiles of the distribution, as richer households are less likely to participate in those surveys (Deaton, 2005).

Estimating the share of inequality of opportunity, Table 6 shows that inequality of opportunity in wealth revolves around 32% of total inequality in wealth, for all three rounds of the survey. It dropped slightly from 31.8% in 1998, to 30.1% in 2006 and then rose to 33.2% in 2012. This shows a trend similar to that of the share of inequality of opportunity in earnings, using both the direct and residual methods. Yet, it is important to note that these results are dependent on the parametric model we specify.

It should also be noted that the results for both earnings and wealth are considered lower bounds of the actual level of inequality of opportunity due to several reasons. First, there are relevant circumstances not accounted for in the estimation, some of which could be correlated with the regressors. Measurement error and transitory income components are also not included, which may mask higher inequality of opportunity. Additionally, despite the fact that the asset index is a good proxy for a household's wealth, wealth of top-incomes in Egypt would still probably be underestimated. Survey data systematically under represent top-incomes' earnings.

4.3 Decomposition analysis of circumstances

The pervious section has shown that inequality of opportunity estimates in both income and wealth reveal similar results. First, circumstances play a role in determining ones' income and wealth. Second, the levels of inequality of opportunity in each case have not changed significantly over the period from 1998 to 2012.

In this section, we present inequality of opportunity decomposition estimates, which show the relative importance of each circumstance category for both welfare measures. Partial effects were calculated by holding a given circumstance variable constant for all individuals, while keeping other circumstances varying; calculating inequality of opportunity in this new distribution and observing the change in proportion to the original inequality of opportunity.

Table 7 presents the partial shares of individual circumstance groups for inequality of opportunity in earnings and wealth. Area of birth and father's education contribute most to inequality of opportunity in both earnings and wealth across the rounds. For both earnings and assets, area of birth steadily declined as a contributor to inequality of opportunity. Meanwhile, the relative contribution of father's education to inequality of opportunity increased over the 3-round period in both earnings and wealth.

Results are also displayed visually in Figures 5A-B. The relative contribution to overall opportunity inequality of the individual circumstance groups is shown on the y-axis. The results also reveal that gender plays a relatively small role. This low result may be due to the fact that the sample size of women in the data compared to men is relatively small.

One way of compensating for limitations in the parametric estimation and sample size issues is to complement our results with Generalized Lorenz Curves (GLC). This allows us to observe the distribution of earnings and assets based on different circumstance characteristics that may not be apparent in the regression. Conceptually, if circumstances did not matter, these distributions should be homogenous. Conversely, results demonstrate that for instance, the higher the mother's education level, the much higher the income distribution one falls in. Figure 6 shows the cumulative population proportion on the x-axis and the distribution of total monthly wages on the y-axis. The various curves denote different levels of mother's education as measured in years of schooling. In almost all cases, the more years of schooling one segment of the group has, the higher the income distribution of that group. This is most evident in the curve of mother's with 18 years of education in 2012, whose distribution is far above that of other groups. The corresponding distributions for the wealth index are available in Appendix 2.

Individuals born in urban areas tend to have higher earnings and wealth compared to those living in rural area (Figure 7). This is expected in the case of earnings in Egypt, as the gap between average per capita urban income and rural income ranges from 67% to 41 % higher, depending on the definition of rural-urban divide (Verme et al., 2014). Yet, these results are quite revealing in the case of wealth since we included in the wealth index all rural-related assets, both productive and unproductive ones, in addition to livestock; which is the main form in which rural households save their wealth. Livestock and rural-related assets were used in order to avoid an urban-bias in the index and they account for a large proportion of the assets in the last two years of the survey,[3] which shows that spatial inequalities in wealth in Egypt are as resonant as those in income. Looking at Generalized Lorenz Dominance, we can see that individuals in urban areas are better off than those in rural areas. It should be noted here that Generalized Lorenz Dominance indicates both inequality and welfare. This means if a distribution X dominates distribution Y by Generalized Lorenz Dominance, then there is less inequality and a higher welfare in X. Last, those curves highly coincide with the GLCs for the

[3] The 1998 survey did not include livestock and rural-related assets, so an urban bias might be overestimated.

current location of residence, which might indicate that individuals born in rural areas are trapped in lower "wealth" levels and higher inequality within their distribution.

5. Conclusion and Policy Implications

This paper contributes to our knowledge of inequality of opportunity in Egypt in terms of both earnings and wealth. The two measures are complementary since earnings are associated with flows in the short run, while wealth is the stock of earnings and other flows over a longer period of time reflecting long-term inequality. Using micro data from Egypt's Labor Market Panel Survey, we use a parametric method to estimate inequality. Inequality in earnings was estimated through total monthly earnings for wage-working individuals between 15 and 65 years of age. Meanwhile, wealth inequality was estimated through constructing a wealth index from the assets owned by households using principal component analysis (PCA) for household heads within the same age group.

The analysis in the paper shows that circumstances have an impact on inequalities in both earnings and wealth. Inequality of opportunity accounted for 9%-11% of inequality in earnings and 30%-33% of wealth inequality over the 1998 to 2012 period. Total income inequality has increased initially and then declined, while wealth inequality has been gradually declining. The paper shows that area of birth and father's education account for the largest shares in explaining inequality of opportunities in Egypt, while other circumstance variables such as gender, mother's education, father's occupation and employment status can explain less variation in individual earnings and wealth.

On the earnings side, these results correct for and update previous measures of inequality of opportunity in earnings. They also show that the amount of earnings inequality we can ascribe to a few key circumstances is not of a very large magnitude. On the other hand, on the wealth side, this is the first extensive study aiming to measure inequality of opportunity in wealth in Egypt. Results indicate that the opportunity share of inequality is three time greater in wealth than in earnings. However, the circumstances that contribute most to opportunity inequality are primarily the same for both earnings and assets. One reason this may be is that the wealth index contains a large number of consumer goods and durables, which are closely linked to earnings, as with increased wages households tend to spend more on items such as TVs, refrigerators, cars and so on. Another key similarity between both earnings and wealth is that the regression results both indicate the importance of human capital. Coefficients for father's and mother's education are consistently positive and almost always statistically significant determinants of earnings and assets. It is likely that more divergent results could be found by comparing a broader measure of income inequality of opportunity to asset inequality, or between earnings inequality of opportunity and a fuller measure of wealth.

Equalizing opportunities in earnings can bring about more immediate effects, but since the accumulation of wealth takes place over a long period of time, additional reforms may be required to shorten the equalization period. This may call for policies such as taxation on returns to capital, inheritance or cash transfers. Given the importance of certain circumstances for both earnings and wealth inequality, namely parent's education and area of birth, these factors should receive greater attention in policies aimed at reducing inequality. Government policies should focus on increasing access to education for both males and females in order to avoid a large share of inequality in future generations. About 71% of individuals in the survey in 2012 had illiterate mothers, while only 0.09% had mothers with post-graduate degrees. Dispersion among fathers is lower, whereby close to 48% had illiterate fathers, while 0.42% had fathers with post-graduate degrees. Immediate action thus needs to decrease the share of illiterate individuals in the population. In 2012, close to 38% of individuals who were less than 15 years had illiterate mothers, and about a quarter had illiterate fathers. With regards to area of birth, the government should focus its efforts on bridging the gap between urban and rural

areas, as discrepancies between rural Upper Egypt and urban governorates can be observed in several aspects starting with access to public services, availability of infrastructure and the quality of basic services such as education and health.

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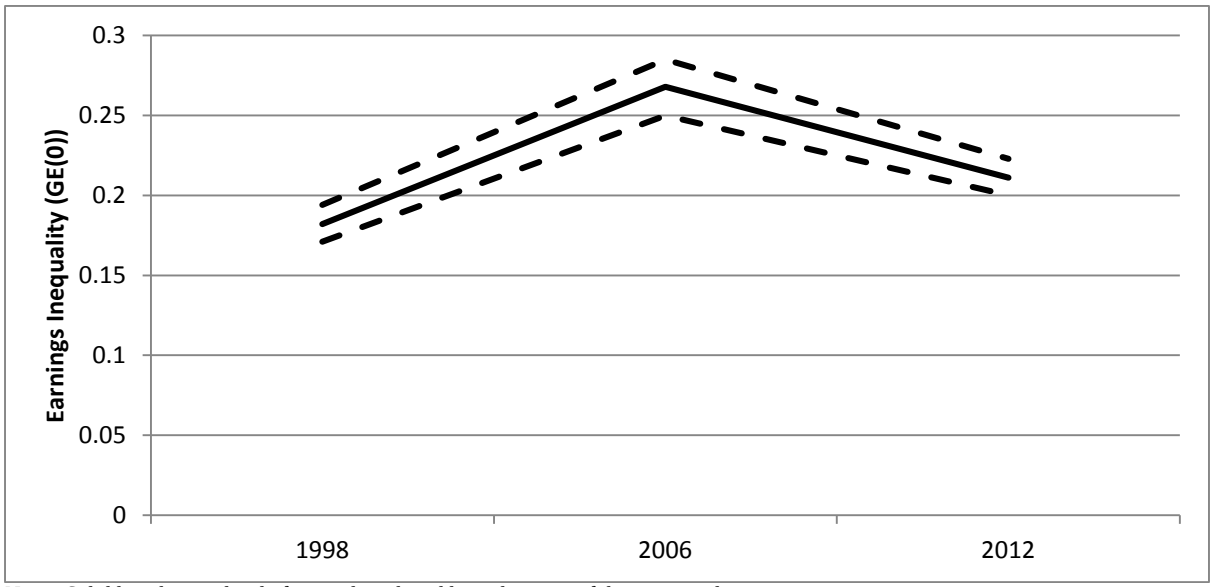
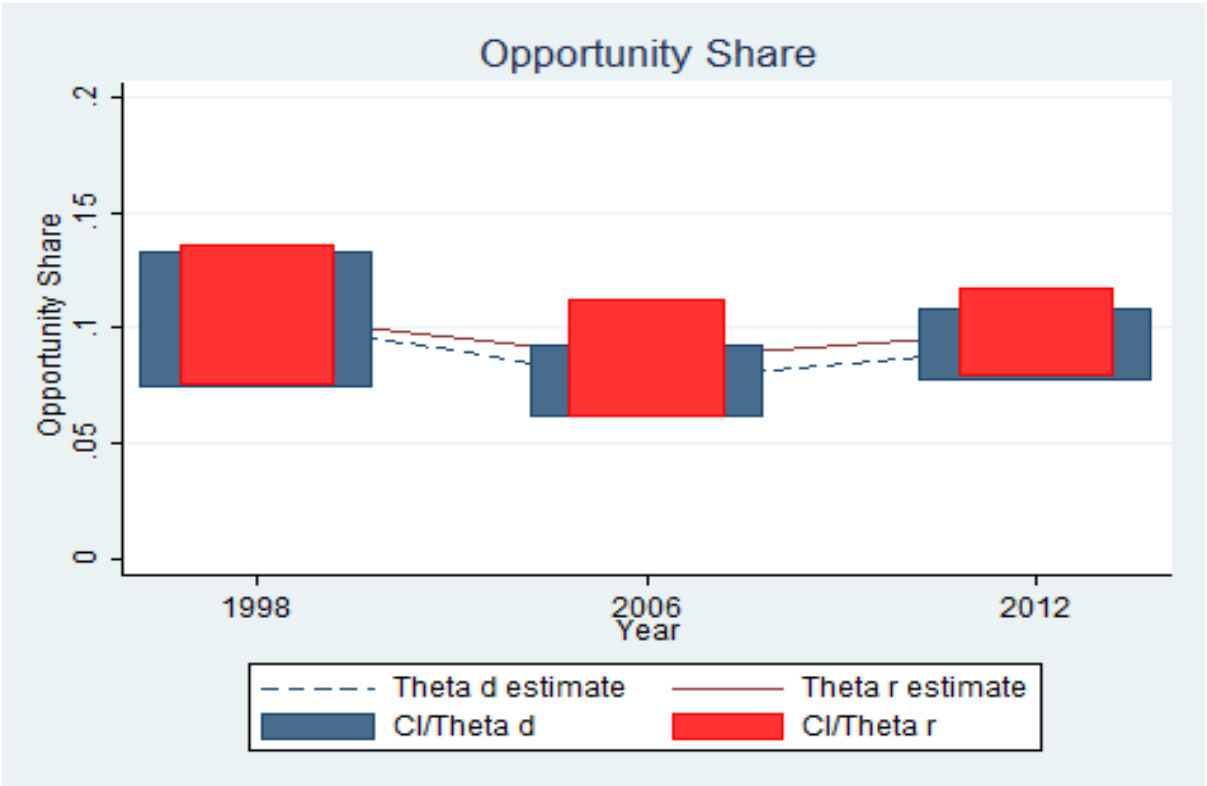
Figure 1: Trend in Total Earnings Inequality (with 95% confidence intervals)



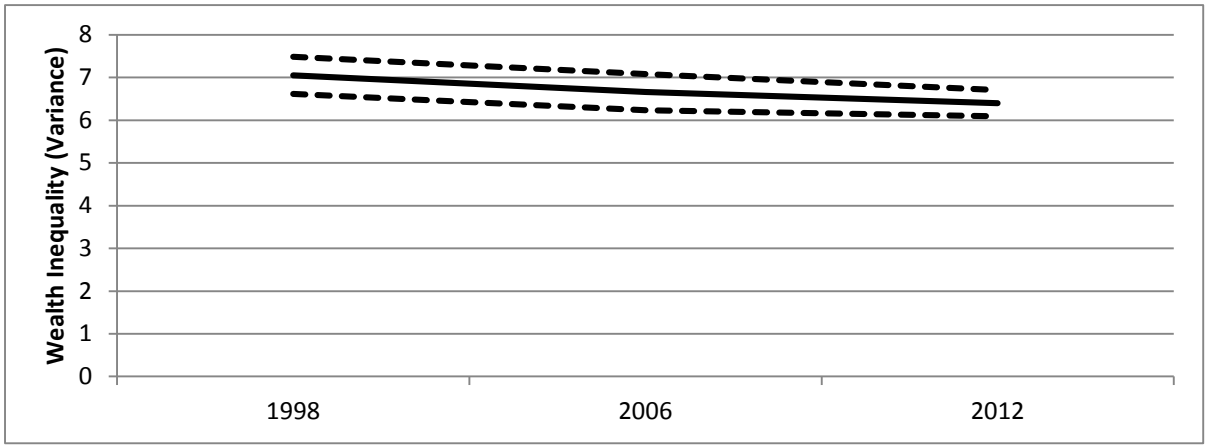
Notes: Solid line denotes level of inequality; dotted lines denote confidence intervals.
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Figure 2: Trend in Share of Inequality of Opportunity in Earnings (estimates and 95% confidence intervals)



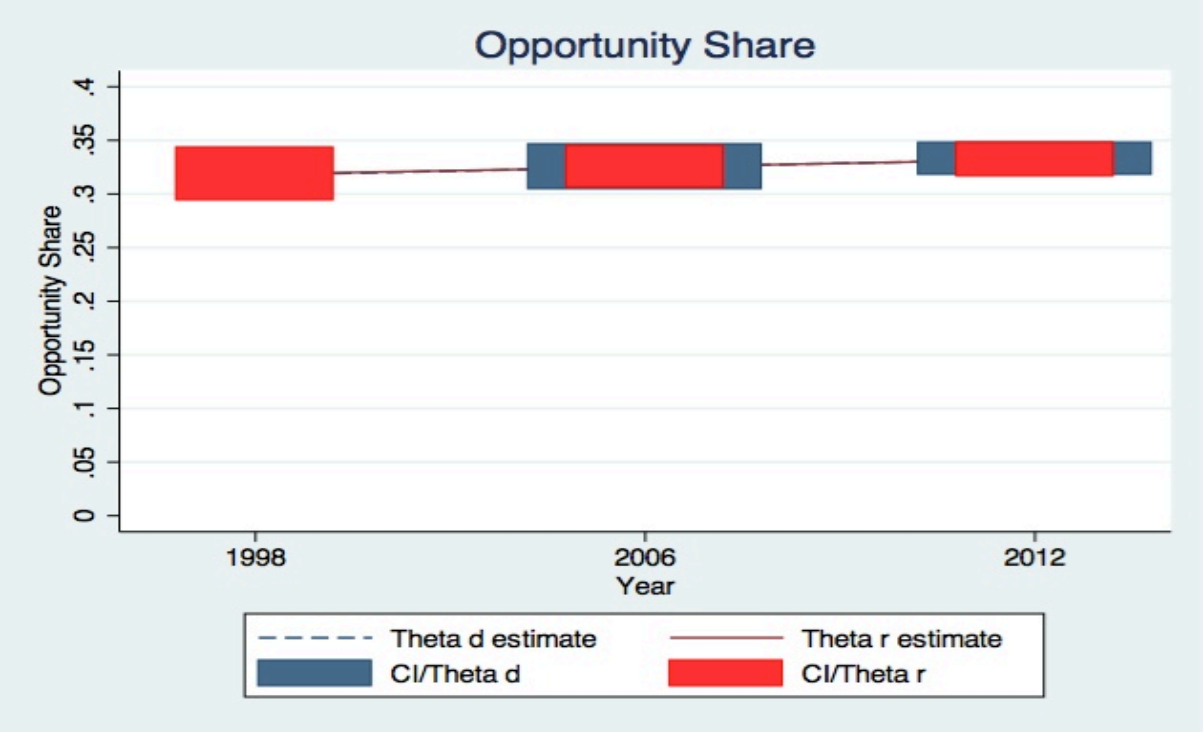
Note: Theta d – direct method estimate, Theta r – residual method estimate. Within-group inequality is used to measure the share of inequality of opportunity using the residual method, while between-group inequality is used to measure the share of inequality of opportunity using the direct method.
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Figure 3: Trend in Wealth Inequality (with 95% confidence intervals)



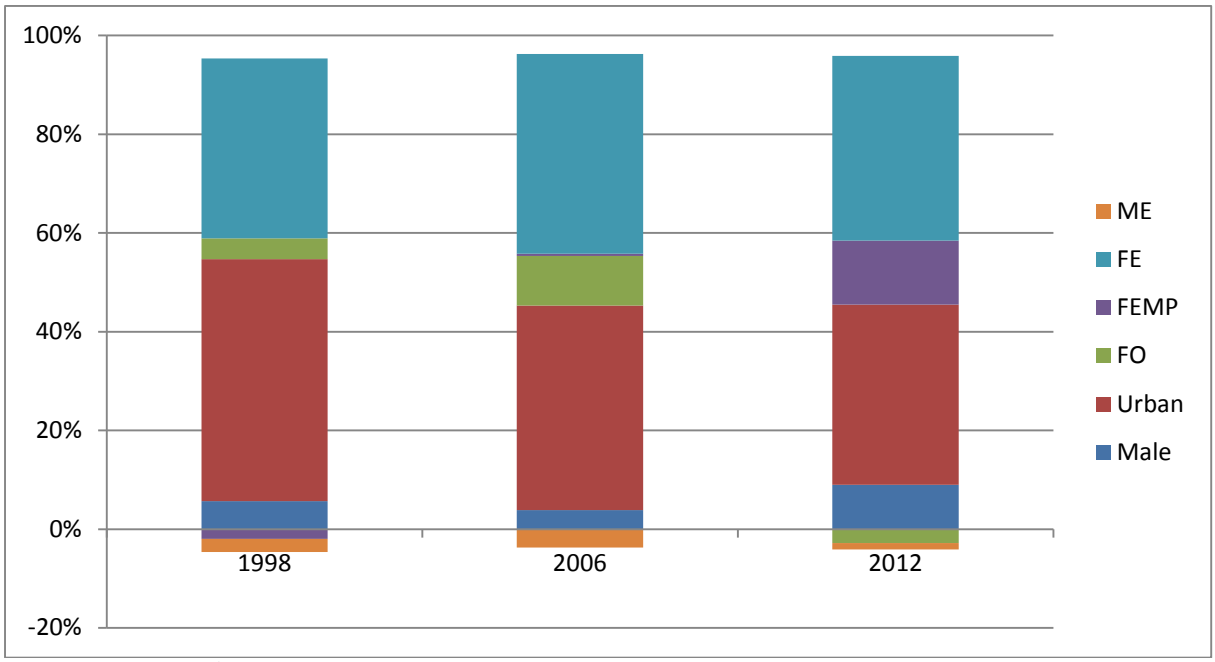
Notes: Solid line denotes level of inequality; dotted lines denote confidence intervals.
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Figure 4: Trend in Share of Inequality of Opportunity in Wealth (estimates and 95% confidence intervals)



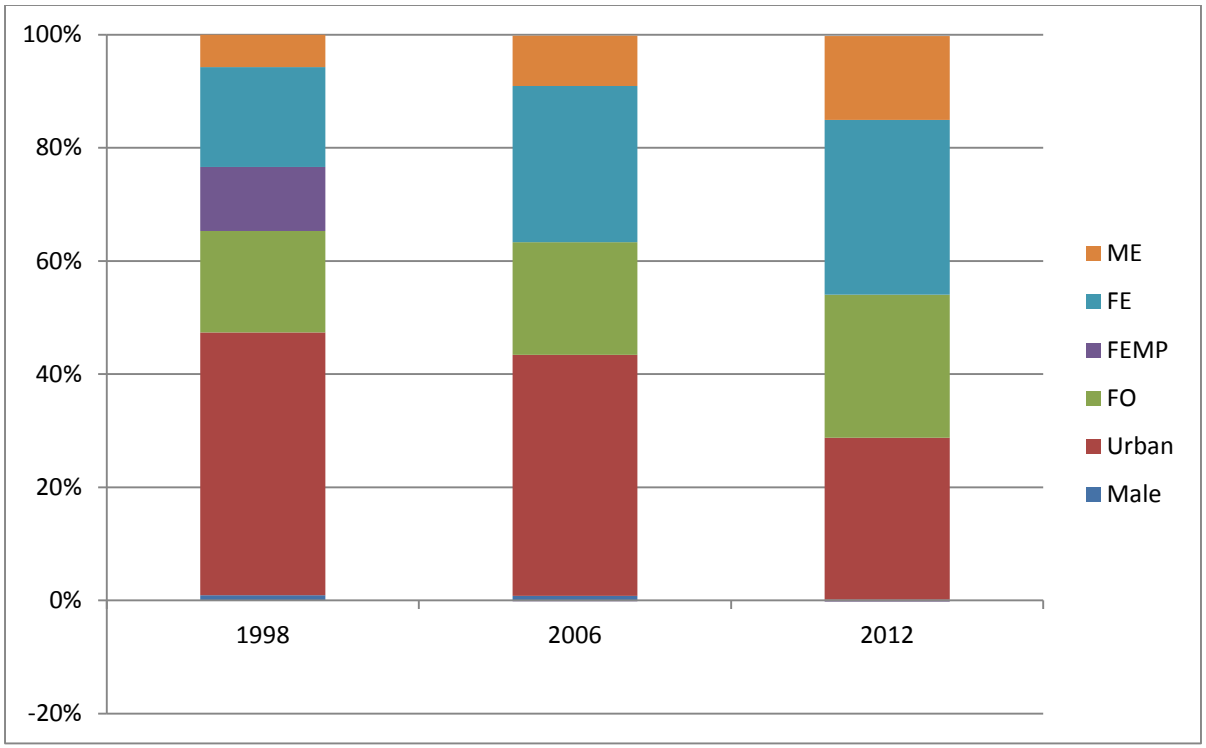
Note: Theta d – direct method estimate, Theta r – residual method estimate
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Figure 5A: Partial Shares Decomposition - Income



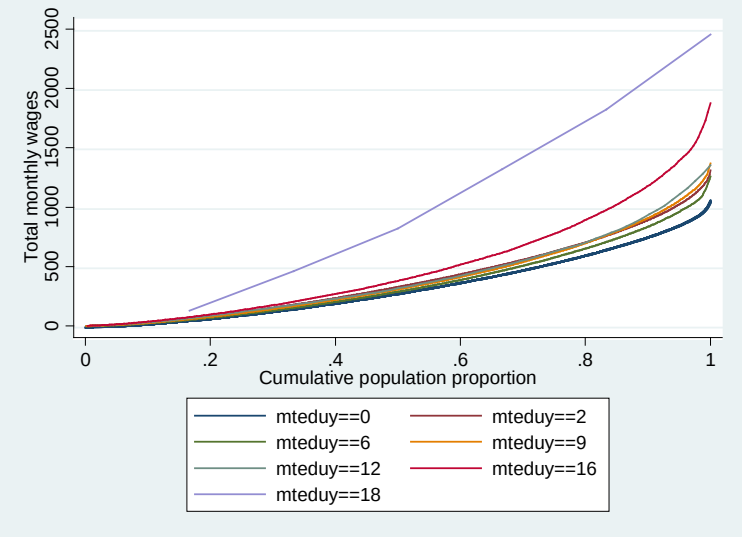
Notes: Graph legend definitions: ME – Mother's education, FE – Father's education, FEMP – Father's employment status / sector, FO – Father's occupation, Urban – Area of birth, Male – Gender.
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

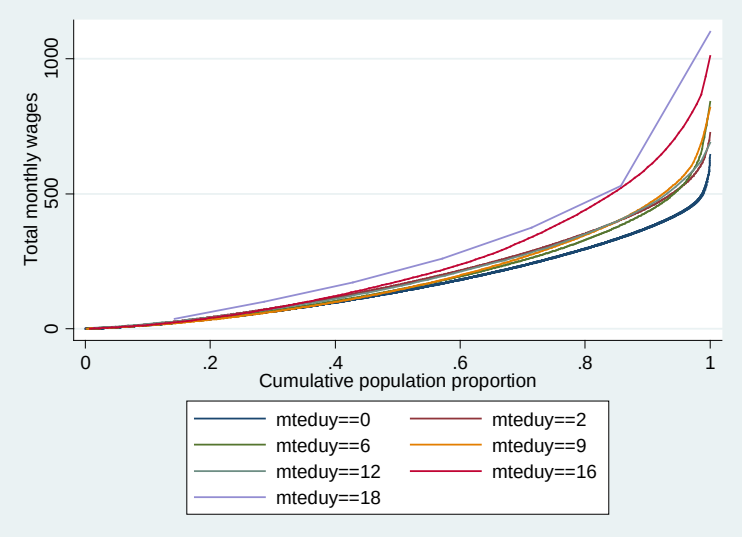
Figure 5B: Partial Shares Decomposition - Wealth

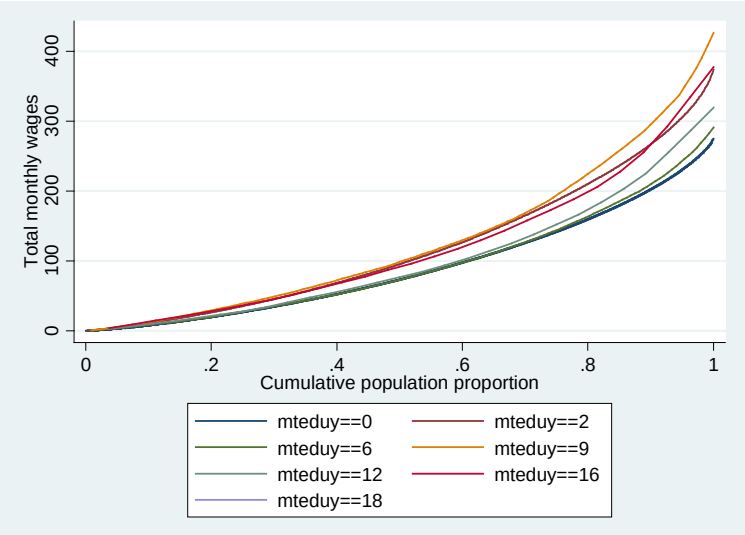


Notes: Graph legend definitions: ME – Mother's education, FE – Father's education, FEMP – Father's employment status / sector, FO – Father's occupation, Urban – Area of birth, Male – Gender.
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Figure 6: GLCs for Total Monthly Income Distributions Based on Mother's Years of Education for 2012, 2006 and 1998

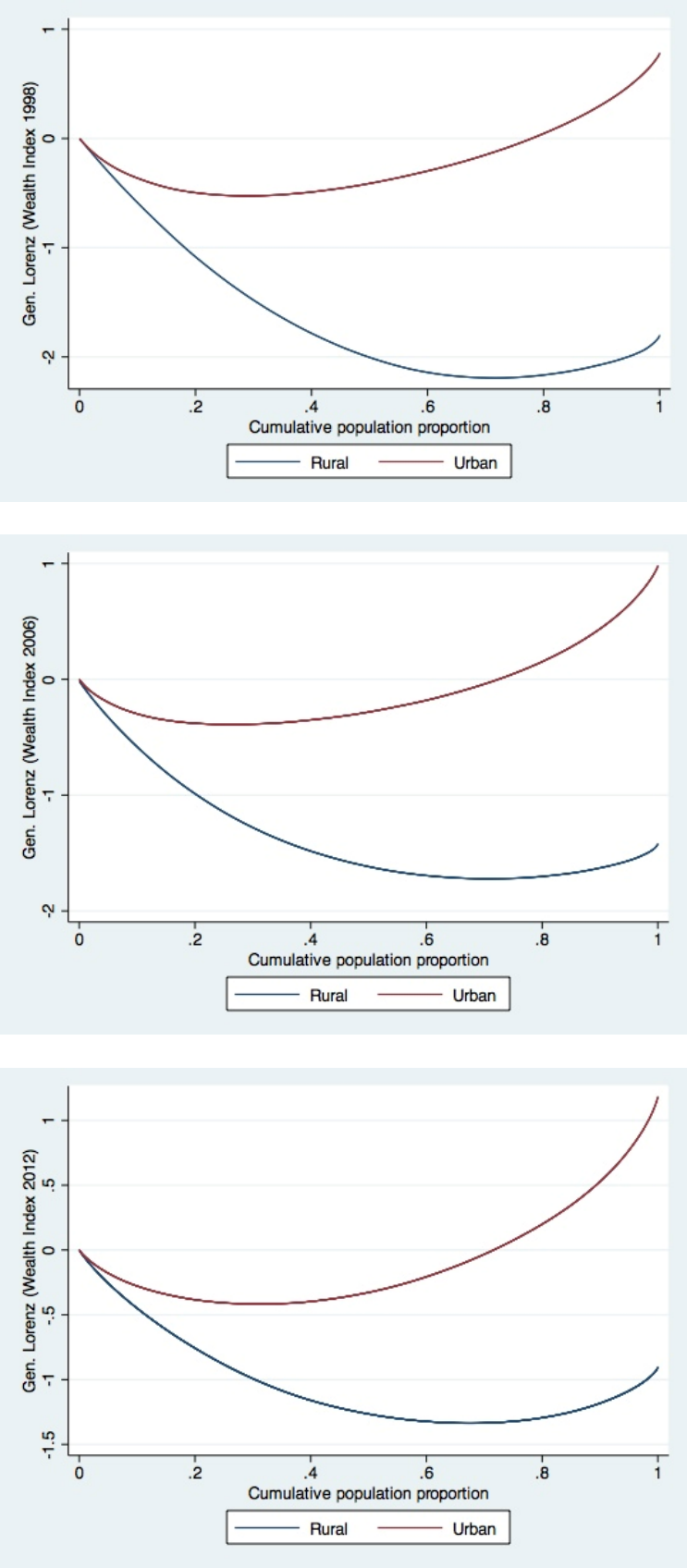






Note: In the graph legend, mteduy is years of education.
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Figure 7: GLCs for Wealth Index Distribution Based on Area of Birth for 2012, 2006 and 1998



Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Table 1: Earnings

	1998			2006			2012		
	Real monthly earnings			Real monthly earnings			Real monthly earnings		
	Mean	Std. Dev.	No. of Obs.	Mean	Std. Dev.	No. of Obs.	Mean	Std. Dev.	No. of Obs.
Rural	701	492	847	899	575	2,476	919	529	3,308
Urban	956	720	1,986	1,146	786	3,914	1,092	588	3,776
Women	725	517	730	920	716	1,463	886	508	1,641
Men	876	670	2,103	1,064	701	4,927	1,045	579	5,443

Source: Author's calculations from ELMPS (1998, 2006 and 2012). Earnings variable is real Monthly Wage All Jobs (in 2012 L.E. using CPI).

Table 2: Wealth Index Summary Statistics

	1998			2006			2012		
	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs	Mean	Std. Dev.	Obs
Rural	-1.80	2.65	1028	-1.42	2.37	2706	-0.90	2.08	5838
Urban	0.78	2.25	2380	0.98	2.25	3929	1.18	2.58	4472
Female	-0.37	2.80	541	-0.38	2.76	1028	-0.16	2.53	1539
Male	0.07	2.62	2867	0.07	2.54	5607	0.03	2.53	8771

Source: Author's calculations from ELMPS (1998, 2006 and 2012).

Table 3: Regression Results of Earnings on Circumstances

	1998	2006	2012
Age	0.0260***	0.0544***	0.0352***
	(0.00645)	(0.00520)	(0.00434)
Age-squared	-0.0000261	-0.000441***	-0.000233***
	(0.0000831)	(0.0000691)	(0.0000555)
Male	0.257***	0.329***	0.303***
	(0.0209)	(0.0189)	(0.0163)
Urban	0.113***	0.107***	0.134***
	(0.0248)	(0.0179)	(0.0168)
Father's Education (no education omitted)			
Primary and Preparatory	0.0288	0.110***	0.0833***
	(0.0405)	(0.0219)	(0.0237)
Secondary and Post Secondary	0.166***	0.125***	0.135***
	(0.0393)	(0.0294)	(0.0236)
University and Above	0.284***	0.326***	0.256***
	(0.0677)	(0.0391)	(0.0344)
Mother's Education (no education omitted)			
Primary and Preparatory	0.0655	0.0382	0.0680**
	(0.0589)	(0.0315)	(0.0236)
Secondary and Post Secondary	0.125*	0.0445	0.101**
	(0.0597)	(0.0388)	(0.0317)
University and Above	0.0561	0.218**	0.296***
	(0.108)	(0.0785)	(0.0536)
Father's Occupation Status (agricultural worker omitted)			
Non-aggri. Father's occup.	0.132***	0.134***	0.0510*
	(0.0264)	(0.0227)	(0.0215)
Father's employment status / sector (public wage-worker omitted)			
Private wage-worker	-0.0429	-0.00979	-0.0669***
	(0.0274)	(0.0215)	(0.0200)
Private employer	0.0506	0.0551*	0.0479
	(0.0265)	(0.0242)	(0.0274)
Private self-employed	-0.0520	-0.0186	-0.0535*
	(0.0374)	(0.0249)	(0.0269)
Unpaid / No job	0.117	0.0785	-0.0669
	(0.0604)	(0.0593)	(0.0461)
Constant	5.225***	4.959***	5.433***
	(0.127)	(0.103)	(0.0891)
Number of Observations	2800	6379	7376
Adjusted R-squared	0.242	0.184	0.151

Notes: * p<0.05, ** p<0.01. *** p<0.001

Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Table 4: Parametric Results on Inequality of Opportunity in Earnings

Variable	1998	2006	2012
Total Inequality	0.182***	0.268***	0.211***
	(0.00591)	(0.00895)	(0.00587)
Within-group Inequality	0.163***	0.244***	0.190***
	(0.00566)	(0.00891)	(0.00505)
Between-group Inequality	0.0189***	0.0205***	0.0195***
	(0.00303)	(0.00216)	(0.00183)
Opportunity Share (Residual)	0.105***	0.0867***	0.0981***
	(0.0156)	(0.0130)	(0.00977)
Opportunity Share (Direct)	0.104***	0.0767***	0.0922***
	(0.0153)	(0.00801)	(0.00799)

Notes: * p<0.05, ** p<0.01. *** p<0.001
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Table 5: Regression Results of Asset Index on Circumstances

Variable	1998	2006	2012
Male	0.433***	0.388***	0.181**
	(4.22)	(5.29)	(3.10)
Urban	1.908***	1.668***	1.173***
	(21.43)	(27.49)	(25.10)
Age	0.164***	0.0451*	0.00840
	(5.32)	(2.43)	(0.60)
Age-squared	-0.00159***	-0.000310	0.0000716
	(-4.69)	(-1.46)	(0.44)
Father's Education (no education omitted)			
Primary and Preparatory	0.807***	1.109***	0.889***
	(3.82)	(11.81)	(12.07)
Secondary and Post Secondary	1.420***	1.384***	1.202***
	(7.76)	(11.82)	(13.22)
University and Above	2.051***	2.096***	2.582***
	(8.87)	(12.35)	(19.35)
Mother's Education (no education omitted)			
Primary and Preparatory	0.778*	0.797***	0.966***
	(2.46)	(5.74)	(9.35)
Secondary and Post Secondary	0.937**	0.952***	1.133***
	(3.11)	(5.41)	(8.82)
University and Above	1.780*	0.999**	1.528***
	(2.55)	(2.83)	(7.14)
Father's Occupation Status (agricultural worker omitted)			
Non-aggri. Father's occup.	0.788***	0.859***	1.082***
	(8.22)	(12.17)	(19.58)
Father's employment status / sector (public wage-worker omitted)			
Private wage-worker	-0.732***	-0.294***	-0.190**
	(-6.31)	(-3.60)	(-2.99)
Private employer	0.499***	0.442***	0.379***
	(4.34)	(5.53)	(5.77)
Private self-employed	-1.054***	-0.0155	0.0736
	(-4.64)	(-0.17)	(0.97)
Unpaid / No job	0.0122	0.163	-0.174
	(0.02)	(0.41)	(-0.87)
Constant	-6.339***	-3.593***	-2.217***
	(-9.13)	(-9.04)	(-7.58)
Number of Observations	3408	6635	10310
Adjusted R-squared	0.3256	0.3298	0.3354

Notes: * p<0.05, ** p<0.01. *** p<0.001
Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012)

Table 6: Inequality of Opportunity Measurement

Variable	1998	2006	2012
Total Inequality	7.051***	6.662***	6.399***
	(35.12)	(28.30)	(48.62)
Within-group Inequality	4.806***	4.497***	4.274***
	(31.01)	(26.47)	(48.18)
Between-group Inequality	2.239***	2.165***	2.125***
	(51.45)	(63.25)	(71.09)
Opportunity Share (Residual)	0.318***	0.325***	0.332***
	(0.0134)	(0.0101)	(0.00787)
Opportunity Share (Direct)	0.318***	0.325***	0.332***
	(0.0100)	(0.0102)	(0.00802)

Notes: * p<0.05, ** p<0.01. *** p<0.001
Source: Author's calculations based on data from the ELMS (1998) and ELMPS (2006, 2012)

Table7: Partial Shares of Circumstances on Inequality of Opportunity in Income and Wealth

	1998		2006		2012	
Variable	**Income**	**Wealth**	**Income**	**Wealth**	**Income**	**Wealth**
Partial shares associated with:						
Gender	0.0541	0.00371	0.0398	0.00362***	0.0917	0.000551
	(0.0538)	(0.00207)	(0.0748)	(0.00107)	(0.0476)	(0.000294)
Area of Birth	0.469***	0.188***	0.428***	0.193***	0.373***	0.139***
	(0.0689)	(0.0110)	(0.0569)	(0.00645)	(0.0468)	(0.00382)
Father's Occupation	0.0402	0.0721***	0.104	0.0897***	-0.0285	0.123***
	(0.0738)	(0.00408)	(0.0572)	(0.00378)	(0.0442)	(0.00347)
Father's Employment	-0.0191	0.0458***	0.00489	-0.000788	0.132*	-0.00107
	(0.0587)	(0.00698)	(0.056)	(0.00301)	(0.0514)	(0.00164)
Father's Education	0.349***	0.0710***	0.418***	0.125***	0.382***	0.150***
	(0.0622)	(0.00679)	(0.0691)	(0.00601)	(0.0608)	(0.00513)
Mother's Education	-0.0251	0.0231***	-0.0386	0.0403***	-0.0136	0.0722***
	(0.0634)	(0.00257)	(0.0783)	(0.00252)	(0.0645)	(0.00294)

Notes: * p<0.05, ** p<0.01. *** p<0.001
Source: Author's calculations based on data from the ELMS (1998) and ELMPS (2006, 2012)

Appendix

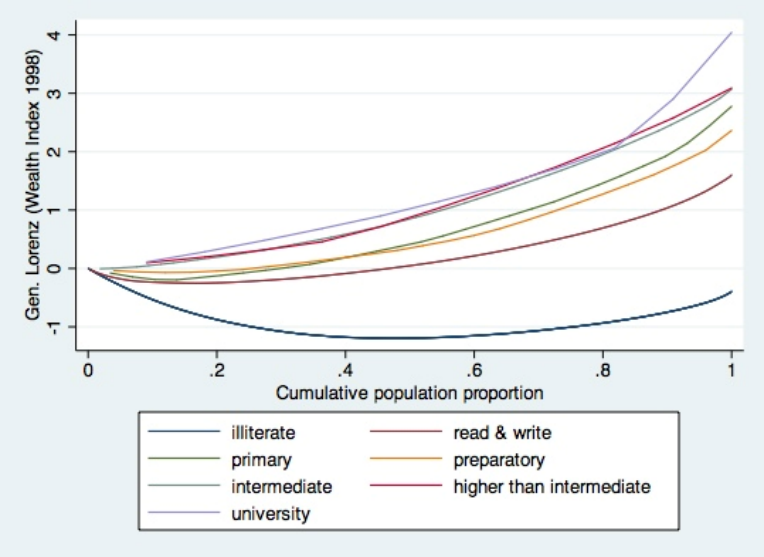
Appendix 1: Scoring Factors of Wealth Index Assets

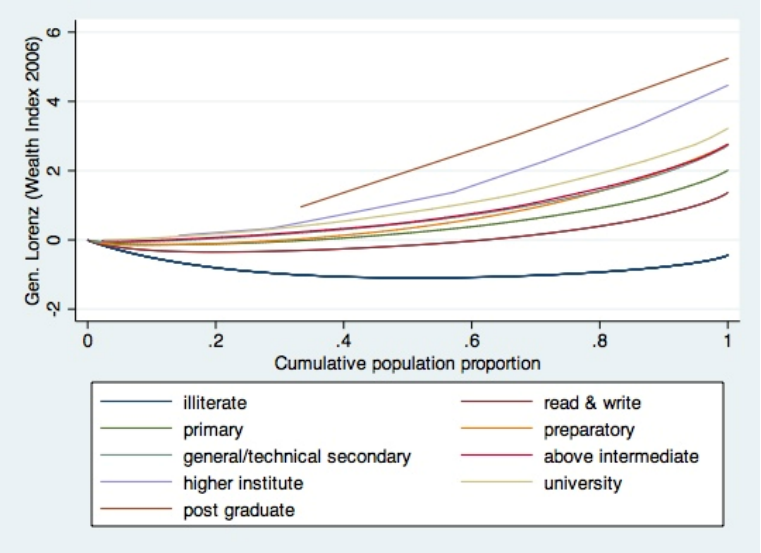
Variable	1998 Comp 1	2006 Comp 1	2012 Comp 1
Fridge	0.2697	0.2104	0.1301
Freezer	0.1256	0.1463	0.1751
Dishwasher	0.0806	0.1077	0.0947
Color TV	0.278	0.2485	0.1715
Black & white TV	-0.1346	-0.1658	-0.0607
VCR/DVD	0.1928	0.185	0.1248
Air condition	0.1211	0.1698	0.2151
Microwave oven	0.0455	0.1008	0.1656
Cooker/stove	0.2309	0.1638	0.1363
Kerosene Cooker	-0.1613	-0.1212	-0.1391
Traditional gas oven			-0.0323
Electric fan	0.2184	0.1457	0.1235
Water heater	0.2626	0.2483	0.2552
Heater	0.1466	0.1303	0.1276
Sewing machine	0.1289	0.0872	0.0484
Iron	0.2573	0.2266	0.201
Radio tape recorder CD player	0.1938	0.1616	0.1246
Semi-auto washing machine	0.2238	0.1493	-0.1584
Full-auto washing machine			0.2533
Camera	0.1752	0.1524	0.1384
Bicycle	0.0827	0.0264	0.0214
Motorcycle/scooter	0.029	0.0187	0.0055
Private car	0.1581	0.1805	0.2041
Taxi	0.0188	0.0132	0.0175
Truck	0.0227	0.0215	0.0208
Tok-tok		0.0018	0.0048
Desktop computer		0.1874	0.2209
Laptop computer			0.1821
Wireless internet router			0.1564
Mobile phone		0.2386	0.1733
Satellite dish		0.1921	0.1426
Satellite extra receiver			0.0776
Large tractor		-0.0048	-0.0281
Small tractor		-0.017	-0.0209
Machine pulled plow or harrower		-0.0123	-0.02
Animal pulled plow		-0.0228	-0.0335
Mechanical water pump		-0.0502	-0.0747
Animal water pump		-0.0241	
Manual water pump		-0.041	-0.0386
Sprinkler		-0.0221	-0.0269
Motor thresher		-0.0166	-0.0295
Hand thresher		-0.0164	-0.0141
Rice winnower			-0.0209
Machine to process livestock feed			0.0027
Motorized insecticide pump			-0.0232
Mill		0.0023	
Hand insecticide pump			-0.0232
Donkey cart		-0.0714	-0.0985
Small cart pulled by person		-0.0496	-0.053
Poultry battery		0.0107	-0.0013
Beehives			-0.0024
Laptop owned by HH head			
MP3 or Ipod owned by HH head			0.0727
Farms			-0.1285
Straw roof	-0.104	-0.1009	-0.0569
Mud roof	-0.0362	-0.0532	-0.0312
Wooden roof	-0.2105	-0.1948	-0.1681
Steel roof	-0.0091	-0.0029	-0.0166
Concrete roof	0.2463	0.2344	0.1937
Tiles roof	-0.0032	-0.0206	-0.0118
Other roof	-0.0297	-0.0324	-0.05
Mud floor	-0.2424	-0.2226	-0.1656
Wooden floor	-0.0085	-0.0044	0.0055
Brick floor	-0.0501	-0.0279	-0.029
Tiles floor	0.2459	0.1899	-0.0795
Ceramic floor			0.2067
Parquet floor			0.035
Other floor	-0.0034	0.0564	-0.0089

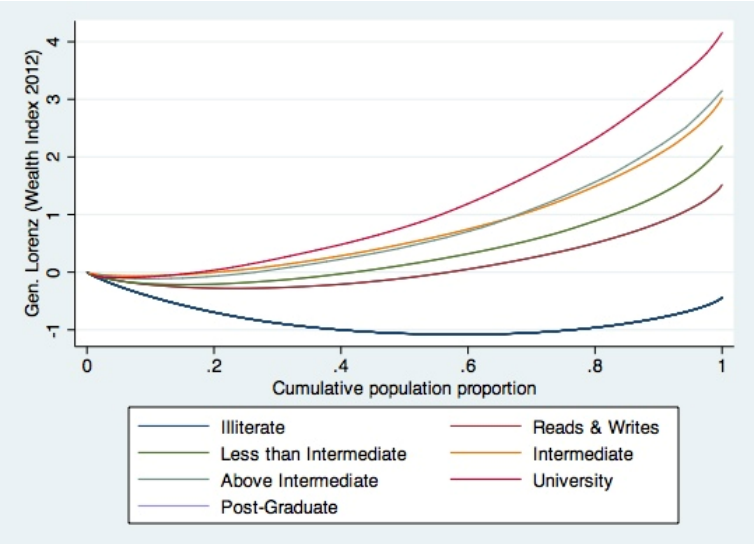
Appendix 1: Continued

Variable	1998 Comp 1	2006 Comp 1	2012 Comp 1
Brick concrete wall	0.114	0.1405	0.0475
Brick mud wall	-0.1442	-0.1239	-0.1017
Wooden wall	-0.0136	-0.0152	-0.0211
Concrete wall	0.0442	0.0146	0.0467
Mud wall	-0.1404	-0.1329	-0.0749
House area per member	0.0433	0.0496	0.0886
Cows		-0.004	
Buffaloes		-0.0541	
Goats		-0.0669	
Sheep		-0.0384	
Camels		-0.0449	
Donkeys		-0.1221	
Horses		-0.0386	
House		-0.1238	
Partially own house		-0.1238	
Apartment			0.042
More than one apartment			0.0187
Villa			0.0067
Village house			-0.1609
Shared apartment			-0.0601
Independent room			-0.0419
Cows			-0.1026
Buffaloes			-0.0915
Goats			-0.0655
Sheep			-0.0407
Camels			-0.0198
Donkeys			-0.1401
Horses			-0.0321
Financial Assets (interest)			0.0776
Property	0.0713		
Land	0.0335		

Appendix 2: GLCs for Wealth Index Distributions Based on Mother's Years of Education for 2012, 2006 and 1998







Source: Author's calculations based on data from the ELMPS (1998, 2006 and 2012).