Inequality of Opportunity in Egypt

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The article evaluates the contribution of inequality of opportunity to earnings inequality in Egypt and analyzes its evolution across three time periods and different population groups. It provides parametric and nonparametric estimates of a lower bound for the degree of inequality of opportunity for wage and salary workers. On average, the contribution of opportunity-shaping circumstances to earnings inequality declined from 22 percent in 1988 to 15 percent in 2006. Levels of inequality of opportunity were fairly stable while earnings differentials widened markedly, leading to a decline in the share of inequality attributable to opportunities. Father's background and geographic origins had the largest effect on earnings, although the impact of mother's education has risen in recent years. The degree of inequality of opportunity did not differ significantly by gender or rural–urban area, although the incidence was lower for men and for rural areas. The results indicate an increase in inequality of opportunity across age groups, but there is some evidence that opportunity differentials have been declining for the oldest generation. JEL codes: D31, D63

Political demands for greater equity in Arab societies reach beyond poverty reduction to the entire spectrum of income and wealth distribution. Popular concerns for fairness and justice are generally about inequality of outcomes more than inequality of opportunity, with social inequalities often measured by examining the degree of income inequality. However, strategies for directly equalizing outcomes may come at the cost of weakening incentives for individual effort, investment, and innovation.

Inequality of outcomes, such as in income or education, reflects differences in effort and circumstances. Inequality stemming from circumstances, such as gender, ethnicity, family background, and place of birth, is widely considered unfair and deserving of attention from policymakers (Roemer 1998; Roemer and others 2003; Peragine 2004).[1] Constraints on access to basic services and

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1. According to Roemer (1998), outcomes are a consequence of at least two sets of factors: "circumstances," which are factors beyond a person's control, and "effort," which are the actions a person takes and can be held accountable for. Inequality of opportunity occurs when the distribution of outcomes depends on the individual's circumstances.

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resources that are beyond an individual's control perpetuate the lack of capabilities and opportunities for large parts of society (Bourguignon, Ferreira, and Walton 2007; Elbers and others, 2008). Such disparities in opportunity may discourage effort by individuals, waste productive potential, and contribute to social instability and institutional frailty, possibly dampening economic growth prospects (Ali 2007).

The pursuit of greater equity through greater equality of opportunities could enhance economic efficiency. Equality of opportunity is broadly concerned with equal rewards for individual effort irrespective of prior circumstances and could lead to more efficient use of human and physical resources, improve social cohesion, and contribute to sustainable development (Roemer 1998).

Empirical work on inequality of opportunity, though comparatively recent, is developing rapidly. Several parametric and nonparametric techniques have been proposed to measure it. This literature, initially concerned mainly with Western Europe and Latin America, has been extended recently to sub-Saharan Africa and Turkey (see, for example, Bourguignon, Ferreira, and Menéndez 2007; Lefranc, Pistolesi, and Trannoy 2008; Cogneau and Mesple-Somps 2008; Barros and others (2009), Checchi and Peragine 2010; Checchi, Peragine and Serlenga 2010; and Ferreira, Gignoux, and Aran 2011).

These studies helped establish empirically the extent to which people in a given society face different opportunities. However, empirical applications of the concept of inequality of opportunity are scarce, and there is little or no research addressing inequalities of opportunity in Arab countries. This lack of research is attributable in large part to the limited availability of household income and expenditure surveys and to the paucity of observations on individuals' circumstances.

To fill some of this knowledge gap, this article assesses the degree of opportunity inequality in earnings inequality in Egypt, drawing on data from the 1988 Labor Force Sample Survey, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006. These are among the few surveys in the Arab region with information on family background.

While World Bank estimates show that inequality is moderate in Egypt compared with other Arab countries, it is persistent.[2] Unevenness in the distribution of opportunities across regions, professional categories, or socioeconomic classes could contribute to the inequality and explain some of its persistence. Analysis of inequality of opportunity in Egypt can improve understanding of the institutional and economic mechanisms underpinning inequality and thus inform public actions to compensate for circumstances-based disadvantages, eliminate inequality traps, and foster development. Reducing inequality of opportunity would contribute to both social improvement and greater equality in income and wealth distribution.

2. See Povcal website: http://iresearch.worldbank.org/PovcalNet/povcalNet.html.

The study applies the parametric model proposed by Bourguignon, Ferreira, and Menéndez (2007) and the nonparametric methodology suggested by Checchi and Peragine (2010) to measure the contribution of inequality of opportunity to earnings inequality in Egypt. Inequality of opportunity indices are computed for Egyptian wage and salary workers for 1988, 1998, and 2006. The sample is also split by gender, area, and age.

The results reveal that the share of earnings inequality attributable to circumstances fell, on average, from 22 percent in 1988 to 15 percent in 2006. The decline reflects stability in the levels of inequality of opportunity combined with rising total inequality over 1988–2006.

These are lower bound estimates of the true share of opportunity inequality. They would likely be much higher if data for more circumstance variables were available and if other indicators of economic welfare, such as household consumption or income, were used as a base.

The analysis of area differences reveals a somewhat lower incidence of inequality of opportunity in rural than in urban areas. Disaggregation by gender suggests similar opportunity inequality for men and women, but with a higher incidence for women. Younger cohorts experienced a higher incidence of opportunity inequality than did the oldest ones in recent years, but a lower incidence in the 1990s.

The article is organized as follows: section I describes the empirical model and the procedures used to infer inequality of opportunity. Section II provides an overview of the data. Section III reports the main results, and section IV summarizes the essential findings and conclusions.

I. The Empirical Model

Estimation of the degree of inequality of opportunity associated with a given distribution of earnings (outcomes) is based on the frameworks of Bourguignon, Ferreira, and Menéndez (2007) and Checchi and Peragine (2010). The determinants of an individual's earnings, y_i, are separated into a set of circumstance variables, denoted by the vector $\mathbf{C_i}$; efforts variables, denoted by the vector $\mathbf{E_i}$; and unobserved factors v_i. The earnings function can be specified as

$$y_i = f(C_i, E_i, v_i) \qquad i : 1 \ldots N. \tag{1}$$

The circumstance variables are economically exogenous since they are outside an individual's control, but effort factors may be endogenous to circumstances since an individual's actions may be influenced by ethnicity, parental background, and so on.

Equality of opportunity occurs, in Roemer's (1998) sense, when earnings are independently distributed from circumstances. This independence implies that circumstances have no direct causal effect on earnings and no causal impact on

effort. The degree of opportunity inequality can therefore be determined by the extent to which the conditional distribution of earnings on circumstances, $F(y|C)$, differs from $F(y)$.

Nonparametric Method

Parametric and nonparametric methods can be used to estimate inequality of opportunity indexes. The nonparametric approach, suggested by Checchi and Peragine (2010), is based on two alternative partitions of the total population, based on two alternatives for computing inequality of opportunity.[3] The first partition divides the population into groups by circumstance categories, with the members of each group, named *type*, endowed with similar circumstances. The second partition, based on effort, splits the population into subsets (*tranches)* of individuals who exert the same degree of effort. Since effort cannot be observed, a person's effort is measured, following Roemer (1998), by his or her quantile in the income or earnings distribution for the individual's type subgroup. So, all individuals at the same quantile of their types distributions of earnings are considered to be exerting the same level of effort. Although both methods are plausible for modeling equality of opportunity, they can yield different results. Since there is no obvious reason for preferring one approach over another, estimates are provided using both methods.[4]

The nonparametric approach has substantial advantages for predicting the share of inequality due to opportunities, including its computational simplicity and flexibility due to the absence of a functional form specification. Its main drawback is that it requires large data sets for accuracy. The greater the set of circumstances, the higher the number of cells in the partition and the higher the number of cells with zero or few observations. Moreover, this approach does not permit estimating partial effects of circumstances, holding all else constant (Ferreira and Gignoux forthcoming; Checchi, Peragine, and Serlenga 2010).

Types. In the first partition, inequality of opportunity is given by inequality between types.[5] This inequality can be assessed by applying a smoothing transformation using a constant reference value of effort $\bar{E}$, namely, $f(C_i, \bar{E}) \quad \forall i$. The smoothed distribution can be represented by the average income, $\{\mu_c\}$, of a given type, identified by c. All within-type inequality is eliminated in the

3. In this approach, the unobservable term v is confounded with E, and the individual is considered responsible for any random component that is not included in the vector of circumstances that may affect his/her outcome (Checchi and Peragine 2010).

4. See Checchi and Peragine (2010) and Checchi, Peragine, and Serlenga (2010) for details on the types and tranches approaches.

5. This measure is related the ex ante view of equality of opportunity, which focuses on the differences between the outcome prospects of individuals with similar circumstances as opposed to the second method, which is related to the ex post view of equality of opportunity and focuses on outcome inequalities among individuals who exert the same effort (Flaurbaey and Peragine 2009; Checchi, Peragine, and Serlenga 2010)

smoothed distribution $\{\mu_c\}$ by replacing each individual's earnings with type-specific mean earnings μ_c. Thus the inequality in $\{\mu_c\}$ captures the inequality due to circumstances only. Then, given an inequality measure I, the opportunity share of earnings inequality can be defined as:

$$\theta^d_{types} = \frac{I(\{\mu_c\})}{I(F(y))}. \tag{2}$$

Inequality of opportunity can also be measured indirectly using a standardized distribution obtained by replacing each person's earnings y_i^c with $z_i^c = \frac{\mu}{\mu_c} y_i^c$, where y_i^c is the earnings of individual i in type c and μ is overall mean earnings. The standardization removes all between-types inequality, leaving only within-type inequality, or inequality due to effort. Hence, the share of inequality due to unequal opportunities can be computed residually by $\theta^r_{types} = 1 - I(\{z_i^c\})/I(F(y))$.

The direct and residual methods can yield different results; the only inequality measure for which the two methods give the same results is the mean log deviation *(GE(0))*, which has a path-independent decomposition when the arithmetic mean is used as the reference income or earnings (Foster and Shneyerov 2000).

Tranches. In the second partition, inequality of opportunity can be assessed by focusing on inequality within groups with similar effort levels. As previously, a smoothing transformation is applied to eliminate all inequality within tranches. The part of inequality due to unequal opportunities can be expressed as

$$\theta^r_{tranches} = 1 - \frac{I(\{\mu_e\})}{I(F(y))} \tag{3}$$

where $\{\mu_e\}$ is a smoothed distribution in which each individual's earnings is replaced by tranche-specific mean earnings. Inequality of opportunity can also be computed directly by suppressing all between-tranches inequality. As previously, a standardized distribution is obtained by reweighting all tranche distributions to equalize the means of the different effort groups. Each person's earnings within a tranch e of a type c, $y_i^{e,c}$, is replaced by $z_i^{e,c} = \mu/\mu_e y_i^{e,c}$. Inequality of opportunity can then be captured directly by: $\theta^d_{tranches} = I(\{z_i^{e,c}\})/I(F(y))$.

As previously stated, when the mean log deviation inequality index is used, the residual and direct methods yield the same opportunity inequality measures.

Parametric Method

The parametric method, which is less data-demanding, can be used to measure inequality of opportunity and the effect of individual circumstances. Evaluating the extent of inequality of opportunity using parametric and nonparametric

decompositions and comparing the estimates allows checking the consistency of the results and also indicates the plausible range of true opportunity inequality.

The parametric analysis follows the work of Bourguignon, Ferreira, and Menéndez (2007), estimating opportunity inequality as the difference between observed earnings inequality and the inequality that would prevail if there were no differences in circumstances.

Let $\tilde{F}(\tilde{y})$ be the counterfactual earnings distribution when circumstances are identical for all individuals. The opportunity share of earnings inequality can be defined as

$$\Theta_P = 1 - \frac{I\left(\tilde{F}(\tilde{y})\right)}{I(F(y))}. \tag{4}$$

The first step in computing Θ_P is to estimate a specific model of equation (1). Following Bourguignon, Ferreira, and Menéndez (2007), the earnings function is expressed in the following log-linear form:

$$\begin{aligned} \ln(y_i) &= C_i\alpha + E_i\beta + \upsilon_i \\ E_i &= \mathrm{A}C_i + \varepsilon_i \end{aligned} \tag{5}$$

where α and β are vectors of coefficients, A is a matrix of coefficients specifying the effects of the circumstance variables on effort, and ε_i is an error term.

Model (5) can be expressed in reduced form as

$$\ln(y_i) = C_i\delta + \eta_i \tag{6}$$

where $\delta = \alpha + \beta\mathrm{A}$ and $\eta_i = \upsilon_i + \varepsilon_i\beta$.

Inequality of opportunity can be measured using equation (4), where the counterfactual distribution is obtained by replacing y_i with its estimated value from equation (6), which can be expressed as $\tilde{y}_i = \exp(\bar{C}\hat{\delta} + \hat{\eta}_i)$.[6]

The parametric approach allows estimation of the partial effects of one or some circumstance variables on earnings, while controlling for the others by simulating distributions such as

$$\tilde{y}_i^j = \exp\left(\bar{C}^j\hat{\delta}^j + C^{h\neq j}\hat{\delta}^{h\neq j} + \hat{\eta}_i\right),$$

where $\tilde{F}(\tilde{y}^j)$ is the counterfactual earnings distribution obtained by keeping circumstance C^j constant.

6. Checchi, Peragine, and Serlenga (2010) computed parametric counterparts for the nonparametric measures of opportunity inequality calculated using both the types and tranches approaches. Here the analysis is limited to estimation of the parametric alternatives to inequality of opportunity indexes measured by the types approach, assuming implicitly all unobserved variance in η as the only true source of effort.

The inequality share specific to circumstance j can be computed by:

$$\Theta_P^j = 1 - \frac{I\left(\tilde{F}\left(\tilde{y}^j\right)\right)}{I(F(y))}.$$

II. Data

The empirical analysis uses data from the Egypt Labor Force Sample Survey of 1988 (LFSS 88), the Egypt Labor Market Survey of 1998 (ELMS 98), and the Egypt Labor Market Panel Survey of 2006 (ELMPS 06), carried out by the Economic Research Forum and the Central Agency for Public Mobilization and Statistics.[7] The surveys were conducted on nationally representative samples of households, and methodology and data were selected to ensure comparability. The surveys include information on household characteristics; individual earnings, education, and employment status; and parents' education, occupation, and employment status. Individuals' current earnings, measured as real monthly earnings from all occupations, was the measured outcome. The analytical sample was restricted to individuals aged 15–65 years old with positive earnings.

Computing the opportunity share of earnings inequality for the entire country is important to the design of equal-opportunity policies, but it fails to capture the differential intensity of opportunity inequality across areas and population groups. Disparities in labor market participation between gender and age groups and differences in labor market conditions between rural and urban areas influence the distribution of earnings and could affect inequality of opportunity measures. Table 1 reports the labor market participation and the rates of employment with positive earnings by area gender, and age group for each survey round. Large gender differences are observed in labor force participation. Men's participation greatly exceeds women's. Labor force participation is also larger in urban areas and for the mid-age cohort.[8] The percentage of individuals of working age in employment with positive earnings is much higher in urban than in rural areas and is much larger for men than for women. The labor market participation rate increases between 1998 and 2006, particularly for women, and there is a slight rise in the employment rate with positive earnings for women and a decline for the other population subgroups.

Because heterogeneity in population composition and in labor force participation may distort the aggregate picture of inequality of opportunity, opportunity inequality indices are also computed for population subgroups. Each

7. For more details about the surveys, see Assaad (2002).

8. Labor market participation decisions may depend on an individual's circumstances. Sample selection bias, especially likely for women, is not addressed here because of the complexity of the procedure for correcting for this bias.

TABLE 1. Rates of Labor Force Participation and Employment (percent)

Survey year	Subgroup	Labor force participation rate	Employment rate with positive earnings
1988	Rural	na	36.2
	Urban	na	72.2
	Women	na	28.4
	Men	78.9	62.8
	Ages 15–29	na	53.2
	Ages 30–44	na	56.7
	Ages 45–65	na	39.2
	Total	na	50.8
1998	Rural	48.1	42.7
	Urban	50.3	71.9
	Women	22.1	27.4
	Men	76.2	70.3
	Ages 15–29	41.2	54.0
	Ages 30–44	61.1	59.2
	Ages 45–65	49.2	47.4
	Total	49.1	54.0
2006	Rural	54.1	42.0
	Urban	53.9	71.7
	Women	27.8	28.9
	Men	80.9	66.8
	Ages 15–29	44.9	53.1
	Ages 30–44	68.2	58.0
	Ages 45–65	55.3	46.4
	Total	54.0	53.1

na is not available; only data on labor force participation rate with extended market definition are available.

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

survey sample is partitioned by area of birth (urban, rural), gender, and age (15–29, 30–44, and 45–65).[9]

Parametric and nonparametric decompositions are applied for each population subgroup and for the entire population in each survey year. The data from the three surveys are also pooled to form a single dataset, and the same procedures are applied to the entire sample. This might clarify the extent and evolution of inequality of opportunity and its importance in shaping earnings differences across population subgroups and time.

Sample sizes are 4,258 for LFSS 88, 4,740 for ELMS 98, and 7,501 for ELMPS 06. Missing information on father's occupation and mother's employment status reduced the samples to 4,135, 4,048, and 6,499 economically active individuals who are representative of the Egyptian workforce.

9. Region of birth is included because region of residence might be endogenous. However, the number of migrants is quite small, suggesting a limited potential bias. The number of individuals living in a different region than they were born in was 134 for LFSS 88, 323 for ELMS 98, and 503 for ELMPS 06.

Nonresponses on family background are likely to be nonrandom and therefore to introduce sample selection bias. Missing information on parental employment and occupation status was 7–9 percent. It was lower for the oldest age group and for LFSS 88. The effect of selective nonresponse is investigated by comparing the composition of the final sample with the sample including individuals with missing information. Although nonresponse was found to be statistically selective, the two samples were highly similar in almost every respect.

As a robustness check, the results were compared with the coefficient estimates from an earnings regression on all the circumstance variables for which there are no missing observations, run in both the full sample and the final sample used in the empirical analysis. The results, reported in table 2, suggest that selective nonresponse did not introduce large biases, since the coefficients do not differ statistically (at the 95 percent confidence level) between the final and full sample in each survey year and in the pooled survey data.

The circumstance variables available in the three surveys are father's and mother's education and employment, father's occupation status when the individual was age 15, and region of birth (Metropolitan, Lower Egypt, or Upper Egypt).[10] Using all these variables in the nonparametric analysis is problematic because of an insufficient number of observations, which would result in a large number of empty or small cells.

The quality of the nonparametric inequality of opportunity measures depends on the quality of the estimates for the type/tranche-specific means. The sampling variance of these means could be very large for cells with few observations and would cause an upward bias in the nonparametric estimates of opportunity inequality (Ferreira and Gignoux forthcoming). Therefore, both the parametric and the nonparametric decompositions consider only father's and mother's education, father's occupation status, and the individual's region of birth. The number of categories for each variable was restricted to three or fewer in order to reduce the number of circumstance groups. Gender is also used as a circumstance variable when the sample is not subdivided by gender.

Father's education is coded into three categories (none, primary and preparatory, and secondary and tertiary) and mother's into two (none, and primary and more).[11] Father's occupation is coded as skilled agricultural workers and other. Region of birth is coded as Metropolitan (Greater Cairo, Alexandria, and Suez), Lower Egypt, and Upper Egypt.[12]

In the tranches approach, and based on the hypothesis that individuals at the same quantile of the earnings distribution have expended the same degree of effort, the distribution of earnings, conditional on circumstances, was divided into 10 deciles.

10. Information on mother's occupation is also available, but this variable was disregarded because of the large number of missing entries.

11. Only two categories were used for mother's education because of the small number of observations in the category secondary and tertiary.

12. Place of birth may be capturing effort as well as circumstances for individuals who migrate since the age of migration is unknown.

TABLE 2. Effects of Selective Nonresponse on Earnings Regression Coefficients

	1988		1998		2006		All years	
Variable	Sample used	Full sample	Sample used	Full sample	Sample used	Full sample	Sample used	Full sample
Male dummy variable	0.398***	0.398***	0.238***	0.2445***	0.352***	0.362***	0.334***	0.338***
	(0.030)	(0.030)	(0.021)	(0.020)	(0.023)	(0.021)	(0.014)	(0.014)
Age	0.021***	0.021***	0.021***	0.021***	0.020***	0.021***	0.021***	0.021***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)
Mother's years of education	0.031***	0.031***	0.025***	0.023***	0.030***	0.032***	0.029***	0.029***
	(0.004)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Father's years of education	0.003	0.003	0.004	0.004	0.001	0.002	0.000	0.000
	(0.009)	(0.009)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)
Region of birth (omitted = Lower Egypt)								
Metropolitan	0.179***	0.180***	0.253***	0.238***	0.241***	0.216***	0.226***	0.214***
	(0.025)	(0.025)	(0.022)	(0.020)	(0.022)	(0.020)	(0.013)	(0.013)
Upper Egypt	−0.084***	−0.085***	−0.065***	−0.060***	−0.028	−0.037	−0.051***	−0.053***
	(0.027)	(0.026)	(0.021)	(0.020)	(0.020)	(0.019)	(0.013)	(0.012)
Constant	4.853***	4.851***	4.781***	4.782***	4.960***	4.934***	4.903***	4.899***
	(0.043)	(0.043)	(0.039)	(0.036)	(0.039)	(0.036)	(0.025)	(0.024)
Sample size	4135	4258	4048	4740	6499	7501	14682	16499
Adjusted R-squared	0.20	0.21	0.24	0.23	0.17	0.17	0.21	0.21

* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Note: The dependent variable is the logarithm of real monthly earnings. Numbers in parentheses are bootstrapped standard errors based on 100 replications.

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

Since using more circumstance variables and a finer partition of categories would better capture the contribution of unequal opportunities to earnings inequality, inequality of opportunity indices were also computed parametrically, exploiting the richness of the dataset on family background, and the results were compared with the previous estimates. The parametric and nonparametric measures based on comparable circumstance variables are, therefore, complemented with a parametric decomposition using additional circumstances and refining the categories for each circumstance.

The variables used in this decomposition are father's and mother's education, measured by the number of years of schooling; employment for both parents, grouped into three categories (wage worker, employer, and self-employed and work for family); father's occupation status, grouped into four categories (high status, medium status, low status, and skilled agricultural worker); and dummy variables for region of birth.[13] Birth region is coded into three regions as before, and urban and rural areas in Lower and Upper Egypt are captured by a dummy variable. Gender and age are also used as circumstance variables when the sample is not subdivided by gender or age.

Table 3 presents descriptive statistics for all survey years combined. Earnings are higher for male subsamples, for the oldest cohort, and for urban areas. Father's mean number of years of schooling is higher in urban areas of birth and significantly higher for women than for men, suggesting that women with educated parents have more chances of entering the labor force, thereby suggesting the possibility of selection biases.

Table 4 shows the mean and standard deviation of real monthly earnings for each survey year. Earnings declined slightly between 1988 and 1998 but then increased between 1998 and 2006. While the changes in mean earnings are not very large, dispersion in earnings increased considerably in 2006, especially for women and the mid-age cohort. Dispersion was significantly lower in rural areas than in urban areas between 1988 and 1998, but it increased considerably in 2006, and was slightly higher in rural areas.

III. Estimation Results

The parametric and nonparametric methods were applied to measure the degree of inequality of opportunity for earnings in Egypt. For the entire population, for each population subgroup, and for each survey year, table 5 displays

13. Parents' education, reported in the surveys in discrete levels, is converted into years as follows: illiterate (0 years), read and write (2); primary (6), preparatory (9), general or vocational secondary (12), postsecondary (14), university four years (16); university five years (17), and postgraduate (18). The nine categories of father's occupational position (based on the occupational classification used by the Central Agency for Public Mobilization and Statistics) were recoded into four groups: high status (senior officers and managers, professionals, and professors); medium status (clerks, service and market sales, and craft); low status (plant and machine operators and elementary occupations); and skilled agricultural workers.

TABLE 3. Descriptive Statistics, All Survey Years

Statistic	Rural	Urban	Women	Men	Ages 15–29	Ages 30–44	Ages 45–65	Total
Mean monthly earnings (Egyptian pounds)	444.4	653.8	481.0	572.3	411.6	590.2	721.2	554.4
	(1,155.0)	(1,084.3)	(1,377.2)	(1,051.5)	(640.2)	(1,422.8)	(1,125.3)	(1,123.3)
Mean father's years of schooling	1.5	4.1	4.5	2.5	3.1	2.9	2.5	2.9
	(2.9)	(5.0)	(5.1)	(4.0)	(4.5)	(4.3)	(4.1)	(4.3)
Mean mother's years of schooling	1.1	2.4	2.4	1.6	2.4	1.7	0.9	1.8
	(2.9)	(4.1)	(4.2)	(3.5)	(4.2)	(3.5)	(2.5)	(3.6)
Father's employment (%)								
Wage worker	82.7	85.5	85.3	83.9	81.5	85.9	85.1	84.1
Employer	14.9	12.7	12.6	14.0	14.0	13.1	14.3	13.7
Self employed	2.4	1.9	2.1	2.2	4.5	1.0	0.6	2.2
Father's occupation status (%)								
High status	11.2	33.6	35.1	19.9	19.6	24.4	25.1	22.87
Medium status	24.6	41.6	35.2	33.0	37.7	32.8	28.4	33.4
Low status	6.9	12.2	9.1	9.8	12.1	9.5	6.5	9.7
Skilled agricultural worker	57.3	12.6	20.6	37.3	30.6	33.3	40.0	34.0
Mother's employment (%)								
Wage worker	18.4	15.5	14.1	17.6	32.1	11.4	5.5	16.9
Employer	8.6	2.7	3.4	6.1	11.9	3.1	0.9	5.55
Self employed	73.0	81.8	82.5	76.4	55.9	85.5	93.6	77.6
Region of birth (%)								
Metropolitan	0.0	61.5	41.9	30.0	31.6	32.5	33.2	32.3
Lower Egypt	59.5	22.5	39.6	40.2	39.7	40.4	40.0	40.06
Upper Egypt	40.6	16.0	18.5	29.9	28.7	27.2	26.8	27.65
Number of groups in nonparametric approach								
Observed number of groups	39.0	56.0	26.0	30.0	55.0	56.0	52.0	56.0
Mean number of observations per group	144.0	174.0	125.0	403.0	93.0	111.0	74.0	274.0
Number of observations	5947	10552	3476	13023	6039	6592	3868	16499

Note: Numbers in parentheses are standard deviations. Results are weighted by appropriate sampling weights to reflect the characteristics of the Egyptian population.

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

TABLE 4. Descriptive Statistics, Real Monthly Earnings (Egyptian pounds)

	1988		1998		2006	
Subgroup	Mean	Standard deviation	Mean	Standard deviation	Mean	Standard deviation
Rural	414.6	280	334.7	222.3	543.1	1694.1
Urban	640.5	652.8	500.7	482.3	787	1543.6
Women	419.4	395.8	377.7	551.4	595.4	2021.9
Men	581.5	571.9	429.4	337.4	682.2	1512.5
Ages 15–29	408.6	321.7	318.7	221.1	481	918
Ages 30–44	588.5	495.5	416.4	304.4	732.5	2120.2
Ages 45–65	754.8	838.3	559.3	584.6	848.2	1518
Total	548	544.1	419.7	387.4	665.2	1625

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

the estimates of overall earnings inequality and of the degree of inequality of opportunity using the mean log deviation, *GE(0)*, which is the only inequality measure with a path-independent decomposition.

Aggregate Analysis

The level of overall earnings inequality in Egypt, measured with mean log deviation, averaged 34 percent for the entire period 1988–2006. The parametric and nonparametric decompositions suggest that 11–20 percent of this inequality can be attributed to unequal opportunities associated with only five circumstance variables: gender, father's and mother's education, father's occupation, and individual's region of birth.

The types nonparametric analysis and the parametric analysis yield broadly similar results for the entire period, while the tranches nonparametric analysis yields higher opportunity inequality shares. Regardless of the decomposition employed, the results should be viewed as lower-bound estimates of the share of inequality due to *all* circumstances. Despite the richness of the circumstance variables in the datasets, many relevant circumstance variables, such as family wealth, quality of parents' education, and innate ability, remain unobserved. Adding more circumstance variables, or further refining the subdivision of categories within each circumstance variable, would increase (but cannot reduce) the share of inequality arising from circumstance inequality.

There is a clear pattern of increasing earnings inequality in recent years. Overall earnings inequality declined slightly, from 26.7 percent in 1988 to 21.9 percent in 1998, before increasing substantially to 42.3 percent in 2006. All the population subgroups experienced an increase in earnings inequality. Inequality was higher in urban areas, among women, and among the oldest cohort in 1988, but these differences declined over time.

TABLE 5. Estimates of Earnings Inequality and Inequality of Opportunity

			Nonparametric estimate					
			Tranches approach		Types approach		Parametric estimate	
Survey year	Variable	Overall earnings inequality	Opportunity inequality	Opportunity share	Opportunity inequality	Opportunity share	Opportunity inequality	Opportunity share
1988	Rural	0.179***	0.040***	0.224***	0.021**	0.117***	0.011	0.059
		(0.011)	(0.007)	(0.024)	(0.007)	(0.034)	(0.007)	(0.039)
	Urban	0.288***	0.074***	0.257***	0.045***	0.156***	0.035***	0.122***
		(0.012)	(0.006)	(0.015)	(0.006)	(0.019)	(0.006)	(0.017)
	Men	0.246***	0.055***	0.225***	0.035***	0.141***	0.029***	0.119***
		(0.011)	(0.005)	(0.013)	(0.005)	(0.018)	(0.005)	(0.019)
	Women	0.300***	0.077***	0.256***	0.042***	0.140***	0.029***	0.097***
		(0.019)	(0.013)	(0.029)	(0.013)	(0.035)	(0.009)	(0.026)
	Ages 15–29	0.270***	0.067***	0.247***	0.035***	0.130***	0.020***	0.075***
		(0.014)	(0.008)	(0.020)	(0.006)	(0.019)	(0.005)	(0.018)
	Ages 30–44	0.190***	0.064***	0.337***	0.048***	0.251***	0.041***	0.218***
		(0.011)	(0.008)	(0.026)	(0.009)	(0.034)	(0.007)	(0.026)
	Ages 45–65	0.258***	0.094***	0.363***	0.073***	0.282***	0.060***	0.232***
		(0.025)	(0.012)	(0.034)	(0.012)	(0.037)	(0.012)	(0.049)
	Total	0.267***	0.071***	0.268***	0.045***	0.170***	0.037***	0.140***
		(0.010)	(0.005)	(0.011)	(0.005)	(0.017)	(0.004)	(0.014)
1998	Rural	0.178***	0.022***	0.121***	0.009***	0.051***	0.007***	0.039***
		(0.009)	(0.002)	(0.013)	(0.002)	(0.012)	(0.002)	(0.011)
	Urban	0.222***	0.039***	0.173***	0.028***	0.126***	0.023***	0.105***
		(0.013)	(0.004)	(0.013)	(0.004)	(0.014)	(0.003)	(0.015)
	Men	0.210***	0.033***	0.158***	0.026***	0.121***	0.025***	0.117***
		(0.007)	(0.003)	(0.012)	(0.004)	(0.015)	(0.003)	(0.013)
	Women	0.240***	0.049***	0.203***	0.031*	0.128***	0.021**	0.086***
		(0.039)	(0.011)	(0.023)	(0.012)	(0.026)	(0.006)	(0.019)

	Ages 15–29	0.176***	0.033***	0.187***	0.027***	0.153***	0.021***	0.116***
		(0.011)	(0.004)	(0.017)	(0.004)	(0.018)	(0.004)	(0.016)
	Ages 30–44	0.182***	0.038***	0.208***	0.031***	0.170***	0.027***	0.147***
		(0.008)	(0.004)	(0.019)	(0.005)	(0.021)	(0.004)	(0.019)
	Ages 45–65	0.223***	0.060***	0.269***	0.047***	0.209***	0.036***	0.161***
		(0.024)	(0.009)	(0.025)	(0.013)	(0.034)	(0.006)	(0.026)
	Total	0.219***	0.039***	0.177***	0.029***	0.130***	0.026***	0.117***
		(0.011)	(0.003)	(0.011)	(0.003)	(0.012)	(0.003)	(0.012)
2006	Rural	0.404***	0.081***	0.201***	0.055*	0.136**	0.015***	0.038***
		(0.061)	(0.019)	(0.029)	(0.024)	(0.042)	(0.003)	(0.008)
	Urban	0.423***	0.072***	0.170***	0.053***	0.125***	0.024***	0.057***
		(0.028)	(0.011)	(0.022)	(0.012)	(0.023)	(0.007)	(0.017)
	Men	0.412***	0.069***	0.167***	0.046***	0.110***	0.028***	0.069***
		(0.031)	(0.008)	(0.014)	(0.010)	(0.020)	(0.006)	(0.014)
	Women	0.445***	0.084***	0.189***	0.044	0.100*	0.022***	0.049***
		(0.069)	(0.018)	(0.027)	(0.030)	(0.050)	(0.004)	(0.012)
	Ages 15–29	0.345***	0.077***	0.224***	0.054**	0.157***	0.034***	0.099***
		(0.042)	(0.010)	(0.013)	(0.020)	(0.036)	(0.008)	(0.021)
	Ages 30–44	0.453***	0.103***	0.227***	0.092***	0.203***	0.03	0.066
		(0.047)	(0.024)	(0.034)	(0.027)	(0.042)	(0.019)	(0.045)
	Ages 45–65	0.381***	0.092***	0.242***	0.061***	0.161***	0.027**	0.070**
		(0.047)	(0.015)	(0.027)	(0.018)	(0.035)	(0.008)	(0.025)
	Total	0.423***	0.077***	0.181***	0.049***	0.116***	0.023**	0.055**
		(0.030)	(0.007)	(0.012)	(0.012)	(0.021)	(0.008)	(0.019)
All years	Rural	0.320***	0.064***	0.199***	0.032*	0.099**	0.021	0.065
		(0.034)	(0.011)	(0.017)	(0.015)	(0.036)	(0.011)	(0.033)

(Continued)

TABLE 5. Continued

Survey year	Variable	Overall earnings inequality	Nonparametric estimate				Parametric estimate	
			Tranches approach		Types approach			
			Opportunity inequality	Opportunity share	Opportunity inequality	Opportunity share	Opportunity inequality	Opportunity share
	Urban	0.341***	0.065***	0.190***	0.038***	0.112***	0.039***	0.115***
		(0.013)	(0.005)	(0.008)	(0.006)	(0.015)	(0.004)	(0.010)
	Men	0.329***	0.060***	0.182***	0.035***	0.105***	0.039***	0.119***
		(0.017)	(0.005)	(0.007)	(0.006)	(0.016)	(0.003)	(0.009)
	Women	0.362***	0.070***	0.193***	0.02	0.056*	0.019**	0.052**
		(0.045)	(0.009)	(0.010)	(0.011)	(0.023)	(0.006)	(0.020)
	Ages 15–29	0.295***	0.065***	0.220***	0.038***	0.127***	0.038***	0.129***
		(0.023)	(0.006)	(0.007)	(0.010)	(0.023)	(0.005)	(0.013)
	Ages 30–44	0.332***	0.075***	0.225***	0.061***	0.184***	0.049***	0.148***
		(0.032)	(0.009)	(0.016)	(0.015)	(0.031)	(0.009)	(0.029)
	Ages 45–65	0.315***	0.079***	0.251***	0.044***	0.141***	0.042***	0.134***
		(0.031)	(0.010)	(0.019)	(0.008)	(0.022)	(0.006)	(0.021)
	Total	0.341***	0.068***	0.200***	0.036***	0.106***	0.039***	0.113***
		(0.017)	(0.005)	(0.007)	(0.005)	(0.012)	(0.004)	(0.011)

* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Note: Numbers in parentheses are bootstrap standard deviations based on 100 replications.

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

Many factors could have contributed to the increase in earnings inequality, including changes in the education composition of the Egyptian labor force, increasing returns to education and experience, and a transition to a more decentralized and market-oriented economy, but it seems likely that much of the rise was driven by variable and accelerating inflation.[14] Inflation was very unstable over this 19-year period, high and volatile over 1988–91, steadily declining over 1991–2002, and steadily rising after 2002, especially in 2004.[15] Many studies have found inequality-increasing effects of inflation (see, for example, Ferreira, Leite, and Litchfield 2008).[16]

The trend in inequality of opportunity levels is similar to that of overall inequality, declining between 1988 and 1998 and then increasing from 1998 onwards. Nevertheless, the variations in inequality of opportunity levels over the entire period are much less pronounced than those in overall inequality. The nonparametric measures posted a slight increase over 1988–2006, while the parametric estimates fell slightly. The differences in the levels of inequality of opportunity at the beginning and end of the period are barely statistically significant.

Since overall earnings inequality increased significantly over the entire period, while the levels of inequality of opportunity were generally stable, the opportunity share of inequality declined sharply between the late 1980s and the mid-2000s.

Figure 1 reveals a similar downward trend for both parametric and nonparametric estimates of the proportion of earnings inequality attributable to unequal opportunities. The contribution of opportunity to inequality fell from 14–27 percent in 1988 to 6–18 percent in 2006, depending on the measure used.

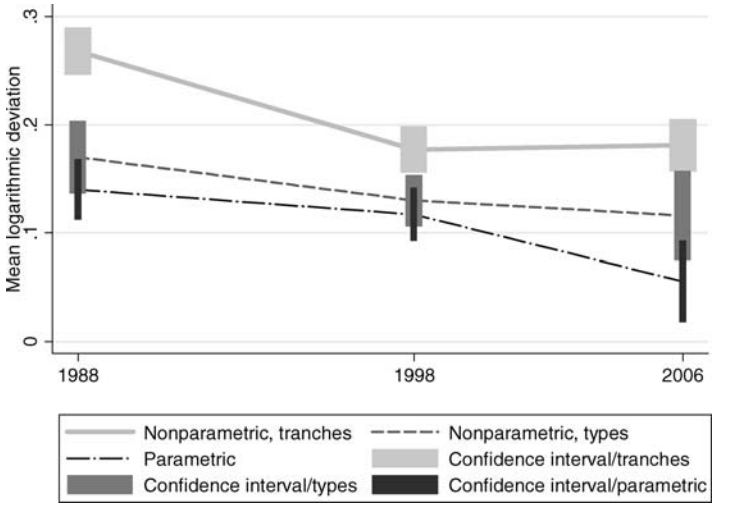
The parametric estimates are systematically lower than the nonparametric estimates. The opportunity inequality shares for the entire country for each survey year measured by the tranches method dominate the types and parametric measures. Although the types method yields higher results than the

14. A Mincerian regression was run to see whether improvements in the educational attainment of the labor force contributed to the rise of inequality. The evidence suggests that returns to education increased between 1988 and 2006, while returns to experience declined. However, the results show a substantial increase of returns to education and experience over 1988–2006 in rural areas, suggesting that the greater dispersion of earnings, particularly in rural areas, was caused by the increasing returns to education and experience.

15. See World Bank (http://data.worldbank.org/country/egypt-arab-republic) or International Monetary Fund data (www.imf.org/external/data.htm).

16. The measures of inequality for Egypt provided by the World Bank range from a mean log deviation of 16.9 percent in 1990/91 to 17.8 percent in 2004/05, with a slight drop to 15.5 percent in 1995/96. Although the current study finds a broadly similar pattern of variability, the inequality estimates are higher and suggest a much greater increase in recent years. The World Bank inequality estimates are based on consumption and expenditure data, which are often considerably lower than estimates based on income and labor earnings data. Moreover, earnings tend to be more volatile and more sensitive to macroeconomic fluctuations than consumption and expenditures, which are likely to be closer to permanent income (Barros and others 2009).

FIGURE 1. Parametric and Nonparametric Estimates of the Share of Inequality of Opportunity for the Egyptian Labor Force (with confidence intervals at 95 percent)



Source: Author's calculations based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

parametric decomposition, the difference turns out to be (borderline) significant only for 2006 and insignificant for the other survey rounds. These differences are likely the result of small-sample biases that raise spurious sampling variation in nonparametric decomposition. The problem is particularly acute in the tranches approach, where each cell is subdivided into deciles.

Another plausible explanation is the ability of the tranches approach to assess in a finer way the individual earnings gaps attributable to circumstances (Aaberge, Mogstad, and Peragine 2011). The parametric and types methods focus on the inequality between social groups identified by their circumstances and are less sensitive than the tranches method to inequalities between individuals within the same social group. These parametric and types methods depend on group-specific mean income and fail to capture the effect on inequality of opportunity of Pigou-Dalton redistribution within social types, while the tranches approach does (Checchi and Peragine, 2010; Checchi, Peragine, and Serlenga 2010).

Between 1988 and 1998, when the economic adjustment program was implemented, the level of overall earnings inequality fell 18 percent and that of opportunity inequality fell by 30–45 percent.

The earning gaps between social groups and among individuals at the same effort level have narrowed, presumably because of the expansion of education for underprivileged children, moderate macroeconomic stability, and the

resumption of growth during this period.[17] Inequality among individuals at the same effort level appears to have declined more rapidly than inequality between social types, explaining the larger decline observed in the opportunity share measured by the tranches method.

From 1998 onward, earnings gaps widened again, with the gaps widening less between social groups than within effort groups. The economic policy reforms implemented in Egypt since 2000, which include privatization, deregulation, and progressive trade liberalization, facilitated the transition to a more market-oriented economy. Despite the positive payoffs of these reforms, they might have brought about distributional changes that widened income differentials. Thus the increase in inequality during this period might be associated with the market-oriented reforms and the expansion of inflation. While inequality of opportunity levels rose nearly to their 1988 level, overall earnings differentials widened even more, leading to a decrease in the share of inequality attributed to opportunities. It follows, then, that earnings inequality was due increasingly to differential effort.

However, the decline in the share of inequality attributable to opportunities does not necessarily mean that the true opportunity share of inequality has fallen or that differences in effort have increased substantially. The possibility of underestimation problems attributable to omitted unobserved circumstance variables or to transitory earnings components cannot be ruled out.

A more market-oriented economy rewards individuals' skills and education quality more highly, increasing the variation in earnings within the educational attainment categories of workers and consequently within the education categories of their parents. If the quality of parental education plays a growing role over time in shaping earnings inequality in Egypt, and since this variable is omitted, estimates of inequality of opportunity would be expected to be higher in 2006.

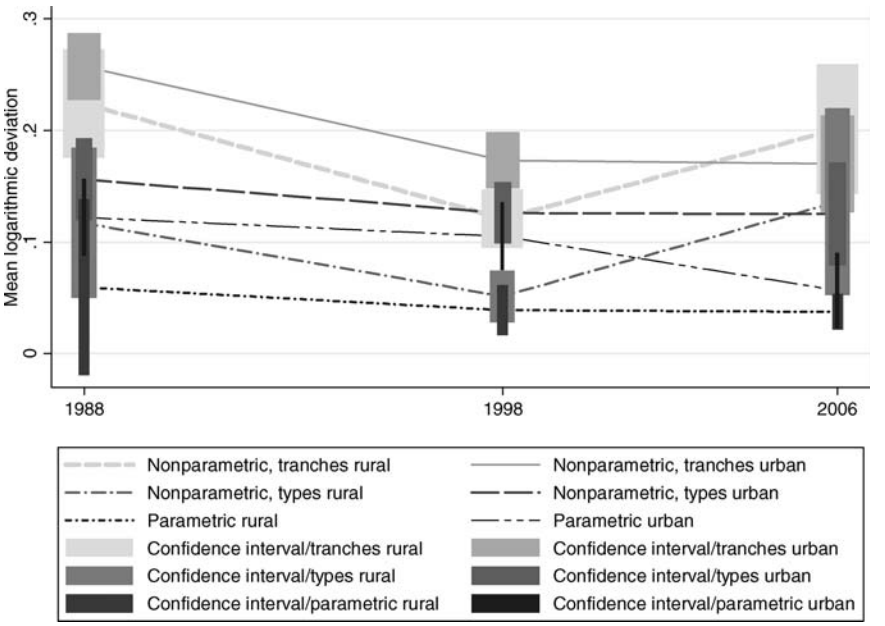
On the other hand, using current earnings to measure opportunity inequality might distort the assessment of the extent to which circumstances affect the distribution of outcomes, because of measurement error and idiosyncratic shocks to earnings. The transitory earnings components add to the dispersion of earnings not explained by circumstances, confounding the variance of transitory earnings with the part of earnings inequality due to effort. And that could lead to overestimating the degree of effort inequality (Barros and others 2009; Aaberge, Mogstad, and Peragine 2011).

Population Subgroup Analysis

Because the aggregate analysis presented above could mask area, gender, and age disparities in opportunity inequality within Egypt, inequality of

17. See Cogneau and Gignoux (2009) for the contribution of educational expansion to earnings and opportunity (in)equality in Brazil.

FIGURE 2. Parametric and Nonparametric Estimates of the Share of Inequality of Opportunity by Area (with confidence intervals at 95 percent)



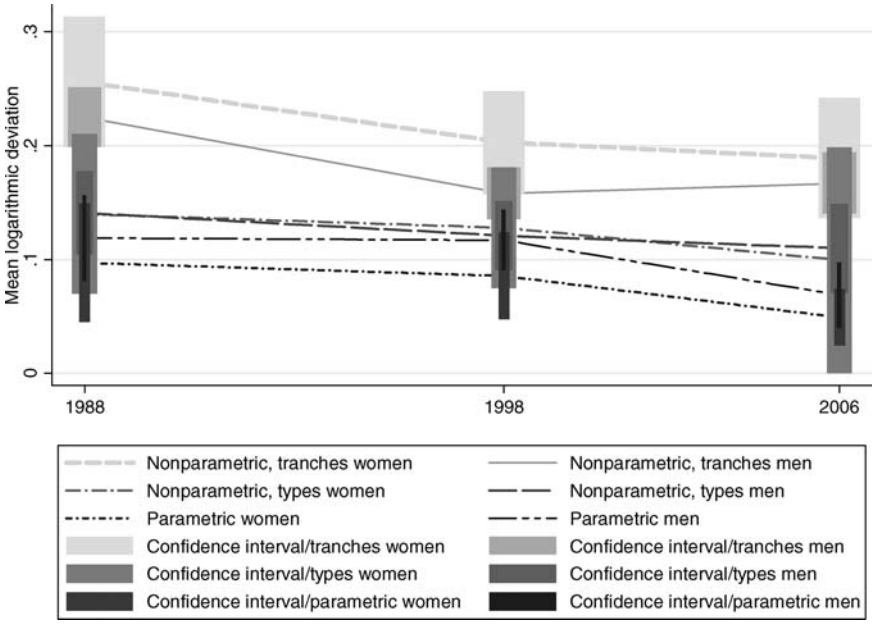
Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

opportunity measures were also computed for each population subgroup (see table 5 and figures 2, 3, and 4).

AREA. The parametric and nonparametric estimates revealed somewhat higher inequality of opportunity levels and shares in urban than in rural areas, but the difference is statistically significant only in 1998. Between 1988 and 1998, overall inequality was fairly stable in rural areas and declined in urban areas; inequality of opportunity levels dropped in both areas, though it dropped more in rural areas (see table 5 and figure 2). From 1998 onwards, overall and opportunity inequality levels rose in both urban and rural areas. Inequality of opportunity measures regained their late 1980s levels in urban areas but rose much more in rural areas. Although overall inequality in rural earnings rose significantly, from 18 percent to 40 percent, the opportunity share also increased, from 12 percent to 20 percent (tranches approach), showing a larger contribution of unequal opportunities to the variance in rural earnings.

The parametric estimates of the opportunity inequality share, while not significantly different from those obtained by the types method, show no variations over time in rural areas. This may be explained either by the omission of circumstance variables, which could cause a meaningful drop in the parametric measures of inequality of opportunity, or by large sampling variation, which could induce an upward bias in the nonparametric measures. This possibility is

FIGURE 3. Parametric and Nonparametric Estimates of the Share of Inequality of Opportunity by Gender (with confidence intervals at 95 percent)



Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

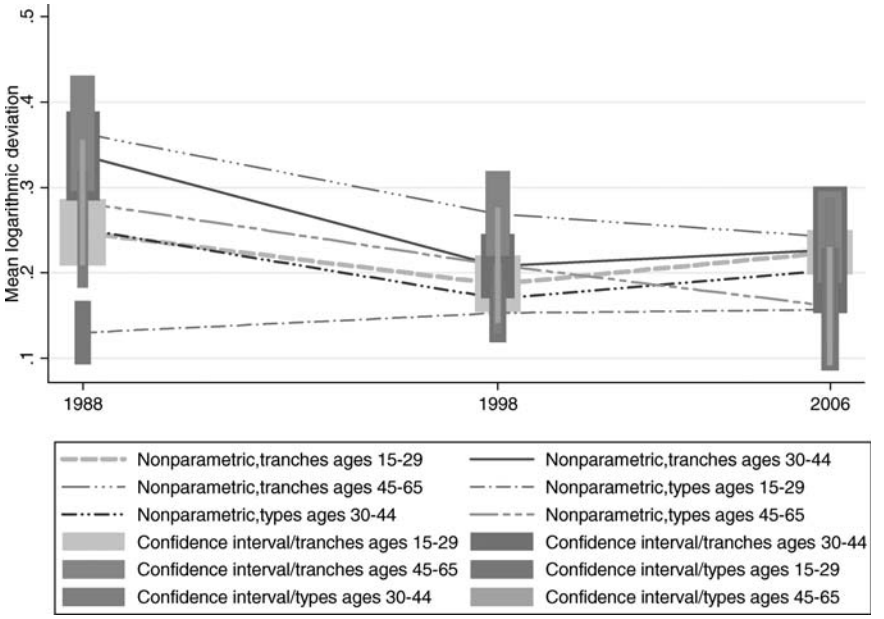
explored later by estimating inequality of opportunity indices parametrically using a richer set of circumstances and a more refined partition.

In addition to rising inflation and the transition to a more liberal market, increasing labor market returns to education and to experience contributed to the substantial increase in rural earnings differential between 1998 and 2006. There have been substantial improvements in the education of the rural labor force, an accelerating movement of labor out of agriculture as structural reforms took hold, and a shift to high- and medium-status occupations. All these factors might have increased the influence of family background on income differentials between social types and, even more, among individuals at similar levels of effort.

GENDER. The contribution of unequal opportunities to earnings inequality is higher for women by the tranches method, while it is higher for men by the parametric and types methods (figure 3). However, the difference in inequality of opportunity between men and women is barely significant for the tranches method and insignificant for the others.

The difference in results can be explained by the fact that the omitted circumstances are more important to the distribution of earning for women. Large sampling variance in small cells can also be involved, since sample sizes are smaller for women than for men. Again, the tranches method produces

FIGURE 4. Nonparametric Estimates of the Share of Inequality of Opportunity by Age Groups (with confidence intervals at 95 percent)



Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

higher estimates while the types and parametric measures are quite close to each other.

The levels of overall and opportunity inequality in earnings seem to follow a similar historical path for both genders, including a decline in the late 1990s and a subsequent increase. Nevertheless, opportunity inequality rose slightly for men from the beginning to the end of the period and was more stable for women, while overall earnings inequality rose substantially for both men and women. Therefore, the share of opportunity inequality declined more over time for women's earnings.

The growing dispersion in earnings in recent years could be associated with the rise in the educational attainment of the Egyptian labor force and the increase in returns to schooling. Although improvements in education levels and returns to education were more pronounced for women, earnings inequality increased slightly more for men, suggesting that inflation and policy changes had a greater effect on men's earnings.

The estimates of inequality of opportunity for women should be treated with caution since they suffer from potential underestimation. Women's much lower labor force participation rates (30 percent, compared with almost 80 percent for men; see tables 1 and 3) raise concerns about sample selection bias.

Moreover, parents' education level and father's occupational status are considerably higher for women, suggesting that women's labor force participation decisions are influenced by their family background, so that women who expect to be discriminated against due to their circumstances might be less likely to enter the labor force. In that case, the true opportunity inequality measures for women would be expected to be much larger than those obtained here.

AGE. Figure 4 displays the evolution of the shares of opportunity equality in earnings inequality over time for each age cohort; for readability, only the nonparametric estimates are plotted. The types and parametric results are quite close.

Except in 1988, when the share of opportunity inequality was notably lower for the youngest cohort, there is no statistically significant difference between age groups. Although the tranches method yields higher estimates, the difference between the estimates and those obtained by the types method is insignificant, which strengthens confidence in the results.

These findings suggest that the increase in educational attainment across successive age cohorts over 1988–2006 was accompanied by a slight, but borderline statistically significant, increase in the levels and shares of inequality of opportunities. Between 1988 and 1998 overall earnings inequality and opportunity earnings inequality (both levels and shares) increased across age cohorts, from the youngest to the oldest, while in 2006 overall inequality and opportunity inequality were higher for the mid-age cohort (see table 5 and figure 4).[18]

The decline in earnings differential already noted between 1988 and 1998 for all population subgroups was modest for Egyptian wage and salary workers ages 30–44, while the large increase in the gap after 1998 was much more pronounced for this cohort than for the others. This age cohort also experienced a larger increase in inequality of opportunity levels during the 2000s and therefore an increase in the share of unequal opportunities (from 17–21 percent in 1998 to 20–23 percent in 2006, depending on the measure used). The gap between social groups increased more than the gap between people at the same effort level for the mid-age cohort. Despite the increase, this age cohort had a lower incidence of opportunity inequality in 2006 than in 1988, when the share was greater than 25 percent. The upward trend in inequality of opportunity shares between 1998 and 2006 is not apparent in the parametric decomposition, however.

On the other hand, from 1998 to 2006, only a slight rise in the levels of inequality of opportunity was noted for the youngest cohort and an even slighter rise for the oldest. So the share of opportunity inequality in earnings inequality increased for the youngest, from 19 percent to 22 percent, and decreased for the oldest, from 27 percent to 24 percent by the tranches

18. Inequality of opportunity may be underestimated for the youngest cohort due to the possible importance of part-time work in this age group (Bourguignon, Ferreira, and Menéndez 2007).

approach. When measured using the types and parametric methods, the increase in the opportunity shares for the youngest cohorts appears to be smaller, while the decrease for the oldest age group appears greater.

These results suggest that during the 1990s the contribution of unequal opportunities to earnings inequality was lower for the younger cohorts than for older cohorts and highest for the mid-age cohort in recent years.

The rise in inequality of opportunities for the youngest cohort likely reflects the increasing effect of parental education on their earnings. Returns to parents' education in Egypt were found to increase with age, contributing to the greater dispersion in earnings within older cohorts. However, while returns to parents' education increased over time for the mid-age and youngest groups, it fell for the oldest cohort. Although this explanation sounds plausible, we cannot reject the possibility of underestimation due to unobserved circumstances, transitory earnings components, or the incidence of part-time employment. Taking these elements into account might change the finding that the younger cohort is suffering from a higher incidence of opportunity inequality than the older one today.

Parametric Decomposition

Although informative, these results capture only a part of the contribution of circumstances to an individual's earnings inequalities. To check the robustness of these results to the introduction of additional exogenous circumstances, a parametric decomposition was conducted that added additional family background characteristics to the previous analysis (father's and mother's employment status; rural or urban area of birth) and used a finer partition of the circumstance categories. Age is also used as a circumstance variable when the sample is not split by age groups.

To begin, reduced form earnings equation (6) is estimated by ordinary least squares (OLS) for the entire population and separately for each population subgroup by survey year and for all years combined. Because of space limitations, regression results are presented in table 6 only for the entire population for each survey year and using the whole sample. The estimates, globally significant at the 10 percent level or lower, support the view that circumstances have an important influence on outcomes and, as shown in the descriptive statistics in table 3, that being male and being older are associated with higher income. Differences in region of birth are found to contribute to wage differences. With Lower Egypt as the reference, people born in Upper Egypt have lower incomes, while those born in Metropolitan regions do better. Likewise, individuals born and working in urban areas earn more than those in rural areas. The parental background variables are also found to affect earnings. Father's and mother's years of education have a significant positive influence. Father's and mother's employment also has a positive influence, but the effect was rarely significant in 1988. Father's occupational status does not appear to be important.

TABLE 6. Regression of Earnings On Circumstances

Variable	1988	1998	2006	All years
Urban dummy variable	0.086***	0.097***	0.070***	0.081***
	(0.028)	(0.023)	(0.022)	(0.014)
Male dummy variable	0.410***	0.276***	0.377***	0.360***
	(0.030)	(0.020)	(0.023)	(0.014)
Age	0.021***	0.019***	0.017***	0.019***
	(0.001)	(0.001)	(0.001)	(0.001)
Father's years of school	0.024***	0.016***	0.020***	0.020***
	(0.005)	(0.003)	(0.003)	(0.002)
Mother's years of school	0.008	0.015***	0.014***	0.013***
	(0.009)	(0.003)	(0.003)	(0.002)
Father's employment status (omitted= wage worker)				
Employer	−0.002	−0.061**	0.014***	−0.015
	(0.029)	(0.027)	(0.027)	(0.016)
Self-employed	−0.213	0.001	−0.219***	−0.149***
	(0.202)	(0.119)	(0.051)	(0.045)
Father's occupation (omitted= medium status)				
High status	0.033	0.042*	0.038	0.038**
	(0.033)	(0.025)	(0.025)	(0.016)
Low status	−0.026	−0.002	0.036	0.012
	(0.040)	(0.032)	(0.030)	(0.020)
Skilled agricultural worker	−0.085***	−0.080***	−0.092***	−0.083***
	(0.027)	(0.024)	(0.024)	(0.014)
Mother's employment (omitted = self-employed)				
Wage worker	−0.137***	−0.179***	−0.237***	−0.192***
	(0.053)	(0.030)	(0.028)	(0.019)
Employer	−0.094	−0.005	−0.130***	−0.068***
	(0.067)	(0.049)	(0.038)	(0.026)
Region of birth (omitted = lower Egypt)				
Metropolitan	0.102***	0.185***	0.166***	0.154***
	(0.029)	(0.024)	(0.025)	(0.014)
Upper Egypt	−0.086***	−0.074***	−0.024	−0.054***
	(0.027)	(0.021)	(0.020)	(0.014)
Constant	4.872***	4.858***	5.103***	4.966***
	(0.048)	(0.046)	(0.047)	(0.029)
Number of observations	4135	4048	6499	14682
Adjusted R-square	0.213	0.258	0.185	0.219

* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Note: The dependent variable is the logarithm of real monthly earnings. Numbers in parentheses are bootstrapped standard errors based on 100 replications. Urban dummy variable, male dummy variable, and age are not included among the regressors when the model is estimated separately by area, gender, and age cohort, respectively.

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

Nonetheless, with medium status as the reference, having a father in an agricultural occupation has a strong and statistically significant negative effect on earnings.

TABLE 7. Parametric Estimates of Inequality of Opportunity

Variable	1988	1998	2006	All years
Overall inequality of opportunity	0.067***	0.058***	0.064***	0.063***
	(0.005)	(0.006)	(0.012)	(0.006)
Share of inequality of opportunity	0.253***	0.266***	0.151***	0.184***
	(0.015)	(0.014)	(0.029)	(0.020)
Partial shares associated with circumstances				
Gender	0.030***	0.019	0.01	0.015
	(0.007)	(0.012)	(0.012)	(0.008)
Mother's education	0.006	0.002	0.018*	0.017**
	(0.008)	(0.004)	(0.008)	(0.005)
Father's education	0.055***	0.01	0.034***	0.041***
	(0.011)	(0.007)	(0.008)	(0.006)
Father's employment	0.001	0.001	0.010***	0.008***
	(0.001)	(0.002)	(0.002)	(0.001)
Mother's employment	0.007*	0.005	0.018*	0.015**
	(0.003)	(0.007)	(0.009)	(0.006)
Father's occupation status	0.020**	0.002	0.022***	0.022***
	(0.007)	(0.006)	(0.006)	(0.003)
Birth area[a]	0.022***	0.004	0.015**	0.017***
	(0.006)	(0.006)	(0.005)	(0.004)
Birth region[b]	0.035***	0.044***	0.024**	0.030***
	(0.009)	(0.010)	(0.008)	(0.006)

* Significant at the 10 percent level; ** significant at the 5 percent level; *** significant at the 1 percent level.

Note: Numbers in parentheses are bootstrapped standard errors based on 100 replications.

a. Urban or rural.

b. Metropolitan, Lower Egypt, or Upper Egypt.

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

The estimation results for each population subgroup, available on request, show similar effects of the circumstance variables on earnings.

Next, the counterfactual earnings distribution is simulated using the coefficient estimates to compute the share of earnings inequality arising from unequal opportunities and the contribution of individual circumstance variables.

The parametric estimates of inequality of opportunity using a richer set of circumstance variables, reported in table 7, are significantly higher than the parametric measures reported in table 5. The opportunity shares are 15–27 percent over 1988–2006, compared with 6–14 percent when fewer circumstance groups and coarser partitions are used, suggesting that father's and mother's employment and the area of birth played a significant role in accounting for opportunity disparities in Egypt.

The disaggregation by area reveals that the contribution of opportunities to earnings inequality decreases over time in rural areas, despite the rise in the

FIGURE 5. Contribution of Individual Circumstance Variables to Earnings Inequality for the Egyptian Labor Force

Source: Author's calculation based on data from the Egypt Labor Force Sample Survey of 1988, the Egypt Labor Market Survey of 1998, and the Egypt Labor Market Panel Survey of 2006.

level of inequality of opportunity.[19] This result suggests that the increase in the share of rural opportunity inequality using the nonparametric methods (see table 5 and figure 2) might be due to sampling variance in small cells.

The analysis by gender shows that women suffer a significantly greater incidence of opportunity inequality than men. This finding, similar to that reported in table 5 and figure 3 using the tranches approach, suggests a higher sensitivity of the parametric estimates to the omitted circumstance variables for women than for men. The contribution of father's and mother's employment to earnings inequality is as important as that of the other circumstance variables for women but less important for men.

Figure 5 depicts the evolution over 1988–2006 of the contribution of individual circumstance variables to earnings inequality for the entire population. Of all observed circumstance variables, father's education and region of birth are associated with the largest shares of earnings inequality. Inequality of opportunity related to father's education declined from 6 percent in 1988 to 1 percent in 1998, before rising again to nearly 4 percent in 2006. Inequality of

19. The results for the population subgroups are available from the author.

opportunity resulting from region of birth was fairly stable between 1988 and 1998, at around 4 percent, and declined to 2 percent in 2006.

Gender, father's occupation and mother's employment also play an important role in determining earnings inequality, accounting for 1–3 percent of total inequality for the entire population. Gender's importance in shaping opportunity declines over time.

Mother's education and father's employment make a limited contribution to reducing earnings inequality when area, gender, and other family background variables are controlled for. However, mother's education has a growing influence on earnings in the recent period.

For population subgroups, parental education was found to be a more important determinant of opportunity for women in 1988, while father's occupation status and mother's employment accounted for the largest share of earnings variations in recent years. In rural areas, inequality was shaped mainly by gender until 1998, while father's occupation and employment had the largest role during the recent period.

There is also some evidence that mother's education contributes more to reducing earnings inequality for the youngest cohort than do the other family background variables.

The share of inequality associated with parental education increases across age cohorts and declines significantly over time for the oldest cohort. This result is consistent with the previous finding of a declining contribution of unequal opportunities to earnings inequality for Egyptian wage and salary workers ages 45–65 and with the possibility that the decline was driven by the weakening effect of parental education on earnings for this cohort.

These findings suggest that policies aimed at reducing the earnings effect of father's education and skills and of regional origins would help reduce inequality of opportunities in Egypt.

IV. Concluding Remarks

It is increasingly argued that inequality of opportunity arising from individual circumstances contributes to the persistence of social and economic inequalities and constrains economic development and, therefore, that society should compensate for this sort of inequality. In the interests of equity, it is thus important to distinguish inequalities due to unequal opportunities from inequalities due to individual choices. Doing so could help identify policy measures and institutional arrangements that favor more egalitarian distribution of opportunities.

To assess the extent to which unequal opportunity affects the distribution of earnings in Egypt, parametric and nonparametric measures were calculated of the lower bound for inequality of opportunity, over time and by population subgroups. The results are consistent with findings of previous studies. Individual circumstances, captured by gender, region of birth, father's and

mother's education, and father's occupation status averaged 11–20 percent of the mean logarithmic deviation index, depending on the estimation procedure.

There was little change in the levels of inequality of opportunity between 1988 and 2006 and a modest decline in 1998; total earnings inequality increased considerably over this period. The opportunity share of earnings inequality therefore declined from 14–27 percent in 1988 to 6–18 percent in 2006, depending on the measure used.

Although the causes of the sharp increase in earnings inequality and the decline in the opportunity share cannot be established with certainty, some explanations may be ventured.

Egypt's transition to a more market-oriented economy since the early 2000s, together with rising inflation, might have contributed to widening income differentials. Expansion of intermediate and higher education between 1988 and 1998, followed by slower expansion from 1998 onward, especially affecting underprivileged social groups might have contributed to equalizing opportunities during the first period and limited the increase in earnings gaps between circumstance groups in the second period.

A parametric decomposition using a richer set of family background variables and a more refined partition to check the robustness of the results to omitted circumstances resulted in a drop in opportunity shares from 27 percent in 1988 to 15 percent in 2006 compared with a decline from 14 percent to 6 percent when fewer circumstance groups are considered. Father's education and occupation status as well as spatial factors (measured by rural or urban area and region of birth) accounted for around 30 percent and 20 percent of the total effect of circumstances.

The analysis by population subgroups reveals a lower incidence of inequality of opportunity in rural areas than in urban areas. Although estimates for rural areas might be biased because of the imprecision of earnings measurement or large sampling variance within small cells, the possibility cannot be ruled out that unobserved circumstances and institutional measures (such as family composition, parents' financial situation, supply and quality of schooling, and labor market institutions) significantly shape the opportunity sets for rural Egyptian wage and salary workers. This is supported by the weak influence of father's education and occupation status on rural earnings. Although they play a large role in determining inequality compared with the observed circumstances, their role is very weak in rural areas, where more than 87 percent of workers have parents with an education level of two years or less and some 57 percent have fathers in agricultural employment.

The disaggregation by gender reveals similar findings for opportunity inequality for men and women, with a somewhat higher incidence for women. The estimates for women are likely to be biased by participation in the labor market: if women's participation decisions are negatively influenced by circumstances, inequality of opportunity would be underestimated.

The analysis by age group suggests that inequality of opportunity accounted for a lower share of earnings inequality for younger cohorts than for older cohorts in the 1990s, while it accounted for a higher share for mid-age and younger groups in 2006. The decline in the contribution of unequal opportunities to earnings inequality for individuals ages 45–65 is likely due to the declining importance of parental education in determining their opportunity sets.

Regardless of the estimation method used, this study suggests that the share of measured earnings inequality in Egypt attributable to circumstances alone varied from one-tenth to one-third from 1988–2006. The true fraction of opportunity inequality would likely be higher if additional circumstance variables were included or if the analysis were based on other measures of economic welfare, such as household income and consumption. Using current earnings may give a misleading picture of the extent of inequality of opportunity because of measurement errors and transitory earnings components.

Ferreira and Gignoux (forthcoming) estimated inequality of opportunity for labor earnings, household income, and household consumption for Colombia, Panama, and Peru and obtained roughly similar opportunity inequality shares of earnings inequality to those found here for Egypt. Their analysis reveals that inequality of opportunity accounts for a larger portion of overall inequality when household income is used rather than labor earnings. The estimates of inequality of opportunity shares tended to be even higher when based on consumption rather than on income or earnings. For Latin American countries for which results are close to those reported here, parametric estimates of the opportunity shares of consumption inequality ranged from 24 percent for Colombia to 39 percent for Panama, compared with 17 percent for earnings inequality. Barros and others (2009) also found that earnings-based measures tend to underestimate inequality of opportunity for long-term welfare because measurement errors and transitory components add to the non-circumstance-driven variance in the earnings and income measures.

Bourguignon, Ferreira, and Menéndez (2007) also report similar results for Brazil. They found that around 23 percent of earnings inequality among Brazilian men in urban areas in 1996 could be attributed to unequal opportunities, as measured by the Theil index, indicating a lower incidence of inequality of opportunity than in Egypt for the same period (around 30 percent of the Theil index, using the parametric method, for 1988–1998).

Although the results of this analysis would help in designing effective public policies for equalizing opportunities, recommending such policies requires further investigation.

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