

دور التعليم في تطور الفرص في مصر (2000-2012)

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ملخص: يعتبر التعليم أداة مهمة من أدوات السياسة للحد من الفقر والتفاوتات؛ لأنه يساعد الأفراد في الوصول إلى وظائف أفضل؛ مما يؤدي إلى زيادة الدخل من العمل، ومن ثم تحسين حياتهم. ولهذه الأسباب تركز الدراسة على اختبار دور التعليم في تحسين الفرص بمصر خلال الفترة (2000-2012) من خلال عدة خطوات: (1) قياس ورسم خرائط لتغير التوزيع المكاني للفرص في محافظات مصر، باستخدام دليل الفرص متعدد الأبعاد (MOI) لقياس الفرص التعليمية، والفرص الوظيفية والاقتصادية، والفرص الكلية. (2) قياس التفاوتات في الفرص بين محافظات مصر وفقاً لمنهجية دليل الفرص الإنسانية (HOI). (3) اختبار نموذج الانحدار على مستوى محافظات مصر (LSDV) لتحديد كيف تؤثر الفرص التعليمية على الفرص الوظيفية والاقتصادية. وتوصلت الدراسة إلى أنه في نحو ثمانية وسبعين في المئة من محافظات مصر كانت الفرص التعليمية ذات تأثير معنوي على الفرص الوظيفية والاقتصادية (إيجابي في ستة وخمسين في المئة من المحافظات، وسلب في اثنتين وعشرين في المئة من المحافظات).

المصطلحات الأساسية: الإنتاجية، رفاهية الإنسان، رأس المال البشري، القدرات، الأدوار، دليل الفرص البشرية، التفاوتات المكانية.

The Role of Education in Opportunity Development in Egypt (2000-2012)

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Abstract: Education is a key policy instrument to reduce poverty and inequalities, because it helps individuals to access better jobs, raise their labor earnings, and improve their standards of living; therefore, the current study examines the role of education in improving opportunities in Egypt (2000 - 2012), through a number of steps: (1) measuring and mapping the change of spatial distribution of opportunity across Egyptian governorates by using the Multidimensional Opportunity Index (MOI) to measure educational opportunities, "jobs and economics" opportunities, and total opportunities; (2) using the Human Opportunity Index (HOI) to measure educational opportunities as well as jobs and economic inequalities among the various governorates; and (3) implementing the Least Squares Dummy Variable (LSDV) regression model on the level of Egyptian governorates. Results show that the educational opportunities in about %63 of Egyptian governorates have significant impacts (positive in %45 of the governorates, and negative in %18 of governorates) on jobs and economic opportunities.

Keywords: Productivity, Human Well-being, Human Capital, Capabilities, Functionings, Human Opportunity Index, Spatial Inequalities.

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1. Introduction

1.1 Importance of the Study

Spatial and social outcomes are shaped by interactions between individual preferences (choices) and institutions such as educational systems and regional housing markets (Wilson & Greenlee, 2016:626). Education is an important dimension of human development, as growth in Human Development Index HDI is associated with growth in public spending on education (UNDP, 2013:78). That is because education has important links with economic and social outcomes, as it affects the jobs and economic opportunities of individuals, and it positively affects health, because educating mothers ensures protecting their kids' lives (UNDP, 2013:89). Also, education is seen as a key policy instrument to reduce poverty; it helps individuals to access better jobs and raise their labor earnings, which will improve their lives. On labor market, education determines the productivity of individuals, while their attained qualifications affect their jobs opportunities on labor market (Ionescu, 2012:130).

1.2 Study Aims and Methodology

Due to the importance of education, the main aim of our study is to focus on analyzing the role of education in improving "jobs and economic" opportunities of the governorates in Egypt, and on its role in changing the geography of opportunities in Egypt during the period (2000-2012). To achieve this objective, two methodologies were implemented: the descriptive analysis to provide theoretical literature of the social and economic roles of education, and the quantitative analysis to calculate the levels of different kinds of opportunities, as well as testing the relationship between 'educational' opportunities and "jobs and economic" opportunities of Egyptian governorates over the period of (2000-2012).

In addition to section one for the introduction, this study is divided into three more sections: section two carries out a literature review of the study links between 'educational' opportunities and "jobs and economic" opportunities, and it includes an explanation of the education impacts on labor market, economic growth, and human well-being. Section three includes the applied part of the study. The study has three applied steps: (1) on the level of Egyptian governorates, we calculate "the educational" opportunities, "jobs and economic" opportunities, and 'total' opportu-

nities by using the multidimensional opportunity index (MOI) methodology, and then we calculate change in the spatial distribution of opportunities in Egypt to determine the advantaged and disadvantaged governorates. (2) on the national level of Egypt, we measure 'educational' inequalities, and "jobs and economic" inequalities among Egyptian governorates by using the human opportunity index (HOI) methodology. (3) we implement the least squares dummy variable (LSDV) regression model on the level of Egyptian governorates to determine the impacts of 'educational' opportunities on "jobs and economic" opportunities for each governorate in Egypt. Section four presents the final results.

2 The Theoretical Section: Literature Review

The term "*Opportunity*" refers to the range of circumstances that opens doors to economic mobility and human progress. There are three sources of opportunity (MOA, 2012a:1): (1) Things that individuals cannot change, such as their parents' educational level or their racial or ethnic heritage; in general, those who were born to parents who did not graduate high school have fewer opportunities than those who were born to parents with college degrees. (2) Individual's personal characteristics and attributes, where people persistence, hard work, charisma, or talents can open doors for them, and allow them to overcome a disadvantaged start. (3) Conditions that can be found in different communities, such as jobs, primary care physicians, or high schools.

Opportunity has to have some important characteristics: it should be important to human development, it can affect outcomes (such as income, and labor earnings), it is exogenous to individuals, and it can be modified by social choice and public policy to achieve the full coverage of opportunities (Paes de Barros et al., 2009: 39). Moreover, the concept of "equality of opportunity" refers to the situation in which all individuals are independent of exogenous circumstances, and have the same opportunities in life (Paes de Barros et al., 2009:37). The following literature review shows the impacts of education on the available opportunities, particularly its positive impacts on human capital, labor market outcomes, and human well-being.

2.1 Impacts of Education on labor Market Outcomes

Human capital can be defined as the useful skills and knowledge acquired by individuals, and it can be increased by investing in education,

because additional education and experience lead to more efficient decision-making by consumers and workers, which positively changes economic opportunities (Riddell & Song, 2011:2). The human capital model confirms that a sacrifice of current income (the goods and services that teachers and students could produce if they were not engaged in education) is accepted in order to generate monetary and non-monetary returns in the future (Quiggin, 1999:130-144). According to the human capital equation, the wages (R) are functions of (S) and (E), where (S) refers to years of schooling, and (E) refers to years of Experience (Adnan Wadie, 2007:9). Accordingly, the impacts of education on labor market outcomes can be summarized by the relationship between education and the future gains which result from increasing the educational level of individuals, because knowledge and skills contribute to increased productivity and hence, other things being equal, to higher earnings (Quiggin, 1999:130-144). Hence, individuals invest in more education to achieve returns on their investments, because investment in education can explain the structure of wages, and distribution of personal income according to human capital equation (ElBaradei & Metwally, 2001:9-14).

The positive effects of education on productivity makes education important for production, and economic growth, because it complements the roles of other inputs in the production process, as it is responsible for increasing efficiency and productivity of the human input (Vellala et al., 2014: 231-232). Some studies concluded that growth in human capital is a key factor to economic growth (Quiggin, 1999: 130-144), and to labor market outcomes because the educational level of the labor supply side, which is measured by the average years of education of the workforce, determines the skills of labor, thereby employment rate will rise whenever there is an equilibrium between the demanded job skills, and the supplied job skills (Wadie, 2002:1). Consequently, investments in education, research, and development in tertiary education have direct effects in the realization of positive labor market outcomes, because they can increase wages and earnings, employment rate, productivity, and job opportunities; therefore, students who obtained their degrees and had training find jobs faster and earn more (Inoescu, 2012: 130-133). However, the positive associations between education and re-employment rates of unemployed workers depend on some unobserved factors that are correlated with both variables, for example, individuals from advantaged

backgrounds with well-connected social networks may have better employment opportunities (Riddell & Song, 2011:2).

Moreover, a high level of education makes it easier to absorb best-practice technology, because education would have facilitated the development of knowledge. The very limited level of education decreases job opportunities in advanced societies, so education is needed for people to benefit from the scientific advancement as well as to contribute to it, and in cases of countries with low incomes per capita and tend to catch up with those with high incomes, the rate of catch-up depends positively on the number of years of education (Stevens & Weale, 2003:14).

2.2 Role of Education in Increasing Human Well-being

Education can increase human well-being according to Amartya Sen's capability approach which is a moral framework that aims to analyse how a person's well-being is determined, and this approach concentrates on human ends and on the importance of respecting the people's ability to achieve the goals that they value. Sen said that "the well-being of a person must be thoroughly dependent on the nature of his or her being, i.e. on the functionings achieved" (Sen, 1992: 40).

Sen depended on two concepts to determine how human well-being is measured. The first concept is functionings, Sen said that "Living may be seen as consisting of a set of interrelated functionings, consisting of beings and doings, and a person's achievement in this respect can be seen as the vector of his or her functionings" (Sen, 1992:39), so a person's well-being is a summary index of the person's functionings, where functionings are the beings and doings that a person may value, and functionings are also the observable achievements of each person, such as being safe and well-nourished (Sen, 1992:39). The second concept is capability to function, which, according to Sen, "represents the various combinations of functionings (beings and doings) that the person can achieve; thus, capability is a set of vectors of functionings that reflects a person's freedom to lead one type of life or another as well as reflecting the person's freedom to choose from possible livings" (Sen, 1992:40); according to Sen, therefore, capability (or the ability) to achieve functionings will form the person's freedom (the real opportunities) to have well-being (Sen, 1992:40). Hence, Sen's capability approach seems to be significantly related to education in many ways (Saito, 2003:21-22).

To Sen, education can improve human well-being when it succeeds in achieving two complementary roles: the first is expansion of human capabilities, and the second is teaching values in exercising capabilities, as explained in the next section below.

2.2.1 Role of Education in the Expansion of Human Capabilities

According to Sen, education plays a role not only in accumulating human capital but also in broadening human capability, and, consequently, increasing human well-being, as individuals can benefit from education in many ways (Saito, 2003:24). Expansion of capabilities happens in two related aspects of capabilities: (1) expansion of child capacity or ability; for example, teaching the child how to swim enables him to have a capability to swim, and (2) expansion of opportunities that a child has; for example, when a child learns mathematics, he will have wider opportunities as a result to become a mathematician, a banker and so on. Before learning mathematics the capability set of the child may not include these newly created opportunities and capabilities, and the child may not aim to have those new capabilities in the beginning of learning mathematics. Those new capabilities resulting from education help the child to be autonomous to choose his way of life. Then under Sen's capability approach, education helps in making the child autonomous through expanding the capability set (Saito, 2003:27).

2.2.2 Role of Education in Teaching Values in Exercising Capabilities

The second role of education under Sen's capability approach is its role in teaching values in exercising capabilities. Sen argues that bad capabilities do not exist, and capabilities cannot be considered bad but in their use; however, this idea is criticized, as capabilities are neutral by nature, possibly bad in use rather than always good. Therefore, education should play a role in supplementing the enhancement of capability with attention to values. Education is needed to develop a person's judgment so that he would be able to assess in which way it is appropriate to use capabilities. That can be done by teaching different values to the child, who is under the care of others, so that he would be able to choose and learn the educational guidelines by reading, communicating, arguing, and the ability to choose in a more informed way. Hence, the best type of education, according to the capability approach, is the one that makes individuals autonomous, and at the same time develops people's judgment on exercising capabilities (Saito, 2003:28-29).

2.3 Role of education in decreasing income inequality

There is a positive correlation between educational inequality and income inequality; in general, income inequality is affected by educational attainment in a process called skills deepening, where a higher level of educational attainment of labor force leads to a reduction in income inequality, because it increases job and earning opportunities for the lowest classes, and it makes upward social mobility (Pose & Tselios, 2008:9). According to empirical studies, such as that for the 102 EU regions over the period 1995-2000, regression coefficients indicate that both secondary and tertiary education influence the resulting income distribution. The relationship is positive, robust, and statistically significant. The higher the secondary and the tertiary educational attainment, the higher the income inequality, with secondary education normally having a greater sway on the variation in income inequality, as its coefficient is higher than the coefficient on tertiary education. The empirical results also show that a highly unequal distribution of education level completion is associated with higher income inequality. This relationship is robust and statistically significant (Pose & Tselios, 2008:21-22).

However the impact of educational attainment on income inequalities depends on the balance between composition effect, and wage compression effect. Composition effect means that an increase in tertiary education tends at least initially to increase income inequality, while wage compression effect means that over time education leads to a reduction in income inequality. An increase in tertiary education reduces wages of highly-educated workers, because their supply goes up, and simultaneously raises wages of less-educated workers, because their supply goes down. Hence, a rise in educated labor supply increases competition for positions which need advanced educational certifications and thereby should reduce income inequality between the more and less educated. Moreover, increasing proportion of population attaining a higher level of education leads, in the long-run, to decrease wages for highly-educated workers. Thus, the effect of education on income inequality depends on the balance between supply and demand of labor market. Due to the importance of education in reducing income inequality, it is essential to improve educational attainment, and that requires improving the access to education (coverage component), development of the quality of

education, and increasing investment in education (Pose & Tselios, 2008:7-10). Sen underscores the important role of public policies in general in affecting the quality of life and longevity of population, but in order to reach economic opportunities we need in addition to education a variety of economic influences including epidemiological policies, healthcare, educational facilities, and so on (Sen, 1997: 387).

The previous review of the theoretical literature shows the importance of education in improving "jobs and economic" opportunities. The human capital equation states that wages depend on years of schooling, and most of the studies, such as Pose (2008), Sen (1992, 1997), Inoescu (2012), and Saito (2003) confirmed the positive impacts of education on social and economic outcomes. Hence, it can be concluded that investment in improving education opportunities can make social and economic mobility, because achieving high level of education will improve the productivity of individuals and expand their capabilities, which will increase their "jobs and economic" opportunities and their human well-being. These results shall be tested in the following section by reflecting on the situation in Egypt during the period (2000-2012).

3 The Applied Section

In this section the study analyzes the role of education in opportunity development in Egypt during the period of (2000-2012), in view of the results presented in the literature review section.

3.1 Data, hypothesis, and aims of the applied study

Our sample includes the calculated 'educational' opportunities, and "jobs and economic" opportunities in twenty seven Egyptian governorates over the span of thirteen years (2000-2012). The hypothesis underlying this applied section is that 'educational' opportunities can improve "jobs and economic" opportunities in the Egyptian governorates. Accordingly, the main aim of this section is examine the way in which "the educational" opportunities in Egyptian governorates can reflect on "jobs and economic" opportunities during the period of (2000-2012). The applied study is divided into three practical sub-parts as follows:

- 1 - Measuring the spatial change of opportunities in Egypt: on the level of the governorates of Egypt, we calculate 'educational' opportunities, "jobs and economics" opportunities, and 'total' opportunities during the period (2000-2012) by using MOI methodology, and then

we examine the change in the geography of opportunities across Egyptian governorates between 2000 and 2012 to determine the spatial change of opportunities in Egypt, and the change of advantaged and disadvantaged governorates.

- 2 - Measuring the regional inequalities in Egypt: on the national level of Egypt, HOI methodology is used in calculating 'educational' inequalities, and "jobs and economic" inequalities among Egyptian governorates (2000-2012).
- 3 - Testing the relationship between 'educational' opportunities, and "jobs and economic" opportunities in each governorate by using the suitable regression analysis.

3.2 Measuring the spatial change of opportunities in Egypt (2000-2012)

3.2.1 Methodology of calculating educational opportunities, "jobs and economics" opportunities, and total opportunities of Egyptian governorates (2000-2012).

According to opportunity indexing strategy (MOA,2012b:1), 'educational' opportunities, "jobs and economic" opportunities, and 'total' opportunities are calculated on the level of Egyptian governorates during the period (2000-2012), by using MOI methodology, which is a unique tool designed to provide a snapshot of what opportunity looks like, in three steps:

- 1 - First, normalizing the indicators: the indicators of 'educational' opportunities, and "jobs and economic" opportunities of Egyptian governorates are shown in [table (1)]. Those variables are chosen according to opportunity indexing strategy (MOA, 2012b:2). Normalization is important in order to include the indicators in a composite index via rescaling data to be all expressed in a common form. MOI uses a simple rescaling procedure that compares the performance of a governorate on a given indicator to the best and the worst performance observed in any governorate on the same indicator. The rescaled value is a value from zero to one hundred, where zero represents the worst possible outcome and one hundred represents the best possible outcome. The general formula for rescaling positive indicators (such as indicators of education dimension) using this method is shown in equation (1) (MOA, 2012b:3). In case of rescaling negative indicators (such as the

indicators of "jobs and economic" dimension using this method, higher values do not represent desirable outcomes, then one final rescaling step has to be done by subtracting the outcome of the rescaling formula from one before multiplying by one hundred, as shown in equation (2) (MOA,2012b:3).

$$\text{Observed Outcome Rescaled} = \left(\frac{\text{ObservedOutcome} - \text{WorstOutcome}}{\text{BestOutcome} - \text{WorstOutcome}} \right) \times 100(1)$$

$$\text{Observed Outcome Rescaled} = \left\{ 1 - \frac{\text{ObservedOutcome} - \text{WorstOutcome}}{\text{BestOutcome} - \text{WorstOutcome}} \right\} \times 100(2)$$

- 2 - Second, averaging the rescaled scores together within each dimension of the index once all indicators of 'educational' opportunities and "jobs and economic" opportunities are on a scale of zero to one hundred. "Educational" opportunities are the average of rescaled values for 'educational' indicators [table (1)]. "jobs and economics" opportunities are the average of rescaled values for "jobs and economic" indicators [table (1)]. "Educational" opportunities, and "jobs and economics" opportunities of Egyptian governorates scores range from zero to one hundred, and those scores can be used to rank these Egyptian governorates [tables (2), (3)].
- 3 - Third, averaging dimensions scores together to calculate the multidimensional opportunity index: 'total' opportunities of governorates of Egypt are the average of 'educational' opportunities, and "jobs and economic" opportunities and they are expressed as values between zero and one hundred. This is the final opportunity score, and it can be used to rank Egyptian governorates on multi-dimensional opportunity index (MOI) [table (4)].

Table 1: Governorate-level Opportunity Index (MOI) Indicators

Dimension	Indicator	Data sources (2000- 2010)
Education	1 - High school graduation (as % of secondary enrollment) of the governorates of Egypt (2000-2012) (%).	1 - UNDP, Egypt Human Development Report, 2003, 2004, 2005, 2006, 2008, 2010. 2- Years 2007, 2009, 2010, 2011, and 2012 from: Annual Bulletin of Labor Force Sample Survey in the Arab Republic of Egypt, 2007, 2009, 2010, 2011, 2012. http://www.censusinfo.-capmas.gov.eg

Cont/ Table 1: Governorate-level Opportunity Index (MOI) Indicators

Dimension	Indicator	Data sources (2000- 2010)
	2 - Percentage of population 15+ with secondary education and more (Total) of the governorates of Egypt (2000-2012) (%).	1 - UNDP, EGYPT HUMAN DEVELOPMENT REPORT, 2000, 2003, 2004, 2005, 2008. 2 - Years from 2009 to 2012 from: http://www.censusinfo.capmas.gov.eg
Jobs and local economy	1 - Unemployment rate (total) of the governorates of Egypt (2000-2012) (%).	1 - UNDP, EGYPT HUMAN DEVELOPMENT REPORT, 2003, 2004,2005,2008,2010. 2- Years 2000, 2003, and 2005 from: Annual Bulletin of Labor Force Sample Survey in the Arab Republic of Egypt, 2000, 2003, 2005. http://www.censusinfo.capmas.gov.eg 3- Years from 2008 to 2012 from: Statistical Yearbook 2015. http://www.censusinfo.capmas.gov.eg
	2 - Poor persons (% of total population) (total) of the governorates of Egypt (2000-2012) (%).	1 - UNDP, EGYPT HUMAN DEVELOPMENT REPORT, 2000, 2003, 2004, 2005, 2008, 2010. 2 - Year 2003 is an average of years 2002, and 2004. 3 - Years 2006, and 2007 are the average of years 2004/2005, and 2008/2009. Years from 2010 to 2012 from: : http://www.censusinfo.capmas.gov.eg

Table 2: Development of "Educational" Opportunities in Egyptian Governorates (2000-2012) (%)

Governorates	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Δ opportunity
Cairo	95.19	77.73	86.03	87.36	87.36	85.40	84.95	80.40	83.12	79.91	75.89	82.62	89.79	-5.40
Alexandria	81.95	63.99	74.58	72.41	72.41	74.05	73.70	77.71	74.61	69.41	64.90	67.30	80.09	-1.86
Port-Said	97.96	88.89	94.71	92.13	92.13	75.75	75.75	88.10	89.88	89.65	85.28	83.58	94.26	-3.70
Suez	86.75	86.57	84.09	73.98	73.98	68.10	68.37	74.69	81.76	84.52	77.06	82.16	87.28	0.53

Cont/ Table 2: Development of "Educational" Opportunities in Egyptian Governorates (2000-2012) (%)

Governorates	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Δ opportunity
Damietta	67.92	57.22	63.03	67.40	67.40	47.22	47.66	62.15	70.53	70.39	57.43	58.31	67.17	-0.75
Dakahlia	69.39	53.35	56.36	67.61	67.61	49.70	49.61	57.16	70.70	72.77	58.38	55.32	68.10	-1.29
Sharkia	66.32	56.73	59.08	58.39	58.39	40.29	40.21	61.11	68.96	66.44	52.52	59.88	64.86	-1.46
Kalyoubia	71.30	58.38	67.59	67.08	67.08	65.51	65.60	60.94	65.05	53.15	44.41	49.22	68.39	-2.91
Kafr El-Sheikh	60.39	31.53	49.70	58.01	58.01	34.79	34.79	18.53	53.83	59.24	55.20	47.20	52.99	-7.40
Gharbia	74.35	67.09	65.98	61.17	61.17	57.72	57.72	64.01	73.41	61.49	58.18	54.98	68.04	-6.31
Menoufia	70.36	55.94	58.48	62.88	62.88	47.54	47.63	59.78	65.82	50.85	44.33	38.67	61.44	-8.92
Behera	56.45	37.79	44.78	45.01	45.01	28.66	28.66	41.39	45.05	43.89	41.66	47.88	48.31	-8.14
Ismailia	77.45	74.03	68.47	76.62	76.62	56.56	56.21	71.64	68.52	55.41	53.52	61.67	73.14	-4.31
Giza	27.58	49.80	58.17	63.23	63.23	62.62	61.73	52.40	72.55	61.71	55.79	54.94	62.97	35.39
Beni-Suef	53.37	46.54	47.65	47.47	47.47	27.66	27.30	43.00	46.48	34.73	11.61	49.11	47.17	-6.20
Fayoum	52.97	4.81	34.22	41.84	41.84	54.54	54.27	20.51	46.45	40.24	39.69	42.27	36.27	-16.70
Menia	54.83	37.16	46.05	49.11	49.11	15.97	15.70	39.32	44.42	40.77	26.56	43.44	34.56	-20.27
Assyout	59.79	39.79	50.38	47.29	47.29	32.01	31.48	41.73	44.04	44.23	24.06	31.99	43.06	-16.73
Suhag	51.95	38.94	46.91	33.01	33.01	3.29	3.21	41.60	38.38	24.26	19.75	25.24	39.43	-12.52
Quena	48.92	24.32	24.97	41.17	41.17	12.49	12.49	35.90	42.27	36.11	32.11	15.44	43.84	-5.08
Luxor city	58.17	50.24	59.52	37.46	37.46	33.89	34.07	48.11	26.16	58.00	39.35	24.13	59.34	1.17
Aswan	71.22	51.45	53.08	54.69	54.69	33.37	33.19	59.18	60.90	54.33	23.51	47.30	45.97	-25.25
Red Sea	85.39	90.00	91.11	91.11	91.11	55.98	53.49	75.41	89.88	52.97	83.47	89.30	96.99	11.60
New Valley	87.85	66.04	87.67	79.92	79.92	62.18	62.45	100.00	88.50	100.00	100.00	96.63	96.35	8.50
Matrouh	44.90	30.00	0.00	0.00	0.00	30.54	30.54	64.21	17.26	40.74	18.52	8.11	0.00	-44.90
North Sinai	64.49	60.02	60.48	43.54	43.54	27.15	27.86	55.44	25.24	57.26	46.06	45.30	73.51	9.02
South Sinai	84.53	88.61	72.14	66.85	66.85	53.98	50.77	75.01	82.63	80.58	70.81	73.16	76.36	-8.17
average	67.47	55.07	59.45	58.77	58.77	45.81	45.53	58.13	60.61	58.63	50.37	53.15	62.21	

Source: "Educational" opportunities are calculated according to MOI

Table 3: Development of "Jobs and Economic" Opportunities in Egyptian Governorates (2000-2012) (%)

Governorates	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Δ opportunity
Cairo	86.70	72.55	84.23	81.18	84.79	76.10	69.45	63.83	76.18	76.38	60.65	64.35	56.83	-29.87
Alexandria	89.06	69.98	86.16	83.29	86.57	74.72	71.35	61.91	73.07	72.98	70.66	57.63	62.11	-26.95
Port-Said	81.22	69.06	93.96	61.67	46.03	49.76	69.53	66.22	47.25	47.25	67.49	45.53	34.23	-46.99
Suez	81.89	75.41	69.86	72.40	61.36	52.85	69.96	74.42	63.19	74.02	71.00	75.10	69.82	-12.07
Damietta	94.67	82.95	100.00	96.52	87.11	71.16	85.46	84.54	83.34	92.26	76.07	69.18	76.86	-17.81
Dakahlia	67.65	48.11	56.25	75.52	83.17	78.22	71.25	61.76	75.63	71.19	71.05	71.25	67.84	0.19
Sharkia	72.29	57.26	69.55	67.61	61.49	49.08	55.58	49.56	68.23	73.18	51.36	77.75	67.91	-4.38
Kalyoubia	79.12	68.89	79.91	80.93	78.99	74.81	71.46	72.29	78.28	81.86	73.71	68.27	65.65	-13.47
Kafr El-Sheikh	72.79	53.46	75.49	77.32	69.46	83.13	78.46	64.91	69.93	79.65	73.13	65.56	65.59	-7.20
Gharbia	76.61	49.71	72.83	84.60	79.78	80.53	69.52	62.87	78.78	79.51	62.33	66.02	65.01	-11.60
Menoufia	73.36	54.69	68.98	76.67	74.87	79.47	72.73	71.75	77.54	78.86	46.08	78.44	82.14	8.78
Behera	73.62	61.85	70.86	75.51	72.63	73.32	61.99	67.12	71.13	75.44	72.89	78.22	79.09	5.47
Ismailia	75.83	72.56	70.86	57.64	54.04	46.57	75.99	60.95	66.18	72.26	67.56	70.05	66.14	-9.69
Giza	80.11	71.09	84.26	82.62	81.06	76.64	63.92	70.80	65.71	64.78	76.54	68.60	57.55	-22.56
Beni-Suef	56.03	32.39	49.62	60.00	65.26	46.90	42.38	59.78	66.28	66.28	44.28	72.66	67.28	11.25
Fayoum	67.78	44.65	61.76	69.61	82.26	91.76	83.25	81.35	71.98	76.54	48.34	54.41	55.61	-12.17
Menia	68.05	56.98	69.65	64.33	47.16	47.46	71.76	60.24	69.07	73.04	47.64	70.12	67.28	-0.77
Assyout	31.22	14.34	22.45	33.09	34.54	33.11	41.49	29.28	32.90	36.82	0.00	35.31	36.13	4.91
Suhag	49.10	31.56	45.16	44.49	49.40	49.88	42.89	39.83	44.17	52.70	27.32	43.69	40.48	-8.62
Quena	51.00	37.19	57.89	43.41	50.78	44.64	50.88	52.65	48.45	55.40	40.89	52.32	39.08	-11.92
Luxor city	61.71	34.09	66.02	67.49	69.34	84.28	45.85	31.66	23.49	19.71	45.51	41.60	35.45	-26.26
Aswan	29.37	29.37	32.03	29.86	34.95	51.60	33.63	47.78	52.23	60.46	33.73	43.43	50.31	20.94
Red Sea	77.61	78.81	79.67	70.21	78.21	87.33	80.05	89.27	70.01	78.48	74.04	79.18	59.47	-18.14
New Valley	70.50	53.62	70.96	83.83	83.04	89.16	66.22	52.10	83.00	73.88	84.42	69.07	52.81	-17.69
Matrouh	82.74	85.79	75.04	70.62	75.79	76.53	80.05	84.01	70.45	81.20	65.16	78.47	74.41	-8.33
North Sinai	71.67	73.00	69.03	70.28	68.54	50.78	78.63	83.35	86.90	85.59	52.20	72.57	44.58	-27.09
South Sinai	74.15	88.11	83.64	81.40	76.51	52.73	84.95	70.19	58.97	78.06	78.38	89.26	94.74	20.59
average	70.22	58.05	69.12	68.97	68.04	65.65	66.25	63.50	65.64	69.55	58.61	65.11	60.53	

Source: "jobs and economic" opportunities are calculated according to MOI.

Table: 4 Development of ‘total’ opportunities of governorates of Egypt (2000-2012) (%)

Governorates	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Δ opportunity
Cairo	90.95	75.14	85.13	84.27	86.08	80.75	77.20	72.12	79.65	78.15	68.27	73.49	73.31	-17.64
Alexandria	85.51	66.99	80.37	77.85	79.49	74.39	72.53	69.81	73.84	71.20	67.78	62.47	71.10	-14.41
Port-Said	89.59	78.98	94.34	76.90	69.08	62.76	72.64	77.16	68.57	68.45	76.39	64.56	64.25	-25.34
Suez	84.32	80.99	76.98	73.19	67.67	60.48	69.17	74.56	72.48	79.27	74.03	78.63	78.55	-5.77
Damietta	81.30	70.09	81.52	81.96	77.26	59.19	66.56	73.35	76.94	81.33	66.75	63.75	72.02	-9.28
Dakahlia	68.52	50.73	56.31	71.57	75.39	63.96	60.43	59.46	73.17	71.98	64.72	63.29	67.97	-0.55
Sharkia	69.31	57.00	64.32	63.00	59.94	44.69	47.90	55.34	68.60	69.81	51.94	68.82	66.39	-2.92
Kalyoubia	75.21	63.64	73.75	74.01	73.04	70.16	68.53	66.62	71.67	67.51	59.06	58.75	67.02	-8.19
Kafr El-Sheikh	66.59	42.50	62.60	67.67	63.74	58.96	56.63	41.72	61.88	69.45	64.17	56.38	59.29	-7.30
Gharbia	75.48	58.40	69.41	72.89	70.48	69.13	63.62	63.44	76.10	70.50	60.26	60.50	66.53	-8.95
Menoufia	71.86	55.32	63.73	69.78	68.88	63.51	60.18	65.77	71.68	64.86	45.21	58.56	71.79	-0.07
Behera	65.04	49.82	57.82	60.26	58.82	50.99	45.33	54.26	58.09	59.67	57.28	63.05	63.70	-1.34
Ismailia	76.64	73.30	69.67	67.13	65.33	51.57	66.10	66.30	67.35	63.84	60.54	65.86	69.64	-7.00
Giza	53.85	60.45	71.22	72.93	72.15	69.63	62.83	61.60	69.13	63.25	66.17	61.77	60.26	6.41
Beni-Suef	54.70	39.47	48.64	53.74	56.37	37.28	34.84	51.39	56.38	50.51	27.95	60.89	57.23	2.53
Fayoum	60.38	24.73	47.99	55.73	62.05	73.15	68.76	50.93	59.22	58.39	44.02	48.34	45.94	-14.44
Menia	61.44	47.07	57.85	56.72	48.14	31.72	43.73	49.78	56.75	56.91	37.10	56.78	50.92	-10.52
Assyout	45.51	27.07	36.42	40.19	40.92	32.56	36.49	35.51	38.47	40.53	12.03	33.65	39.60	-5.91
Suhag	50.53	35.25	46.04	38.75	41.21	26.59	23.05	40.72	41.28	38.48	23.54	34.47	39.96	-10.57
Quena	49.96	30.76	41.43	42.29	45.98	28.57	31.69	44.28	45.36	45.76	36.50	33.88	41.46	-8.50
Luxor city	59.94	42.17	62.77	52.48	53.40	59.09	39.96	39.89	24.83	38.86	42.43	32.87	47.40	-12.54
Aswan	50.30	40.41	42.56	42.28	44.82	42.49	33.41	53.48	56.57	57.40	28.62	45.37	48.14	-2.16
Red Sea	81.50	84.41	85.39	80.66	84.66	71.66	66.77	82.34	79.95	65.73	78.76	84.24	78.23	-3.27
New Valley	79.18	59.83	79.32	81.88	81.48	75.67	64.34	76.05	85.75	86.94	92.21	82.85	74.58	-4.60
Matrouh	63.82	57.90	37.52	35.31	37.90	53.54	55.30	74.11	43.86	60.97	41.84	43.29	37.21	-26.61
North Sinai	68.08	66.51	64.76	56.91	56.04	38.97	53.25	69.40	56.07	71.43	49.13	58.94	59.05	-9.03
South Sinai	79.34	88.36	77.89	74.13	71.68	53.36	67.86	72.60	70.80	79.32	74.60	81.21	85.55	6.21
average	68.85	56.57	64.29	63.87	63.41	55.73	55.89	60.81	63.13	64.09	54.49	59.14	61.37	

Source: ‘total’ opportunities are calculated according to MOI.

3.2.2 Results of calculating 'educational' opportunities, "jobs and economics" opportunities, and "total" opportunities of Egyptian governorates (2000-2012)

Development of 'educational' opportunities, "jobs and economic" opportunities, and 'total' opportunities of Egyptian governorates during the period (2000-2012), which are calculated according to MOI, are shown in [tables (2), (3), and (4)]. Changes in 'educational' opportunities, "jobs and economic" opportunities, and 'total' opportunities of Egyptian governorates during the period (2000-2012) are shown by visualizing the results in a series of panel plots. For each kind of the calculated opportunities, the panel includes a scatter plot of opportunity score in 2000 (x-axis), and in 2012 (y-axis) with the median values of each variable used to locate four quadrants [fig.2, fig.3, and fig.4].

Quadrant I includes governorates whose opportunity scores are above the median in 2000, and are also above the median in 2012. Quadrant II includes governorates whose opportunity scores are below the median in 2000, but are above the median in 2012. Quadrant III includes governorates whose opportunity scores are below the median in 2000, and are also below the median in 2012. Quadrant IV includes the governorates whose opportunity scores are above the median in 2000, but are below the median in 2012 (Wilson & Greenlee, 2016: 630).

Governorates which fall into each of the four quadrants are pictured in a thematic map [fig.2, fig.3, and fig.4]. For each kind of opportunity, quadrant I refers to the advantaged governorates, because their levels of opportunities are high, and greater than the average level of opportunities in year 2000 and year 2012. Quadrant II refers to an improvement, because the level of opportunities was less than the average level in year 2000 and became greater than the average level in year 2012. While quadrant III refers to the disadvantaged governorates, because their levels of opportunities are low and smaller than the average level of opportunities in year 2000 and year 2012. Quadrant IV refers to a deterioration, because the level of opportunities was above the average level in year 2000 and became less than the average level in year 2012. Table(5) shows the results of the classification of Egyptian governorates into four quadrants in each type of opportunity, and according to these results we developed a reclassification of Egyptian governorates into the following categories:

- 1 - Advantaged governorates in both 'educational' opportunities and "jobs and economics" opportunities; these include the governorates

of Alexandria, Suez, Damietta, Kalyoubia, Gharbia, Ismailia, and South Sinai, which form about twenty five percent of Egyptian governorates and twenty percent of Egypt total population⁽¹⁾.

- 2 - Advantaged governorates in 'educational' opportunities only; these include the governorates of Cairo, Port-Said, Dakahlia, Red Sea, and New Valley, which form about nineteen percent of Egyptian governorates and twenty percent of Egypt 'total' population, although the governorates of Cairo, Port-Said, Red Sea, and New Valley fall in quadrant IV of "jobs and economic" opportunities, which means that their levels of "jobs and economic" opportunities had deteriorated in 2012 despite their high levels of the 'educational' opportunities. The governorate of Dakahlia, however, falls in quadrant II, which means that its level of "jobs and economics" opportunities had improved in the year 2012.
- 3 - Advantaged governorates in "jobs and economic" opportunities only; these include the governorates of Sharkia, Kafr El-Sheikh, Menoufia, Behera, and Matrouh, which form about nineteen percent of Egyptian governorates, and twenty-three percent of Egypt "total" population, but they include disadvantaged governorates in 'educational' opportunities, represented by the governorates of Kafr El-Sheikh, Behera, and Matrouh, as they fall in quadrant III of 'educational' opportunities, while the governorate of Menoufia falls in quadrant IV of 'educational' opportunities.
- 4 - Disadvantaged governorates in both 'educational' opportunities, and "jobs and economic" opportunities; these include the governorates of Fayoum, Assyout, Suhag, Quena, and Luxor city, which form about nineteen percent of Egyptian governorates, and eighteen percent of Egypt total population.

The different observed levels of opportunities across the various governorates of Egypt shows the case of geographical or horizontal inequalities which reflects the concept of inequality of opportunity, because the different observed levels of opportunities resulted from geographic characteristics, which are considered as exogenous conditions to the

(1) The capability approach is considered as a rejection of the economic model of individuals which concentrates on maximizing individuals' self-interest regardless of relationships and emotions, and a recognition of the diversity of human needs and priorities.

individuals who live in Egyptian governorates. One reason of inequality of opportunity in Egypt is financial ecentralization which leads to the concentration of investments in some governorates (Al-Hefnawi, 2002:48).

Table 5: Changes in Opportunities in Egyptian Governorates (2000-2012)

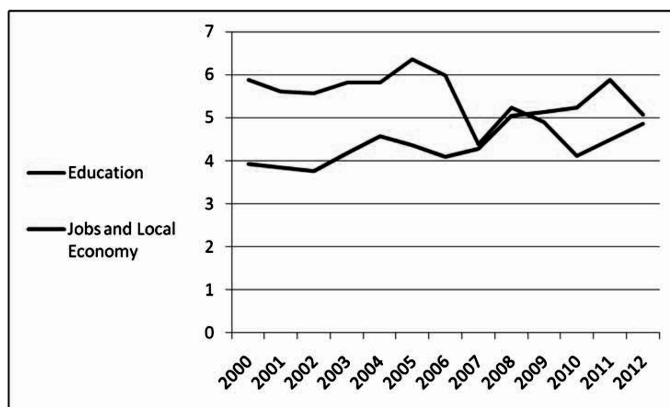
Dimension	Quadrant I	Quadrant II	Quadrant III	Quadrant IV
Education	Cairo Alexandria Port-Said Suez Damietta Dakahlia Kalyoubia Gharbia Ismailia Red Sea New Valley South Sinai	Sharkia Giza North Sinai	Kafr El-Sheikh Behera Beni-Suef Matrouh Fayoum Menia Assyout Suhag Quena Luxor city	Menoufia Aswan
Jobs and Local Economy	Alexandria-Suez Damietta-Sharkia Kalyoubia Kafr El-Sheikh Gharbia- Menoufia Behera - Ismailia Matrouh-South Sinai	Dakahlia Beni-Suef Menia	Fayoum Assyout Suhag Quena Luxor city Aswan	Cairo Port-Said Giza Red Sea New Valley North Sinai
Total	Cairo Alexandria Port-Said Suez Damiett Sharkia Kalyoubia Gharbia Menoufia Ismailia Red Sea New Valley South Sinai	Dakahlia Behera	Kafr El-Sheikh Giza Beni-Suef Fayoum Menia Assyout Suhag Quena Luxor city Aswan Matrouh North Sinai	

Source: author findings

Table 6: Inequalities among the Egyptian Governorates (2000-2012) (%)

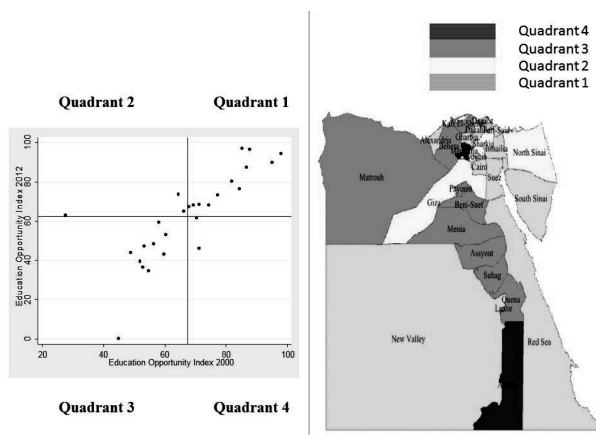
Dimension	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Change (2000-2012)
Education	5.87	5.62	5.57	5.82	5.82	6.35	5.98	4.38	5.23	4.9	4.11	4.48	4.86	-1.01
Jobs and Local Economy	3.92	3.84	3.77	4.18	4.58	4.36	4.10	4.28	5.04	5.14	5.24	5.88	5.08	1.16

Source: Inequalities are calculated according to HOI.



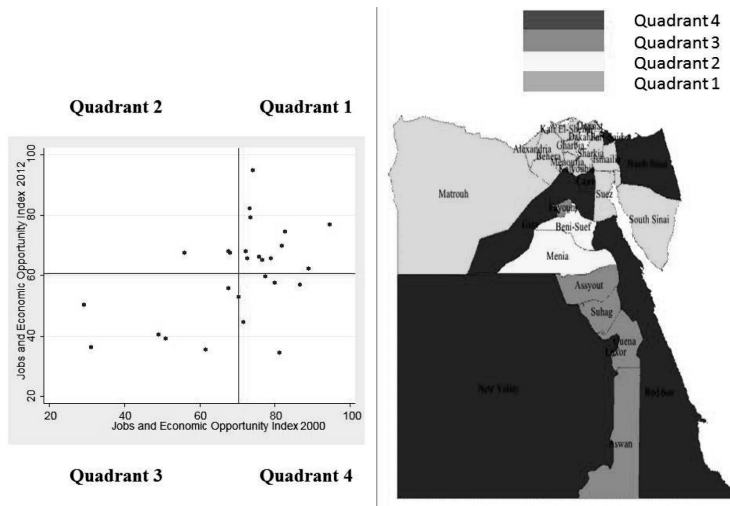
Source: Author findings

Fig.1 Development of Educational and Job and Economic Inequalities in Egypt (2000-2012)



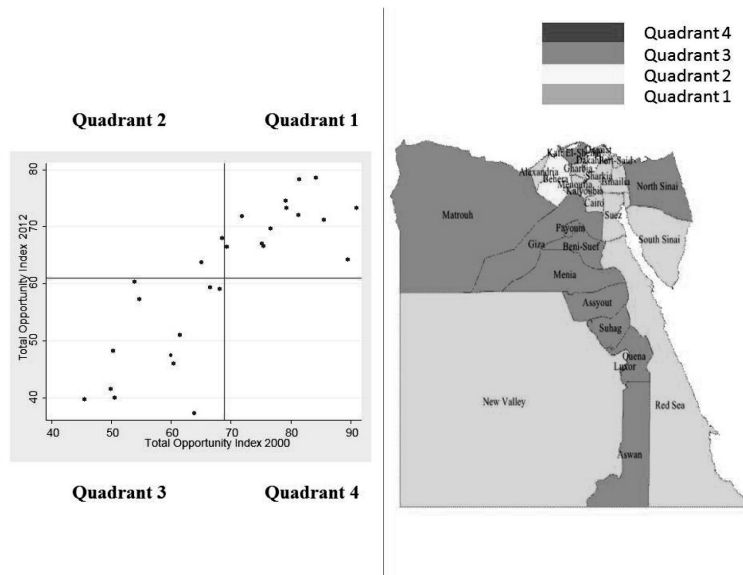
Source: Author findings

Fig. 2 Change in Education Opportunity Index of Egyptian Governorates (2000-2012)



Source: Author findings

Fig.3 Change of Job and Economic Opportunity Index in Egyptian Governorates (2000-2012)



Source: Author findings

Fig. 4 Change of 'Total' Opportunity Index in Egyptian Governorates (2000-2012)

3.3 Measuring 'educational' inequalities, and "jobs and economic" inequalities among Egyptian governorates

Inequality is a term that obviously suggests a departure from some idea of equality (Villaverde & Maza, 2009: 11). Inequality can be used to refer to both inequalities of distribution of outcomes (such as income inequalities), and inequalities of opportunities (Paes de Barros et al., 2009: 1-40). It is clear from the results of the change of different kinds of opportunities of Egyptian governorates, that there are spatial differences in the distribution of opportunities in Egypt during the period (2000-2012). On the national level of Egypt 'educational' inequalities, and "jobs and economic" inequalities of Egypt during the period (2000-2012) are calculated by using HOI methodology. 'Educational' inequalities, and "jobs and economic" inequalities of Egypt are shown in [table (6)]. HOI in equation (3) is a measure of the coverage rate of an opportunity discounted by inequality in its distribution across groups (governorates of Egypt). HOI value extends from zero to one hundred percent, and one hundred percent means achieving the universal coverage for all basic services. Inequality in access (or D-Index) is shown in equation (4).

$$HOI = (1 - D) \times C \quad (3)$$

Where C: overall coverage (the level of opportunity on the national level)

(1-D): effect of inequality on coverage

$$D = \frac{1}{2C} \sum_{k=1}^m \alpha_k |C - C_k| \quad (4)$$

Where m: number of groups (number of governorates)

C_k : Coverage of the group k (the level of opportunity on the governorates)

α_k : Share of group (governorate) k in total population

D refers to The D-index, the measure of inequality of opportunity, which is a version of the dissimilarity index. The D-index ranges from zero to one (zero to one hundred in percentage terms), and in a situation of perfect equality of opportunity D will be zero (Paes de Barros et al., 2009: 64-65). According to D-index, we calculate 'educational' inequalities, and "jobs and economic" inequalities among Egyptian governorates (2000-2012) in two steps:

- 1 - Step One, calculating inequalities among Egyptian governorates for each variable shown in [table (1)]. The D-Index model was applied for each variable [high school graduation as % of secondary enrollment of Egyptian governorates, Percentage of population 15+ with secondary education and more (Total) of Egyptian governorates, Unemployment rate (total) of Egyptian governorates, and Poor persons (% of total population) (total) of Egyptian governorates].
- 2 - Step Two: calculating 'educational' inequalities among Egyptian governorates by averaging of educational indicators inequalities which are calculated from step one. Then "jobs and economic" inequalities among Egyptian governorates are the average of "jobs and economic" indicators inequalities, which are calculated from step one.

The results are shown in [table (6)], and [fig.1], and they show that there is downward trend in 'educational' inequalities, while there is upward trend in "jobs and economic" inequalities.

3.4 Testing how 'educational' opportunities can affect "jobs and economic" opportunities in Egyptian governorates during (2000-2012)

3.4.1 Variables of the model

By using the calculated 'educational' opportunities and "jobs and economic" opportunities of Egyptian governorates over thirteen years from year 2000 to year 2012 and across twenty seven governorates [tables (2), (3)], we test our hypothesis of assuming that 'educational' opportunities can improve "jobs and economic" opportunities at Egyptian governorates. Hence the following regression model is estimated to test that hypothesis:

$$JEGMOI = C + \sum_{i=2}^{27} \delta_i (D_i^* EDFMOI) + \mu_{it} \quad (5)$$

$$R^2 = 0.565571, \bar{R}^2 = 0.530709$$

The dependent variable JEGMOI refers to "jobs and economics" opportunities of Egyptian governorates during (2000-2012) [see table (3)]. The explanatory variable ($D_i^* EDFMOI$), is the interaction between dummy variables of governorates of Egypt D_i , which takes values from one to twenty seven where two equal Alexandria, and educational opportunities of governorates of Egypt during (2000-2012) EDFMOI [see table (2)].

We have twenty seven governorates, and thirteen observations, so the study implemented the least squares dummy variable (LSDV) regression model, which assumes that the intercept varies across governorates (Gujarati, 2004:640-652) in order to analyze the impact of governorates instead of testing separate models for each governorate. We expected positive impact of the independent variable on the dependent variable. The results are shown in [table (7)]. The estimated model explains fifty seven percent of the variations in "jobs and economics" opportunities of Egyptian governorates. The effect of Cairo governorate equals the constant (63.99382), which means that the initial value of JEGMOI in Cairo equals 63.99382, while the value of JEGMOI in Alexandria equals the constant term plus Alexandria parameter ($63.994 + 0.136 = 64.130$).

We tested if our estimated model suffers from any econometric problems, such as Serial Correlation, Heteroskedasticity, and Multicollinearity to get valid regression. For Serial Correlation problem: one interpretation of serial correlation in the errors of a panel data model is that the error in each time period contains a time-constant omitted factor, and we focus on the alternative that the error is a first-order autoregressive process under the null hypothesis of no serial correlation $p_1 = 0$ (Wooldridge, 2002: 176). We run the model depending on the error estimated from the model in equation (5), $p_1 = 0.221$ and $p\text{-value} = 0.084$, then the model does not suffer from serial correlation at significant level 95% [table(9)]. For Heteroskedasticity problem: the errors of the model may increase as the value of independent variables increases, hence in case of heteroskedasticity the OLS estimates are no longer BLUE and the standard errors are biased; our model does not suffer from heteroskedasticity problem [table (10)], and according to correlation coefficients matrix among our independent variables there is no Multicollinearity problem.

Table 7: Results of Regression Analysis

Dependent Variable: JEGMOI

Method: Panel Least Squares

Date: 03/13/18 Time: 21:23

Sample: 2000 2012

Periods included: 13

Cross-sections included: 27

Total panel (balanced) observations: 351

Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	63.99382	2.881142	22.21127	0.0000
ALEXANDRIA*EDGMOI	0.136277	0.040997	3.324098	0.0010
PORT_SAID*EDGMOI	-0.043286	0.058253	-0.743066	0.4580
SUEZ*EDGMOI	0.080810	0.045009	1.795401	0.0735
DAMIETTA*EDGMOI	0.337782	0.048918	6.905012	0.0000
DAKAHLIA*EDGMOI	0.088881	0.059568	1.492107	0.1366
SHARKIA*EDGMOI	0.001273	0.060643	0.020993	0.9833
KALYOUBIA*EDGMOI	0.176648	0.043897	4.024189	0.0001
KAFR_EL_SHEIKH*EDGMOI	0.159394	0.068409	2.330020	0.0204
GHARBIA*EDGMOI	0.115715	0.049462	2.339471	0.0199
MENOUFIA*EDGMOI	0.145298	0.064145	2.265154	0.0242
BEHERA*EDGMOI	0.189813	0.072913	2.603297	0.0097
ISMAILIA*EDGMOI	0.026552	0.057713	0.460076	0.6458
GIZA*EDGMOI	0.137755	0.053410	2.579200	0.0103
BENI_SUEF*EDGMOI	-0.146718	0.107154	-1.369224	0.1719
FAYOUM*EDGMOI	0.156575	0.105843	1.479321	0.1400
MENIA*EDGMOI	-0.016252	0.097095	-0.167378	0.8672
ASSYOUT*EDGMOI	-0.784278	0.106623	-7.355614	0.0000
SUHAG*EDGMOI	-0.557962	0.118296	-4.716647	0.0000
QUENA*EDGMOI	-0.445257	0.100340	-4.437477	0.0000

Cont/ Table 7: Results of Regression Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LUXOR*EDGMOI	-0.348337	0.124502	-2.797846	0.0055
ASWAN*EDGMOI	-0.443835	0.087143	-5.093196	0.0000
RED_SEA*EDGMOI	0.148164	0.043951	3.371111	0.0008
NEW_VALLEY*EDGMOI	0.085216	0.048143	1.770052	0.0777
MATROUH*EDGMOI	0.408620	0.094398	4.328695	0.0000
NORTH_SINAI*EDGMOI	0.095127	0.084290	1.128569	0.2599
SOUTH_SINAI*EDGMOI	0.190139	0.062508	3.041854	0.0025
R-squared	0.565571	Mean dependent var		65.32558
Adjusted R-squared	0.530709	S.D. dependent var		16.43172
S.E. of regression	11.25651	Akaike info criterion		7.753574
Sum squared resid	41053.73	Schwarz criterion		8.050558
Log likelihood	-1333.752	Hannan-Quinn criter.		7.871771
F-statistic	16.22333	Durbin-Watson stat		1.576149
Prob(F-statistic)	0.000000			

T-test in brackets, 1.96 is significant at $p < 0.05$

Source: Author findings

Table 8: Public Expenditure on Education (%of GDP) in Egypt, and Human Development Index of Egypt (2001-2013)

Year	Public expenditure on education (%of GDP)*	Human Development Index**
2001/2002	5.2	0.653
2003/2004	5.1	0.659
2004	4.67072	0.702
2005/2006	4	0.625
2006	4.00178	...
2007/2008	3.8	0.640
2008	3.76083	

Cont/ Table 8: Public Expenditure on Education (%of GDP) in Egypt, and Human Development Index of Egypt (2001-2013)

Year	Public expenditure on education (%of GDP)*	Human Development Index**
2005-2010	3.8	0.635
2012	...	0.681
2013	...	0.682

Source: * UNDP, EGYPT HUMAN DEVELOPMENT REPORT, 2003, 2004, 2005,2006,2008,2010.

** The World Bank, [http:// www.worldbank.org](http://www.worldbank.org) < <http://www.worldbank.org> > .

... Not available

Table 9: Results of Testing of Serial Correlation Problem

Dependent Variable: JEGMOI

Method: Panel Least Squares

Date: 03/13/18 Time: 21:24

Sample (adjusted): 2001 2012

Periods included: 12

Cross-sections included: 27

Total panel (balanced) observations: 324

Cross-section SUR (PCSE) standard errors & covariance (d.f. corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	62.90418	2.887975	21.78141	0.0000
ERROR_TERM(-1)	0.220823	0.127379	1.733596	0.0840
ALEXANDRIA*EDGMOI	0.131122	0.041957	3.125136	0.0020
PORT_SAID*EDGMOI	-0.059470	0.059860	-0.993493	0.3213
SUEZ*EDGMOI	0.081427	0.045878	1.774851	0.0770
DAMIETTA*EDGMOI	0.341361	0.050887	6.708166	0.0000
DAKAHLIA*EDGMOI	0.111965	0.058373	1.918083	0.0561
SHARKIA*EDGMOI	0.010473	0.061221	0.171062	0.8643
KALYOUBIA*EDGMOI	0.188063	0.044575	4.219059	0.0000
KAFR_EL_SHEIKH*EDGMOI	0.183783	0.071629	2.565754	0.0108
GHARBIA*EDGMOI	0.125744	0.051198	2.456034	0.0146
MENOUFIA*EDGMOI	0.168781	0.066497	2.538182	0.0117

Cont/ Table 9: Results of Testing of Serial Correlation Problem

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BEHERA*EDGMOI	0.222982	0.073683	3.026243	0.0027
ISMAILIA*EDGMOI	0.026755	0.058370	0.458371	0.6470
GIZA*EDGMOI	0.140547	0.055706	2.522990	0.0122
BENI_SUEF*EDGMOI	-0.100264	0.110350	-0.908603	0.3643
FAYOUM*EDGMOI	0.191444	0.099541	1.923279	0.0554
MENIA*EDGMOI	-0.003961	0.103100	-0.038418	0.9694
ASSYOUT*EDGMOI	-0.785365	0.117051	-6.709614	0.0000
SUHAG*EDGMOI	-0.561181	0.124865	-4.494304	0.0000
QUENA*EDGMOI	-0.443784	0.107424	-4.131156	0.0000
LUXOR*EDGMOI	-0.359396	0.128058	-2.806514	0.0053
ASWAN*EDGMOI	-0.401023	0.091603	-4.377818	0.0000
RED_SEA*EDGMOI	0.152962	0.046094	3.318513	0.0010
NEW_VALLEY*EDGMOI	0.094824	0.051167	1.853217	0.0648
MATROUH*EDGMOI	0.424663	0.101860	4.169074	0.0000
NORTH_SINAI*EDGMOI	0.094339	0.089530	1.053715	0.2929
SOUTH_SINAI*EDGMOI	0.216704	0.065178	3.324791	0.0010
R-squared	0.583158	Mean dependent var		64.91799
Adjusted R-squared	0.545136	S.D. dependent var		16.46013
S.E. of regression	11.10131	Akaike info criterion		7.734459
Sum squared resid	36478.78	Schwarz criterion		8.061190
Log likelihood	-1224.982	Hannan-Quinn criter.		7.864872
F-statistic	15.33710	Durbin-Watson stat		1.917693
Prob(F-statistic)	0.000000			

The model does not suffer from Serial Correlation Problem at Significant Level 95%.

Table 10: Results of Testing of Heteroskedasticity Problem

Dependent Variable: ERROR_SQURE

Method: Panel Least Squares

Date: 03/13/18 Time: 21:25

Sample: 2000 2012

Periods included: 13

Cross-sections included: 27

Total panel (balanced) observations: 351

Cross-section SUR (PCSE) standard errors & covariance (d.f.corrected)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	216.0640	32.31164	6.686876	0.0000
ALEXANDRIA*EDGMOI	-1.681757	0.545225	-3.084521	0.0022
PORT_SAID*EDGMOI	0.639451	1.010988	0.632501	0.5275
SUEZ*EDGMOI	-2.156079	0.429204	-5.023440	0.0000
DAMIETTA*EDGMOI	-2.375326	0.605538	-3.922669	0.0001
DAKAHLIA*EDGMOI	-2.315055	0.683350	-3.387806	0.0008
SHARKIA*EDGMOI	-2.255544	0.697937	-3.231731	0.0014
KALYOUNIA*EDGMOI	-3.042018	0.538097	-5.653292	0.0000
KAHR EL SHEIKH*EDGMOI	-3.424979	0.721456	-4.747317	0.0000
GHARBIA*EDGMOI	-1.943101	0.754358	-2.575834	0.0104
MENOUFIA*EDGMOI	-2.307224	1.006235	-2.292928	0.0225
BEHERA*EDGMOI	-4.497225	0.755895	-5.949536	0.0000
ISMAILIA*EDGMOI	-2.144778	0.550796	-3.893962	0.0001
GIZA*EDGMOI	-2.425969	0.629363	-3.854644	0.0001
BENI_SUEF*EDGMOI	-1.694665	1.473671	-1.149961	0.2510
FAYOUM*EDGMOI	-1.346214	1.357577	-0.991630	0.3221
MENIA*EDGMOI	-3.350976	0.893928	-3.748597	0.0002
ASSYOUT*EDGMOI	-1.310834	3.744982	-0.350024	0.7265
SUHAG*EDGMOI	-3.492969	1.757007	-1.988022	0.0477
QUENA*EDGMOI	-4.467864	0.988588	-4.519439	0.0000

Cont/ Table 10: Results of Testing of Heteroskedasticity Problem

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LUXOR*EDGMOI	2.808178	2.184651	1.285413	0.1996
ASWAN*EDGMOI	-1.715302	1.043127	-1.644385	0.1011
RED_SEA*EDGMOI	-1.682372	0.589295	-2.854890	0.0046
NEW_VALLEY*EDGMOI	-0.689714	0.669717	-1.029859	0.3038
MATROUH*EDGMOI	-4.803490	1.238072	-3.879816	0.0001
NORTH_SINAI*EDGMOI	-0.708909	1.435923	-0.493696	0.6219
SOUTH_SINAI*EDGMOI	-1.294209	0.789114	-1.640077	0.1020
R-squared	0.162106	Mean dependent var		116.9622
Adjusted R-squared	0.094867	S.D. dependent var		191.6675
S.E. of regression	182.3495	Akaike info criterion		13.32353
Sum squared resid	10773431	Schwarz criterion		13.62051
Log likelihood	-2311.280	Hannan-Quinn criter.		13.44173
F-statistic	2.410908	Durbin-Watson stat		2.240826
Prob(F-statistic)	0.000203			

The model does not suffer from Heteroskedasticity problem.

3.4.2 Results of testing how educational opportunities can affect "jobs and economic" opportunities in Egyptian governorates during (2000-2012)

According to [table (7)] and [fig.5], we have two main results:

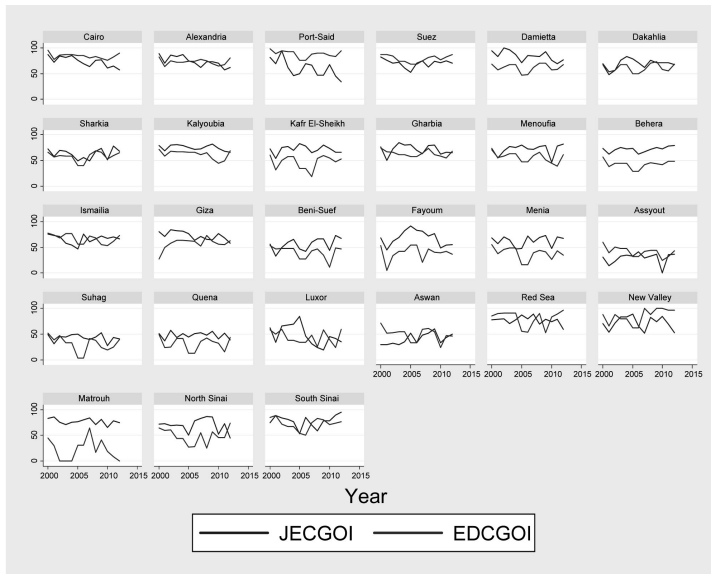
- 1 - There is a significant positive or negative effect of 'educational' opportunities on "jobs and economic" opportunities. Governorates characterized by a positive relationship between 'educational' opportunities and "jobs and economic" opportunities include twelve governorates or forty-five percent of the twenty seven governorates, and they are represented by the governorates of Cairo, Alexandria, Damietta, Kalyoubia, Kafr_el_sheikh, Gharbia, Menoufia, Behera, Giza, Red_sea, Matrouh, and South_sinai. Governorates characterized by a negative relationship between 'educational' opportunities and "jobs and economic" opportunities, include five governorates or

eighteen percent of the twenty seven governorates, and they are represented by the governorates of Assyout, Suhag, Quena, Luxor, and Aswan.

- 2 - The second group includes governorates characterized by an insignificant effect of 'educational' opportunities on "jobs and economic" opportunities, represented by ten governorates or thirty seven percent of the twenty seven governorates, namely the governorates of Port_said, Dakahlia, Sharkia, Ismailia, Menia, North sinai, Beni Suef, Suez, Fayoum, and New Valley.

The positive role of 'educational' opportunities on "jobs and economic" opportunities in some Egyptian governorates during the period (2000-2012) supports our literature review as Sen confirmed on the role of education in broadening two related aspects of human capabilities: (1) expansion of child capacity or ability, and (2) expansion in opportunities. Furthermore, according to a unique survey conducted in 2009/10 in 141 among the poorest 1,000 villages of Egypt covering a total of 10,568 households, it was found that having a minimum level of education at least can reduce both poverty and inequality (Verme et al.,2014: 9-10).

But the negative role or the insignificant effect of 'educational' opportunities on "jobs and economic" opportunities across Egyptian governorates during the period (2000-2012) are explained by 'educational' problems in Egypt; despite the absolute increase in the volume of public expenditure on education, the proportion of this expenditure to total public expenditure and GDP has declined in recent years from 5.2% of GDP in year (2001/2002) to 3.5% of GDP in during (2005-2010) [table(8)]. Also, there is inefficiency in the public spending on education in Egypt, where the vast majority of this expenditure is directed to current expenditure and not investment, as wages and compensation of employees account for the largest share of this expenditure, especially in pre-university education (about 88%). Hence, the size and quality of public expenditure on education in Egypt reduces the ability of education to improve "jobs and economic" opportunities (Al-Arabi,2010:11-25). In addition, according to human development reports of Egypt [table(8)], Egypt is still in the status of countries of medium human development.



Source: Author findings

Fig. 5 Development of 'Educational' Opportunities (EDCGOI), and "Jobs and Economic" Opportunities (JECGOI) in Egyptian Governorates (2000-2012)

4 Conclusions

Human capital equation says that wages $R = F(S, E)$, where S refers to years of schooling, and E refers to years of Experience, and accordingly individuals invest in education to achieve future gains. Pose (2008), Sen (1992, 1997), and Saito (2003) confirmed the positive impacts of education on social and economic outcomes. Hence, our paper concentrated on studying the role of education in Egypt during the period (2000-2012). By using two methodologies, the descriptive analysis and the quantitative analysis, our study had three applied goals: first, measuring the spatial change of opportunities of Egypt by calculating 'educational' opportunities, "jobs and economic" opportunities, and 'total' opportunities during the period (2000-2012) by using MOI methodology; second, measuring regional inequalities of Egypt by using HOI methodology; and third, testing the relationship between 'educational' opportunities and "jobs and economic" opportunities in each governorate by using the least squares dummy variable (LSDV) regression model.

Results of the econometric test show that 'educational' opportunities during the period (2000-2012) had a significant effect (positive or negative) on "jobs and economic" opportunities in about sixty three percent of Egyptian governorates. This result is consistent with the human capital equation and our theoretical section.

Egypt results show that most governorates characterized by positive effects are advantaged in both 'educational' opportunities, and "jobs and economic" opportunities, while all governorates characterized by negative effects are disadvantaged in both 'educational', and "jobs and economic" opportunities, and these results highlight the importance of achievement of high level of educational opportunities to find the positive relationship between 'educational' outcomes and "jobs and economic" outcomes.

Egypt results show that some governorates are advantaged in 'educational' opportunities, without significant impact of 'educational' opportunities on the level of "jobs and economic" opportunities, such as the governorates of Port_said, Dakahlia, Sharkia, Ismailia, and North_sinai. That negative role or insignificant effect of 'educational' opportunities on "jobs and economic" opportunities across Egyptian governorates during the period (2000-2012) can be explained by 'educational' problems in Egypt [table (8)], which were qualitative rather than quantitative. The UNDP world human development report shows that from the 20 countries with the largest increases in mean years of schooling over 1980-2010, only Egypt and 7 other Arab States had employment opportunities that failed to keep pace with 'educational' attainment; moreover, most countries that were part of the recent unrest in the Arab States were in the lower right quadrant, because they had major gains in 'educational' attainment but below-median employment to population ratios (UNDP, 2013:93).

As a result, what is needed in Egypt is making essential reforms in the educational sector to enable 'educational' opportunities to improve "jobs and economic" opportunities. In other words, to achieve improvements in economic development, we need to achieve great improvements in human development especially in the education sector, because the growth in human development index HDI is associated with growth in public spending on education (UNDP, 2013:78). International experiences provide some lessons in improving the 'educational' opportunities (UNDP, 2013:78-80): (1) Indonesia and India make

education a fundamental right for every child, through increasing public spending on construction of schools for basic education; (2) Mauritius provides high-quality primary, secondary and tertiary schooling free of charge; (3) China provides a law of compulsory provision of nine-year basic education regardless of gender, ethnicity or race; (4) In Brazil, transformation of education started with equalization of funding across regions, states and municipalities. For Egypt, however, equalization of funding across governorates will improve the 'educational' opportunities because the different observed levels of opportunities resulted from geographic characteristics, which reflect the concept of inequality of opportunity; also, we need to proceed in increasing the level of coverage of education and improving its quality.

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