# Is there a Gatsby Curve for Educational Attainment in Arab Countries?

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**Abstract**

This is to assess intergenerational mobility and inequalities in educational attainment in Arab

countries with the aim of finding out about the existence of a Gatsby curve for education. The

existence of links between intergenerational mobility and inequalities provide useful insights to

new inclusive economic policies. The paper uses descriptive and regression analyzes based on

Barro and Lee data (2014) for the period 1950-2010. The attained results confirm the existence

of a relationship between education mobility and inequality in educational attainment. This

negative relationship between inequalities and intergenerational mobility in education attainment

confirms the existence of Gatsby curve for education in Arab countries. This allows for new

directions for further economic policies for reducing education inequalities and enhancing more

access of new generations to knowledge, in Arab countries.

**Keywords:** Inequality, GINI, Intergenerational mobility, Education attainment, The Gatsby
Curve, Arab countries.

**JEL:** I320, J620.

## Introduction

Developed economies have been increasingly concerned with intergenerational mobility in

relation to inequalities in education in parallel with intergenerational mobility and inequalities in

income (Altzinger, Cuaresma, Rumplmaier, Sauer and Schneebaum, 2015; Reeves, 2015;

Andreou and Koutsampelas, 2015; Turcotte, 2011 and Grawe, 2004). ) among others. But,

developing countries are not yet rising these concerns in their policy agendas mainly because of the lack of studies on these issues (Magnani and Zhu, 2015; Mehtabul and Bhatt, 2012;  Azevedo and Bouillon, 2010). While intergenerational income mobility in relation to inequalities has benefited from few studies on the Arab world (Bibi and Nabli, 2010), almost none has been addressing fully intergenerational mobility and inequality in education.

It is clear that more studies on social mobility are needed for Arab countries for reasons related to the necessary enrichment of policy making as these studies provide critical information about future likely strategies and updated vision about societal change. The management of the interests and aspirations of different generations require knowledge about the likelihood of intergenerational social mobility mainly in relation to education. The youngest segments of the population hold new aspirations about education, jobs, welfare and happiness. Women have expectations about a better future for themselves, their families, their businesses and their economies. In these processes, previous situations of parents and grandparents are most of the time taken as references for comparisons. The current and persisting unemployment of skilled labor (Driouchi, 2014) with the limitations of enterprise creation (Driouchi, 2014) and the implicit exclusion of women in some Arab countries (Gamar and Driouchi, 2014), constitute major signals for more knowledge about intergenerational social mobility. School attainment and knowledge in Arab Countries has already shown (Driouchi, 2014) how Barro and Lee (2014) data for the period 1950-2010 could be used to analyze education differences between countries. A special focus on the basic data can be found in Bentouila, and Gamar (2014). The opportunities lost with the low level of school attainment and the corresponding time trends in Arab countries are also discussed. The relatively slow speed of recovery in schooling could

already be expressed by the lowest knowledge performances achieved by the economies of North Africa, Sudan and Yemen.

But, there are few publications focusing on intergenerational income mobility in the Arab countries with several contributions that have been looking at the trends taking place in education and especially in relation to accessing new economic and social opportunities. These studies consider that access to education and to higher education in particular is likely to be leading to higher income for the new generations relative to older generations. But, the high level of unemployment facing the educated generations in most Arab countries, is likely to affect their expected incomes and thus their social status relative to their parents. Besides that, Arab countries appear to have responded differently to the challenges of higher education and research with the situation of the Arab Gulf countries and those in North Africa, Jordan, Syria, Sudan and Yemen. This differentiation has generated two poles of economic responses and two new welfare and aspiration systems in Arab countries.

In addition to the above, inequalities in education appear to be dominating. When looking at education attainment and with few exceptions, inequalities are still high in comparison to other countries in the world.

The objective of the current paper is to contribute to showing how the development of further knowledge about intergenerational educational mobility in relation to the prevailing inequalities could further enlighten the economic policy process in the Arab economies. This objective is achieved through the mobilization of Barro and Lee (2014) data on educational attainment. Gini coefficients are calculated and intergenerational elasticities are estimated for each country. They are then related through regression analysis for the development of the Gatsby curve as important tool useful for supporting new directions for new economic and social policies.

This paper is composed of a literature review, the description of the method and data used, results and discussion. Results are derived respectively on the assessment of inequalities, the estimation of intergenerational education mobility, the links between these two measures and the Gatsby curves.

## I.     Literature Review

Several questions related to income, education intergenerational mobility and education inequalities could be addressed through analyzing intergenerational mobility in both income and education with their relationships to measures of inequality. These assessments are likely to provide information about the time path and the inequality trends. Different dimensions have been recently discussed by social scientists. The most recent contributions are reviewed here. As in Gibbons (2011), the study of intergenerational mobility sheds light on future opportunities offered to people relative to the position of their parents. The level of intergenerational mobility is an important measure of the economic openness of a society and of the level of opportunity. However, generational mobility is by no means the only measure (Corak, 2006; d'Addio, 2007). Policies to increase intergenerational mobility may sometimes also affect the achievement of other objectives (Roemer, 2004). While the number of studies of intergenerational income and occupational mobility has been growing (Corak, 2004, 2006 and 2013), the literature on this topic for the developing countries is still limited (Binzel, 2011). But, the intergenerational measure is also useful for the understanding of the generational transmission between parents and children besides the process related to the dynamics of education. Accounting for inequality adds more insights to intergenerational research as new policies could be provided. There are several studies that look at the links to inequality measures. The limits of intergenerational

mobility are discussed in series of papers (Andrews and Leigh, 2009; Blanden, 2008; Breen, 1997; Blanden and Machin, 2004; Corak, 2006; d'Addio, 2007; Roemer, 2004). In addition, new methodological features have been suggested for future studies of intergenerational mobility.

For the USA, Reeves (2015) emphasizes the lack of data on social mobility. The author requires prior knowledge about the patterns of mobility for better measurement. Torche (2015) reviews the sociological and economic literature on intergenerational mobility. Findings on social class, occupational status, earnings, and income mobility are discussed and discrepancies among them are evaluated. What happens in the occupational careers of men if the intergenerational continuity in status is disrupted by the failure to reproduce the parental level of educational attainment in Germany, is discussed by Diewald, Schulz and Baier (2015). Solon (2015) addresses the framework of "Multigenerational mobility" to refer to the associations in socioeconomic status across three or more generations.

Lefgren, McIntyre and Sims (2015) consider that applied researchers have been drawn to models that attribute the demonstrated cross-country differences in intergenerational income transmission to government failures to invest in the human capital of poor children. Altzinger, Cuaresma, Rumplmaier, Sauer and Schneebaum (2015) emphasize that the persistence of socioeconomic outcomes across generations acts as a barrier to a society's ability to exploit its resources efficiently. Mare (2015) considers that social mobility typically focus on the associations between the socioeconomic characteristics of individuals and families in one generation and those same characteristics for the next generation. Luthra and Soehl (2015) emphasize the issue of immigrants given the large proportion of immigrants with very low levels of schooling, the strength of the intergenerational transmission of education between immigrant parent and child as having important repercussions for the future of social stratification in the

United States. Turcotte (2011) observes that in the last 25 years, there has been a substantial increase in the number of young adults completing university in comparion to past generations. Magnani and Zhu (2015) focus on China's rapid economic growth since the late 1980s that has been accompanied by great economic and social transformations, which have resulted in a sharp increase in income inequality. The article contributes to the literature of social mobility in China by examining the impact of parental education on the education of their children using the 1990 and 2000 Chinese Population Censuses. Andreou and Koutsampelas (2015) show how over the last decades, public and private spending on higher education in Cyprus have increased considerably. The authors consider that the expansion of higher education may result to a more equitable distribution of educational opportunities.

Mehtabul and Bhatt (2012) focus on India and consider that there is an important constraint in studying intergenerational education mobility that is the lack of data about parents' education for the entire adult population.

This literature review addresses future issues to be considered in future studies of intergenerational mobility and application for groups of countries such as the Arab world. But, the on-going paper uses simple method and secondary data to address the issue of educational intergenerational mobility.

## II.    Methods and Data

The methods used in this research cover the calculation of GINI measures for income, education and health. It also include methods related to the estimation of intergenerational mobility in relation to income, education and health. The outlines of these methods are provided in the following sections.

## 1. Education GINI index to measure income, education and health inequalities

In order to measure inequality in education we used the GINI coefficient to measure inequalities in education for the Arab Countries. We based the methodology for computing the GINI index for education on the usual methods used to compute it as well as previous works (Digdowiseiso, 2010 and Vinod, Yan and Xibo F. 2000) that used the GINI index to measure the inequalities in educational systems. The following presents the direct and indirect methods to compute the GINI index. We based our calculation of the GINI index on the Barro and Lee (2014) dataset for 15 Arab countries from 1950 to 2010.

The direct method to compute the GINI index is based on a formula (Deaton 1997)

$$GINI\ index = \frac{1}{\mu\ N\ (N-1)} \sum_{i>j} \sum_{j} |y_i - y_j|$$

Where:

μ is the average years of schooling;

N is the total number of observations;

In general to compute the income GINI index, $y_i$ *and* $y_j$ are dollar values of income of individuals. However, when computing the GINI index for education $y_i$ *and* $y_j$ are years of school attainment of individuals.

On the other hand the indirect method consist of constructing the Lorenz curve for education. This curve holds the cumulative percentage of the schooling years on the vertical axis and the cumulative percentage of population in the x-axis. It is also includes a 45 degree line that represents a perfect equality in schooling. The GINI index is estimated using the ratio of the area enclosed between the equality and the Lorenz Curve lines (Area A) to the area between the x-axis and equality line (Area OWQ). Figure 1 presents the Lorenz curve and the respective areas

mentioned to illustrate the areas used to estimate the GINI index. The following determines GINI index for education.

$$GINI\ index = \frac{Area\ of\ A}{Area\ of\ OWQ}$$

This paper uses the second method to compute the GINI index for education for the Arab countries using the Barro and Lee (2014) dataset. We used seven schooling categories, no schooling, and partial schooling for primary, secondary and tertiary that we computed using the total schooling in the Barro and Lee (2014) dataset as well as the completed primary, secondary and tertiary. Then we drew the Lorenz curve for each country for given years to compute the GINI indexes for different years.
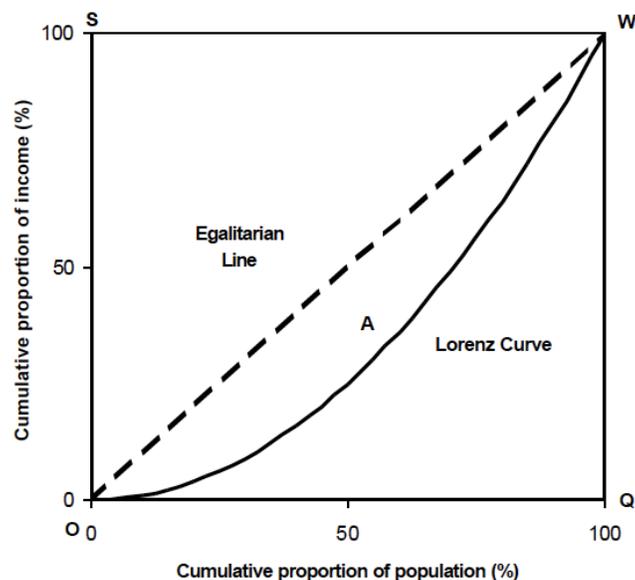


*Figure 1: The Lorenz curve (source: Vinod and al., 2000)*

## 2. Intergenerational Mobility

Intergenerational income mobility is usually measured by a simple linear regression model in which the logarithm of the child's income Ychild (in adulthood) is a function the logarithm of the parent's income Yparent: $\ln(Ychild) = \alpha + \beta \ln(Yparent) + \varepsilon$ The regression coefficient ß is

the so-called income elasticity and ε is the error term indicating other influences not associated with parental income. Roughly speaking, the value of elasticity (ß) represents the fraction of income that is on average transmitted across generations. In general, empirical estimates of ß tend to lie between 0 and 1.

In order to determine the intergenerational mobility using education as an indicator, we considered three generations twenty years away from each other. Thus the first generation starts at 1950, the second at 1970 and the third at 1990. The data are then transformed to logarithms. Then, regressions are run to estimate elasticities of mobility for the average years of schooling (Total, Primary, Secondary and Tertiary) to determine the education mobility from a generation to another for the 15 Arab Countries.

### 3. Data

The research uses the updated data retrieved from the Barro and Lee (2014) dataset. This includes data ranging from 1950 to 2010 for the Arab countries namely: Algeria, Bahrain, Egypt, Iraq, Jordan, Kuwait, Libya, Morocco, Mauritania, Qatar, Syria, Saudi Arabia, Sudan, Tunisia, United Arab Emirates and Yemen. The variables used include average years of total schooling and the four categories of education that captures the status of people in education: the first one concerns those with no education (no schooling), the second those that completed primary education (TP), the third those that completed Secondary education (TS) and the fourth those that completed tertiary education (TT).

This data will be used to study the relationship between inequalities in educational attainment and the intergenerational mobility. The average years of total schooling measured in years will be used to determine the elasticities of the intergenerational mobility in education while the four

educational levels that represent percentages will be used to determine the yearly GINI coefficients for each of the Arab countries.

### III.   Results

The results as attained through the methods detailed above focus on a preliminary description of the basic data used, the GINI and intergenerational elasticities in addition to the outcomes related to the links between mobility and inequality before introducing the Gatsby curves.

### 1.   Descriptive analysis of data

The data used in this paper are mainly based on the Average years of Total Schooling. Figure 1 introduces the average years of Total Schooling of the Arab countries between 1950 and 2010. The mean of the average years of total schooling increased from 0.8738 in 1950 to 6.7856 in 2010 with a standard deviation of 0.6080 in 1950 to 1.8655 in 2010. This denotes an increase in the average years of total schooling in the 60 years period studied. This increase in the average years of schooling is more important for some countries than others. For instance, Jordan, Libya, Qatar and UAE show a higher increase in the average years of total schooling that goes beyond 8 years in 2010. On the opposite side Morocco, Mauritania, Sudan and Yemen show a lower increase around 3.5 years as an average of total schooling. Algeria, Bahrain, Egypt, Iraq, Syria and Tunisia can be viewed as average related to their number of average years of total schooling that are around 6 years. Thus we can classify the Arab countries in three categories regarding their average years of total schooling. Table 1 presents the average years of total schooling in Arab countries respectively with the mean and standard deviation from 1950 to 2010. It shows that some of these countries knew some decrease in some years like Algeria, Bahrain and Kuwait for which the average years of total schooling decreased in 2005 but resumed its increasing pattern for the following year.

**Table 2: Average years of schooling 1950-2010**

| Years | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Algeria | 0.9 | 0.8 | 0.9 | 1.1 | 1.6 | 2.1 | 2.8 | 4.0 | 4.7 | 5.4 | 5.7 | 5.5 | 6.7 |
| Bahrain | 1.0 | 1.1 | 1.3 | 1.8 | 3.1 | 4.0 | 4.9 | 5.7 | 6.5 | 7.1 | 7.5 | 7.2 | 7.1 |
| Egypt | 0.5 | 0.7 | 0.8 | 1.0 | 1.3 | 1.7 | 2.7 | 3.8 | 4.4 | 5.1 | 6.0 | 6.7 | 7.2 |
| Iraq | 0.2 | 0.3 | 0.5 | 0.9 | 1.4 | 2.0 | 2.7 | 3.7 | 4.6 | 5.1 | 5.9 | 6.3 | 7.2 |
| Jordan | 1.3 | 1.8 | 2.4 | 3.0 | 3.5 | 4.0 | 4.6 | 5.7 | 6.6 | 7.6 | 8.4 | 9.1 | 9.6 |
| Kuwait | 1.5 | 1.8 | 2.4 | 2.9 | 3.3 | 3.5 | 4.6 | 5.5 | 5.9 | 6.1 | 6.1 | 6.1 | 6.3 |
| Libya | 0.4 | 0.6 | 0.7 | 1.0 | 1.5 | 2.2 | 3.3 | 4.3 | 5.2 | 5.9 | 6.8 | 7.4 | 8.0 |
| Mauritania | 1.3 | 1.4 | 1.4 | 1.5 | 1.7 | 1.8 | 2.1 | 2.4 | 2.8 | 3.1 | 3.6 | 4.1 | 4.5 |
| Morocco | 0.3 | 0.4 | 0.5 | 0.7 | 1.0 | 1.4 | 1.8 | 2.3 | 2.9 | 3.4 | 3.8 | 4.3 | 5.0 |
| Qatar | 1.6 | 2.1 | 2.5 | 3.2 | 3.8 | 4.3 | 4.8 | 5.2 | 5.6 | 6.1 | 6.6 | 7.3 | 8.4 |
| Saudi | 2.3 | 2.5 | 2.7 | 3.1 | 3.2 | 3.7 | 4.3 | 5.2 | 5.8 | 6.3 | 7.1 | 7.7 | 8.5 |
| Syria | 0.9 | 1.0 | 1.2 | 1.5 | 2.0 | 2.7 | 3.4 | 4.1 | 4.5 | 4.6 | 4.6 | 5.9 | 6.7 |
| Sudan | 0.3 | 0.4 | 0.5 | 0.6 | 0.7 | 1.0 | 1.3 | 1.7 | 2.2 | 2.5 | 2.8 | 3.2 | 3.2 |
| Tunisia | 0.7 | 0.8 | 0.9 | 1.3 | 1.8 | 2.5 | 3.3 | 3.7 | 4.4 | 5.1 | 5.9 | 6.8 | 7.5 |
| UAE | 0.8 | 1.1 | 1.5 | 2.1 | 2.5 | 3.0 | 3.9 | 4.9 | 6.1 | 7.5 | 8.4 | 8.9 | 9.1 |
| Yemen | 0.0 | 0.0 | 0.0 | 0.1 | 0.1 | 0.1 | 0.2 | 0.6 | 1.2 | 1.7 | 2.3 | 3.0 | 3.7 |
| Mean | 0.9 | 1.0 | 1.3 | 1.6 | 2.0 | 2.5 | 3.2 | 3.9 | 4.6 | 5.2 | 5.7 | 6.2 | 6.8 |
| STD Dev | 0.6 | 0.7 | 0.8 | 1.0 | 1.1 | 1.2 | 1.3 | 1.5 | 1.6 | 1.7 | 1.8 | 1.8 | 1.9 |

**Figure 1: Evolution of Average Years of Schooling**
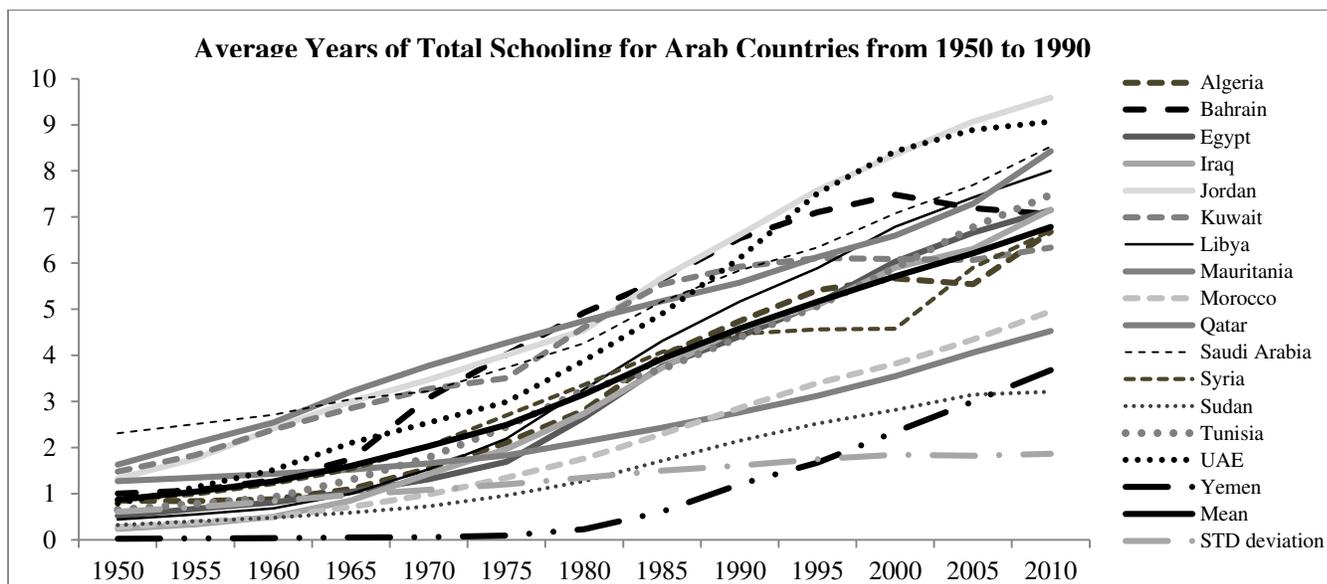


**2. Assessment of GINI coefficients of Education in Arab Countries 1950-2010**

Figure 2 shows the evolution of the GINI coefficient for the educational attainment in the Arab countries between years 1950 and 2010. This graph involves also the mean of the GINI coefficient across the countries for every year.  This graph shows that the GINI coefficient has been decreasing over the last years for the Arab countries meaning that inequalities in educational attainments are reduced. However, these inequalities are still high for certain countries like Yemen and Sudan followed by Morocco and Mauritania with indexes as high as 0.5041, 0.5324, 0.3528 and 0.3175 respectively in 2010. On the other hand, UAE, Saudi Arabia, Qatar, Libya and Jordan show a really low GINI coefficient for the educational attainment, 0.0272, 0.0285, 0.0297, 0.0629 and 0.0548 respectively for these countries for year 2010. On the other hand, countries like Tunisia, Syria, Kuwait, Iraq, Egypt, Bahrain and Algeria has a relatively average GINI coefficient ranging between 0.1418 and 0.2241 in 2010.  The values presented in Table 2 represent the computed GINI coefficient computed and a mean the decreased from 0.7616 in 1950 to 0.1942 in 2010 with a standard deviation of 0.0749 and 0.1592 for the respective years.

**Tableau 2: GINI Coefficients of Arab Countries 1950-2010 (Own computations based on Barro and Lee, 2014: School Attainment Data)**

| Country | 1950 | 1955 | 1960 | 1965 | 1970 | 1975 | 1980 | 1985 | 1990 | 1995 | 2000 | 2005 | 2010 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Algeria | 0.78 | 0.78 | 0.78 | 0.76 | 0.71 | 0.67 | 0.6 | 0.5 | 0.43 | 0.36 | 0.33 | 0.34 | 0.22 |
| Bahrain | 0.76 | 0.75 | 0.73 | 0.68 | 0.54 | 0.44 | 0.34 | 0.26 | 0.17 | 0.12 | 0.09 | 0.12 | 0.15 |
| Egypt | 0.81 | 0.79 | 0.78 | 0.76 | 0.73 | 0.69 | 0.6 | 0.49 | 0.43 | 0.36 | 0.27 | 0.2 | 0.14 |
| Iraq | 0.83 | 0.82 | 0.81 | 0.77 | 0.72 | 0.66 | 0.59 | 0.49 | 0.41 | 0.36 | 0.28 | 0.24 | 0.15 |
| Jordan | 0.73 | 0.69 | 0.63 | 0.57 | 0.52 | 0.47 | 0.42 | 0.31 | 0.22 | 0.12 | 0.05 | 0.01 | 0.05 |
| Kuwait | 0.68 | 0.64 | 0.58 | 0.53 | 0.49 | 0.49 | 0.38 | 0.29 | 0.25 | 0.23 | 0.21 | 0.2 | 0.17 |
| Libya | 0.82 | 0.81 | 0.79 | 0.76 | 0.71 | 0.65 | 0.55 | 0.44 | 0.36 | 0.29 | 0.2 | 0.13 | 0.06 |
| Mauritania | 0.6 | 0.59 | 0.58 | 0.57 | 0.56 | 0.55 | 0.53 | 0.51 | 0.48 | 0.45 | 0.41 | 0.36 | 0.32 |
| Morocco | 0.83 | 0.82 | 0.81 | 0.79 | 0.76 | 0.72 | 0.68 | 0.62 | 0.56 | 0.51 | 0.47 | 0.41 | 0.35 |
| Qatar | 0.7 | 0.65 | 0.61 | 0.54 | 0.48 | 0.44 | 0.39 | 0.35 | 0.31 | 0.25 | 0.21 | 0.14 | 0.03 |
| Saudi | 0.63 | 0.61 | 0.59 | 0.56 | 0.54 | 0.49 | 0.44 | 0.35 | 0.29 | 0.24 | 0.17 | 0.11 | 0.03 |
| Syria | 0.76 | 0.75 | 0.73 | 0.7 | 0.65 | 0.59 | 0.52 | 0.46 | 0.42 | 0.41 | 0.41 | 0.29 | 0.21 |
| Sudan | 0.82 | 0.81 | 0.8 | 0.79 | 0.77 | 0.74 | 0.71 | 0.67 | 0.63 | 0.6 | 0.57 | 0.55 | 0.53 |

| Tunisia | 0.8 | 0.79 | 0.77 | 0.74 | 0.69 | 0.63 | 0.56 | 0.51 | 0.45 | 0.38 | 0.31 | 0.22 | 0.15 |
| UAE | 0.78 | 0.75 | 0.71 | 0.65 | 0.61 | 0.57 | 0.48 | 0.38 | 0.26 | 0.12 | 0.03 | 0.01 | 0.03 |
| Yemen | 0.86 | 0.86 | 0.86 | 0.85 | 0.85 | 0.85 | 0.84 | 0.8 | 0.74 | 0.7 | 0.63 | 0.57 | 0.5 |

**Figure 2: GINI Yearly per Arab Country 1950-2010 (Source Table 1)**



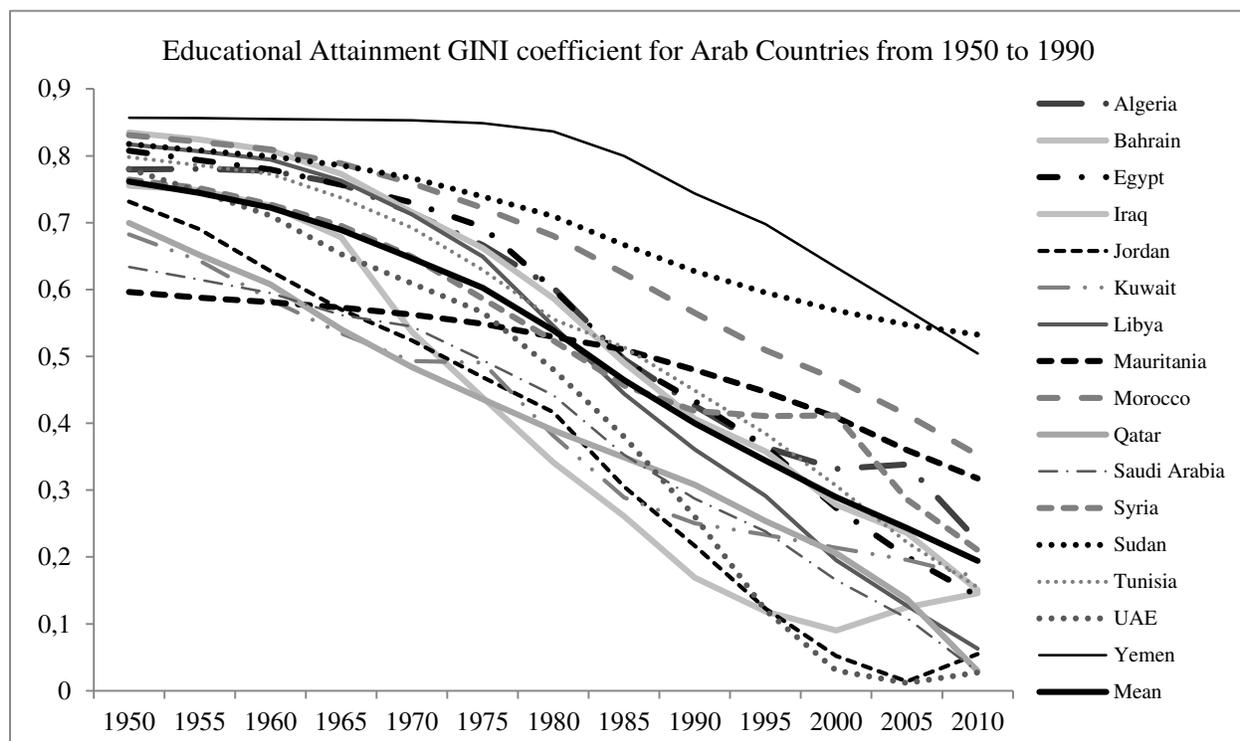Educational Attainment GINI coefficient for Arab Countries from 1950 to 1990

Table 3: Annual Trends of GINI by Arab country (source: Table 1 and regressions)

| Country | Trend | Intercept | R² | Obsevations |
|---|---|---|---|---|
| Algeria | -0.051 (-14.621) | 0.864 (35.112) | 0.9511 | 13 |
| Bahrain | -0.065 (-11.638) | 0.7874 (19.806) | 0.9249 | 13 |
| Egypt | -0.0602 (-14.747) | 0.905 (31.351) | 0.9519 | 13 |
| Iraq | -0.0615 | 0.9173 | 0.975 | 13 |

| | | | | |
|---|---|---|---|---|
| | (-20.705) | (43.64) | | |
| Jordan | -0.0652 (-21.775) | 0.76 (35.896) | 0.9773 | 13 |
| Kuwait | -0.0461 (-17.689) | 0.6736 (36.568) | 0.966 | 13 |
| Libya | -0.0695 (-17.851) | 0.9221 (33.514) | 0.9666 | 13 |
| Mauritania | -0.0225 (-10.614) | 0.6348 (42.445) | 0.9111 | 13 |
| Morocco | -0.0418 (-17.202) | 0.8925 (51.923) | 0.9642 | 13 |
| Qatar | -0.0522 (-36.276) | 0.7049 (69.277) | 0.9917 | 13 |
| Saudi Arabia | -0.0522 (-17.621) | 0.7031 (33.553) | 0.9658 | 13 |
| Syria | -0.0459 (-19.161) | 0.8057 (47.537) | 0.9709 | 13 |
| Sudan | -0.0267 (-19.933) | 0.8496 (89.697) | 0.9731 | 13 |
| Tunisia | -0.0561 (-19.545) | 0.875 (43131) | 0.972 | 13 |
| UAE | -0.0736 (-16.654) | 0.8551 (27.361) | 0.9619 | 13 |
| Yemen | -0.0284 (-6.7633) | 0.9327 (31.39) | 0.8061 | 13 |

(all estimated coefficients statistically highly significant)

## 3. Intergenerational Mobility

Intergenerational Educational Attainment Mobility for Arab Countries 1950-2010 (Source: Barro and Lee (2014), Educational Attainment Data 1950-2010 and Own Logarithmic Regressions Based on 20 years length of a generation).

The regression is based on educational attainment of youngest people (children) as dependent variable with the independent variable representing the oldest generation (parents). The outcomes of the regressions are given by country. The coefficient of the explanatory variable is an elasticity as both dependent and independent variables are under their logarithmic expressions (table 4).

**Tableau 4: Estimated Elasticities**

| Country | Independent | Intercept | $R^2$ | Obsevations |
|---|---|---|---|---|
| Algeria | 0.6429 (4.5721) | 0.4398 (8.6527) | 0.7491 | 10 |
| Bahrain | 0.3778 (5.8349) | 0.5969 (17.9018) | 0.8295 | 10 |
| Egypt | 0.7496 (7.2206) | 0.4516 (12.3833) | 0.8816 | 10 |
| Iraq | 0.5099 (14.4771) | 0.5470 (34.9440) | 0.9677 | 10 |

| | | | | |
|---|---|---|---|---|
| Jordan | 0.6916 (17.7490) | 0.4370 (20.1815) | 0.9783 | 10 |
| Kuwait | 0.4856 (5.8311) | 0.4674 (10.4380) | 0.8293 | 10 |
| Libya | 0.5952 (8.1222) | 0.5342 (17.5802) | 0.9040 | 10 |
| Mauritania | 1.0514 (13.8059) | 0.1271 (5.1353) | 0.9646 | 10 |
| Morocco | 0.6699 (17.8472) | 0.4218 (33.4561) | 0.9785 | 10 |
| Qatar | 0.5902 (11.9104) | 0.4348 (15.6584) | 0.9530 | 10 |
| Saudi Arabia | 0.7800 (9.7937) | 0.1965 (3.4417) | 0.9320 | 10 |
| Syria | 0.5663 (7.6956) | 0.4340 (14.9580) | 0.8943 | 10 |
| Sudan | 0.7779 (8.2241) | 0.3435 (12.5641) | 0.9062 | 10 |
| Tunisia | 0.6551 (12.3391) | 0.4599 (23.0226) | 0.9560 | 10 |
| UAE | 0.6991 (13.4366) | 0.4751 (19.4577) | 0.9627 | 10 |
| Yemen | 0.9469 (4.5720) | 0.7867 (3.3034) | 0.7491 | 10 |

(all estimated coefficients statistically highly significant)

## 4. Link between Educational Attainment Mobility and Inequality

In order to assess the likely links between intergenerational mobility and inequality, linear

regressions are set between the elasticities shown above and the values of the GINI coefficients

for every year 1950-2010. The outcomes of these regressions are introduced in table 5.

**Table 5: Regressions of Elasticities on GINI coefficient for every year**

| Year | Independent | Intercept | $R^2$ | Obsevations |
|---|---|---|---|---|
| 1950 | -0.0575 (-0.0966) | 0.6992 (1.8000) | 0.0007 | 16 |
| 1955 | 0.0399 (0.0748) | 0.6365 (1.8689) | 0.0004 | 16 |
| 1960 | 0.1732 (0.3678) | 0.5555 (1.9036) | 0.0096 | 16 |
| 1965 | 0.3028 (0.7382) | 0.4860 (2.0142) | 0.0375 | 16 |
| 1970 | 0.5388 (1.5904) | 0.3764 (2.0551) | 0.1530 | 16 |
| 1975 | 0.5639* (1.8841) | 0.3896** (2.6194) | 0.2023 | 16 |
| 1980 | 0.5672* (2.2859) | 0.4253** (3.9079) | 0.2718 | 16 |
| 1985 | 0.5563* (2.4898) | 0.4674 (5.5149) | 0.3069 | 16 |
| 1990 | 0.5385* (2.5675) | 0.5066** (7.3761) | 0.3201 | 16 |
| 1995 | 0.4902* (2.3645) | 0.5451** (9.1381) | 0.2854 | 16 |
| 2000 | 0.5164* (2.4548) | 0.5618** (10.7003) | 0.3009 | 16 |
| 2005 | 0.5309* (2.3633) | 0.5761** (11.6733) | 0.2852 | 16 |
| 2010 | 0.6484** (2.6531) | 0.5728** (12.2997) | 0.3346 | 16 |

## 5. The Gatsby Curves for Educational Attainment for Arab Countries

Years 1990, 2000 and 2010 are selected as the most recent years for which statistically

significant regressions results are attained. These three years are then used for the representation

of the Gatsby Curves (figures 3, 4 and 5).

Countries with relatively higher mobility and lower GINI coefficients appear to be Bahrain and

Kuwait only. All the others have relatively higher elasticities. These countries could be divided

in two groups with UAE, Algeria, Qatar, Jordan, Syria, Tunisia, Saudi Arabia, Iraq and Egypt in

a first set and Morocco, Mauritania, Sudan and Yemen in the second set.

More details are shown respectively for the years 1990, 2000 and 2010 in figures 3, 4 and 5 that

illustrate the relationship between education inequalities and the intergenerational mobility. The

set that includes Mauritania, Morocco, Sudan and Yemen have high inequalities and lower

mobility. However, the results of Bahrain and Kuwait indicate lower inequalities with a higher

intergenerational mobility. These trends are maintained for the years 2000 and 2010 as it appears

in figures 4 and 5.

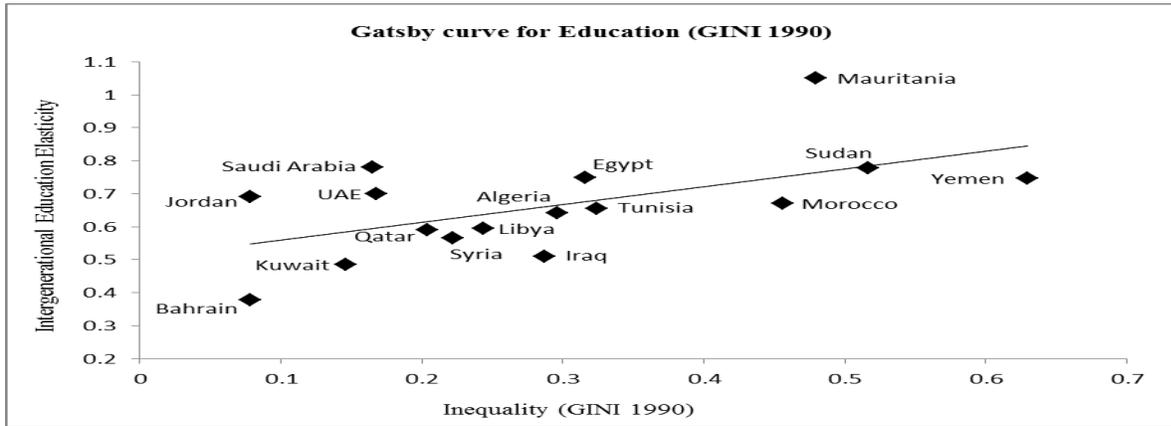**Figure 3: The Gatsby Curve for Educational Attainment (GINI 1990)**



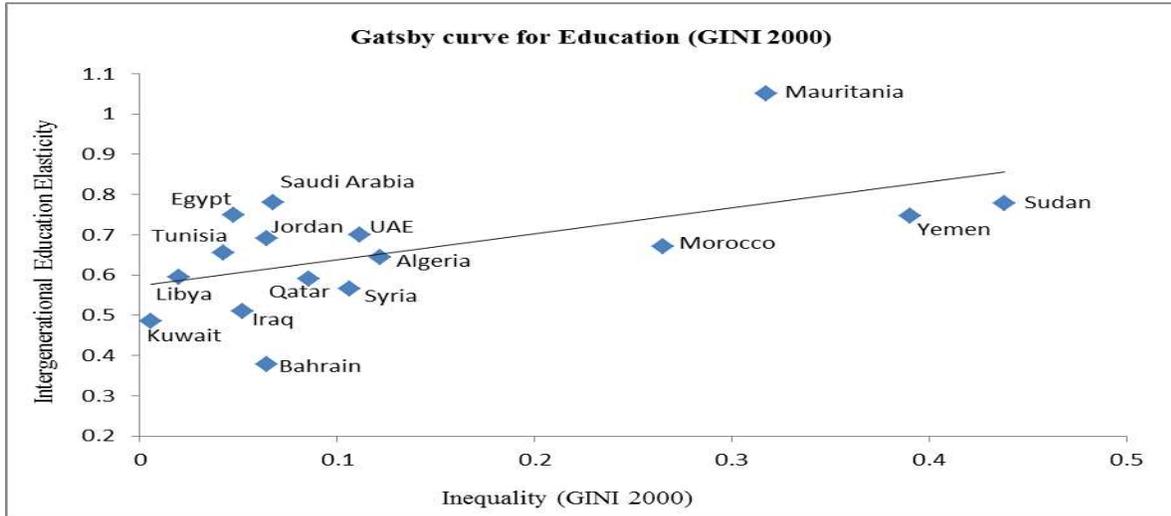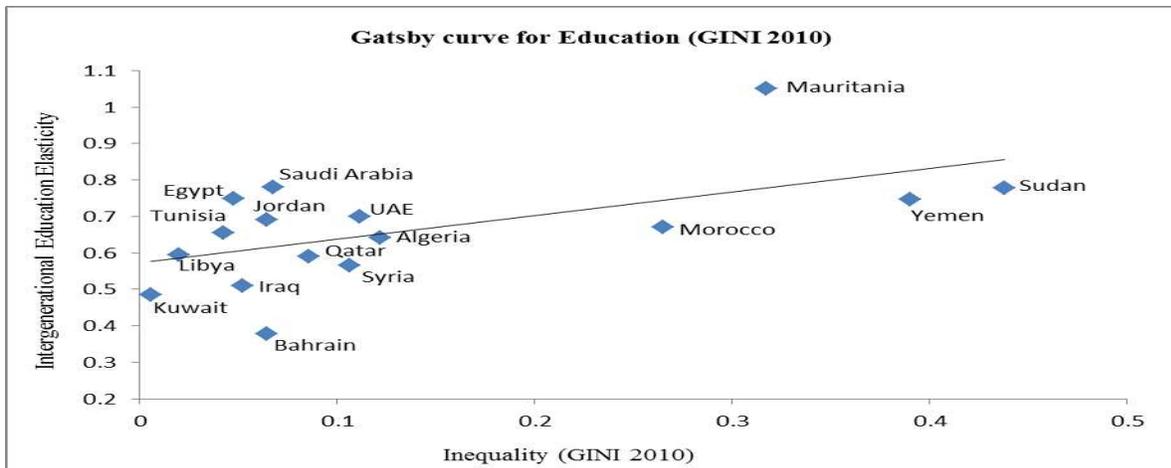**Figure 4: The Gatsby Curve for Educational Attainment (GINI 2000)**



**Figure 5: The Gatsby Curve for Educational Attainment (GINI 2010)**

**IV.    Discussion of the results**

The above results show that there is a Gatsby curve for educational attainment in Arab countries, that is similar to the one shown in the literature and that is based on intergenerational income mobility and inequality in income. The obtained curve for the Arab countries and for educational attainment shows how low inequalities and high mobility are likely to represent countries where children learn more than their parents. Furthermore, higher inequalities lead to lower intergenerational mobility in educational attainment. The attained results indicate that further education policies devoted to reduce inequalities in educational attained need to be pursued in order to enhance equality in school attainment at the levels of primary, secondary and tertiary education. These policies need to be complemented by policies in other sectors such as health and other socio-economic areas (Driouchi, 2013) as important interdependencies exist between education and the rest of the economy. In addition, macroeconomic policies are also invited to account for the reduction of education inequalities. These overall policies need to target all elements that are likely to be sources of inequalities (gender, territories and types of schooling systems besides children of different ages and with and without disabilities).

**Conclusion**

This paper has attempted to assess the links between inequality and mobility in relation to school attainment. The limitations in secondary data directly related to the topic has allowed the use of other sets of secondary information such as the Barro and Lee (2014) database about education attainment. The length of the series used has also allowed to assess inequalities with GINI coefficients for the Arab countries given the lack of data on this

matter. The data on school attainment has also allowed the assessment of intergenerational mobility in school attainment.

The attained results show first, that there have been a decreasing pattern for inequalities in education over the period 1950-2010. This pattern has concerned all Arab countries without exception. Second, only few Arab countries are found to exhibit high levels of mobility in education attainment as most countries have shown high levels of elasticities when regressing the education attainment of the young generation on that of their parents. Third, education attainment can also be represented within the framework of a Gatsby curve with increases of inequalities linked with lower intergenerational mobility in education.

Policies aiming at further reducing inequalities are discussed within the introduced framework.

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