SOURCES OF INEQUALITY IN SELECTED MENA COUNTRIES

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Abstract:

This paper deals with income inequality in the selected MENA countries focusing on the dynamics of domestic wage differentiations. The main aim is to identify the sources of inequalities. GDP per capita, share of manufacturing sector, urban share of population, gender participation in the labor force, education and openness may be possible factors. The paper analyzes pay inequalities using a panel regression model where the Theil index is used as the dependent variable. The results show that GDP per capita and female labor force participation have positive (increasing) effects, and openness has a negative (decreasing) effect on pay inequalities in these countries.

Key words – sources of inequalities; inequality measures; Theil index, pay inequality; MENA countries; Turkey
JEL Codes: D31, O15

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1. INTRODUCTION

There is a vast body of literature on the link between income inequality and economic growth, mostly rooted in Kuznets hypothesis, which claims that inequality increases over time with development and starts to decrease in the later phases of development. The link has been defined by Kuznets as an inverted U-shape. This hypothesis was expected to hold for the transition period of a country from an agrarian economy to an industrialized one which brought in the inequality-increasing effects during migration from rural to urban areas and inequality-decreasing effects as a result of the improvements in education opportunities and social policies that become available to different levels of income groups. The literature also has many empirical works on the topic, and methodological problems have been addressed by some authors. Furthermore, another question arises: What are the sources of inequalities? The sources of inequalities may lie beneath a range of various factors like earnings, age and family structure of households, differences in gender participation in the labor force, natural resources of the economy and income-related human capital indicators such as education and health.

The MENA region is not homogenous in terms of income levels, resource endowments and development levels. In general, manufacturing is not important in the MENA countries. The share of manufacturing in GDP exceeds 15 percent only in Tunisia, Egypt, Jordan and Morocco (as of 2007) and the average of Arab countries is less than 10 percent (UNDP, 2009a: Figure 5.5, 105). Income disparities are relatively small in the region. The Middle East became "the most equal region in the developing world" in 1980s and 1990s (Page, 2007). Although the region has relatively lower income disparities, inequality is still one of the predominant social facts and to identify the sources of inequality still remains a crucial issue. Therefore, the aim of this paper is

to analyze the sources of inequalities in the selected MENA countries. Here we focus on the inequality in the formal sectors reflected by the wage inequalities measured by the Theil index.

We could not consider all MENA countries for the analysis. The panel regression model includes only Algeria, Egypt Arab Republic, Iran Islamic Republic, Jordan, and Morocco among MENA countries. Turkey is also included in the model. Other MENA countries were omitted in the descriptive analysis and in the panel model due to lack of data. In addition to the data problem, the Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) are also not included in the discussion because of their structural differences.

The plan of the paper is as follows: The second section is devoted to the theoretical framework and empirical findings of income distribution. The third section discusses some stylized facts of income inequalities in the MENA region. The fourth section explicates the data and empirical results. The last section concludes.

2. THEORETICAL FRAMEWORK AND EMPIRICAL FINDINGS

Starting with Kuznets (1955), the problem of inequality has been attracting many researchers around the world. The interest on the subject seems to survive further as long as the inequalities exist, the sources are not identified enough and the remedies cannot be found. Kuznets examined the sources of personal income distribution along the lines of a country's economic growth and development. He pointed to two groups of forces that account for increasing inequality in the distribution of income in developed countries. First, he emphasized the importance of the concentration of savings in the upper-income brackets leading to income

inequality. Second, he stressed the importance of industrial structure of income distribution. His main argument lies in the inequality differences between rural and urban populations. In developed countries, a shift from agriculture towards industrialization occurs; hence, urbanization is noticeable. Since it is the norm that rural areas have lower average per capita incomes compared to urban areas, the early phases of development that consists of the industrialization process is prone to higher income inequalities (Kuznets, 1955: 7-8). However, at later phases of development, he expects to see a decline in income inequality due to the increased education opportunities and social policies that become available to different levels of income. At this point, he highlights his famous inverted-U hypothesis for inequality.

The relationship between growth and inequality has been frequently addressed after Kuznets. Some studies strengthened Kuznets' hypothesis or added other variables to explain inequality and augmented Kuznets' hypothesis (Milanovic, 1994; 2002). For instance, Aghion (2002) expands the discussion in the direction of education's impact on wage inequalities grounding his arguments on Schumpeterian growth theory. Korzeniewicz and Moran (2005) attribute the relationship between income inequality and economic growth to the impact of institutions and collective social forces on power arrangements. Similarly, Acemoglu, Johnson and Robinson (2002), Engerman and Sokoloff (1997), and Engerman, Haber, Sokoloff and Menard (2000) associate inequality with the evolution of institutions, which also plays a crucial role on determining income.

Some other studies found results that are contradictory with Kuznets. For instance, Li, Squire and Zou (1998) showed that inequality was relatively stable despite significantly increased incomes between the years 1947 and 1994 contrary to Kuznets' hypothesis of a systematic relationship between inequality and income.

Kuznets was mainly concerned with developed economies of his time. His scholars continued to concentrate on inequality that can be examined in terms of inter-country differences and within country differences. Concentrating on world distribution of income, Sala-i-Martin (2005) estimates world development indicators by integrating individual income distributions for 138 countries between 1970 and 2000 and finds that income inequalities across countries and within countries have converged. He decomposes inequality into "within-country" and "across-country" components and finds that within-country inequality increased over the reported period. On the other hand, the decline in a cross-country inequality more than offset the first effect and delivered an overall reduction in global income inequality (Sala-i-Martin, 2005: 31-32).[1]

Related to inter-country inequalities, another issue has been the convergence problem mainly addressed by Barro (1991) and Barro and Sala-i-Martin (1992). Examining the GDP per capita of 98 countries, Barro (1991) analyzes that the levels of GDP per capita in poorer countries at that time converged to the levels in richer countries. Similarly, Barro and Sala-i-Martin (1992) conclude that the level of GDP per capita converged to the same income level when different countries such as Japan and the US are taken into account.

There have been many attempts to explain inequalities by its sources as well. Milanovic (1994) seeks for the determinants of cross-country income inequalities around the world. He reinterprets and augments Kuznets' hypothesis explaining income inequality by social choice (which he also says public policy) and by factors that are, in the short run, "given" from policymakers' point of view (which are the level of income and regional heterogeneity of a country). He tests his hypothesis on a cross-sectional sample of 80 countries including all OECD countries, all European former socialist countries, and 50 African, Asian, and Latin American countries using data from the 1980s. His explanatory variables to explain the Gini coefficient of

disposable income in the analysis are the country's purchasing power indicated by income, the ratio of average incomes between the richest and poorest region within a country, size of the state sector indicated by the share of all people employed in the state sector, and government expenditures shown by the share of cash and in-kind social transfers in the GDP of a country. He finds that social choice variables as well as the purely economic factors included in Kuznets' own hypothesis play a statistically significant inequality-decreasing role in the selected groups of countries. Milanovic (1999) calculates world income or expenditure distribution of individuals for the years 1988 and 1993. Being the first paper to derive world distribution for individuals based entirely on household survey data from 91 countries, he finds that inequality, measured by the Gini index, increased from an already very high level of 63% in 1988 to 66% in 1993. He observed that "the increase was driven more by rising differences in mean incomes between the countries than by rising inequalities within countries" (Milanovic, 1999: 1). He attributes this increase to the rising urban-rural differences in China, and slow growth of rural incomes in South Asia.

As is mentioned below, implications of the theoretical foundations were traced in a number of empirical studies considering the impacts of various channels that lead to inequality. For instance, Nielsen and Alderson (1997) search for the determinants of inequality in the distribution of family income in the United States for the years 1970, 1980, and 1990. They estimate a random-effects regression model and find evidence for the Kuznetsian behavior of declining inequality with economic development, inequality-increasing effect of urbanization, inequality-increasing impact of educational heterogeneity, and a substantial influence of racial dualism. On the other hand they witness a negative impact of female labor force participation, a

positive impact of female-headed households, and a negative role of manufacturing employment on inequality.

In terms of female labor participation effect on inequality, not all studies agree with Nielsen and Alderson (1997). Thurow (1987) suggests that higher female labor force participation rates worsen the earnings inequality in two ways; first through lower payments to woman workers and second through the norm of assortative mating that leads higher-paid wives to get married to high-paid husbands. Similarly, Bluestone (1990) relates the rise in inequality in the 1970s to increases in female labor force participation among other more important factors.

Political regime has also been investigated as a possible source of inequality in some analyses. Hsu (2008) tests the impact of different political regimes on inequality for the years 1963-2002 using the UTIP-UNIDO data set (UTIP-UNIDO Database, 2009). She discovers that communist countries and Islamic republics are more equal than expected, while conservative democracies, distinct from social democracies, appear to be less equal than otherwise expected. She further explores that there are short-term shifts in the level of inequality within democratic countries with changing governments and policies.

There are a limited number of studies that focus on the inequality problem in the MENA region. Using cross-country data and country-case studies, Adams and Page (2003) work out the patterns in poverty, inequality and economic growth in the MENA region. They find it interesting that the MENA has a low incidence of poverty and income inequality compared to other regions in the world. They attribute this character of the MENA to the international migration/remittances and public sector (government) employment because it is observed that international migration to the Persian Gulf and Europe has led to a noticeable increase in the incomes of the poor in the Middle East since the early 1980s. Besides, to increase employment

levels and to keep people out of poverty, government employment has been used as a policy by many MENA countries. They conduct a regression analysis that shows both factors play a statistically significant role to change the income inequality trends and on the reduction of the level and depth of poverty in the region.

Said and El-Hamidi (2006) investigate the equality effects of the transition to export oriented, and privately held economies in the MENA looking at the alterations in the distribution of returns to education and gender wage premium in Egypt and Morocco. Among their findings on the returns to education analysis was the observation of clear wage compression for all sectors in Egypt. For Morocco, it was observed that wages increased with increased levels of education but there was also some evidence of wage compression for certain categories of workers between 1991 and 1999 indicated by a decline in returns to education. They also find that gender gaps narrowed in Egypt whereas they widened considerably in Morocco over the 1990s (Said and El-Hamidi, 2006: 21-22).

Global integration is expected to alter the trends in income distribution through trade, structural adjustment, opening to external influences and so on. Examining the period 1960-2004, Benar (2007) finds that globalization further increased income inequality in 10 MENA countries (Algeria, Egypt, Iran, Kuwait, Israel, Jordan, Morocco, Syria, Tunisia and Turkey). He uses two indicators for globalization; one is the ratio of trade interrelations (total exports and imports) to GDP and the other is foreign direct investment (FDI) as a percentage of GDP. He chooses Gini coefficients of the selected countries as the measure of income inequality. The analysis reveals that the Gini coefficients are positively correlated with trade and FDI.

Taking into account this theoretical background and empirical verifications, this paper addresses the effect of development as a key determinant of pay inequality in the MENA

intending to have a re-glance at Kuznets' hypothesis. In regards, GDP per capita levels are used together with other possible factors such as the share of manufacturing sector, the urban share of population, female participation in the labor force, education and openness.

3. SOME STYLIZED FACTS OF INEQUALITIES IN THE MENA

According to the Arab Human Development Report, MENA had one of the most equal income distributions in the world for the period 1995-1999 (UNDP, 2002: 90). After the mid of 1980s, the average income of the poor people in the MENA countries increases more quickly than that of the non-poor, although average income growth rate is very low. John Page's arguments behind the increasing share of the incomes accruing to the poor in the MENA are international migration, income from remittances and public employment (Page, 2007).

Keeping the problem of comparability in mind, Page (2007: Figure in 837) displays the patterns of inequality in terms of Gini coefficients in low and middle income countries in six regions for the years 1970–1999. He notes that starting at a very high Gini coefficient in the 1970s, the MENA region improved most strikingly among other regions until the year 2000. Another fact he points to is that the other regions except Sub-Saharan Africa have not recorded any improvement at the end of 30 years' time. Supportively, he displays a figure of the income shares accruing to the lowest quintile for the period 1980–1999. The regional pattern of change implies that the MENA region, together with Latin America and Sub-Saharan Africa, experiences an increase in the quintile share whereas East Asia and Europe and Central Asia experience a decrease in the share of the lowest %20. Between 1985 and 1995, a rapid increase in the quintile share of MENA is detected, reaching a ratio of 8%. Although it slightly decreases

towards the year 2000, MENA still has the highest share of income that is accrued to the lowest quintile compared to other regions.

We evaluate MENA countries separately by using Gini coefficients and income quintiles. Although the MENA region has lower income disparities than the other regions of the world, the changes in income inequality are not identical within the region. The change in income inequality is measured by Gini improvement which is calculated as the difference between the subsequent Gini coefficients. Table-1 shows that the selected countries have positive Gini improvements except Jordan and Morocco.

[Insert Table 1 approximately here]

Due to the differences in methods while conducting household surveys and depending on the type of data that is aimed to be collected, it is hardly possible to make strict cross-country comparisons in terms of income distribution. Some surveys are based on the incomes of households (or individuals) whereas some others are based on consumption expenditures.[2] This changes the way how the standard of living will be indicated. Moreover, income that is asked in surveys is defined in many different ways. World Bank (2001) suggests that consumption usually reflects welfare much better than income especially in developing countries. Choosing the household or the individual as the observation unit is another problem since the size of households or the characteristics of individuals such as age show a wide range of variability. Considering these, World Bank (2001) displays the income and consumption distribution indicators for a large number of countries. MENA is represented by the countries in Table-2. Gini coefficients and percentage shares of income or consumption in the country's reported

survey year are given. According to this data, we can easily say that in the reported years, all countries' indicators reveal that the lowest shares of income (or consumption) accrue to the bottom 20% income-groups and the highest shares of income (or consumption) are absorbed by the top 20% income-groups. This is a sign of the depth of inequality between the poorest and richest income (or consumption) groups. For instance, in Turkey, according to the 1994 survey, the bottom 20% of the population consumes only as low as 5.8% whereas the highest quintile has a share of 47.7% in total consumption. The differences between the second, third and fourth quintiles are also striking. Turkey's Gini index is also as high as 41.5% which means that the situation is very far from perfect equality in terms of individual consumption.

[Insert Table 2 approximately here]

4. DATA AND EMPIRICAL RESULTS

Since the region is not homogenous in terms of economic characteristics, we aim to identify the sources of inequalities in a selected group of countries that are similar regarding their resource constraints and levels of development. We will focus on the developing countries of the region such as Algeria, Egypt, Jordan, Islamic Republic of Iran, Morocco and Turkey. We omit Gulf Cooperation Council (GCC) countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates) since they have pursued fundamentally different levels of development. However, data availability is another point that constrains our research; so we will neglect some countries like Djibouti, Iraq, Lebanon and Libya due to lack of data. We try to enlarge our work as far as the availability of data for at least one point in time.

In this study, we aim to analyze pay inequalities in the MENA countries using panel data analysis. There are different inequality measures such as Gini, Theil and Atkinson. Each measure has its own advantages and disadvantages. Gini, Theil and Atkinson indices are independent of scale, symmetric and ensure the transfer principle; so they are the most common indices in use. Scholars like Atkinson (1970) and Theil (1979) have written on the characteristics of different inequality measures. Gini coefficient, derived from the cumulative distribution of income or consumption (represented by the Lorenz curve), is an estimate of deviation from perfect equality. It is relatively easy to derive and interpret Gini coefficients. An updated version of Deininger and Squire Gini coefficients for world income inequality is available at the UNU-WIDER World Income Inequality Database (2008). However, these data were reported with many breaks in time which we did not prefer in our panel analysis. Variance analysis has also plausible statistical properties and is easy to interpret but it's difficult to find cross-country data on it. Atkinson index is based on a welfare function and is suitable to use to decompose inequality; but again, it is hard to find long series of this index to examine a panel of countries. Theil (1967) proposed a decomposable measure based upon the Lorenz curve, allowing the comparison of between-group and within-group in-equality (Cowell, 1980). It gives equal weight to the all parts of the distribution. It has also some disadvantages. For instance, being based upon a Lorenz derivation, the Theil index cannot escape the problem of intersecting Lorenz curves when different geographic areas are compared.

Taking these into consideration, we prefer to use UTIP-UNIDO Wage Inequality Theil Measure, which is a measure of the manufacturing pay inequality based on the UNIDO Industrial Statistics. The University of Texas Income Project (UTIP) has developed this measure with the consideration of a strong link between increased earning and wage inequality and income

inequality (Galbraith and Kum, 2002, 2005).[3] This measure of inequality seems to be a useful alternative for income inequality measures that are mostly based on household and expenditures survey because especially in industrialized countries, it is much easier to collect data on pay statistics. The data set includes 156 countries and 3554 observations in the 1963-2003 time-span. Here we use the Theil indices for Algeria, Egypt, Iran, Jordan, Morocco and Turkey between the years 1980-1997. The series before 1980 and after 1997 have a lot of empty cells and not suitable to put into analysis.

We use a group of social and economic development indicators to offer an explanation for inequality. The general model is as follows:

UTIP-UNIDO THEIL = f (GDP per capita, Sector composition, Share of urban population, Female labor participation rate, Education, Openness)

The abbreviations for the corresponding variables are as follows:

THEIL:	UTIP-UNIDO Theil measure
GDPPC:	GDP per capita (constant 2000US$)
INDVA:	Industry, value added (% of GDP)
MAVA:	Manufacturing, value added (% of GDP)
URB:	Urban population (% of total)
LABPR:	Labor participation rate, female
EDUHDI:	UNDP-HDI Education index
OPENN:	Trade (% of GDP)

Before estimating the panel regression model, we portrayed the relation between UTIP-UNIDO THEIL index and each independent variable of the model on the scatter diagrams to see the general picture. We sketched scatter diagrams between UTIP-UNIDO THEIL index and each independent variable separately for six selected countries (See Appendix-A6 for scatter diagrams).

As we explain above, our dependent variable is the UTIP-UNIDO Theil index.[4] Value "0" of the Theil index equals perfect equality; as inequality increases, the index rises.[5]

GDP per capita corresponds to constant (year 2000) US$ values for per capita incomes of the countries chosen. Inspired from Kuznets, we expect that inequality increases over time with development and starts to decrease in the late phases of development. Therefore, GDP per capita may have an inequality-increasing effect at the early phases of development and may have an inequality-decreasing effect towards the later phases of development as a result of the increased education opportunities and social policies that become available to different levels of income groups. Industry and manufacturing value added as the percentage shares in GDP are used as indicators for sector composition. Our expectation is that sector composition of production has an influence on inequality. Agricultural production share may have an increasing effect on inequality through lower wages compared to other sectors. Industrial and specifically manufacturing value added shares may have a decreasing impact on inequality. Urban population share variable is reported as the percentage of the whole population who lives in urban areas. Again, through wages, it is expected to influence pay inequality depending on the rural-urban composition of a country. Female labor participation rate is the ratio of the female population who is in the labor force. The expected effect of female labor participation on

inequality is positive based on the empirical findings of several studies like Thurow (1987) and Bluestone (1990).

We use the 5-year averages of the UNDP-HDI Education index as a composite indicator of education (See Appendix -A2 for the data). Education is expected to decrease inequalities indicating a higher level of development. As the openness variable, we choose the share of trade in total GDP. This variable is chosen to capture the effects of trade-related structural changes either through wages or GDP growth. Openness could also be thought as a proxy to institutional quality due to a number of factors. Alonso and Garcimartín (2009) explain those factors mentioning the ability of international openness to create a more dynamic, competitive sophisticated and demanding environment and to facilitate learning processes giving way to less corruption and better institutions. Rigobon and Rodrik (2004) also detected positive relationship between trade openness and rule of law.

The data for all the explanatory variables except the education variable were taken from World Development Indicators (2009). Education data was compiled from UNDP (2009b).

First, we examine the data in terms of unit roots. We execute first generation and second generation panel unit root tests. First generation tests assume cross-sectional independence across units whereas second generation tests reject the cross-sectional independence hypothesis. Because of this, we will rely on Moon and Perron test statistics among second generation unit root test results.[6] These statistics (with constant and trend) imply the rejection of the unit root existence in all the variables of concern. Following these results, we perform stationary panel data analyses with the original series without any transformation. We run both fixed-effects and random-effects models.

We estimated seven equations. Model-1 includes all the explanatory variables. We insert manufacturing share and industrial share variables separately in the equations to avoid multicollinearity and to see which one has higher explanatory power on pay inequality. However, assuming that the manufacturing share has relatively higher explanatory power than the share of industry, only manufacturing share is used as the sector composition variable for the estimation of the general model reported in Table-3.

The random effects model shows that per capita income and female labor participation rates are significant determinants of the Theil measure at 2% level. Having a much higher statistical significance, GDP per capita is found to have an apparently inequality-increasing impact with a positive coefficient.[7] This means that higher levels of GDP per capita will imply higher inequality levels in the chosen MENA countries. It can be interpreted as part of the Kuznets hypothesis that assumes higher inequality levels at the initial phase of development and industrialization.

Female labor participation has also a positive influence on inequality. This result is consistent with the results of Thurow (1987) and Bluestone (1990). Furthermore, we can see that the openness variable is also statistically significant at 19% level and has a negative impact on Theil. Similarly, education has an inequality-decreasing effect only at 29% significance level. This means that, despite having lower significance levels, there is weak evidence that higher education levels (in this case, higher HDI education index) and higher trade shares are expected to decrease pay inequalities within the chosen MENA countries. Urban share of population appeared with an insignificant coefficient in Model-1 (Table-3). This is contradictory to Kuznets' hypothesis and empirical findings of many other authors. However, this does not mean that the insignificant variables are irrelevant in generating inequality because of two reasons:

First, it is possible that the countries considered are not identical in terms of the mechanisms which link these variables with wage distribution in the formal sectors. Second, relatively shorter time span of the data which was used for estimation may not be sufficient enough to capture the structural nature of change in wage distribution.

We eliminate the education variable from Model-1 and estimate the regression again. Table-4 shows the fixed-effects and random-effects estimates for (a) and (b) versions of Model-2. Since the Hausman test statistics evaluate that both models correspond to the data, it is convenient to use either model to estimate the model. In fact, the direction of the effects in both equations is the same as expected. Both regressions detect GDP per capita and female labor participation rates as statistically significant variables and positively influential on inequality. Openness and manufacturing share coefficients have very low statistical significance (18% level), however inequality-decreasing effects.

We estimate the same model again inserting the industrial share variable instead of the manufacturing share variable. Table-5 presents the results of fixed-effects and random-effects estimates for the model 2(c) and 2(d). Again, both versions represent positive and statistically significant impacts of GDP per capita and female labor participation on inequality. Openness becomes statistically significant (at levels of 8% and 10% respectively) and reveals its inequality-decreasing effect. This result is inconsistent with the findings of Benar (2007). As we cited earlier (in Section 2), using the same openness indicator (which was chosen to capture the effect of globalization in that paper), Benar (2007) evaluates that openness increased income inequality in 10 MENA countries (Algeria, Egypt, Iran, Kuwait, Israel, Jordan, Morocco, Syria, Tunisia and Turkey). The inconsistency may have risen from our focus on pay inequality in the formal sector whereas he analyzes overall income inequality.[8]

We expect that formal sectors are much more prone to the influence of openness as they are engaged in exporting and importing activities. This increases the rate of integration with the world which may have a more equalizing effect on the earnings of the formal sector employees. Industrial share of GDP and urban share of total population continue to have statistically insignificant parameter estimates.

Finally, we included only the significant variables in the model 3(a) and 3(b). The results are displayed in Table-6. The coefficient estimates are consistent with previous results. In other words, GDP per capita and female labor participation both have inequality-increasing effects whereas openness has inequality-decreasing effect. All three coefficients are highly significant.

To sum up, GDP per capita and female labor participation rates are significantly influential on inequality in our all model specifications. The positive impact of GDP per capita reveals the continued importance of the Kuznetsian pattern of rising inequality at lower levels of economic development. The positive impact of female labor participation is not surprising. Empirically, similar effects related to pay inequality and female labor participation relationship were detected in a number of studies. Thurow (1987:34-35) explained the contribution of increased female-labor force participation to the upswing in earnings inequality in the US as follows: Since women are usually paid less and have a tendency to work in part-time jobs, higher female labor force participation increases the earnings inequality. Similarly, Bluestone (1990:28-32) evaluates that there is evidence (although weak) of the earnings inequality increasing effect of female labor force participation. Thurow's and Bluestone's analyses provide hints for the situation that more women participating into the labor force will result in higher inequality when other factors are kept constant.

[Insert Table 3 approximately here]

[Insert Table 4 approximately here]

[Insert Table 5 approximately here]

[Insert Table 6 approximately here]

4. CONCLUSION

Despite having improved very strikingly since the 1970s, MENA countries continued to have high inequality rates in the 1980s and 1990s. The situation can be identified by various inequality measures including Gini coefficients and income quintiles as earlier studies do. Here we have tried to mirror inequality in a different context taking into account the manufacturing pay inequality and its determinants. Still the explanatory strength of the study is restrained to the limits of the data chosen and the method used for the analysis. Since the manufacturing pay inequality offers a good understanding of the inequality in the formal sectors of an economy, the results cannot be totally generalized to the income inequality issue. However, as is mentioned above, it is detected in several studies that it even gives a useful hint about explaining income inequality due to the parallel trends in pay inequality Theil indices and Gini coefficients by time.

Considering the literature on within-country income inequality, several versions of a panel data model are utilized in order to analyze the sources of inequalities in the selected MENA countries. The model findings reveal that GDP per capita and female labor force participation have inequality-increasing effects whereas openness has an inequality-decreasing effect on pay inequalities in the selected MENA countries. Industry value added (% of GDP), manufacturing value added (% of GDP), urban population share, and UNDP-HDI Education index do not appear as statistically significant variables. The positive impact of GDP per capita indicates that these countries were still at the increasing part of the inverse-U curve until the end of 1990s. Earning inequalities between men and women in favor of men (since men usually earn higher in most parts of the world) may be a source of inequality-increasing effect of female labor participation. The negative coefficients estimated for the openness variable indicate that improving effect of trade integration on formal sector pay distribution should not be ignored.

Further research remains to be conducted to see whether there has been any change in terms of pay inequality in the MENA region since the 1990s when data is available for a more recent period. This would possibly shed light on the evolution of income inequality as well.

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TABLES AND FIGURES

Table 1: GINI Improvement in selected MENA countries

Countries	Years	Length of the period	GINI Improvement*
Algeria	1988, 1995	7	0.05
Egypt Arab Rep.	1991, 2005	14	0.00
Iran Islamic Rep.	1986, 2005	19	0.09
Jordan	1987, 2006	19	-0.02
Moracco	1985, 2007	22	-0.02
Tunisia	1985, 2000	15	0.02
Turkey	1987, 2005	18	0.01
Yemen Rep.	1992, 2005	13	0.01

*Difference between the last period and first period
Source: Calculated from World Bank (2009).

Table 2: Distribution of income or consumption

			Percentage share of income or consumption				
Economy	Survey year	Gini index	Lowest 20%	Second 20%	Third 20%	Fourth 20%	Highest 20%
Algeria	1995a,b	35.3	7.0	11.6	16.1	22.7	42.6
Egypt	1995a,b	28.9	9.8	13.2	16.6	21.4	39.0
Israel	1992c,d	35.5	6.9	11.4	16.3	22.9	42.5
Jordan	1997a,b	36.4	7.6	11.4	15.5	21.1	44.4
Morocco	1998–99a,b	39.5	6.5	10.6	14.8	21.3	46.6
Tunisia	1990a,b	40.2	5.9	10.4	15.3	22.1	46.3
Turkey	1994a,b	41.5	5.8	10.2	14.8	21.6	47.7
Yemen	1992a,b	39.5	6.1	10.9	15.3	21.6	46.1

a. Refers to consumption shares by percentiles of population. b. Ranked by per capita consumption. c. Refers to income shares by percentiles of population. d. Ranked by per capita income
Source: Data gathered from World Bank (2001).

Table 3: Estimation results for Model 1

Model 1: General model with all explanatory variables Panel Estimation by Random Effects

Dependent variable: THEIL

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	0.0851	0.1223	0.69579	0.48655870
2.	GDPPC	3.8412e-05	7.4817e-06	5.13410	0.00000028
3.	MAVA	-7.4882e-04	5.8649e-04	-1.27678	0.20167851
4.	URB	6.2024e-06	4.8285e-04	0.01285	0.98975105
5.	LABPR	2.1564e-03	9.3181e-04	2.31417	0.02065820
6.	OPENN	-2.0725e-04	1.5825e-04	-1.30958	0.19033766
7.	EDUHDI	-0.2230	0.2094	-1.06495	0.28689817

Table 4: Estimation results for Model 2(a) and 2(b)

Model 2(a): Fixed Effects				Model 2(b): Random Effects		
Dependent Variable: THEIL				Dependent Variable: THEIL		
Variable	Coeff	Std Error	Signif	Coeff	Std Error	Signif
Constant				-0.0411	0.0304	0.17653202
GDPPC	4.0772e-05	7.9011e-06	0.00000131	3.7601e-05	7.4429e-06	0.00000044
MAVA	-8.2110e-04	6.1395e-04	0.18421769	-7.5000e-04	5.8649e-04	0.20096653
URB	-1.8076e-04	5.1026e-04	0.72392329	-1.7909e-05	4.8232e-04	0.97038079
LABPR	2.5670e-03	9.9288e-04	0.01121513	2.1821e-03	9.3150e-04	0.01915073
OPENN	-2.1881e-04	1.6409e-04	0.18547755	-2.0480e-04	1.5824e-04	0.19558490

Table 5: Estimation results for Model 2(c) and 2(d)

Model 2(c): Fixed Effects				Model 2(d): Random Effects		
Dependent Variable: THEIL				Dependent Variable: THEIL		
Variable	Coeff	Std Error	Signif	Coeff	Std Error	Signif
Constant				-0.0366	0.0343	0.28699650
GDPPC	3.6476e-05	7.3845e-06	0.00000326	3.4039e-05	7.0245e-06	0.00000126
INDVA	-2.3204e-05	6.1016e-04	0.96974318	-1.5958e-04	5.6996e-04	0.77948776
URB	-8.5516e-06	4.9863e-04	0.98635207	1.3623e-04	4.7199e-04	0.77287101
LABPR	1.9976e-03	9.3283e-04	0.03474239	1.6198e-03	8.6841e-04	0.06215009
OPENN	-2.9194e-04	1.6546e-04	0.08081218	-2.5487e-04	1.5947e-04	0.10997968

Table 6: Estimation results for Model 3(a) and 3(b)

Model 3(a): Fixed Effects				Model 3(b): Random Effects		
Dependent Variable: THEIL				Dependent Variable: THEIL		
Variable	Coeff	Std Error	Signif	Coeff	Std Error	Signif
Constant				-0.0397	0.0295	0.17817548
GDPPC	3.6378e-05	6.7076e-06	0.00000041	3.4360e-05	6.4678e-06	0.00000011
LABPR	1.9943e-03	6.5353e-04	0.00292245	1.8315e-03	6.3622e-04	0.00399346
OPENN	-2.9513e-04	1.4330e-04	0.04206630	-2.5232e-04	1.3884e-04	0.06916649

APPENDIX

A1. UTIP-UNIDO Wage Inequality THEIL Measure (1980-1997)

COUNTRY	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
Algeria	0,0062				0,0067	0,0058	0,0098	0,0095	0,0124	0,0091	0,0080	0,0069	0,0094	0,0089	0,0085	0,0236		0,0154
Egypt	0,0167	0,0226	0,0328	0,0316	0,0334	0,0219	0,0228	0,0227	0,0295	0,0377	0,0393	0,0544	0,0491	0,0575	0,0642	0,0672	0,0746	0,0647
Iran, I.R. of	0,0158	0,0094	0,0083	0,0067	0,0066	0,0050	0,0057	0,0095	0,0061	0,0084	0,0115	0,0120	0,0228	0,0289	0,0247	0,0174	0,0273	0,0335
Jordan	0,0433	0,0609	0,0783	0,0947	0,0940	0,0956	0,1093	0,1097	0,1064	0,0910	0,0570	0,0554	0,0559	0,0616	0,0551	0,0566	0,0652	0,0665
Morocco	0,0979	0,0906	0,0844	0,0795	0,0531	0,0486	0,0564	0,0676	0,0743	0,0855	0,1039	0,0955	0,0737	0,0832	0,0787	0,0699	0,0749	0,0838
Turkey	0,0431	0,0398	0,0334	0,0285	0,0288	0,0284	0,0287	0,0324	0,0334	0,0498	0,0569	0,0614	0,0822	0,0693	0,0686	0,0792	0,0653	0,0611

A2. UNDP-HDI Education Index

HDI rank	Country name	1980	1985	1990	1995	2000	2005	2006	2007
79	Turkey	0,598	0,690	0,711	0,726	0,754	0,817	0,824	0,828
88	Iran	0,402	0,532	0,658	0,723	0,746	0,794	0,793	0,793
96	Jordan	0,642	0,616	0,703	0,629	0,703	0,872	0,870	0,870
104	Algeria		0,524	0,542	0,552	0,693	0,738	0,743	0,748
123	Egypt	0,416	0,495	0,514	0,605	0,640	0,697	0,697	0,697
130	Morocco	0,337	0,346	0,338	0,436	0,446	0,554	0,563	0,574

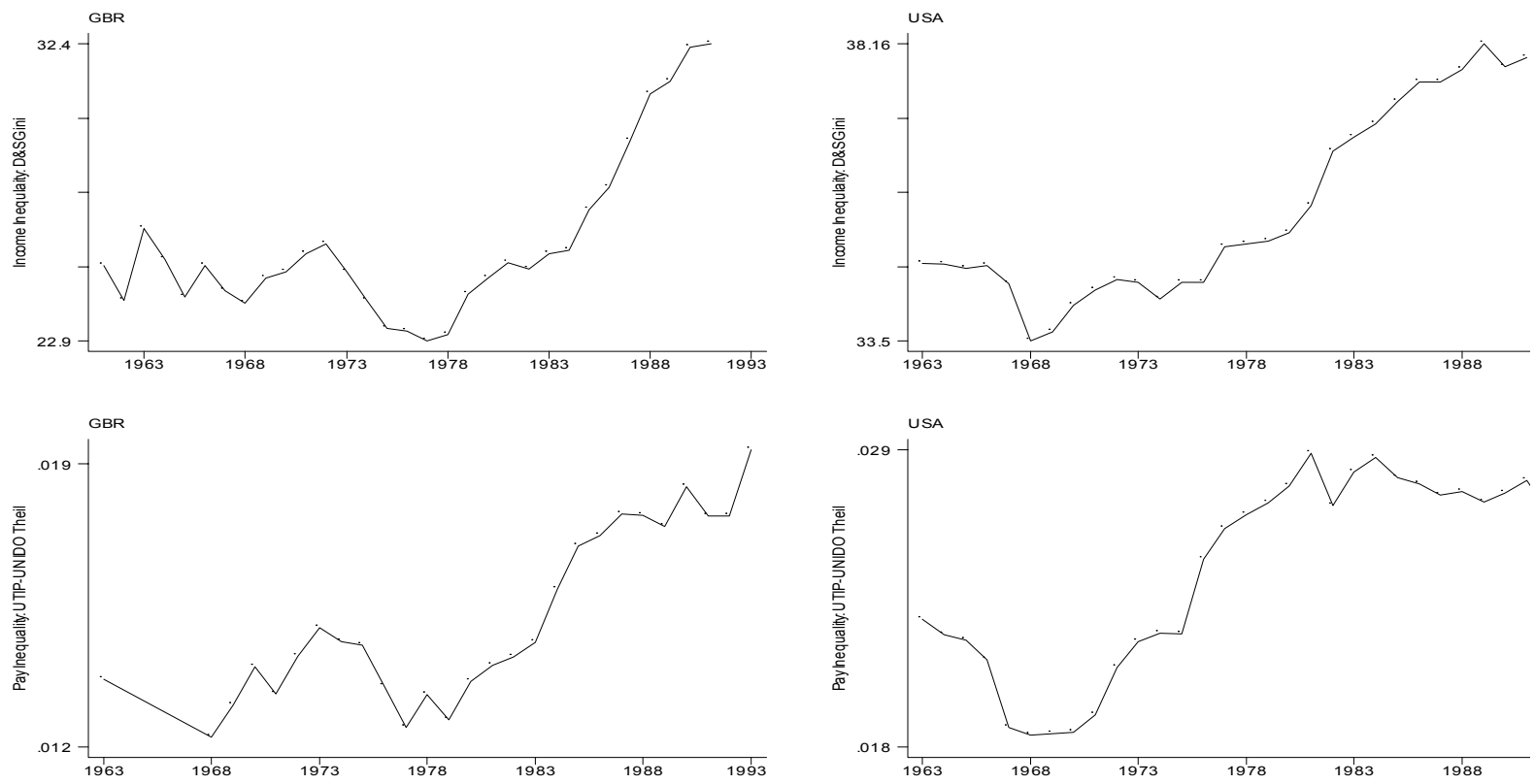
A3. HOW TO COMPUTE THEIL STATISTIC

$$\begin{cases} T = \sum_{j=1}^{m} p_j R_j \log R_j + \sum_{j=1}^{m} p_j R_j T_j \\ \\ T_j = \frac{1}{n_j} \sum_{i \in g_j} r_i \log r_i \end{cases}$$

where $p_j = \frac{n_j}{n}$ and $R_j = \frac{\mu_j}{\mu_Y}$

n ~ employment; μ~ average income; j ~ subscript denoting group

Source: UTIP tutorials



Source: Galbraith and Kum (2005: 224).

This figure from Galbraith and Kum (2005: 224) shows that UTIP-UNIDO Theil and Deininger & Squire Gini for Great Britain and the USA move together in the same time horizons. The authors further claim that manufacturing pay inequality may be an indicator of changes in inequality beyond formal industry pay.

A4. UNIT ROOT TEST RESULTS

1ST GENERATION UNIT ROOT TESTS

			Common Unit Root LLC		Individual Unit Root IPS	
			Statistic	Prob	Statistic	Prob
1	THEIL	Constant	-1,82318	0,0341	-2,36290	0,0091
		Constant and trend	-2,61754	0,0044	-4,01881	0,0000
2	GDPPC	Constant	0,14254	0,5567	1,55699	0,9403
		Constant and trend	-2,27348	0,0115	-2,14467	0,0160
3	INDVA	Constant	-3,07628	0,0010	-3,07746	0,0010
		Constant and trend	-1,92222	0,0273	-0,86833	0,1926
4	MAVA	Constant	-3,11220	0,0009	-3,35477	0,0004
		Constant and trend	-3,56726	0,0002	-2,51273	0,0060
5	URB	Constant	-2,90128	0,0019	0,65794	0,7447
		Constant and trend	0,47512	0,6826	1,68352	0,9539
6	LABPR	Constant	1,82904	0,9663	2,57151	0,9949
		Constant and trend	-1,76866	0,0385	0,46139	0,6777
8	OPENN	Constant	-2,11958	0,0170	-2,02131	0,0216
		Constant and trend	-3,02820	0,0012	-2,22481	0,0130

2ND GENERATION UNIT ROOT TESTS

Moon and Perron Test Statistics (with constant)

1	THEIL	tstar_a	-0,544
		tstar_b	-1,496
2	GDPPC	tstar_a	0,105
		tstar_b	0,747
3	INDVA	tstar_a	0,211
		tstar_b	1,563
4	MAVA	tstar_a	0,041
		tstar_b	0,379
5	URB	tstar_a	0,239
		tstar_b	**15,358**
6	LABPR	tstar_a	0,222
		tstar_b	**4,135**
8	OPENN	tstar_a	-0,034
		tstar_b	-0,064

BOLD: reject unit root, k=4

Null hyphotesis: unit root

If the test statistic is >1.96 or < -1.96 ; fail to reject the null hypothesis.

Moon and Perron Test Statistics (with constant and trend)

1	THEIL	tstar_a	**-2,968**
		tstar_b	**-2,581**
2	GDPPC	tstar_a	**-2,241**
		tstar_b	**-2,728**
3	INDVA	tstar_a	**-3,686**
		tstar_b	**-4,342**
4	MAVA	tstar_a	**-2,08**
		tstar_b	**-2,427**
5	URB	tstar_a	**-2,303**
		tstar_b	**-2,77**
6	LABPR	tstar_a	**-2,347**
		tstar_b	**-2,344**
8	OPENN	tstar_a	**-3,436**
		tstar_b	**-3,863**

BOLD: reject unit root

Null hyphotesis: unit root

If the test statistic is >1.96 or < -1.96 ; fail to reject the null hypothesis.

A5. ESTIMATION RESULTS

Model 1: GENERAL MODEL WITH ALL EXPLANATORY VARIABLES

```
Panel Regression - Estimation by Random Effects
Dependent Variable THEIL
Panel(18) of Annual Data From      1//1980:01 To      6//1997:01
Usable Observations    108      Degrees of Freedom   101
Mean of Dependent Variable      0.0455555556
Std Error of Dependent Variable 0.0304711702
Standard Error of Estimate      0.0151142811
Sum of Squared Residuals        0.0230725907
Log Likelihood                     284.97903
Hausman Test(4)                     3.497631
Significance Level                0.47823861
```

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	0.0851	0.1223	0.69579	0.48655870
2.	GDPPC	3.8412e-05	7.4817e-06	5.13410	0.00000028
3.	MAVA	-7.4882e-04	5.8649e-04	-1.27678	0.20167851
4.	URB	6.2024e-06	4.8285e-04	0.01285	0.98975105
5.	LABPR	2.1564e-03	9.3181e-04	2.31417	0.02065820
6.	OPENN	-2.0725e-04	1.5825e-04	-1.30958	0.19033766
7.	EDUHDI	-0.2230	0.2094	-1.06495	0.28689817

Model 2(a): INCLUDING MANUFACTURING AS AN INDEPENDENT VARIABLE

```
Panel Regression - Estimation by Fixed Effects
Dependent Variable THEIL
Panel(18) of Annual Data From      1//1980:01 To      6//1997:01
Usable Observations    108      Degrees of Freedom    97
Centered R**2     0.768469      R Bar **2   0.744600
Uncentered R**2   0.928892      T x R**2     100.320
Mean of Dependent Variable      0.0455555556
Std Error of Dependent Variable 0.0304711702
Standard Error of Estimate      0.0153992443
Sum of Squared Residuals        0.0230022622
Regression F(10,97)                 32.1951
Significance Level of F           0.00000000
Log Likelihood                     303.28651
```

	Variable	Coeff	Std Error	T-Stat	Signif
1.	GDPPC	4.0772e-05	7.9011e-06	5.16028	0.00000131
2.	MAVA	-8.2110e-04	6.1395e-04	-1.33741	0.18421769
3.	URB	-1.8076e-04	5.1026e-04	-0.35425	0.72392329
4.	LABPR	2.5670e-03	9.9288e-04	2.58538	0.01121513
5.	OPENN	-2.1881e-04	1.6409e-04	-1.33354	0.18547755

Model 2(b): INCLUDING MANUFACTURING AS AN INDEPENDENT VARIABLE

```
Panel Regression - Estimation by Random Effects
Dependent Variable THEIL
Panel(18) of Annual Data From      1//1980:01 To      6//1997:01
Usable Observations    108      Degrees of Freedom   102
Mean of Dependent Variable      0.0455555556
Std Error of Dependent Variable 0.0304711702
Standard Error of Estimate      0.0150426875
Sum of Squared Residuals        0.0230808095
Log Likelihood                     284.41197
Hausman Test(5)                     4.631752
Significance Level                0.46245133
```

Variable	Coeff	Std Error	T-Stat	Signif
1. Constant	-0.0411	0.0304	-1.35151	0.17653202
2. GDPPC	3.7601e-05	7.4429e-06	5.05197	0.00000044
3. MAVA	-7.5000e-04	5.8649e-04	-1.27880	0.20096653
4. URB	-1.7909e-05	4.8232e-04	-0.03713	0.97038079
5. LABPR	2.1821e-03	9.3150e-04	2.34258	0.01915073
6. OPENN	-2.0480e-04	1.5824e-04	-1.29423	0.19558490

Model 2(c): INCLUDING INDUSTRY AS AN INDEPENDENT VARIABLE

```
Panel Regression - Estimation by Fixed Effects
Dependent Variable THEIL
Panel(18) of Annual Data From      1//1980:01 To      6//1997:01
Usable Observations    108      Degrees of Freedom    97
Centered R**2     0.764203      R Bar **2   0.739895
Uncentered R**2   0.927582      T x R**2     100.179
Mean of Dependent Variable      0.0455555556
Std Error of Dependent Variable 0.0304711702
Standard Error of Estimate      0.0155404590
Sum of Squared Residuals        0.0234260689
Regression F(10,97)                 31.4372
Significance Level of F           0.00000000
Log Likelihood                     302.30064
```

Variable	Coeff	Std Error	T-Stat	Signif
1. GDPPC	3.6476e-05	7.3845e-06	4.93957	0.00000326
2. INDVA	-2.3204e-05	6.1016e-04	-0.03803	0.96974318
3. URB	-8.5516e-06	4.9863e-04	-0.01715	0.98635207
4. LABPR	1.9976e-03	9.3283e-04	2.14146	0.03474239
5. OPENN	-2.9194e-04	1.6546e-04	-1.76440	0.08081218

Model 2(d): INCLUDING INDUSTRY AS AN INDEPENDENT VARIABLE

```
Panel Regression - Estimation by Random Effects
Dependent Variable THEIL
Panel(18) of Annual Data From      1//1980:01 To      6//1997:01
Usable Observations    108      Degrees of Freedom   102
Mean of Dependent Variable      0.0455555556
Std Error of Dependent Variable 0.0304711702
Standard Error of Estimate      0.0151833959
Sum of Squared Residuals        0.0235146222
Log Likelihood                     283.70320
Hausman Test(5)                     4.578553
Significance Level                0.46944263
```

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	-0.0366	0.0343	-1.06473	0.28699650
2.	GDPPC	3.4039e-05	7.0245e-06	4.84570	0.00000126
3.	INDVA	-1.5958e-04	5.6996e-04	-0.27999	0.77948776
4.	URB	1.3623e-04	4.7199e-04	0.28862	0.77287101
5.	LABPR	1.6198e-03	8.6841e-04	1.86522	0.06215009
6.	OPENN	-2.5487e-04	1.5947e-04	-1.59828	0.10997968

Model 3(a): REGRESSION WITH ONLY SIGNIFICANT VARIABLES

```
Panel Regression - Estimation by Fixed Effects
Dependent Variable THEIL
Panel(18) of Annual Data From      1//1980:01 To      6//1997:01
Usable Observations    108      Degrees of Freedom    99
Centered R**2     0.764199      R Bar **2   0.745145
Uncentered R**2   0.927580      T x R**2     100.179
Mean of Dependent Variable      0.0455555556
Std Error of Dependent Variable 0.0304711702
Standard Error of Estimate      0.0153828251
Sum of Squared Residuals        0.0234264994
Regression F(8,99)                   40.1057
Significance Level of F            0.00000000
Log Likelihood                      302.29965
```

	Variable	Coeff	Std Error	T-Stat	Signif
1.	GDPPC	3.6378e-05	6.7076e-06	5.42347	0.00000041
2.	LABPR	1.9943e-03	6.5353e-04	3.05157	0.00292245
3.	OPENN	-2.9513e-04	1.4330e-04	-2.05955	0.04206630

Model 3(b): REGRESSION WITH ONLY SIGNIFICANT VARIABLES

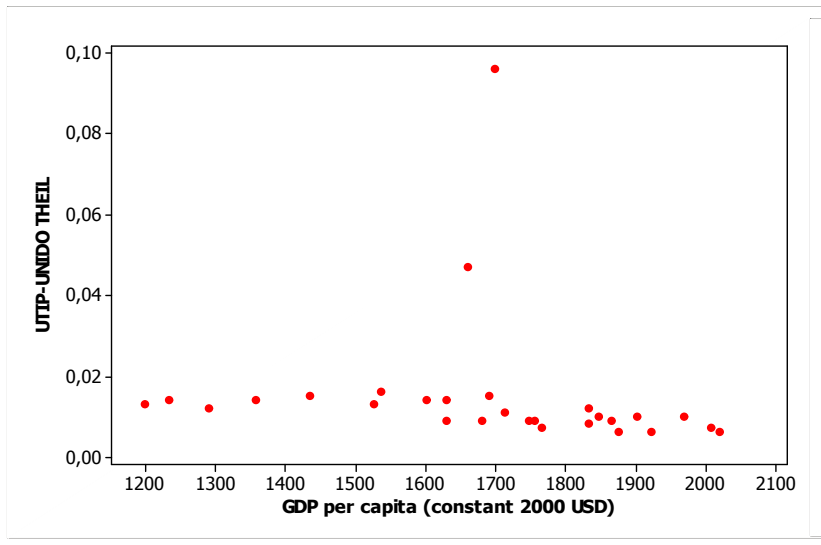
```
Panel Regression - Estimation by Random Effects
Dependent Variable THEIL
Panel(18) of Annual Data From      1//1980:01 To      6//1997:01
Usable Observations    108      Degrees of Freedom   104
Mean of Dependent Variable      0.0455555556
Std Error of Dependent Variable 0.0304711702
Standard Error of Estimate      0.0150283321
Sum of Squared Residuals        0.0234884795
Log Likelihood                   283.61987
Hausman Test(3)                   4.600950
Significance Level               0.20346060
```

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	-0.0397	0.0295	-1.34639	0.17817548
2.	GDPPC	3.4360e-05	6.4678e-06	5.31242	0.00000011
3.	LABPR	1.8315e-03	6.3622e-04	2.87868	0.00399346
4.	OPENN	-2.5232e-04	1.3884e-04	-1.81733	0.06916649

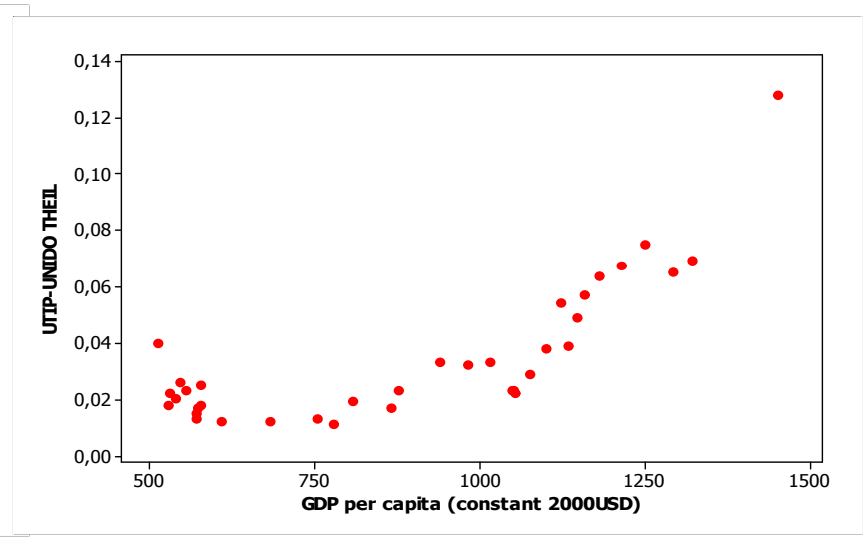
A6. SCATTER DIAGRAMS

Figure A6.1: Scatter plot of UTIP-UNIDO THEIL vs GDP per capita (constant 2000 USD)

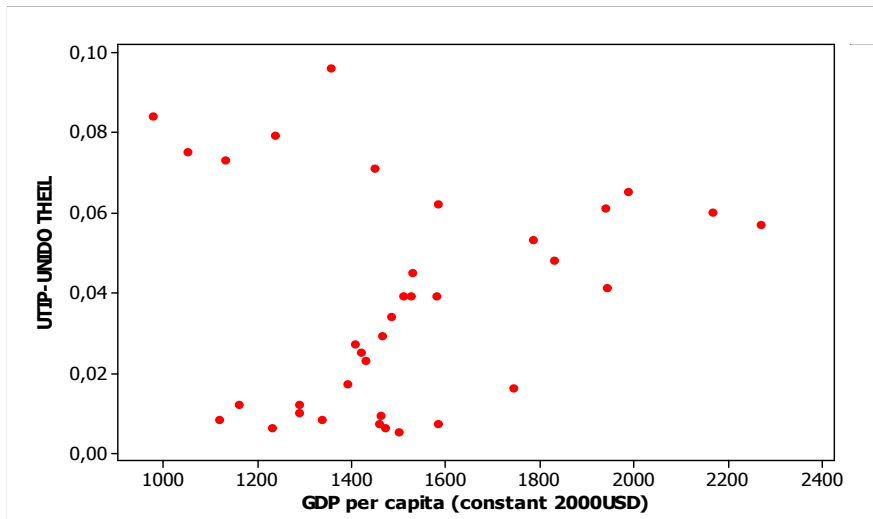
ALGERIA (1967-1997)



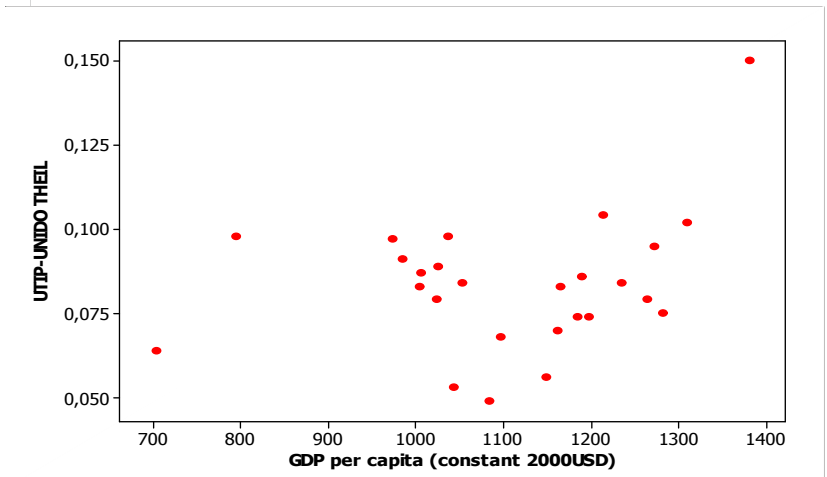
EGYPT (1964-2002)



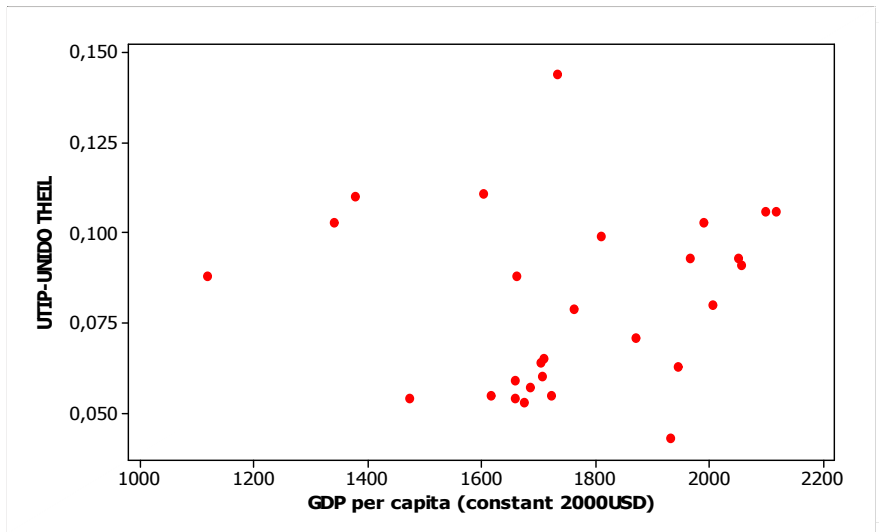
IRAN (1965-2000)



MOROCCO (1976-2001)



JORDAN (1975-2002)



TURKEY (1968-2000)

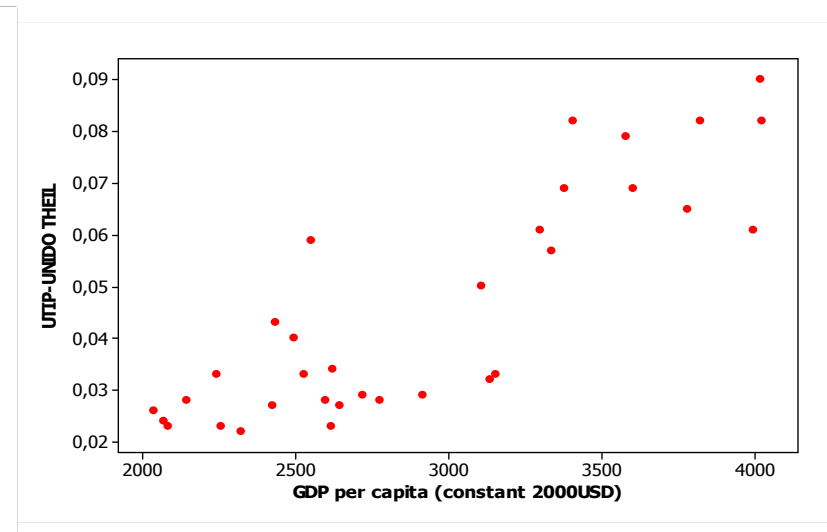
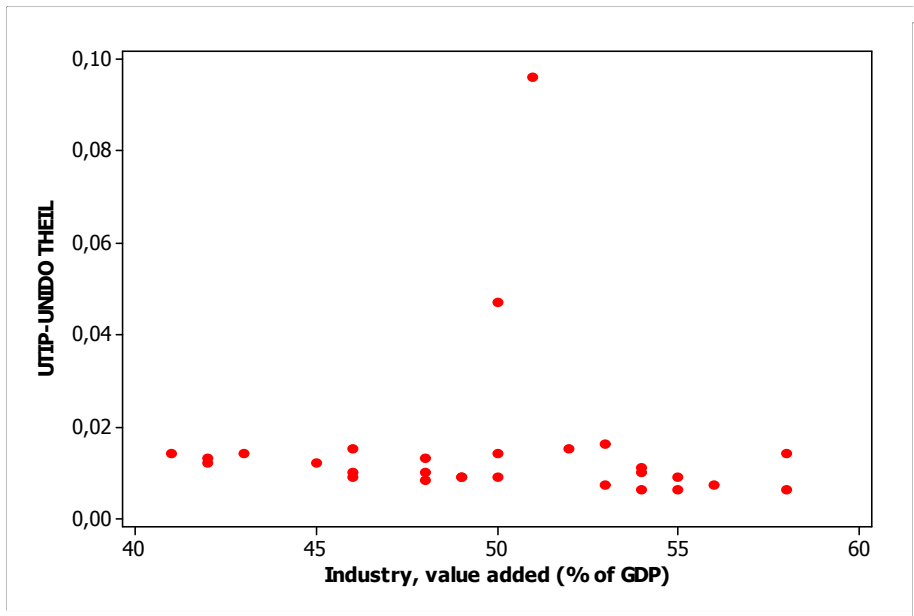
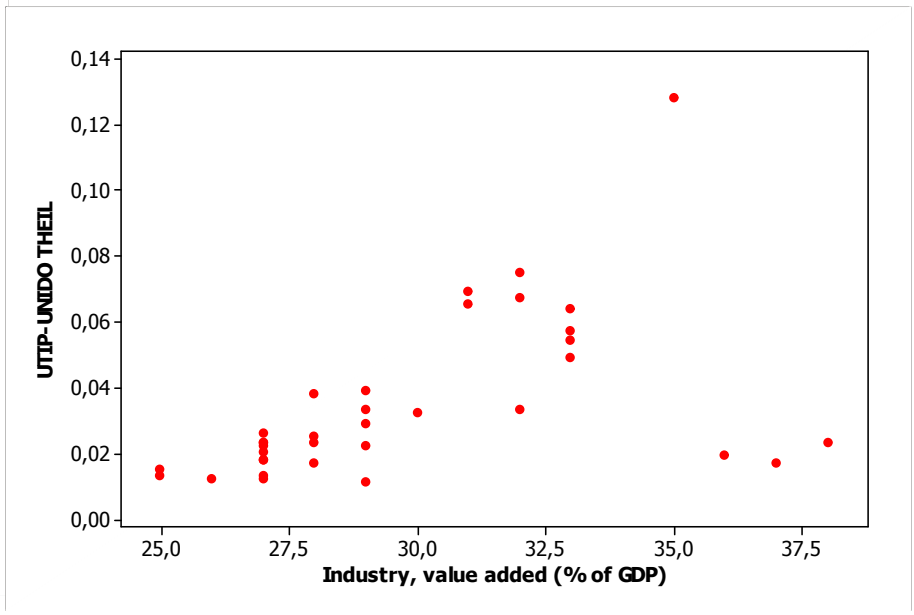


Figure A6.2: Scatter plot of UTIP-UNIDO THEIL vs Industry, value added (% of GDP)

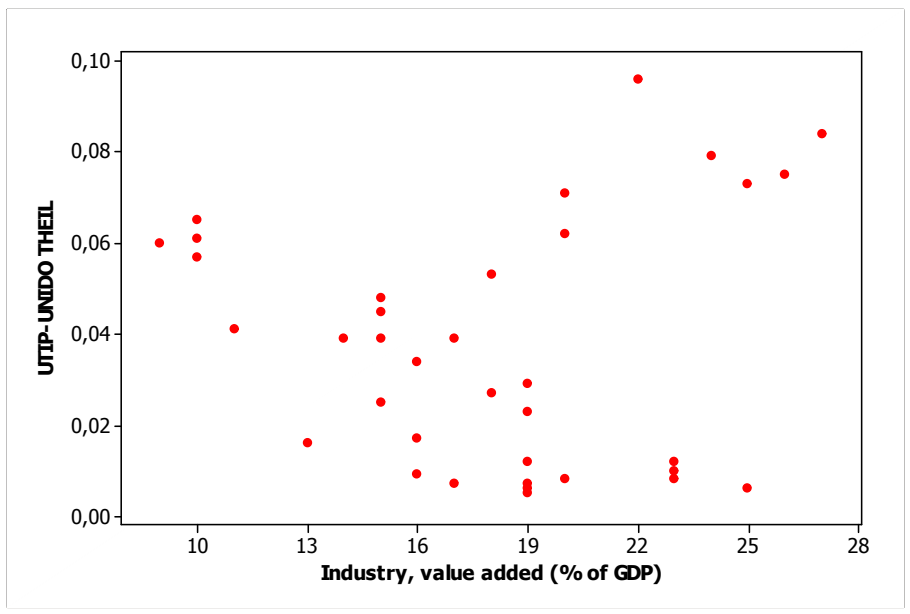
ALGERIA (1967-1997)



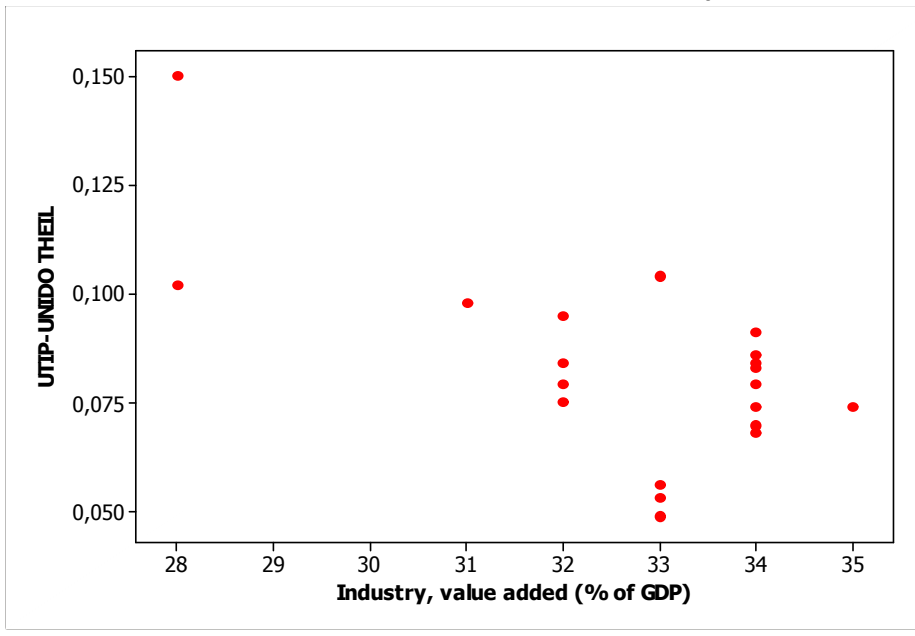
EGYPT (1968-2002)



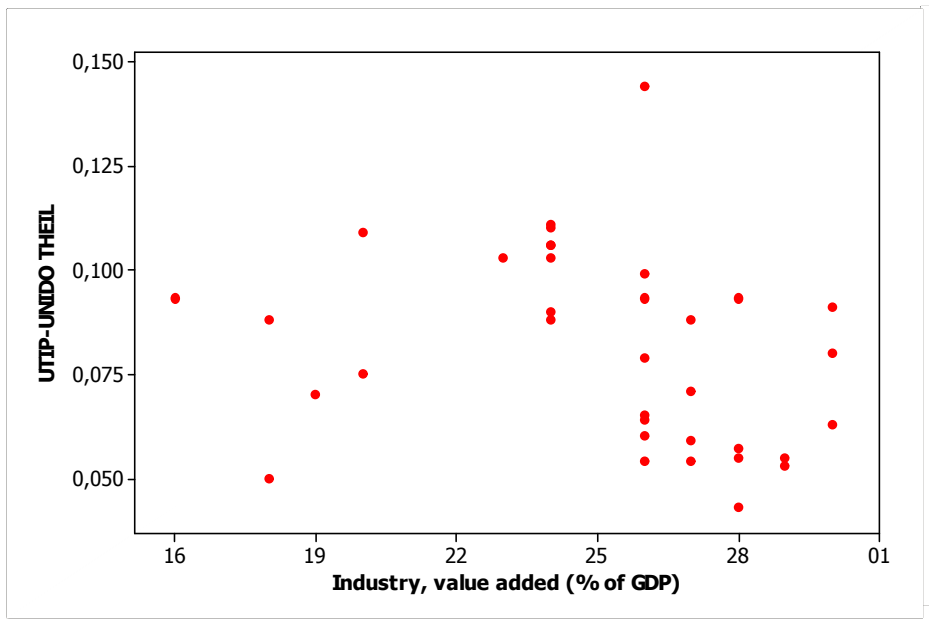
IRAN (1965-2000)



MOROCCO (1980-2001)



JORDAN (1965-2002)



TURKEY (1968-2000)

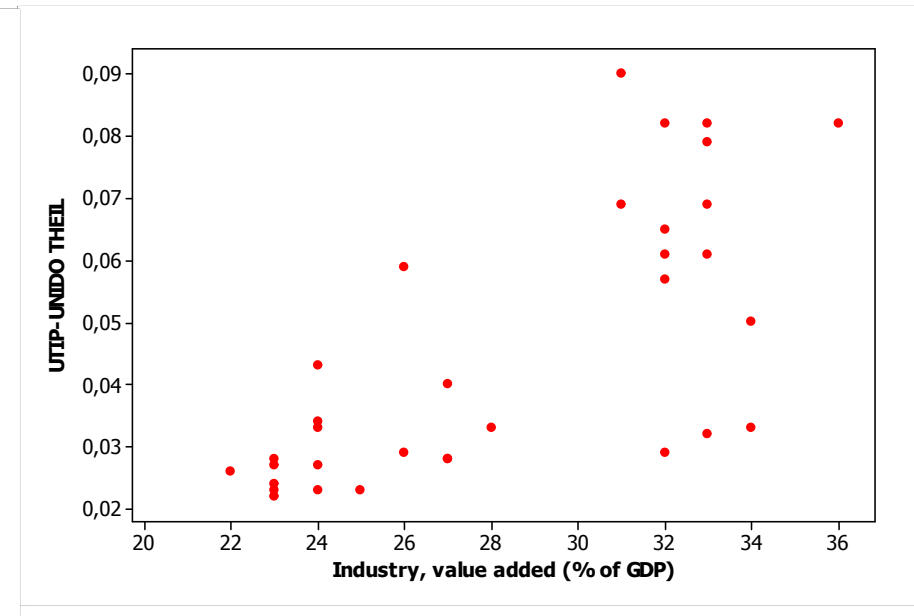
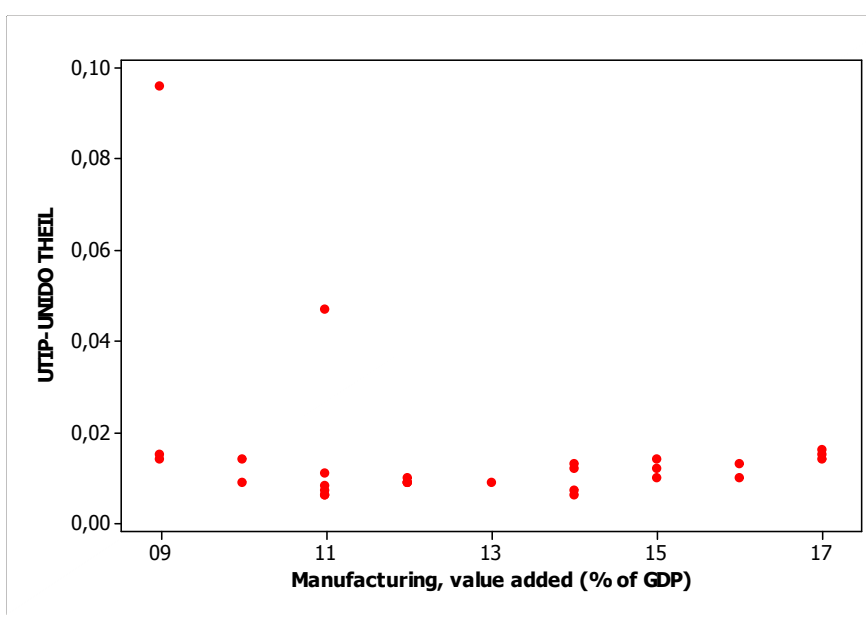
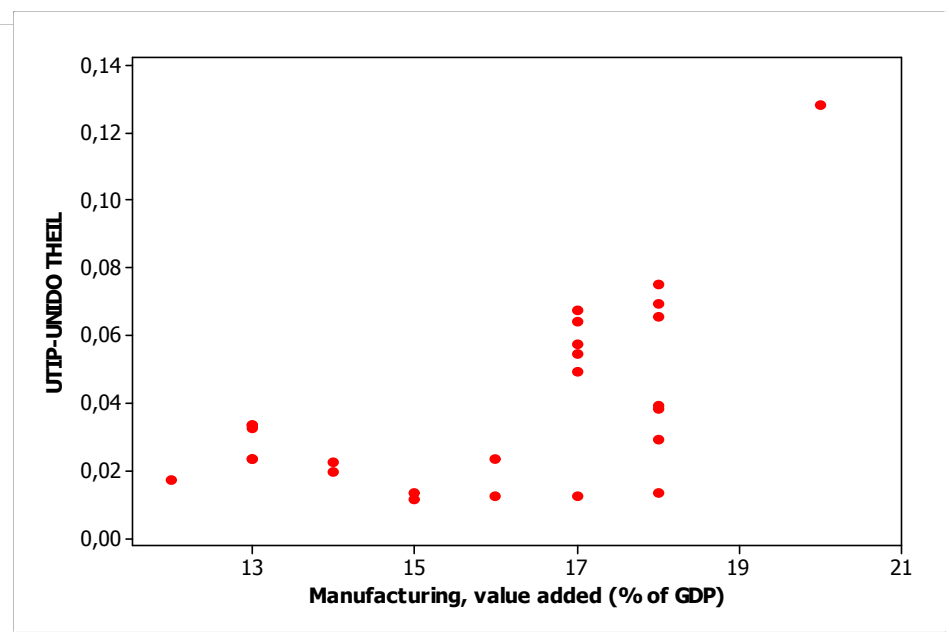


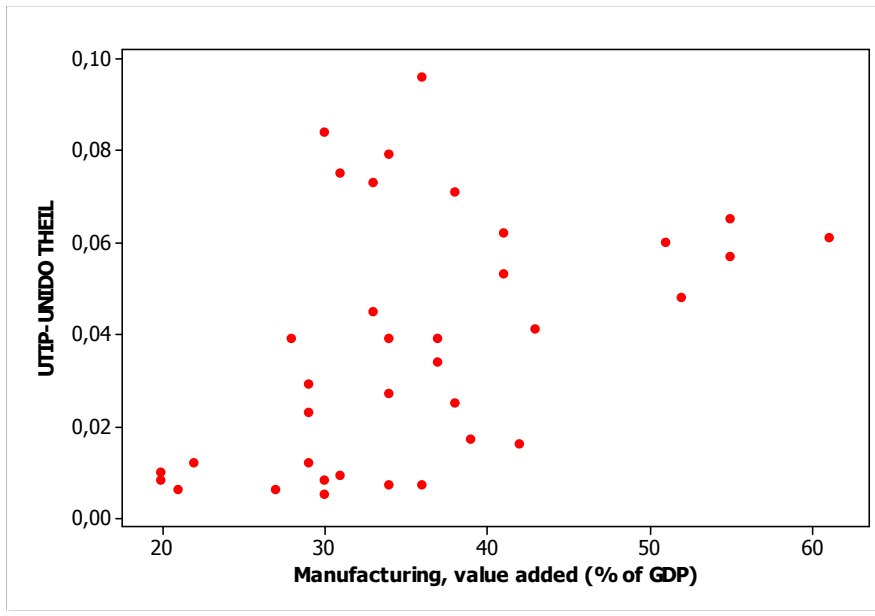
Figure A6.3: Scatter plot of UTIP-UNIDO THEIL vs Manufacturing, value added (% of GDP)

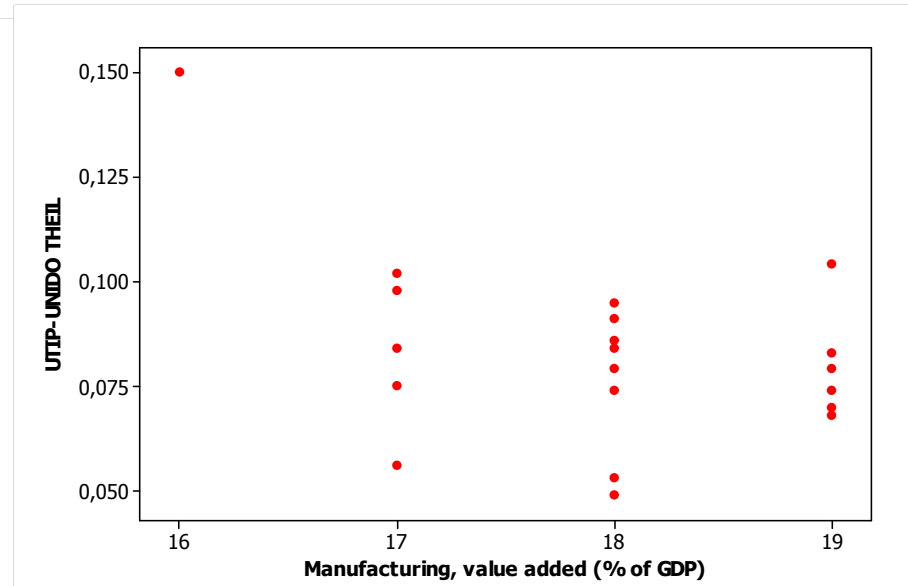
ALGERIA (1967-1997)



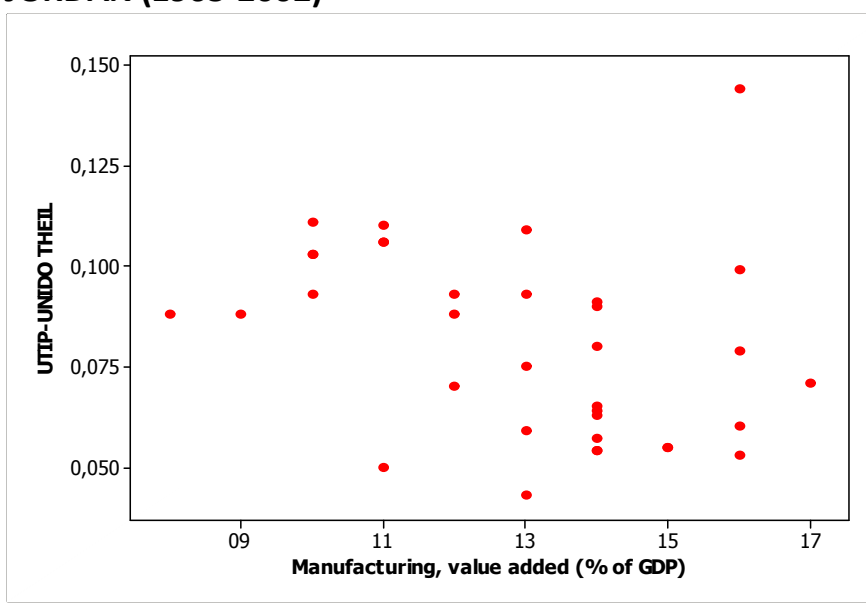


IRAN (1965-2000)





JORDAN (1965-2002)



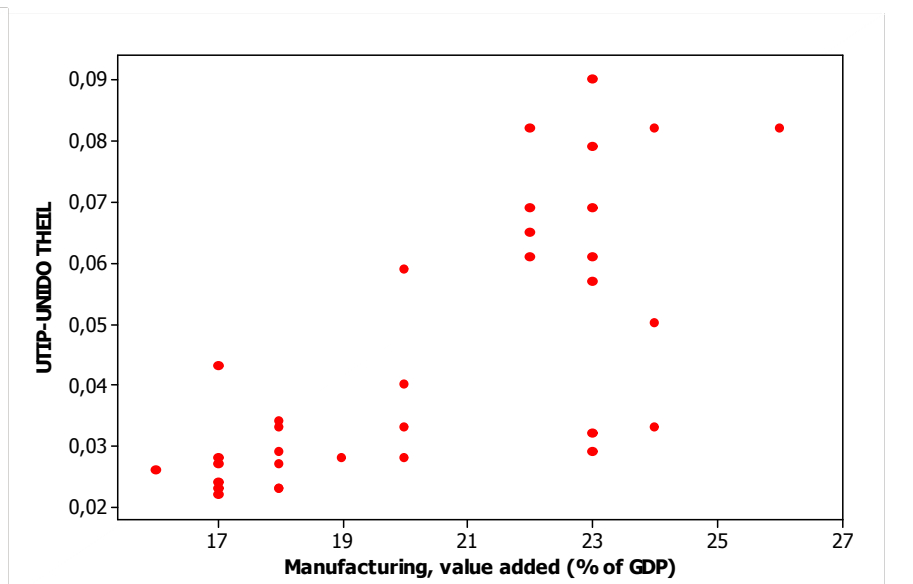
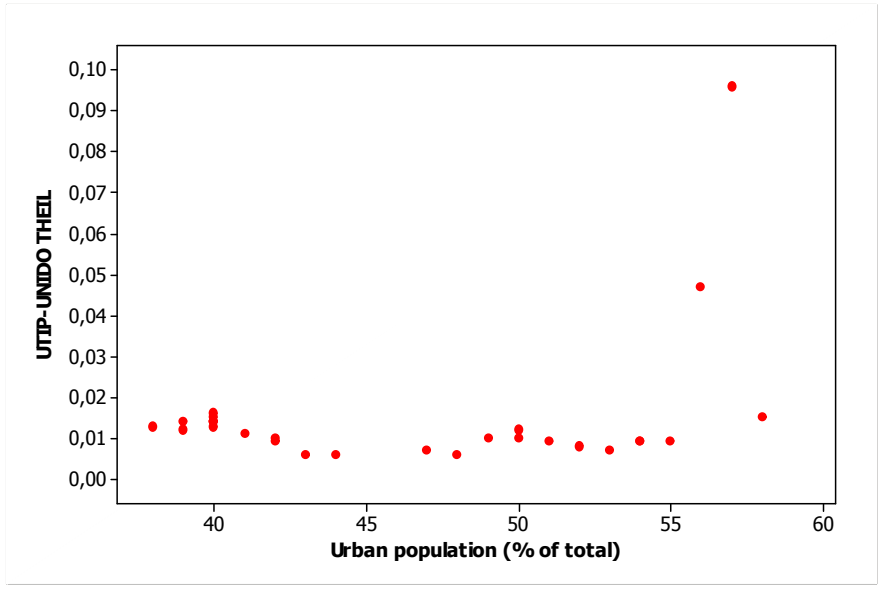
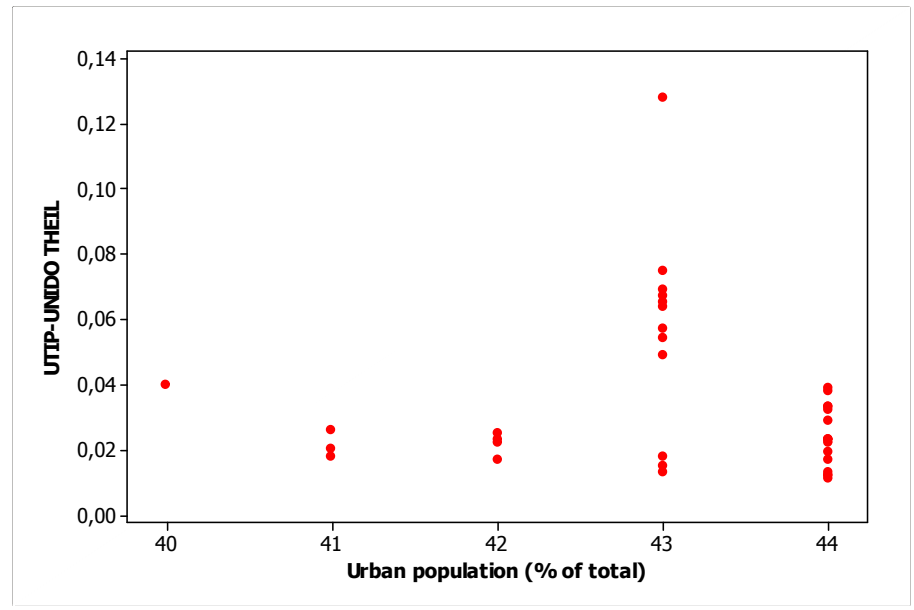


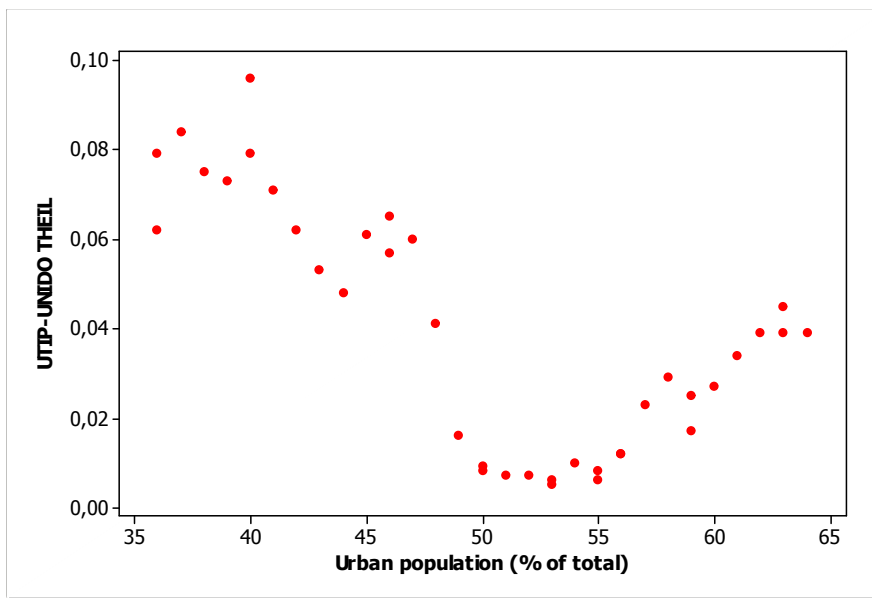
Figure A6.4: Scatter plot of UTIP-UNIDO THEIL vs Urban population (% of total)

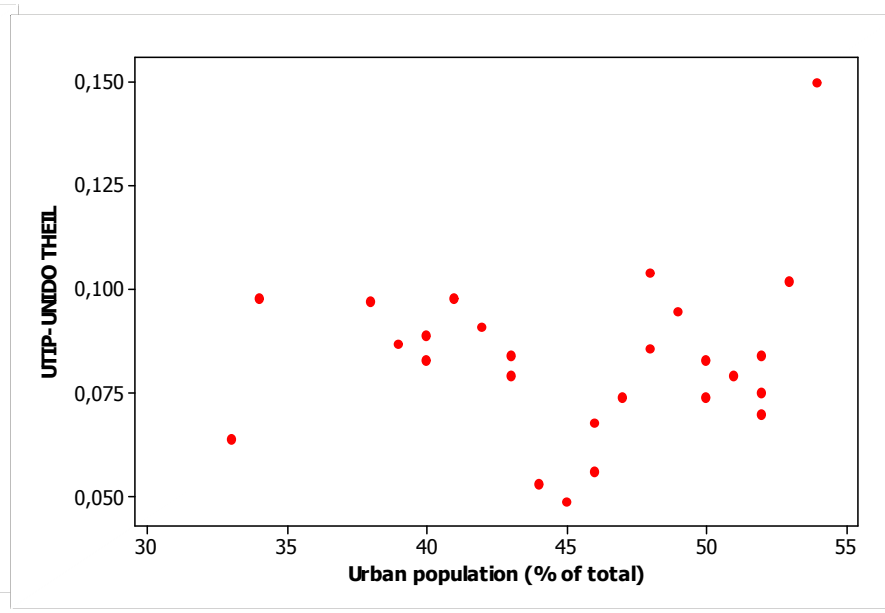
ALGERIA (1967-1997)



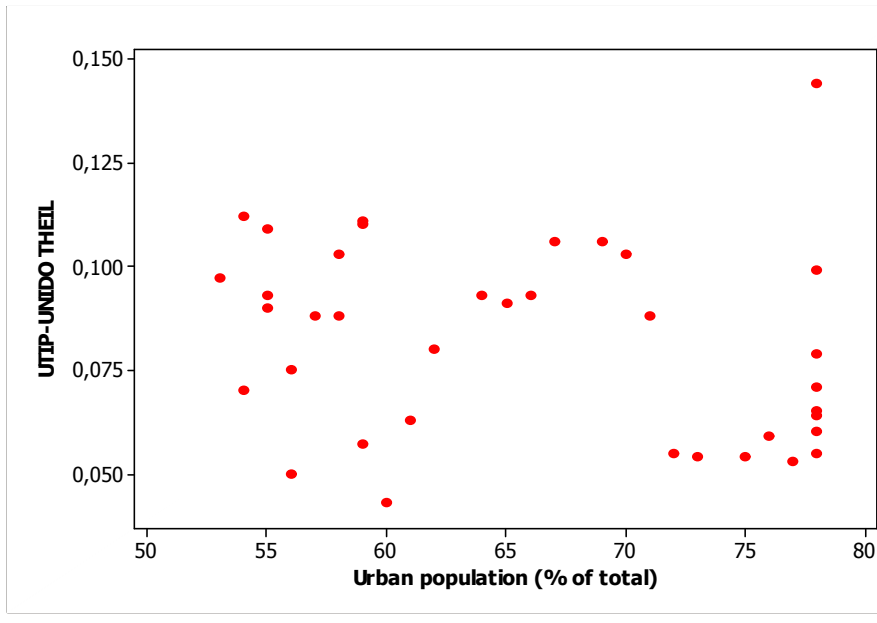


IRAN (1963-2000)





JORDAN (1963-2002)



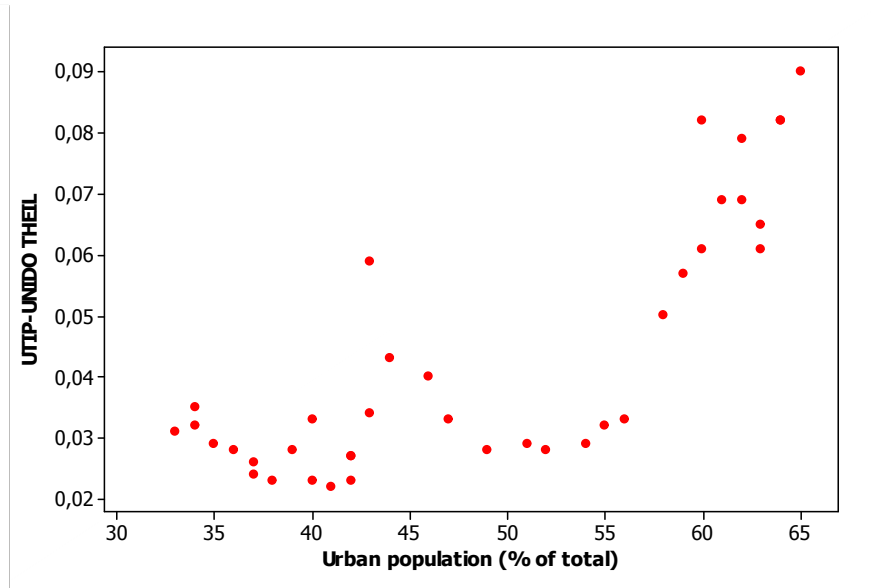
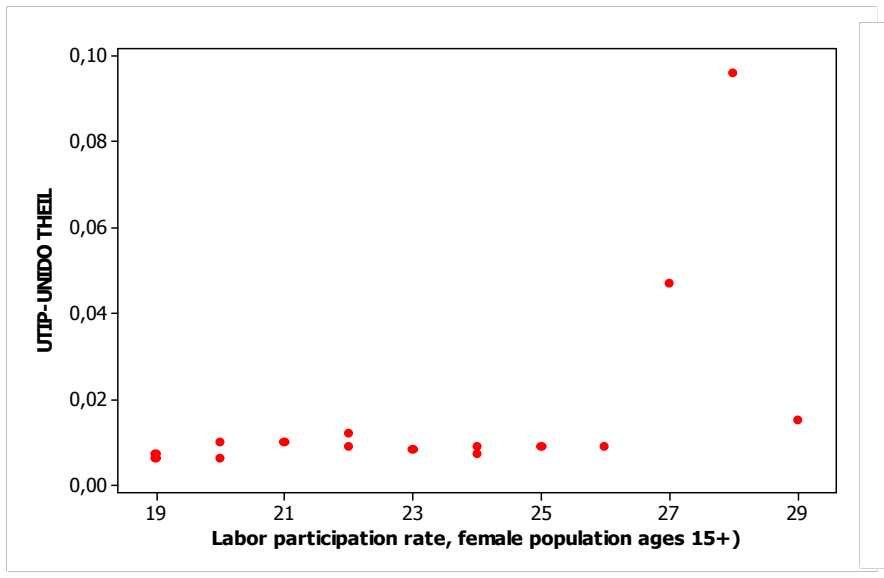
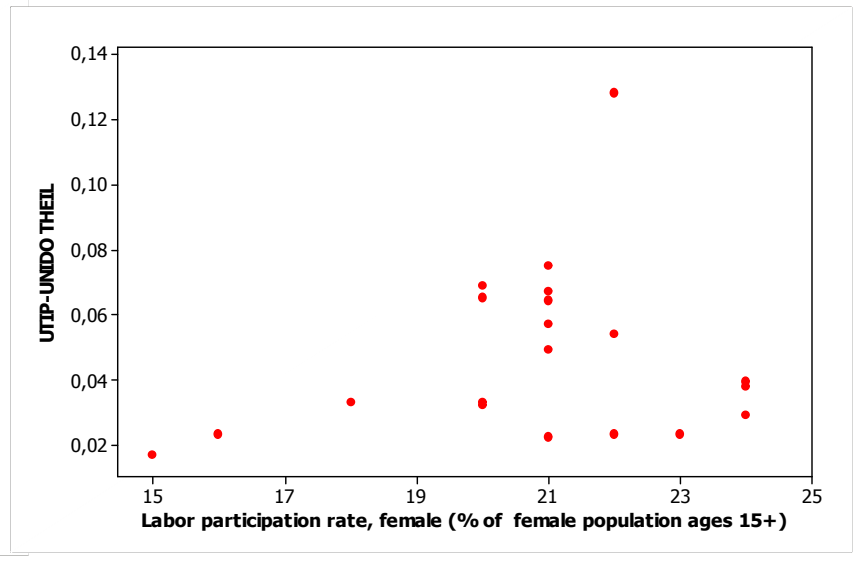


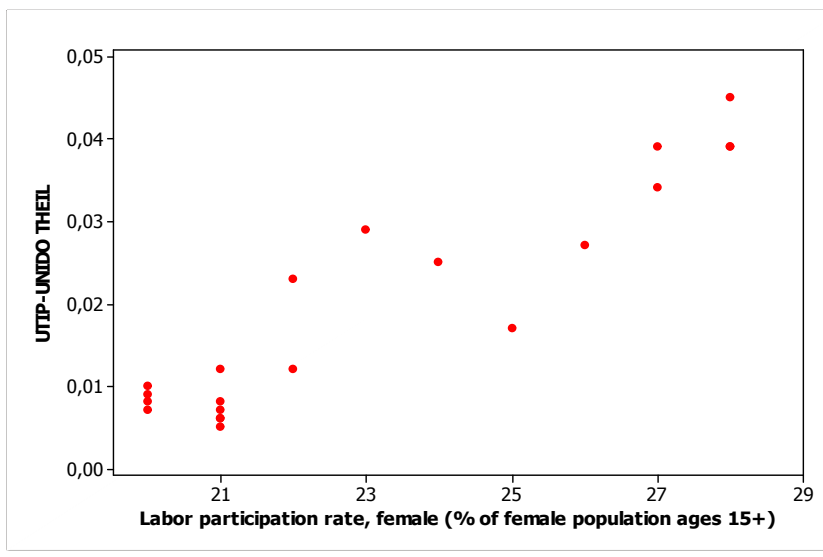
Figure A6.5: Scatter plot of UTIP-UNIDO THEIL vs Labor participation rate, female
(% of female population ages 15+)

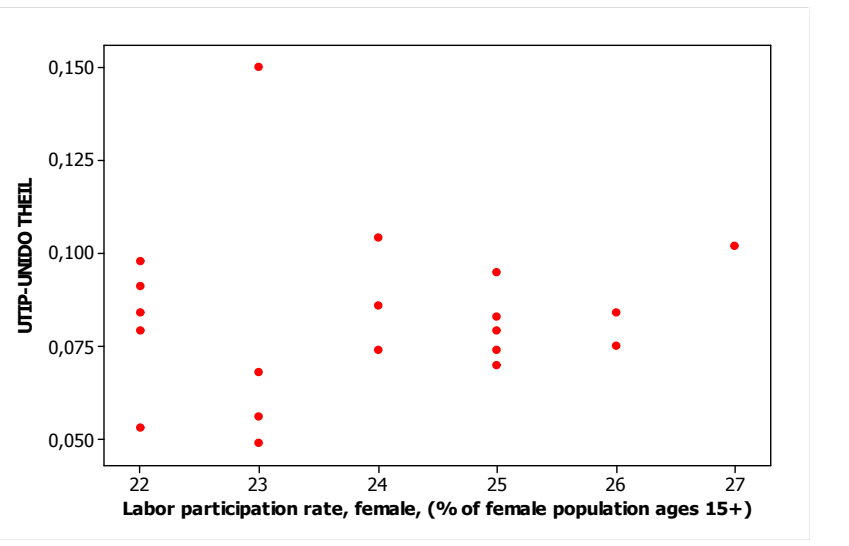
ALGERIA (1980-1997)



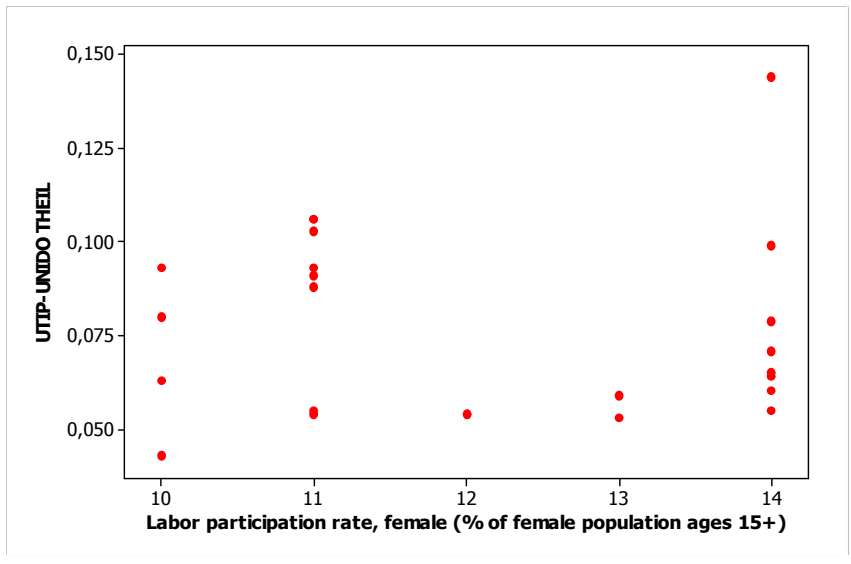


IRAN (1980-2000)





JORDAN (1980-2002)



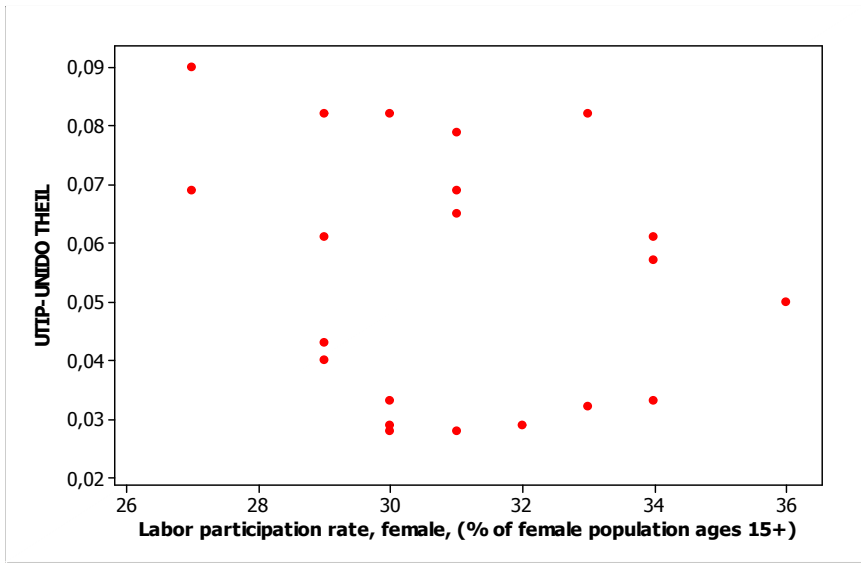
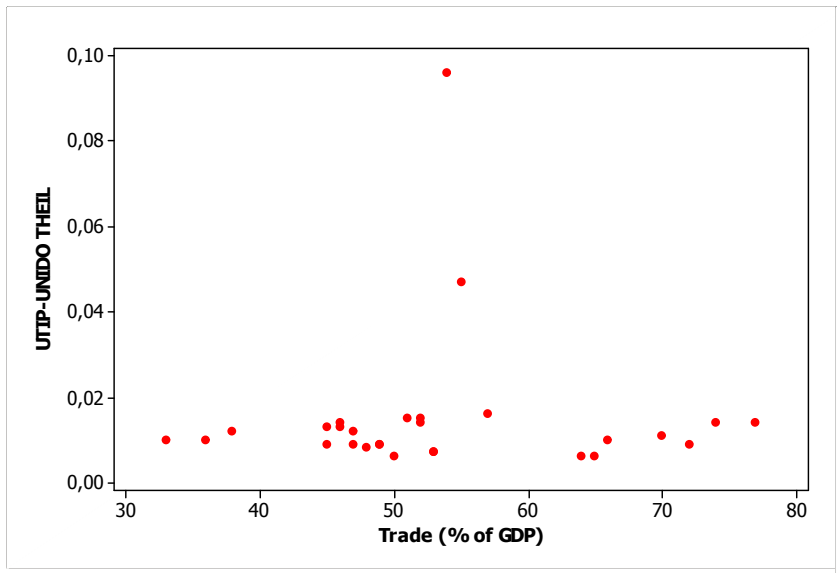
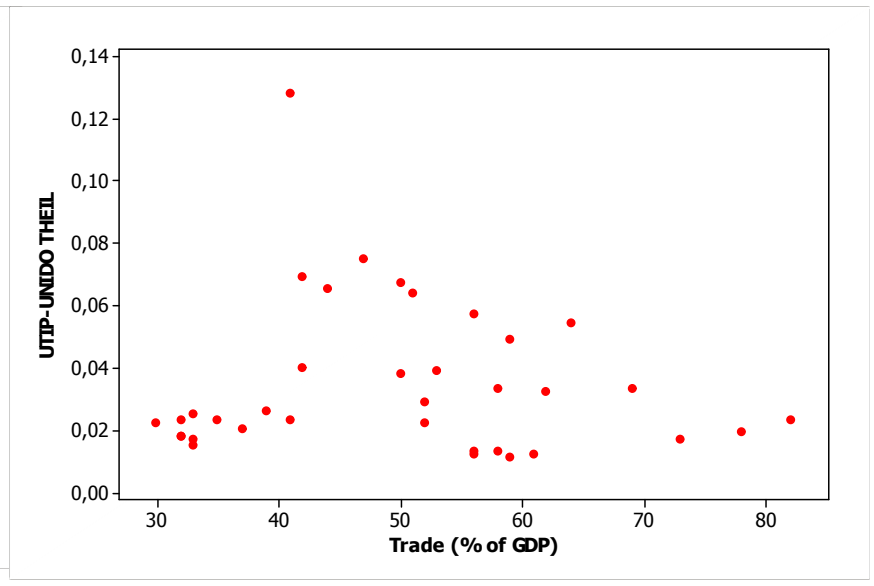


Figure A6.6: Scatter plot of UTIP-UNIDO THEIL vs Trade (% of GDP)

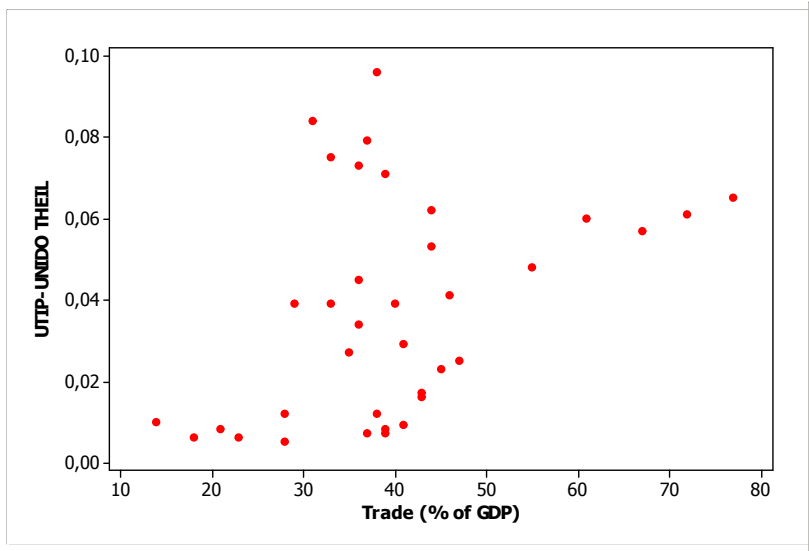
ALGERIA (1967-1997)



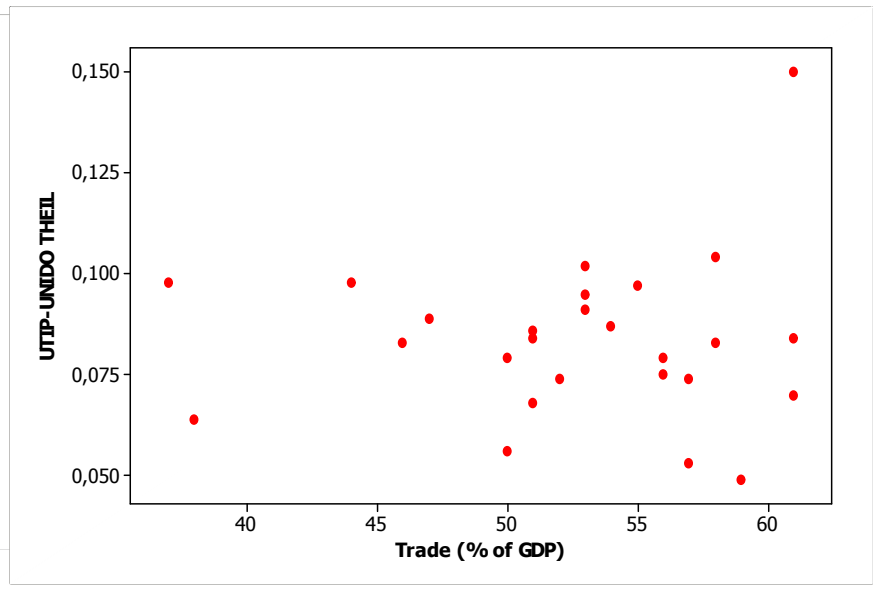
EGYPT (1964-2002)



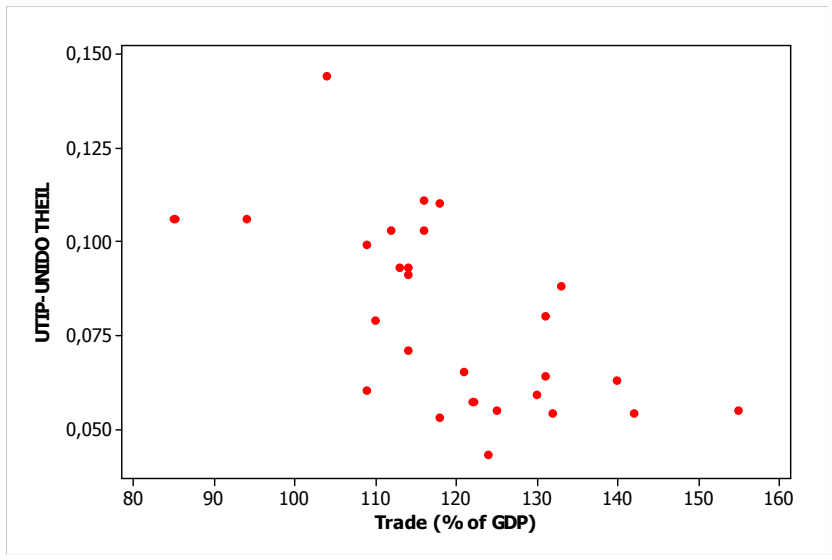
IRAN (1963-2000)



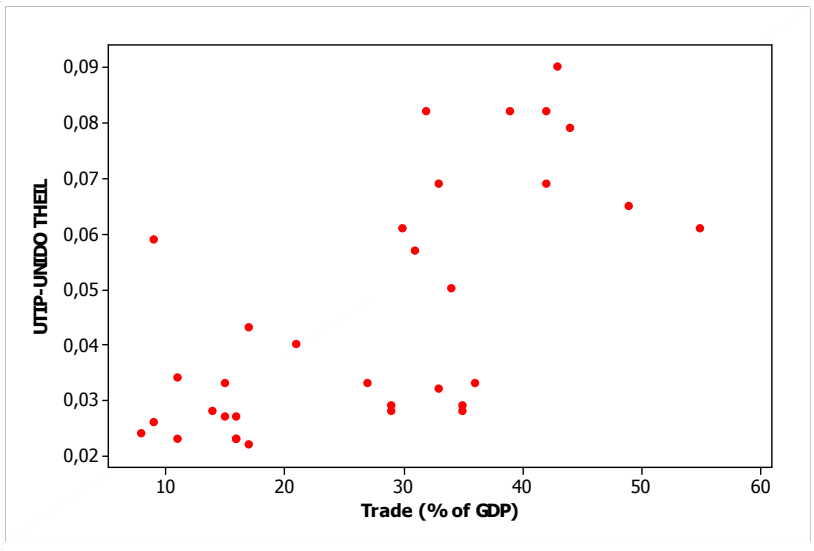
MOROCCO (1967-2001)



JORDAN (1976-2002)



TURKEY (1968-2000)



NOTES

[1] Kanbur (2000) underlines the superiority of case studies to cross-country approach.

[2] There is a substantial body of literature on methodological issues and measurement errors in surveys (as examples, see Sudhir and Segal, 2008, Jenkins and Micklewright, 2008, and Nugent, 1983).

[3] In Appendix-A3, a figure from Galbraith and Kum (2005:224) is displayed in order to show UTIP-UNIDO Theil and Deininger & Squire Gini for Great Britain and the USA move together in the same time horizons.

[4] See Appendix-A1 for the Theil-index values.

[5] See Appendix-A3 for the general computation of the Theil statistic.

[6] Although relying on Moon and Perron test results, we report the results of other unit roots tests in Appendix-A4.

[7] We did no run a fixed-effects model here because the regression contains the education variable which is a composite measure calculated from 5-year averages for the corresponding time period.

[8] Benar (2007) also covers a different time period (1960-2004) in the analysis.