## An Analysis of Tax Structure Changes in the MENA Region in Response to Trade Liberalization

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October 2003

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#### Abstract

There has been an unprecedented trade liberalization starting in mid-1980s by a wide spectrum of developing countries. In the same period, there have also been considerable changes in the tax structures of countries. This paper uses panel data on 65 countries including 16 MENA countries for the period 1980-1997 to examine how tax structures responded to trade liberalization. It is found that, unlike other Non-OECD countries, the MENA countries did not increase their reliance on domestic consumption taxes in response to trade liberalization. Trade liberalization didn't seem to have a strong impact on major revenue sources of the MENA countries.

JEL classification: E62, H20, H71, H87 Key words: Trade liberalization, tax structures, the MENA region

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### **1. Introduction**

There has been widespread international trade and investment liberalization by developing countries throughout 1980s and 1990s. There are two major events that led to significantly lower use of international trade taxes. The first is the Tokyo Round that was completed in 1979. In this trade round, ninety-nine participating countries agreed to a substantial reduction in tariff rates by 1986. Another important aspect of the Tokyo Round was that developing countries took part in the tariff reductions for the first time. The second major event is the Uruguay Round of trade talks, which started in 1986 and comprised 125 participating countries. With the formal signing in April 1994, countries reached substantial new agreements on general tariff reduction.<sup>1</sup> A key feature of these events is that trade liberalization gained momentum for non-OECD countries after the mid-1980s. On the other hand, there was less of an effort within the OECD, as international trade taxes were already at considerably lower levels.

These widespread trade reforms in mid-1980s provide an excellent natural experiment to analyze tax structure changes. These events indeed coincide with significant changes in the tax structures of countries. For instance, Tosun (2002a) shows that there has been a statistically and economically significant move from international trade taxes to domestic taxes on goods and services<sup>2</sup> in non-OECD countries since mid-1980s. Keen and Lighart (2002) provided a rationale for this by arguing that replacement of import duties and export taxes with domestic consumption taxes improves welfare and increases revenues. Tosun (2002a) argues that potential exportability of domestic taxes on goods and services may also explain the move to these taxes.

While the tax structures of industrialized nations are similar to a certain extent. developing countries' tax structures vary extensively (Tanzi, 1992; Zee, 1996 and Tanzi and Zee, 2000). Within that spectrum, Middle East and North Africa (MENA) region countries have unique characteristics such as economic dependency on sizeable oil reserves and astounding growth in the working-age population<sup>3</sup>. Related to the latter characteristic, Tosun (2002b, 2003) argues that demographic differences between regions can lead to capital flows from low population growth to high population growth regions. Given the high population growth rate in MENA region countries<sup>4</sup>, capital flows from the European Union (EU) and other developed countries can potentially change the economic growth and thereby the tax structure in the MENA region. A number of studies addressed fiscal policy and tax structures in the MENA region countries. Among these, a study by Abed (1998) gives a comprehensive overview of the trade liberalization experience of Southern Mediterranean Region (SMR) countries through European Union's Association Agreements.<sup>5</sup> He discusses various tax reform proposals needed to counteract revenue losses from tariff reductions. However, that study does not provide an

<sup>&</sup>lt;sup>1</sup>The average decrease in all duties for the Tokyo Round and the Uruguay Round was 29.6 and 38 percent, respectively. See Yarbrough and Yarbrough (2000: 320).

<sup>&</sup>lt;sup>2</sup> These taxes include general sales, turnover, or value-added taxes and excise taxes.

<sup>&</sup>lt;sup>3</sup> Dhonte, Bhattacharya and Yousef (2000) call this a demographic explosion.

<sup>&</sup>lt;sup>4</sup> Abed and Davoodi (2003) mention high population growth in the MENA region as a major factor in region's economic performance. <sup>5</sup> Another study by Eken, Helbling and Mazarei (1997) examines the effect of fiscal structure on economic growth in

the MENA countries.

empirical estimation of the effect of trade liberalization on the tax structures. It also focuses only on SMR countries. Eltony (2002) examined the tax structures and tax efforts of 16 Arab countries. Among other factors, he also showed the share of exports and imports in GDP, which is used as a general measure of openness, as an important factor in the tax revenue performance of Arab countries. However, a broad comparison that shows how the tax structures of different groups of countries within the general Non-OECD group responded to widespread trade reforms in mid-1980s has not yet been done. It would be convenient and useful to include MENA in that comparison since MENA region countries are all Non-OECD countries and they differ considerably from both OECD and other Non-OECD countries in their economic and demographic structures and trade orientation.<sup>6</sup>

This paper provides an empirical examination of how tax structures of MENA region countries changed in response to extensive trade liberalization in mid-1980s. Following up on the arguments in Keen and Ligthart (2002) and Tosun (2002a) about the desirability of the domestic consumption taxes for countries that are liberalizing their international trade, the main focus of the paper is to see whether the tax structure has indeed shifted to domestic taxes on goods and services in response to increased openness to trade. In view of that, a comparison of MENA countries to OECD and other Non-OECD countries would give policymakers in the MENA region insights as to how to reform their countries' tax structures.

The paper is structured as follows. In the next section, I review changes in tax revenue structures. Section 3 describes the variables in the empirical analysis, the empirical specification and the data. The econometric considerations that guide the empirical work are explained in section 4. Section 5 presents the empirical results and provides interpretations. The final section provides concluding remarks and proposes directions for further study.

#### 2. Widespread Trade Liberalization and Tax Structure of MENA Countries

The Uruguay and Tokyo rounds of trade talks paved the way for unprecedented trade liberalization in 1980s and 1990s by a wide spectrum of developing countries. In the same period, there have also been considerable changes in the tax structures of countries. Table 1 shows the tax structure changes for a selection of 65 countries between 1980-82 and 1995-97.<sup>7</sup>

#### <INSERT TABLE 1 HERE>

The tax classifications are adopted from IMF's Government Finance Statistics. *Taxes on income, profits and capital gains* comprise individual income and corporate income taxes; *social security contributions* include contributions to the social security programs by employees, employers and self-employed or nonemployed; *property taxes* include recurrent taxes on immovable property and net wealth, estate, inheritance and gift taxes, taxes on financial and

<sup>&</sup>lt;sup>6</sup> Oliva (2000) provides a detailed analysis of how MENA countries differ among themselves in terms of openness to trade.

<sup>&</sup>lt;sup>7</sup> See Appendix Table 1 for a list of sample countries classified into different regional or economic groups. Notice that Central and Eastern European countries (CEECs) are not included in the Appendix Table 1. These countries are used only for the comparison in Table 1 and are excluded from the empirical analysis due to lack of data. These countries include Albania, Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, and the Slovak Republic.

capital transactions and all other recurrent and nonrecurrent taxes on property; domestic taxes on goods and services include general sales, turnover, or value-added taxes and excise taxes; *international trade taxes* include customs and other import duties, taxes on exports, and taxes on the profits of export or import monopolies; and other taxes include all other unclassified taxes.

Comparing first the differences in tax composition in 1995-97 across countries, OECD countries rely less on international trade taxes and more on income taxes compared to all other groups. Also, OECD countries and Central and Eastern European Countries (CEECs) draw more tax revenue from social security contributions compared to other countries. There is considerably greater reliance on trade taxes in MENA countries compared to all other countries. Next, Table 1 shows that OECD, MENA and other Non-OECD countries all decreased their reliance on international trade taxes between 1980-82 and 1995-97. Another visible trend is the considerable increase in the reliance on domestic taxes on goods and services in these groups.

While Table 1 shows the clear trend towards greater reliance on domestic taxes on goods and services and lower reliance on international trade taxes, the question of whether this has indeed been due to greater openness of these countries to trade still needs to be explicitly addressed. The next section describes the empirical approach used to examine how different tax groups in Table 1 have responded to trade liberalization.

#### **3.** Empirical Analysis

#### **3.1 Dependent Variables**

The empirical analysis uses seven major components of total tax revenue. Accordingly, total tax revenue (T) is defined as

$$T = PCT + SST + PAYT + PROPT + GST + IT + OT,$$
(1)

where, PCT is personal and corporate taxes on income, profits and capital gains, SST is social security contributions from both the employees and the employers, PAYT is payroll taxes, PROPT is property taxes, GST is domestic taxes on goods and services taxes, IT is international trade taxes and OT is all other taxes. Accordingly, tax shares are defined as the ratio of each tax on the right hand side of (1) to total tax revenue on the left hand side of (1). This implies that

$$\frac{PCT}{T} + \frac{SST}{T} + \frac{PAYT}{T} + \frac{PROPT}{T} + \frac{GST}{T} + \frac{IT}{T} + \frac{OT}{T} = 1.$$
(2)

Tax structure changes can be examined by using each of the seven tax shares in (2) as dependent variables in regressions that form a seemingly unrelated system (Kenny and Winer, 2001). In this seemingly unrelated system, the value of the coefficients of the explanatory variables would also sum to 1. The regression analysis uses dependent variable definitions in (2).

#### **3.2 Explanatory Variables and Other Control Variables**

One of the key explanatory variables is the *openness* index defined as the ratio of the sum of exports and imports to the gross domestic product. Clearly, a liberalized trade structure is expected to trigger a shift from international trade taxes to other taxes in the tax structure.

Interacting this openness index with dummy variables that represent country groups and the period of heightened trade liberalization creates various interaction variables. Thus the interactions consist of three variables: a dummy variable that is set to 1 for the period after 1986, which identifies the change in trade regimes through the Tokyo and Uruguay rounds; a dummy variable for the country group, such as Non-OECD, MENA, or Non-OECD excluding MENA, which is used to identify the "experiment" group that experienced a rise in openness; and as explained before, an openness index which indicates whether a country indeed opened its trade. The interaction variables created with different combinations of these three variables will give us the complete effect of trade reform in the specific group of countries that became relatively open after mid-1980s. The variable of interest is the interaction of openness index, country group dummy and post-1986 dummy. This triple interaction gives the combined effect and is expected to capture the relationship between trade reform and change in the tax mix. The triple interaction would give us the so-called "difference-in-differences"<sup>8</sup>. The question is whether the countries in a specific group (experiment group) that became more open in the post-1986 period significantly changed their tax structure relative to a control group (OECD countries). This is the natural experiments approach that is recently popularized by Martin Feldstein (1995) and Nada Eissa (1995, 1996). In this approach, tax reforms are used as natural experiments to analyze behavioral changes. Here the reform is widespread trade liberalization of mid-1980s.

The remaining control variables include the *share of international tourism receipts in* total exports; fuel exports as percent of total merchandise exports; old-age dependency ratio; government spending lagged one year, GDP per capita, population density and finally year dummies to capture the effect of any time specific events. The share of international tourism receipts in total exports and *fuel exports as percent of total merchandise exports* are used to control for the tax exporting behavior of countries. In his seminal paper, Mclure (1967) shows the importance of interstate tax exporting for the tax systems of U.S. states. Tosun (2002a) argues that countries that attract considerable number of tourists are expected to rely more on general sales or excise taxes, as taxes on international tourism expenditures are easy to export. Similarly, oil exporting MENA countries may rely more on certain excise taxes and corporate income tax in the hope of exporting those taxes. Old-age dependency ratio is used to control for relatively heavy reliance on certain taxes such as social security contributions due to a higher proportion of the elderly population. Lagged government spending controls for the size of the public sector. The size of the public sector may affect tax composition because the marginal cost of various taxes may change at different rates when the size of the public sector changes (Hettich and Winer 1984; Gade and Adkins 1990).

<sup>&</sup>lt;sup>8</sup> For example, difference-in-differences will tell us whether a MENA country that became relatively open in the Post-1986 experienced a significant increase or decrease in a specific tax compared to all other countries in the sample.

Two controls are used for the size of countries. Population density is a control for population differences relative to the land area of countries. GDP per capita controls for the size of the economies taking into consideration the population size. This is important because the sample includes low, lower-middle, upper-middle, and high-income countries. In addition, GDP growth directly affects tax bases, particularly income and consumption. Tosun and Abizadeh (2003) show that growth in GDP per capita has had a significant impact on the tax structures of OECD countries. The authors argue that the greatest impact was indeed on personal income taxes and goods and services taxes. Finally, year dummies are used to capture any time specific effects.

#### **3.3 Empirical Specification**

As also argued by Kenny and Winer (2001), a way to efficiently estimate the seemingly unrelated system in (2) is to include exactly the same set of explanatory variables described in the previous section in each regression.<sup>9</sup> Fixed-effects and random-effects procedures are the two typical approaches for estimating panel data. A fixed effects model has the advantage of removing the bias from the estimation caused by a possible correlation between the explanatory variables and time-invariant country specific effects. This approach in a sense uses countries as controls for themselves. Another important characteristic of the fixed effects model is that it produces consistent estimates even when the random effects model is valid. The dependent variable as defined in (2) is the share of each tax in total tax revenues. The following specification is used to run regressions with tax shares as dependent variables:

$$TaxShare_{it}^{j} = \alpha + \beta_{1}Group * Openness * Post - 1986 + \gamma_{1}Group * Openness + \gamma_{2}Group * Post - 1986 + \gamma_{3}Openness * Post - 1986 + \delta_{1}Openness + \delta_{2}Group + \eta Z_{it} + f_{i} + \phi_{t} + \varepsilon_{it},$$
(3)

where "*TaxShare*<sup>j</sup>" is the share in total tax revenues for tax j in country i at time t. I include interaction variables that capture the effect of openness to trade in the post-1986 period. Interactions consist of three variables: "*Openness*" is an openness index measured as the ratio of the sum of exports and imports of goods and services to the gross domestic product. "*Post-1986*" is a dummy that is set to 1 for the period after 1986 in order to identify the change in the trade regimes. "*Group*" is a dummy variable for the country group that is being analyzed, which constitutes the "experimental group". *Group* takes the value 1 for the country that belongs to the group under study. The country groups that are compared are Non-OECD, MENA and Non-MENA-Non-OECD. Thus, three sets of regressions (one for each case) are run for the specification in (3).<sup>10</sup> The variable of interest is the interaction of *Openness*, *Post-1986* and *Group*. The triple interaction, *Group*\**Openness*\**Post-1986*, gives the combined impact of increased openness in the post-1986 period on the specific tax share in the country group that is examined. This variable is expected to capture the relationship between the trade reform and the

<sup>&</sup>lt;sup>9</sup> A combined seemingly unrelated regression (SUR) model would be preferred to running separate regression equations when explanatory variables differ between these equations. SUR would then be relevant because the errors associated with the dependent variables may be correlated. However, when same set of explanatory variables is used, SUR gives the same results in terms of coefficients and standard errors as separate regressions.

<sup>&</sup>lt;sup>10</sup> The dummy variable Post-1986 is omitted because of the year dummies included in the specification.

share of different taxes in total tax revenues.  $f_i$  represents the unobservable country specific, time-invariant effects,  $\phi_t$  represents unobservable time specific effects<sup>11</sup>, and  $\varepsilon_t$  represents timevariant unsystematic effects and is i.i.d.  $Z_{it}$  includes all remaining control variables that are described in the previous section. In equation (3) the coefficient of interest is  $\beta_1$  which is an indicator of the response of different tax shares to the increased openness of the specific group of countries through extensive trade liberalization, controlling for all other plausible factors. The analysis of  $\beta_1$  will also constitute a test of the difference-in-differences procedure explained in the previous section.

### **3.4 Data Sources**

Data for the regression analysis comes from two main sources: World Development Indicators CD-ROM (World Bank), 2002 and Government Finance Statistics CD-ROM (IMF), 2003. I focus on the years 1980-1997, due to data availability. The pre-1980 data is not available for many countries and for many data series. There are 65 countries in the sample of which, 26 are OECD countries. Out of 39 Non-OECD countries, 16 are MENA countries. 19 of the sample countries are in Europe, 2 are in North America, 7 are in Latin America, 16 are in Middle East and North Africa, 9 are in Sub-Saharan Africa, 3 are in South Asia and 9 are in East Asia and Pacific Region. Table 2 presents the descriptive statistics of the data.

#### <INSERT TABLE 2 HERE>

### 4. Econometric Tests

The first series of tests involve testing for the fixed-effects specification. I start with a simple *F*-test for the joint significance of the dummies that form the fixed effects. In all regressions, the null hypothesis, which says that fixed-effect dummies are "not significant", is resoundingly rejected.<sup>12</sup> In addition to this, I conduct Hausman specification test<sup>13</sup> for random effects to check the robustness of the fixed effects specification. In a random effects model, the assumption is that individual country effects  $f_i$  in equation (3) and all other regressors are uncorrelated. However, if they are correlated then the coefficient estimates of the regressors in a random effects model will be inconsistent and systematically different from those for a fixed effects model, and the fixed effects model is strictly a better choice. In Hausman specification test, the null hypothesis says that coefficient estimates of the fixed effects and random effects models are not systematically different from each other.

Hausman specification tests show that fixed effects specification is clearly more appropriate for almost all of the regressions. However, the null hypothesis is not rejected in 2 out of 21 regressions. Thus, in these two regressions, random effects model can still be run. However, we know that fixed effects regression produces unbiased and consistent estimates even

<sup>&</sup>lt;sup>11</sup> The year 1980 is excluded to avoid the dummy variable trap.
<sup>12</sup> See Baltagi (1995: 12) for the specifics of this test.

<sup>&</sup>lt;sup>13</sup> See Hausman (1978) for the original description of this test.

when the random effects model is valid.<sup>14</sup> Therefore, I use the fixed effects as a base model for comparison of results.

Another potential problem with cross-sectional units of the panel is that variances of the errors across countries may not be identical. Test for heteroskedasticity is conducted by using the Breusch-Pagan / Cook-Weisberg test. Based on the results of this test, the null hypothesis, which says that variances are constant, is rejected in all regressions. Subsequently, Huber/White/Sandwich robust standard errors were used to correct for the heteroskedasticity in errors.

Finally, given the panel nature of the data there is a potential for serial correlation of errors. Baltagi (1995) proposes a Lagrange Multiplier test for first-order serial correlation in residual terms for fixed effects models.<sup>15</sup> Accordingly, Baltagi's Lagrange Multiplier test rejects the existence of serial correlation under the assumption that residuals are AR (1) in all of the regressions.<sup>16</sup>

#### **5. Empirical Results**

In all of the regressions, the key variable is the triple interaction "Non-OECD\*Openness\*Post-1986." The fixed effects regression results are presented in Tables 3 through 5.<sup>17</sup>

#### <INSERT TABLE 3 HERE>

Table 3 shows the results for all Non-OECD countries (*Group*=1 if Non-OECD country). The coefficient estimates for Non-OECD\*Openness\*Post-1986 are statistically significant in regressions with personal and corporate income taxes, property taxes, and domestic taxes on goods and services, shown respectively in columns (1), (4), and (5). The sign for the trade taxes is negative as expected but the coefficient estimate is not statistically significant. Among the taxes that are significantly affected, the largest impacts had been on personal and corporate taxes and domestic taxes on goods and services. Therefore, a Non-OECD country that became more open in the post-1986 period tended to increase its share of domestic taxes on goods and services and decrease its share of personal and corporate taxes. For example, the coefficient estimates indicate that an increase in openness by 10 percentage points in Non-OECD countries in the post-1986 period would have led to a 0.42 percentage point increase in domestic taxes on goods and services, holding other factors constant. This result is in line with the arguments put forth by Keen and Ligthart (2002) regarding the welfare improvement from switching to domestic consumption taxes and by Tosun (2002a) regarding the desirability of these taxes by policymakers due to their potential exportability to nonresidents.

#### <INSERT TABLE 4 HERE>

<sup>&</sup>lt;sup>14</sup> However, the fixed effects estimator is not as efficient as the random effects estimator.

<sup>&</sup>lt;sup>15</sup> See Baltagi (1995: 93).

<sup>&</sup>lt;sup>16</sup> Lagrange Multiplier test statistic is asymptotically distributed as  $\chi_1^2$ .

<sup>&</sup>lt;sup>17</sup> The coefficients for country and year dummies are not shown in any of the tables due to limited space.

The results for MENA countries (*Group*=1 if MENA country) in Table 4 show significant differences from the results for all Non-OECD countries. The coefficient estimates for MENA\*Openness\*Post-1986 are statistically significant in social security contributions, payroll tax and other taxes regressions. The estimate for the international trade taxes regression is again negative but not significant. Change in openness in the post-1986 period did not seem to trigger a move from personal and corporate income taxes to domestic taxes on goods services in MENA countries as it did in the inclusive group of Non-OECD countries. Instead, the shift seemed to have been towards social security contributions and the payroll tax with the greatest impact on social security contributions. However, as shown in Table 1, social security contributions and the payroll tax make only a fraction of total tax revenues in the MENA region. Thus, these results indicate that none of the major tax revenue sources were significantly impacted by the increased trade openness in the post-1986 period.

#### <INSERT TABLE 5 HERE>

While Tables 3 and 4 show the contrast between the impact of openness on the tax structures for MENA group and Non-OECD in general, comparing the results for the MENA group to results for the Non-OECD group excluding MENA countries will give us a clearer picture about the distinctiveness of the MENA results. For this, Table 5 presents the results for the Non-OECD countries excluding the MENA countries (*Group*=1 if Non-MENA-Non-OECD country). The coefficient estimate of Non-OECD-Non-MENA\*Openness\*Post-1986 for the domestic taxes on goods and services is positive, significant and it looks very similar to its counterpart in Table 3 for all Non-OECD countries. The estimate in Table 5 indicates that an increase in openness by 10 percentage points in Non-OECD countries excluding MENA countries in the post-1986 period would have led to a 0.44 percentage point increase in domestic taxes on goods and services, holding other factors constant. At the same time, the estimate for personal and corporate income taxes also looks similar to the one in Table 3 but the significance is lost. The results in Table 5 also show that social security contributions and payroll tax have been significantly and negatively affected, contrary to positive and significant results for MENA countries.

Nevertheless, the strong shift in Non-OECD countries to domestic taxes on goods and services due to openness in the post-1986 period seem to be prevailing for Non-OECD countries excluding MENA countries as well. This leaves MENA as the remaining Non-OECD group that failed to exhibit the positive and significant link between trade openness and domestic taxes on goods and services in the post-1986 period.

#### 6. Concluding Remarks and For Future Research

This paper highlights the specificity of the MENA countries within a broader group of Non-OECD countries. I provide evidence that there has been a statistically significant move to domestic taxes on goods and services in trade liberalizing non-OECD countries. This finding is in line with proposals in the literature stating developing countries to liberalize their trade and concurrently reform their tax structures by raising domestic consumption taxes. While this finding is supported for Non-OECD countries in general and for other Non-OECD countries excluding the MENA region countries, it failed to materialize for the MENA region countries. Thus, there is room for tax reform in the MENA region that would aim at decreasing the reliance on international trade taxes and increasing the reliance on domestic taxes on goods and services while liberalizing their trade structures at the same time.

This study did not a find a significant impact of trade openness in the post-1986 period on major tax revenue sources of MENA countries. This may be indicating that some other forces (economic, demographic or political) have been at play for these countries. Thus, a broader examination of MENA tax structures and how they compare to other economic or geographic regions would be a natural extension of this paper. In addition, the link between high population growth, which is seen as one of the most significant demographic trend in this region, and tax structure should also be given further attention. This would show us how big a role demographics play in determining the tax structures. To my knowledge, the link between demographics and tax structures has not yet been addressed in the context of the MENA region.

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OECD	1980-82	1988-90	1995-97
Taxes on Income, Profits and Capital Gains	0.37	0.37	0.35
Social Security Contributions	0.25	0.25	0.26
Payroll Tax	0.01	0.01	0.01
Taxes on Property	0.02	0.03	0.02
Domestic Taxes on Goods and Services	0.29	0.30	0.34
Taxes on International Trade and Transactions	0.05	0.03	0.01
Other Taxes	0.01	0.01	0.01
MENA	1980-82	1988-90	1995-97
Taxes on Income, Profits and Capital Gains	0.30	0.27	0.30
Social Security Contributions	0.07	0.09	0.08
Payroll Tax	0.01	0.01	0.02
Taxes on Property	0.03	0.03	0.02
Domestic Taxes on Goods and Services	0.23	0.27	0.25
Taxes on International Trade and Transactions	0.33	0.30	0.29
Other Taxes	0.03	0.03	0.04
Other Non-OECD	1980-82	1988-90	1995-97
Taxes on Income, Profits and Capital Gains	0.33	0.33	0.33
Social Security Contributions	0.08	0.10	0.10
Payroll Tax	0.01	0.01	0.01
Taxes on Property	0.02	0.02	0.02
Domestic Taxes on Goods and Services	0.34	0.35	0.36
Taxes on International Trade and Transactions	0.19	0.17	0.15
Other Taxes	0.03	0.02	0.03
Central and Eastern European Countries (CEECs)	1980-82	1988-90	1995-97
Taxes on Income, Profits and Capital Gains	-	-	0.20
Social Security Contributions	-	-	0.33
Payroll Tax	-	-	0.00
Taxes on Property	-	-	0.00
Domestic Taxes on Goods and Services	-	-	0.39
			0.07
Taxes on International Trade and Transactions	-	-	0.07

# Table 1. Changes in Tax Composition (1980-97)Shares in Total Tax Revenues<sup>a</sup>

Source: Government Finance Statistics CD-ROM (IMF), 2003.

Variable	Number of Observations	Mean	Standard Error	Minimum	Maximum
Personal and corporate taxes on income, profits and capital gains (% share)	1068	33.68	17.94	0	95
Social security contributions (% share)	1068	15.57	16.82	0	59
Payroll tax (% share)	1065	0.80	1.70	0	11
Property taxes (% share)	1065	2.30	2.51	0	20
Domestic taxes on goods and services in total tax revenues (% share)	1065	31.97	15.75	0	97
International trade taxes (% share)	1065	13.76	15.22	0	79
Other taxes (% share)	1063	1.94	3.33	0	50
Openness	1120	72.85	55.21	9	439
GDP per capita	1140	10,847	11,445	85	47,821
Fuel exports (% of merchandise exports)	995	15.96	26.51	0	98
International tourism, receipts (% of total exports)	1097	8.12	7.91	0	89
Lagged government expenditure (% of GDP)	994	31.43	13.97	9	212
Population density (people per sq km)	1139	197.39	632.97	2	6,220
Population aged 65 and above (% of total population)	1170	7.44	4.93	1	18
Non-OECD	1170	0.61	0.49	0	1
Non-OECD*Openness	1120	43.69	59.56	0	439
Openness*Post-1986	1120	45.27	55.79	0	407
Non-OECD*Post-1986	1170	0.37	0.48	0	1
Non-OECD*Openness*Post-1986	1120	27.23	50.98	0	407
MENA	1170	0.25	0.43	0	1
MENA*Openness	1120	16.60	37.82	0	251
MENA*Post-1986	1170	0.15	0.36	0	1
MENA*Openness*Post-1986	1120	10.36	30.31	0	210
Non-MENA-Non-OECD	1170	0.36	0.48	0	1
Non-MENA-Non-OECD *Openness	1120	27.09	54.92	0	439
Non-MENA-Non-OECD *Post-1986	1170	0.22	0.41	0	1
Non-MENA-Non-OECD *Openness*Post-1986	1120	16.86	45.06	0	407

## Table 2. Descriptive Statistics

Source: Author's calculations.

					Domestic		
	Personal and				Taxes on	Internatio	
	Corporate	Social Security	/	Property	Goods and	nal Trade	
	Income Taxes	Contributions	Payroll Tax	Taxes	Services	Taxes	Other Taxes
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Openness	-0.033	0.046	-0.002	-0.012	0.034	-0.017	-0.013*
	(-0.85)	(1.60)	(-0.47)	(-1.60)	(0.62)	(-0.46)	(-1.8)
Logged GDP per capita	2.509	0.777	0.081	0.582	-2.457	-3.67	2.188***
	(1.04)	(0.48)	(0.46)	(1.25)	(-0.93)	(-1.55)	(3.29)
Fuel exports (% of merchandise	0.049	-0.013	-0.001	0.001	-0.028	-0.001	-0.009**
exports)	(1.61)	(-1.44)	(-0.37)	(0.36)	(-1.13)	(-0.02)	(-2.26)
International tourism, receipts (%	-0.019	-0.262***	$0.012^{*}$	0.046***	0.191	0.018	0.018
of total exports)	(0.24)	(-2.80)	(1.68)	(2.82)	(1.87)	(0.2)	(0.56)
Lagged government expenditure	0.055	0.034	0.002	0.065***	-0.023	-0.138	0.006
(% of GDP)	(0.67)	(1.28)	(0.86)	(2.82)	(-0.34)	(-0.94)	(1.38)
Population density (people per sq	0.005**	-0.002	-0.002***	-0.002**	-0.006**	0.001	0.006***
km)	(2.23)	(-1.16)	(4.90)	(-3.24)	(-2.58)	(0.36)	(5.30)
Population aged 65 and above (%	0.864	0.3	0.055	-0.27**	-0.219	-0.52	-0.295**
of total population)	(1.5)	(0.45)	(0.82)	(-2.44)	(-0.46)	(-1.28)	(-2.30)
Non-OECD	-8.259***	-0.13	0.396	-1.238**	12.23***	-0.166	-2.622***
	(-2.66)	(-0.06)	(1.3)	(-2.01)	(2.98)	(-0.06)	(-3.15)
Non-OECD*Openness	0.13***	-0.077**	-0.005	0.014*	-0.101*	0.03	0.005
······································	(3.05)	(-2.52)	(-1.00)	(1.69)	(-1.8)	(0.72)	(0.47)
Openness*Post-1986	-0.003	-0.005	-0.002	$0.007^{**}$	0.012	-0.011	0.002
F	(-0.19)	(-0.43)	(-1.40)	(2.20)	(0.73)	(-0.95)	(1.34)
Non-OECD*Post-1986	2.672**	1.952	-0.062	0.604	-4.513**	-1.152	0.337
	(2.10)	(1.51)	(-0.38)	(1.59)	(-2.72)	(-0.98)	(0.78)
Non-OECD*Openness*Post-1986	-0.03**	0.003	0.003	-0.014***	0.042**	-0.005	0.001
r	(-2.01)	(0.18)	(1.53)	(-4.13)	(2.26)	(-0.34)	(0.29)
Constant	32.805**	-5.106	-0.925	-2.732	40.688**	47.797**	* -9.938 <sup>**</sup>
	(2.06)	(-0.500)	(-0.73)	(-0.88)	(2.25)	(2.85)	(-2.41)
Observations	847	847	845	845	844	844	843
R-squared	0.94	0.95	0.88	0.84	0.88	0.9	0.82

#### Table 3. Fixed Effects Regressions For Non-OECD Countries (Group=1 if country is Non-OECD)

<sup>a</sup> Robust t-statistics are shown in parentheses. The dependent variables shown in columns 1 through 7 are the shares in total tax revenues.

\*Indicate 10 percent significance level. \*\*Indicate 5 percent significance levels. \*\*\*Indicate 1 percent significance levels.

	Personal and Corporate Income Taxes	Social Security	Payroll Tax	Property Taxes	Domestic Taxes on Goods and Services	Internatio nal Trade Taxes	Other Taxes
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Openness	0.087***	0.01	0.002	-0.009*	-0.086***	-0.001	-0.007
1	(4.13)	(0.73)	(1.05)	(-1.8)	(-3.21)	(-0.02)	(-1.08)
Logged GDP per capita	2.317	1.912	$0.299^{*}$	0.686	-2.531	-4.34*	1.676**
	(0.9)	(1.14)	(1.71)	(1.44)	(-0.91)	(-1.81)	(2.55)
Fuel exports (% of merchandise	0.048	-0.016*	0.000	0.000	-0.026	0.003	-0.01**
exports)	(1.57)	(-1.91)	(0.22)	(0.05)	(-1.03)	(0.07)	(-2.56)
International tourism, receipts (%	-0.026	-0.263***	0.018***	0.042***	0.223**	0.012	-0.004
of total exports)	(-0.33)	(-2.90)	(2.79)	(2.66)	(2.20)	(0.14)	(-0.14)
Lagged government expenditure	0.049	0.027	0.001	0.066***	-0.01	-0136	0.006
(% of GDP)	(0.59)	(1.21)	(0.37)	(2.84)	(-0.18)	(-0.91)	(1.21)
Population density (people per sq	$0.005^{**}$	0.002	-0.001***	-0.003***	-0.007***	-0.001	0.005***
km)	(2.24)	(1.04)	(-3.21)	(-4.45)	(-2.92)	(-0.28)	(5.62)
Population aged 65 and above (%	0.639	-0.158	0.066	-0.315***	0.304	-0.244	-0.35***
of total population)	(1.1)	(-0.25)	(1.18)	(-3.09)	(0.69)	(-0.64)	(-3.97)
MENA	-47.205***	27.941***	1.262**	-0.403	-14.174	33.052***	-2.004
	(-4.86)	(4.00)	(2.32)	(-0.2)	(-1.47)	(2.97)	(-0.63)
MENA*Openness	-0.037	-0.045	-0.011**	$0.016^{*}$	$0.108^{**}$	-0.008	-0.019
	(-1.00)	(-1.77)	(-1.97)	(-1.91)	(2.90)	(-0.18)	(-1.35)
Openness*Post-1986	-0.028***	-0.016***	-0.003**	-0.003	$0.053^{***}$	-0.011*	$0.007^{**}$
	(-4.29)	(-2.67)	(-2.03)	(-1.25)	(6.71)	(-1.88)	(2.06)
MENA*Post-1986	1.264	-6.234***	-1.295***	-0.455	1.856	1.847	2.915***
	(0.67)	(-4.59)	(-2.96)	(-1.33)	(1.02)	(0.66)	(2.84)
MENA*Openness*Post-1986	-0.009	0.073***	0.019***	-0.002	-0.017	-0.03	-0.034***
-	(-0.51)	(4.76)	(4.73)	(-0.49)	(-1.04)	(-1.2)	(-3.71)
Constant	27.735	-11.235	-2.224*	-3.587	48.549***	52.358***	-9.025**
	(1.63)	(-1.07)	(-1.86)	(-1.11)	(2.77)	(3.11)	(-2.24)
Observations	847	847	845	845	844	844	843
R-squared	0.94	0.95	0.89	0.83	0.88	0.9	0.82

#### **Table 4. Fixed Effects Regressions For MENA Countries** (Group=1 if country is MENA)

<sup>a</sup>Robust t-statistics are shown in parentheses. The dependent variables shown in columns 1 through 7 are the shares in total tax revenues.

\*Indicate 10 percent significance level. \*\*Indicate 5 percent significance levels. \*\*\*Indicate 1 percent significance levels.

	Personal and	Social Security		Property	Domestic Taxes on	Internatio	
	Income Taxes	Contributions	Payroll Tax	Taxes	Services	Taxes	Other Taxes
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Openness	0.025	-0.021	-0.011***	0.005	0.018	0.001	-0.015*
	(1.01)	(-0.98)	(-2.92)	(0.91)	(0.61)	(0.02)	(-1.80)
Logged GDP per capita	2.299	0.93	0.075	0.723	-2.302	-3.738	2.057***
	(0.94)	(0.57)	(0.45)	(1.56)	(-0.87)	(-1.57)	(3.19)
Fuel exports (% of merchandise	$0.054^{*}$	-0.01	0.00	0.001	-0.036	0.00	-0.009**
exports)	(1.72)	(-1.17)	(0.06)	(0.20)	(-1.42)	(0.01)	(-2.04)
International tourism, receipts (%	-0.024	-0.251***	0.015**	0.05***	0.192*	0.015	0.008
of total exports)	(-0.29)	(-2.76)	(2.14)	(3.02)	(1.91)	(0.17)	(0.25)
Lagged government expenditure	0.047	0.035	0.002	0.065***	-0.014	-0.139	0.006
(% of GDP)	(0.55)	(1.37)	(0.62)	(2.88)	(-0.23)	(-0.94)	(1.32)
Population density (people per sq	$0.007^{***}$	0.001	-0.001**	-0.002***	-0.009***	0.00	0.005***
km)	(2.71)	(0.52)	(-1.97)	(-3.92)	(-3.17)	(0.16)	(3.66)
Population aged 65 and above (%	0.787	0.269	0.089	-0.221**	-0.215	-0.352	-0.422***
of total population)	(1.35)	(0.43)	(1.26)	(-2.13)	(-0.47)	(-0.69)	(-2.91)
Non-MENA-Non-OECD	-5.72**	-5.229***	-0.662**	-0.172	13.432***	0.658	-2.165**
	(-2.29)	(-2.95)	(-1.98)	(-0.36)	(4.32)	(0.28)	(-2.23)
Non-MENA-Non-OECD	0.096***	0.009	0.016***	-0.009	-0.129***	0.013	0.001
*Openness	(2.87)	(0.38)	(3.37)	(-1.33)	(-3.46)	(0.34)	(0.09)
Openness*Post-1986	-0.02**	0.025**	0.006***	-0.001	0.022**	-0.025*	-0.006**
-	(-2.16)	(2.49)	(3.48)	(-0.42)	(1.97)	(-1.86)	(-2.01)
Non-MENA-Non-OECD *Post-	1.259	4.93***	0.606***	0.384	-4.49***	-2.005*	-0.793
1986	(1.16)	(4.26)	(2.98)	(1.23)	(-3.23)	(-1.71)	(-1.55)
Non-MENA-Non-OECD	-0.016	-0.042***	-0.01***	-0.005*	0.044***	0.013	0.016***
*Openness*Post-1986	(-1.47)	(-3.52)	(-3.68)	(-1.72)	(2.93)	(0.89)	(2.95)
Constant	30.585*	-2.167	-0.856	-4.703	39.59**	48.00***	-8.95**
	(1.91)	(-0.21)	(-0.73)	(-1.54)	(2.19)	(2.85)	(-2.23)
Observations	847	847	845	845	844	844	843
R-squared	0.94	0.95	0.88	0.83	0.88	0.90	0.82

## Table 5. Fixed Effects Regressions For Non-OECD Countries Excluding MENA Countries (Group=1 if country is Non-MENA-Non-OECD)

<sup>a</sup> Robust t-statistics are shown in parentheses. The dependent variables shown in columns 1 through 7 are the shares in total tax \*Indicate 10 percent significance level. \*Indicate 5 percent significance levels. \*\*\*Indicate 1 percent significance levels.

OECD	Non-OECD					
Australia	Algeria (MENA)	Philippines				
Austria	Argentina	Singapore				
Belgium	Bahrain (MENA)	South Africa				
Canada	Botswana	Sri Lanka				
Denmark	Brazil	Brazil Sudan (MENA)				
Finland	Chile	Syria (MENA)				
France	Cameroon	Thailand				
Germany	Costa Rica	Tunisia (MENA)				
Greece	Djibouti (MENA)	U.A.E. (MENA)				
Iceland	Egypt (MENA)	Uruguay				
Ireland	Ethiopia	Yemen (MENA)				
Italy	India	Zambia				
Japan	Indonesia	Zimbabwe				
Luxemburg	Iran (MENA)					
Mexico	Israel	Israel				
Netherlands	Jordan (MENA)	Jordan (MENA)				
New Zealand	Kenya					
Norway	Kuwait (MENA)					
Portugal	Lebanon (MENA)					
South Korea	Malaysia	Malaysia				
Spain	Malta	Malta				
Turkey	Morocco (MENA)	Morocco (MENA)				
Sweden	Nigeria	Nigeria				
Switzerland	Oman (MENA)					
United Kingdom	Panama					
United States	Pakistan (MENA)					
<sup>a</sup> There are 26 OECD m	nember countries in the sample. N	Note that Mexico and South Korea				
became OECD members	s in 1994 and 1996, respectively.					

Appendix Table 1. List of Sample Countries<sup>a</sup>