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Intra-Industry Trade of Arab Countries: An Indicator of Potential Competitiveness

Prepared by Oleh Havrylyshyn and Peter Kunzel[1]

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Abstract

Recent and ongoing agreements to liberalize trade between the European Union (EU) and Arab countries raises the question as to how the latter will fare in a more competitive environment. This paper uses the Grubel-Lloyd intra-industry trade (IIT) index as an indicator of the degree of industrial specialization to study Arab countries' ability to compete in a more open trade setting. It concludes that whereas increased specialization has been achieved over the last decade in Arab countries, IIT remains low not only in absolute terms, but even in a cross-country comparison, when normalized for the level of development.

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Author's E-Mail Address: ohavrylyshyn@imf.org, pkunzel@imf.org

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Contents

SUMMARY

Arab countries today face prospects of trade liberalization as exemplified by the European Union Association Agreements. Whereas few short-term benefits are anticipated, increased competitiveness is expected to spur improvements to efficiency, stimulate foreign investment, generate growth possibilities, and present access to larger markets. Given that Arab countries face liberalization, this paper makes use of the Grubel-Lloyd intra-industry trade (IIT) index as an indicator of the degree of industrial specialization to study Arab countries' ability to compete in a more open trade setting. The objective thus is to analyze how specialized Arab economies are relative to other countries at present, how well they might adapt in the future what determines the level of specialization and finally in what products Arab countries are competitive.

The results of the paper suggest that the Arab region overall does not have a highly advanced industrial base relative to other regions. In fact, the Arab IIT levels tend to be below expected values even in a cross-country regression using various determinants of IIT. Nevertheless, significant improvements in IIT levels over the last decade for most Arab countries and IIT indices in many manufactured products show signs of improved competitiveness and demonstrate Arab countries' ability to compete in specialized commodities. Finally, the paper presents arguments favoring a more multilateral approach to trade liberalization over a bilateral agreement with the EU alone, and suggests that market-oriented and open economy policies could yield significant gains in the form of increased specialization and higher IIT levels.

I. Introduction

The recent signing and ongoing discussions of bilateral agreements to liberalize trade between the European Union (EU) and several Arab countries[2] raises the question as to how the latter will fare in a more competitive environment. Most Arab countries have traditionally been dependent on their natural resources and, as a consequence, they have had fewer pressures to diversify and specialize their industrial base. As Nsouli, Bisat, and Kanaan (1996), and Havrylyshyn (1997b) point out, some Arab countries are more able to adapt to new trade opportunities, whereas others have less flexibility to adjust to new market opportunities and increased competition. In the trade literature, the amount of intra-industry trade (IIT), or trade in similar goods which a country does, is often taken as a measure of the diversity, degree of specialization, and degree of technical sophistication of its industrial sector. This can be used to infer the country's ability to compete in a changing environment. This study will analyze IIT changes and evolution over the period 1984-94 to shed light on the level of industrial specialization for Arab countries, and the implied potential to compete with industrialized economies in a more open trade setting.

This paper is organized as follows: Section II will discuss the theoretical concept of intra-industry trade; Section III reviews the methodology employed in calculating IIT indices; Section IV presents calculations of levels of intra-industry trade in the Arab region as compared to other regions, on developments of IIT in the Arab region, as well as on the direction of intra-industry trade; Section V assesses the position of Arab countries' IIT within a cross-sectional model of intra-industry trade determinants; Section VI will discuss specific products in intra-industry trade, and intra-industry trade opportunities for Arab countries; finally Section VII draws conclusions from the results obtained in this study.

II. Intra-Industry Trade Theory and Competitiveness Implications for Arab Countries

The factor-proportions theory as posited by Heckscher and Ohlin reflects trade flows in complementary goods based on the relative availability and intensity of factors in the production process. Trade flows between countries occur in complementary goods, owing to the comparative advantage based on differing factor endowments in a perfectly competitive trading environment. Grubel and Lloyd (1975) first observed and analyzed an apparent anomaly: a high proportion of industrial country trade is a two-way exchange within the same group of goods, presumably with the same factor intensity. This trade, which they labeled intra-industry trade, describes trade in similar, but slightly differentiated products, based on

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[2] In this paper, we look only at a subset of 13 countries, for which data was available to conduct the research. These countries include Algeria, Bahrain, Djibouti, Egypt, Jordan, Kuwait, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, and the U.A.E. In addition, we will frequently use two other regional countries for comparison, Israel and Turkey, which have committed themselves to trade liberalization with the EU.

imperfect competition, or trade in close substitutes demanded from consumers in different countries who may have distinct tastes or preferences.

Early critics of this analysis argued that IIT was merely a statistical artifact, representing aggregation of Heckscher-Ohlin trade. This implies that if SITC product categories were disaggregated to further levels, all resulting trade would simply reflect original products based on unique factor ratios. This viewpoint has however been countered both theoretically and empirically. Most recently, Bhagwati (1994), starting from the Heckscher-Ohlin model, has considered IIT from a production position as two-way trade in commodities that are similar in factor-intensity. The explanation for this new theory relies on scale economies at the firm level and imperfect competition, as opposed to factor endowments or intensities. Bhagwati demonstrates that it is always possible to find endowments for which 100 percent of trade is intra-industry trade, so that large shares of IIT may not be contradictory to the factor endowments theory. Furthermore, it can be shown that trade in differing products is in commodities with the same factor intensity, and hence also non-Heckscher-Ohlin trade. As to empirical tests, Gray (1979) demonstrates that whereas calculations of more disaggregated IIT data show decreased values, the IIT phenomenon does not disappear.

Many studies after Grubel and Lloyd have found that the more advanced and developed an economy, the more specialized its trade structure will be.[3] Thus, industrialized countries tend to have greater levels of IIT than developing countries, with a rough continuum where middle-level income countries show IIT levels higher than low-income ones, but below those of industrial countries. Also, successful exporters (East Asia, other Newly Industrialized Countries) exhibit a speedy and substantial increase in the levels of IIT. From this one can make inferences that higher IIT levels reflect a greater ability to compete in a changing trading environment, and large changes in IIT also reflect a flexibility of adapting to competition. Thus, simplifying this interpretation, one could say that those potential signatories of a liberalizing agreement with the EU[4], which have a relatively high or at least recently increased levels of IIT, are perhaps better positioned to be successful in adapting to a new trading environment. For those Arab countries with still low levels of IIT, the gap between their IIT levels and those of the EU is a measure of the opportunity and challenge of establishing the necessary policy background which would stimulate new investment, greater efficiency, and hence higher IIT.

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[3] See Havrylyshyn and Civan (1983), Balassa and Bauwens (1988), and Stone and Lee (1995)

[4] EU Agreements have already been signed with Morocco and Tunisia. Other potential signatories are principally Southern Mediterranean countries, including Egypt, Jordan and Lebanon. We have extended the country scope to include other Arab countries, as we regard this study in a more global context of trade liberalization. Both Israel and Turkey have concluded Association Agreements as well.

It should be clear that IIT is a result, or effect of increased specialization, not a cause thereof; the underlying determinants of a country's preparedness to compete internationally, and to adapt to changing circumstances are influenced by fiscal and monetary policy, factor markets, investment, and international trade and trade restrictions such as tariffs and quotas. These issues are discussed more broadly for the region in the aforementioned papers of Nsouli, Bisat, and Kanaan (1996), and Havrylyshyn (1997b). It should however be noted that significant advantages to specialization exist in the context of trade liberalization. In particular, adjustment based on specialization within the same industry may be less costly than new industrial investment and by reducing the need for labor mobility imposes less social costs. Moreover, increased specialization enhances competitiveness and acts as a catalyst for new innovations, technologies, and growth. These considerations are relevant for policy formulation that aim to minimize social and economic costs in the process of trade liberalization. For the purpose of this paper, we will focus only on the IIT index as an indicator reflecting broadly the degree of competitiveness of Arab countries.

One needs to be cautious interpreting the IIT as an indicator of preparedness. On the one hand a high IIT is broadly indicative of a greater flexibility to compete internationally, and hence to be better prepared for trade liberalization. On the other hand, a reverse causation could be argued: liberalization, even only vis-à-vis the EU, can stimulate investment and efficiency improvements, which in turn would be reflected in an increased IIT index. The proposition that trade liberalization generates increased IIT is posited in the literature, though it remains, in fact, unresolved. Globerman and Dean (1990), argue against this proposition by analyzing the Canada-U.S. Free Trade Agreement. They present results of a survey of Canadian firms which concludes that these do not plan to specialize more. Their study also indicates that there appears to be a "topping out" or even reversal of increasing IIT levels, suggesting that product specialization is not an expected outcome of the FTA between the U.S. and Canada. Similarly, Hamilton and Kniest (1990) examine whether a change in the level of protection has consequences for IIT levels in Australia and New Zealand. They find no support for this hypothesis. One must however caution about inferences regarding these studies, as they analyze the effects of liberalization or protectionism on IIT for industrialized countries, where the notion of topping out may be more applicable. Nevertheless, most studies agree that the impact of trade liberalization on IIT is inconclusive.

In summary, this analysis of Arab countries does not ask if the EU Agreements might or might not lead to increased specialization. Given that Arab countries face liberalization, a more relevant question perhaps is: how well can they compete and adjust to a new environment? The objective thus is to analyze how specialized Arab economies are relative to other countries at present, how well they might adapt in the future, what determines the level of specialization, and finally in what products Arab countries are competitive. IIT is used as the simplified indicator of these characteristics.

III. Methodology of Calculating the Intra-Industry Trade Index

The IIT index we use stems from the original work of Grubel and Lloyd (1975). All data used for the calculation of the indices are at the 3-digit Standard International Trade Classification (SITC) level, and are subsequently aggregated. In addition, and for the purpose of obtaining more meaningful results, we utilize primarily import rather than export data as it is more reliable and complete. Furthermore, as trade data may be distorted or simply not reported for a given year, we take averages over two time periods, 1984-86 and 1992-94.

Inter-industry trade (INTE), that is trade in different products, is defined as:

$$INTE_i = |X_i - M_i| \qquad (1)$$

where Xi are total exports in product category i and Mi are total imports in product category i.

Thus it is clear that intra-industry trade (IIT) is simply all trade that is not inter-industry, or:

$$IIT_i = (X_i + M_i) - |X_i - M_i| \qquad (2)$$

Equivalently, we can normalize IIT to get a measure of the share of intra-industry trade for each commodity:

$$IIT_i = \frac{[(X_i + M_i) - |X_i - M_i|]}{(X_i + M_i)} \qquad (3)$$

Hence if there is no intra-industry trade, one of Xi or Mi will be zero so that the IIT index will be zero. Similarly if all trade is intra-industry, Xi = Mi, and the IIT index will take a value of 1.

As we must determine an aggregated IIT index (AIIT) for each country and region, we follow the proceedings of Grubel and Lloyd, by aggregating the IIT index for each commodity at the 3-digit SITC code level, using the weighted mean:

$$AIIT = \frac{\sum_{i=1}^{n} (X_i + M_i) - \sum_{i=1}^{n} |X_i - M_i|}{\sum_{i=1}^{n} (X_i + M_i)} \qquad (4)$$

This aggregation measure has often been criticized as being biased downward by the degree of trade imbalance. That is the larger the trade imbalance, the larger the net trade, and hence, the smaller the IIT index. Even though adjustments to IIT indices do exist, previous studies have shown that they do not clearly yield significant changes from the unadjusted index. In addition, Lee and Lee (1993) argue that no adjustment to the imbalance has conclusively been calculated, without presenting shortcomings of their own. Subsequently, we will use the unadjusted aggregation measure as presented in (4).

A final issue that must be kept in mind when considering IIT involves re-exports. These goods are not part of increased specialization, but are merely flowing through a country. Albeit re-exports for most countries do not account for significant amounts of total intra-industry trade, they may be important for countries that are natural ports or routing ways such as Hong Kong and Singapore, and possibly for some Arab countries.

IV. Intra-Industry Trade in the Arab Region

Table 1 provides us with an indication of IIT developments for Arab countries over the last decade, and in relation to comparator groups and countries. If one considers the level of IIT as indicative of the level of industrial advancement, the data clearly suggest Arab countries as a group, with an IIT level ranging from below 10 percent to 41.4 percent, and averaging 25 percent, do not have highly advanced industrial bases.

The Arab region compares unfavorably with other regions that have already implemented trade agreements such as NAFTA, which registers an IIT level of 77.3 percent in 1992-94, and a region that has a potential agreement, APEC, whose IIT level already exceeds 90 percent for the same period. IIT levels are considerably lower even when comparing the Arab region to one with comparable per capita income levels, such as Mercosur. At the same time, Arab countries show positive signs of more rapidly increasing IIT levels over the period 1984-86 to 1992-94, relative to a less successful trade agreement such as the Andean Pact.[5] The two comparator countries, Israel and Turkey, have among the highest IIT levels for the region. Israel with a IIT index of 58.4 percent for the 1992-94 period establishes itself as the most specialized economy in the region.

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[5] Successful trade arrangements denote those which are trade creating rather than trade diverting.

Table 1. Intra-Industry Trade Indices in Manufactures: Total Trade

	1984-86	1992-94
Algeria	0.051	0.052
Bahrain	0.107	...
Djibouti	0.055	0.026
Egypt	0.102	0.172
Jordan	0.207	0.248
Kuwait	0.192	0.131
Morocco	0.158	0.204
Oman	0.164	0.414
Qatar	...	0.076
Saudi Arabia	0.047	0.096
Syrian Arab Rep.	0.143	0.125
Tunisia	0.238	0.301
United Arab Emirates	0.074	0.081
Arab Countries 1/	0.159	0.250
Comparator Countries:		
Israel	0.469	0.584
Turkey	0.159	0.284
Regional Averages 1/:		
Industrial Countries	0.876	0.878
E.U.	0.860	0.886
Andean Pact	0.237	0.290
APEC	0.874	0.903
Mercosur	0.428	0.519
NAFTA	0.687	0.773

Source: Trade Analysis and Reporting System (TARS).
1/ Weighted Averages.

Within the Arab region, high-end IIT indices are registered in Oman and Tunisia, followed by Jordan, Morocco[6] and Egypt. Somewhat lower IIT indices in the region are

[6] Morocco's IIT levels may be somewhat understated, as the TARS data that is used does not include trade under the "admission temporaire" regime. Therefore some manufactured goods, in particular textiles, that are traded directly to and from the EU are not recorded. Since these traded manufactures represent specialized trade, it is likely that the absence of this data yields IIT levels that are lower than actual IIT levels for Morocco. Calculations of IIT for Morocco utilizing EU trade data show that IIT levels for trade with the EU are 18.7 percent, above the IIT level of 15.8 percent obtained using Moroccan import data. Given that EU trade

(continued...)

recorded in Kuwait and Syria, whereas the rest of the Arab countries' IIT levels fall below 10 percent. Marked improvements in IIT levels are registered for Oman, for the two comparator countries, Israel and Turkey, and to a lesser extent for Egypt, Jordan, Morocco, Saudi Arabia, and Tunisia. Oman in particular has more than doubled its IIT, and at over 40 percent is second only to Israel in IIT.

However, it appears that Oman's high IIT might reflect the re-export problem mentioned earlier. Oman's strategic location at the entrance of the Persian Gulf makes it a likely candidate for re-exports to the U.A.E., Saudi Arabia, Qatar, Iran and Iraq. When analyzing Oman's trade data more carefully, it appears that tobacco manufactures, representing close to 7 percent of total trade, has substantially increased both on the import and on the export side. Domestic absorption, representing the difference between imports and exports, is roughly 45 percent of total imports. This indicates that over half of total imports in tobacco manufactures are re-exported. A review of other categories however shows that re-exports are not the only cause for increased IIT levels. Other commodities including metals, textiles and articles show increased IIT indices, and at the same time increased domestic exports. Nevertheless, a portion of the large IIT increase in Oman is certainly attributable to re-exports. Saudi Arabia has also doubled its IIT, but at 9.6 percent remains amongst the least specialized. Countries for which IIT indices have actually fallen include Djibouti, Syria, and Kuwait; perhaps the drop in IIT for Kuwait is a consequence of the Persian Gulf war. Indeed, IIT levels for Kuwait were back up to 17.3 percent in 1994.

Overall, one should expect that countries exhibit larger amounts of intra-industry trade within a unified trade or geographical area for proximity reasons. As Balassa and Bauwens (1987) explain, the cost of information for trading differentiated products is higher than for standardized products and increases with distance. This hypothesis is confirmed for the Arab region, as depicted in table 2. IIT levels for the Arab region as a whole for the 1992-94 period is higher for intra-regional than for global trade. IIT is 21.1 percent for Arab trade with other Arab countries, and is virtually the same for IIT trade with developing countries, which is 20.5 percent. IIT indices are highest for trade within the Arab region versus trade with other regions for Egypt, Qatar, U.A.E., and in particular Saudi Arabia which has an intra-regional IIT index of 42.6 percent. Whereas trade for these countries appears to be specialized within the Arab region, their share of Arab trade as a percentage of world trade is below 10 percent. IIT levels are lowest for trade within the Arab region relative to other regions as expected for Israel, which does less than 1 percent of total trade with the other Arab countries, for Turkey and for Oman.

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[6](...continued)
represents 57.6 percent of total trade, it is possible to estimate that IIT for Morocco with the world is 22.1 percent using EU trade data. This differs only slightly from the 20.4 percent IIT level obtained using Moroccan import data.

In contrast, it appears that only 13 percent of trade in similar products is generated between the Arab region and the EU. One can perceive this low level of IIT from two directions. On the one hand, it is true that these levels are very low, especially in comparison to IIT of over 88 percent for EU trade (see table 2). It is also possible to argue that these low levels represent further opportunity for IIT creation, perhaps in the context of EU Association Agreements. Nevertheless, it is evident that more open economies with higher IIT levels to the EU, are in a better position to exploit trade creation opportunities. These countries include Oman, Saudi Arabia, Tunisia, U.A.E, and two important comparator countries in the Mediterranean region, Israel and Turkey.

Table 2. Direction of Trade: Intra-Industry Trade Indices in Manufactures, 1992-94

	Trade with: World	Developing countries	European Union	EU trade (in % of world trade)	Arab Countries	Arab trade (in % of world trade)
Algeria	0.052	0.107	0.047	67.7	0.097	2.8
Bahrain	...	...	...	8.0	...	15.6
Djibouti	0.026	0.050	0.044	32.9	...	9.6
Egypt	0.172	0.250	0.113	41.9	0.278	4.8
Jordan	0.248	0.254	0.100	25.6	0.220	10.4
Kuwait	0.131	0.256	0.081	26.9	0.191	3.8
Morocco	0.204	0.281	0.158	57.6	0.216	8.4
Oman	0.414	0.365	0.204	12.3	0.063	15.4
Qatar	0.076	0.071	0.080	16.4	0.111	9.9
Saudi Arabia	0.096	0.138	0.205	27.5	0.426	6.6
Syrian Arab Rep.	0.125	0.212	0.056	47.5	0.203	7.7
Tunisia	0.301	0.380	0.243	75.4	0.268	4.4
United Arab Emirates	0.081	0.093	0.199	18.4	0.248	6.2
Arab Countries 1/	0.161	0.205	0.128	35.2	0.211	8.1
Oil exporting	0.142	0.172	0.136	25.3	0.189	8.6
Non-oil exporting	0.179	0.238	0.119	46.8	0.237	7.5
Comparator Countries:						
Israel	0.584	0.322	0.425	43.6	0.190	0.0
Turkey	0.284	0.455	0.232	47.7	0.119	3.6

Source: Trade Analysis and Reporting System (TARS).

1/ Simple Averages.

Seven of the thirteen countries representing the Arab region are oil-exporting economies, which influences the IIT levels in commodities other than oil. Historically, the oil-rich countries have had less of an incentive to diversify their economies as they rely more on their oil-generating revenues. The simple average calculations in table 2 confirm somewhat, but not significantly lower overall IIT levels for oil exporting countries than for non-oil

exporting Arab countries. IIT levels for non-oil exporting countries are 17.9 percent in trade with the world, whereas IIT levels for oil-exporting are only about 4 percent lower. A possible explanation for the small difference between IIT levels for oil and non-oil exporting countries is that oil exporting countries generate derivative products and industries, that in turn are quite specialized, such as chemical products. The fact that IIT levels for Saudi Arabia and Oman have risen quite dramatically indicates that these countries are increasing their trade in differentiated products, inferring that their trade is becoming more specialized. IIT levels for Algeria, and the U.A.E. have not changed. The situation of Kuwait, as discussed, is somewhat in doubt, but based on the 1994 data, we can infer that the IIT level has not changed or even somewhat fallen. Due to a lack of data, we cannot make the same comparison for other oil economies, Bahrain and Qatar.

Several Arab countries today face the prospects of trade liberalization with the EU. IIT values for Arab countries are not surprisingly significantly lower than those of EU countries, reflecting the fact that Arab countries are not nearly as specialized as the EU countries. In addition, IIT levels are lower in trade with the EU than within the Arab region for all countries in the region, with the exception of Oman, Israel and Turkey. The potential gain from IIT within the region is quite high as compared to the EU, especially for Arab countries that have low IIT levels with the EU at present. The implication is that there is less flexibility in trade with the EU, and it will take a longer time to adjust to a more competitive trade environment. Arab countries with the lowest EU IIT levels include Algeria, Djibouti and Syria, which have IIT levels between 4 and 6 percent. Other Arab countries with EU IIT levels under 15 percent include Egypt, Jordan, Kuwait, and Qatar. All these countries, except Qatar, have a large gap between IIT levels when comparing EU trade to intra-regional trade. Thus, whereas potential IIT opportunities lie within the region, their level of specialization in IIT has not achieved the level of EU countries. Furthermore, IIT levels for Arab countries in trade with developing countries are also substantially higher than in trade with the EU, and more closely resemble IIT indices registered intra-regionally. This suggests that Arab countries are better able to compete in IIT intra-regionally and with developing countries than with the EU. This supports the argument that trade liberalization with the EU needs to be accompanied by regional or even more multilateral trade liberalization.

V. Determinants of Intra-Industry Trade

Since the pioneering work done by Grubel and Lloyd in the mid-70s, an abundant amount of empirical work has been undertaken to examine IIT determinants. Cross-country models of intra-industry trade have long been studied to attempt to explain the level of sophistication of the trade structure and the level of development of countries. Grubel and Lloyd (1975) showed that the majority of trade in industrial countries was intra-industry trade, and with some qualification that conclusion remains valid in more recent studies such as Globerman and Dean (1990). The notion that the degree of specialization in IIT is correlated with the stage of development has led to a large amount of literature and empirical studies. The purpose in this study is not to add to that literature, but to examine the position of Arab

countries in a global comparison of IIT and to draw inferences about their trade flexibilities. As discussed in section II, trade liberalization does not appear to particularly encourage increased specialization in trade in similar but heterogeneous products. If this is the case, what does? This is the question we aim to answer.

The key determinants for the IIT model are drawn from the theoretical and empirical literature[7]. On this basis, the cross-sectional model we estimate is posited, and the expected signs of the independent variables are shown below:[8]

$$IIT_j = F\ [\ GDP_j,\ PCI_j,\ MFTX_j,\ TIMB_j,\ TO_j,\ ARAB1_j\ ,\ EU_j\ ,\ LAFTA_j\ ] \qquad (5)$$
$$(+/-)\quad (+)\quad (+)\quad (-)\quad (+)\quad (+)\quad (+)\quad (+)$$

(I) The effect of gross domestic product, GDP, or the size of the economy on IIT is somewhat unclear from a theoretical point of view. Scale effects would likely increase the amount of IIT. However, it is arguable that smaller countries at closer proximity would do more IIT than larger ones, as trade between them can be viewed as a continuation of internal trade.

(ii) The effect of the stage of development as measured by per capita income, PCI, is anticipated to be positive reflecting enhanced demand for differentiated products.

(iii) The variable MFTX, representing export concentration of manufactures, is a proxy for the level of industrial advancement. As noted previously, the more industrialized countries tend to have higher ratios of IIT, assuming they have not reached the threshold level. Globerman and Dean (1990) argue that product specialization can "top out" or even reverse, given that a certain level of industrialization has been achieved[9]. Nevertheless, given that our countries are developing, the effects are still expected as postulated. The export concentration index simply measures the share of manufactures in exports, revealing the

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[7] See Havrylyshyn and Civan (1983), Balassa and Bauwens (1988), Stone and Lee (1995).

[8] 78 countries are used in all regression analysis, and are listed in Figure 1. The source of the data is TARS and IMF, World Economic Outlook.

[9] Though as noted in Havrylyshyn and Civan (1983), the definition of IIT constrains it to the range 0-1.0, hence, if the level of development is a key determinant, it is likely there will be a flattening of the curve at the high end, and before 1.0 is reached. Whereas, the upper constraint of unity provides a basis for IIT to "top out", reversion of IIT is less straightforward to explain. A possible interpretation of reversion is that highly sophisticated countries reach a stage of development when the service sector takes on a larger share of the economy, thereby reducing manufacturing activity, and hence IIT.

degree of product diversification. A higher concentration of manufactures in exports implies higher diversity, and hence higher IIT. Thus, the expected sign of MFTX is positive.

(iv) As indicated previously, IIT is biased by the degree of imbalance. As Lee and Lee (1993), we use trade imbalance, TIMB, as a variable to control for bias in the estimation, defined as:

$$TIMB_j=|X_j-M_j|/(X_j+M_j) \qquad (6)$$

where X_j is defined as total exports of country j, and M_j is defined as total imports of country j. Hence the variable represents net trade as a share of total trade, and will take a value of zero at the lower extreme, when there is no imbalance, and a value of one if there are either no exports or imports to a country (i.e., complete imbalance).

(v) Significant effects on intra-industry trade can be related to the countries' level of trade barriers. However, as tariff level data are both difficult to obtain, and as they frequently change, we consider a proxy measure of the degree of non-restrictiveness, trade orientation (TO), similar to the one devised by Balassa and Bauwens (1988). The trade orientation variable is devised by estimating the following equation:

$$\log(X_j/P_j)=\beta_0+\beta_1\log(Y_j/P_j)+\beta_2\log(P_j)+\beta_3(X_j^m/Y_j)+\varepsilon_j \qquad (7)$$

where X_j represents exports of country j, Y_j is gross domestic product, P_j is population, X^m_j represents mineral resources availability or exports of mineral resources, and ϵ_j is the residual term. We are estimating the equation to determine a hypothetical value of per capita exports, and in turn using this to derive the orientation variable. The trade orientation variable is determined by the variation between actual and hypothetical values of per capita exports. If the deviation between actual and hypothesized values of per capita exports, as measured by the trade orientation variable, is positive (negative), this would suggest low (high) restrictiveness. Thus, positive effects of trade orientation are expected on IIT. The results of the estimation for the derivation of the trade orientation variable are reported in Box 1.

All variables behave as expected, and the equation has high explanatory power. The overall fit is significant at the 1 percent level, as are all of the coefficients on the explanatory variables, except for mineral resource coefficient, which is significant at the 10 percent level. The results of the deviations of actual from hypothetical values are behaving as expected, so that very open economics such as Hong Kong and Singapore have the highest positive

deviations, and more restrictive economies such as Argentina have the highest negative deviations. Among the Arab countries, this trend seems to be confirmed, so that large negative deviations of actual from hypothesized values are observed in more restrictive economies with high average tariff rates such as Syria, Morocco, Oman and Algeria. Syria has the highest negative deviation, at -3.14 standard deviations, and Saudi Arabia has the highest positive deviation at 0.77 standard deviations. Other regional countries that have low trade barriers, such as Israel and the U.A.E., also seem to exhibit positive trade orientation estimates.

Box 1: Regression for Trade Orientation Derivation

$$\log(X_j/P_j) = -0.507452 + 1.0432 \log (Y_j/P_j) - 0.176216 \log (P_j) + 0.394778 \log (X^m_j/Y_j)$$
$$\qquad\qquad (3.074) \qquad (25.136) \qquad\qquad (5.064) \qquad\qquad (1.592)$$

$R^2 = 0.90864$ $\qquad$ $F(3,74) = 245.32$ [0.0000]

RSS = 3.41112 for 4 variables and 78 observations

The values below the coefficients are the t-statistics

(vi) The expected signs of the dummy variables ARAB1, EU and LAFTA, are all positive. It is hypothesized that regional integration schemes such as the European Union and the Latin American Free Trade Association should be positively correlated with intra-industry trade reflecting increased possibilities of intra-industry trade within regional integration. These two dummies take on a value of one if they belong to their respective trade group, and zero otherwise. Similarly, common affinity by use of a common language or similar culture has been introduced by the ARAB1 dummy, and is hypothesized to be positively correlated with the level of IIT. Again, the ARAB1 dummy takes on a value of one if the country belongs to the Arab region and zero otherwise.

Model Methodology

Most previous analysis of IIT determinants was undertaken using ordinary least squares estimation techniques, but this has the problem that predicted values may fall outside the dependent variable range, which varies between 0 and 1. In logit analysis, the regression is fitted in a modified form to allow a continuum of values ranging from minus infinity to plus infinity. We adapt the form as specified in Balassa and Bauwens (1988):

$$\ln[\frac{IIT}{(1-IIT)}]=\beta'Z+\omega \qquad (8)$$

where β is the coefficient vector, Z is the vector of explanatory variables, and ω is the disturbance term. While the transformation has allowed for all theoretical values to be assumed, it is not defined for critical values of zero (complete inter-industry trade), or one (all trade is intra-industry). Whereas IIT values of one do not arise in practice, it is possible for IIT to equal zero. In this case, we need to redefine and estimate the equation as follows:

$$IIT=\frac{e^{\beta'Z}}{(1+e^{\beta'Z})}+\xi \qquad (9)$$

A potential problem that may arise in cross-sectional models are inefficient results attributable to heteroscedasticity. We tested for the null of homoscedasticity, which could not be rejected at the 5 percent level of confidence. Thus, we proceed with the nonlinear least squares estimation. The results of the cross-sectional regression (model 1) are reported in Box 2.

All variables except for the LAFTA, and ARAB1 dummies have the anticipated sign. Overall explanatory power is quite high at 70 percent[10], and the overall fit is significant at the 1 percent level. The t-statistics indicate that all the variables are significant at least at the 2.5 percent level, with the exception of the trade imbalance and LAFTA coefficients. To test for exclusion of these two variables, we make use of the Wald test, and determine that the hypothesis that the null of these coefficients being equal to zero cannot be rejected with a 77 percent confidence level, and we therefore proceed to reduce the model.

The revised model (model 2) which excludes the trade imbalance and LAFTA variables is even more robust, and has the same expected coefficients, except the ARAB1 variable. Overall explanatory power has fallen insignificantly, and remains at over 70 percent. The F-statistic for overall fit is well above the 1 percent confidence level, and all the t-statistics have improved. All the coefficients except per capita income and the EU dummy are

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[10] The R^2 value of 0.70 is high especially for cross-sectional data. In relation to previous studies, the degree of explanatory power of this model falls in the high range. In comparison, Balassa and Bauwens (1987), and Lee and Lee (1993) find R^2 values of 0.57 and 0.43 respectively, whereas Havrylyshyn and Civan (1983), and Globerman and Dean (1990) find R^2 values ranging from the 0.73 to 0.82. The reason for the high R^2 may be attributed to the large and diversified sample that includes countries from the highest to the lowest stage of development.

significant at the 1 percent level. Per capita income and EU are again significant at the 2.5 percent level. The hypotheses put forth in previous studies regarding determinants of IIT are confirmed in all the results. The positive coefficient on gross domestic product indicates perhaps that scale effects dominate proximity effects, resulting in a positive coefficient. Furthermore, the significance level of this variable implies strong effects of GDP on the level of intra-industry trade.

Box 2: IIT Regressions

Model 1

$$IIT_j = -2.9246 + 0.3638 \log (GDP_j) + 0.3275 \log (PCI_j) + 0.9179 (MFTX) - 0.9802 (TIMB)$$
$$(4.74) \quad (3.47) \qquad (2.046) \qquad (2.334) \qquad (0.706)$$

$$+ 1.0567 (TO) - 0.8577 (ARAB1) + 0.4905 (EU) - 0.0194 (LAFTA)$$
$$(2.494) \qquad (2.446) \qquad (2.313) \qquad (0.081)$$

$R^2 = 0.70295$ $\quad F(8,69) = 20.411$ [0.0000]

RSS = 1.18771 for 9 variables and 78 observations

Model 2 (reduced model)

$$IIT_j = -3.129 + 0.3714 \log (GDP_j) + 0.3529 \log (PCI_j) + 0.9564 (MFTX) + 1.1615 (TO)$$
$$(5.82) \quad (3.579) \qquad (2.279) \qquad (2.464) \qquad (3.107)$$

$$- 0.8609 (ARAB1) + 0.4634 (EU)$$
$$(2.465) \qquad (2.272)$$

$R^2 = 0.70067$ $\quad F(8,69) = 27.699$ [0.0000]

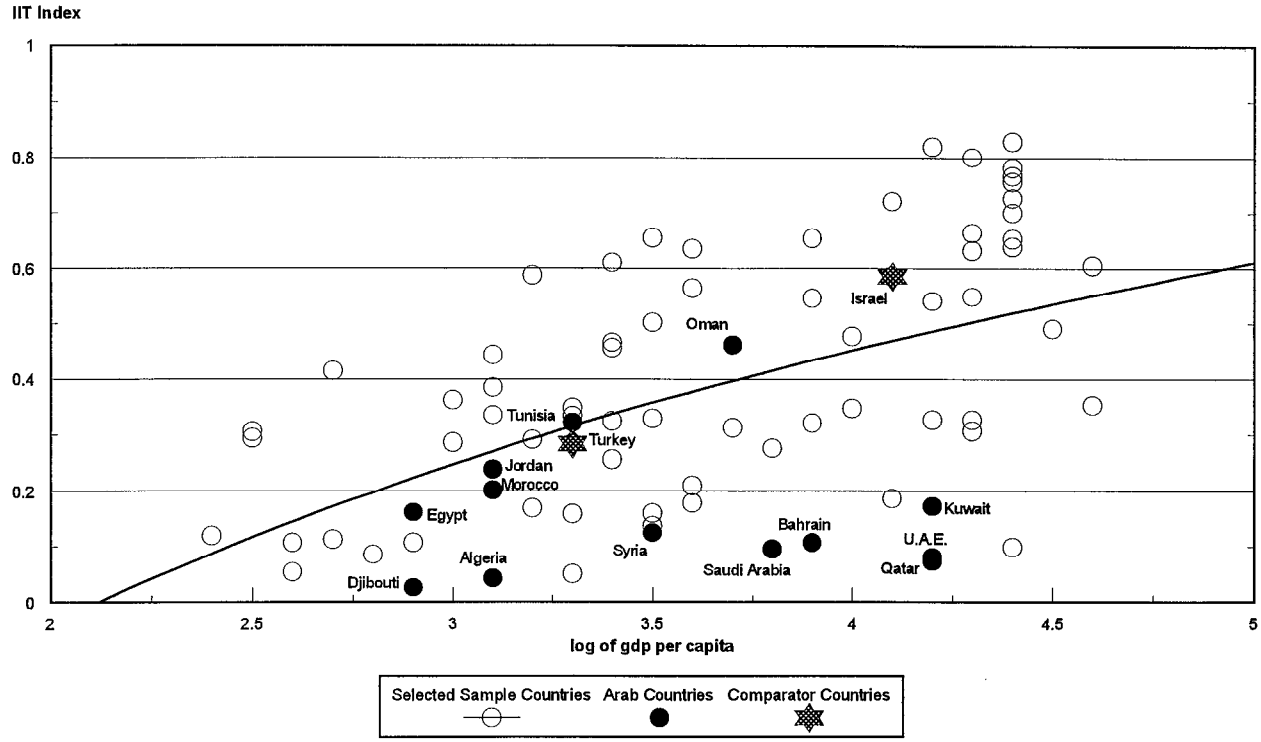
RSS = 1.19685 for 9 variables and 78 observations

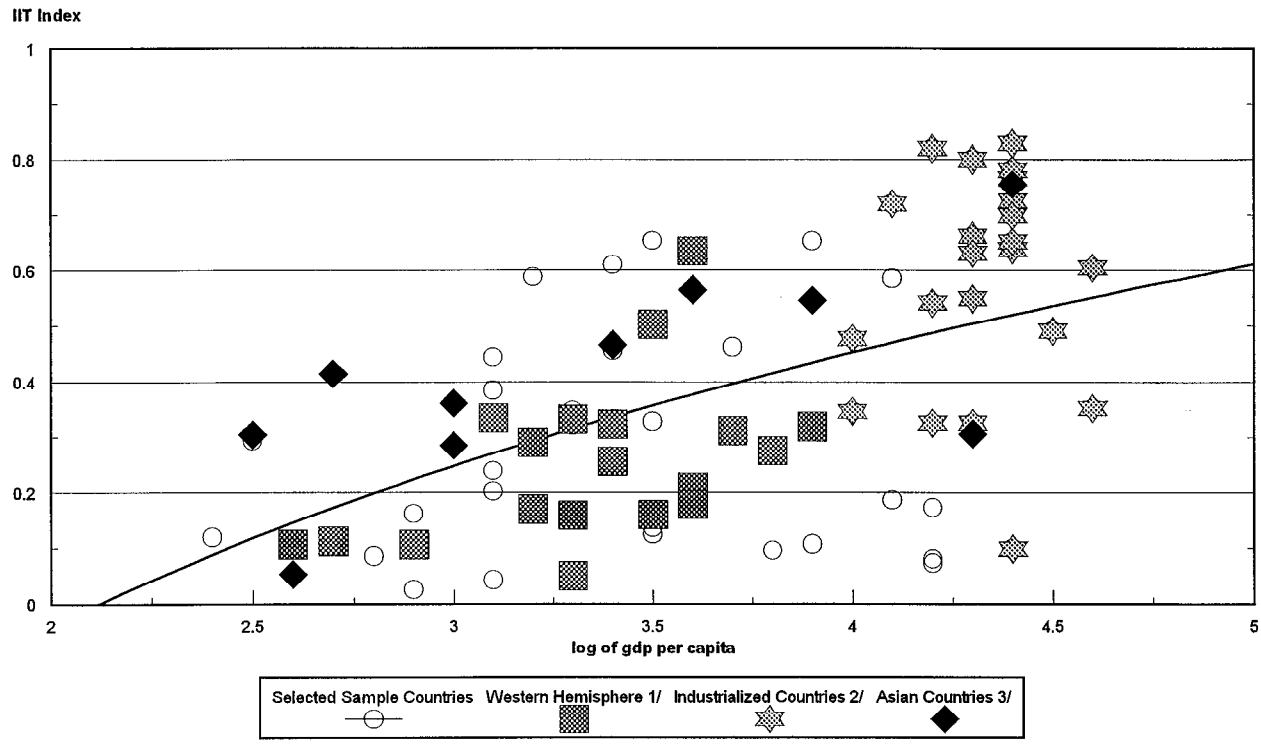
The values below the coefficients are the t-statistics

The per capita income variable has the expected positive contribution, as can be verified from the scatter diagram of Figure 1, which plots IIT ratios against the log of per capita income. Of interest for us is the position of Arab countries, which for the exception of Oman and Tunisia, all lie below the expected levels of IIT given their per capita income levels. The two comparator countries, Israel and Turkey have significantly higher IIT levels

Figure 1

Summary Regression Plots for Selected Arab and Sample Countries, 1994





1/ Western Hemisphere countries include Argentina, Barbados, Bolivia, Brazil, Chile, Columbia, Costa Rica, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru, Trinidad and Tobago ,Uruguay, and Venezuela.

2/ Industrialized countries include Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Spain, Switzerland, Sweden, the United Kingdom, and the United States.

3/ Asian countries include the People's Republic of China, Hong Kong, India, Indonesia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, and Thailand.

than Arab countries, on average. Whereas Turkey lies only slightly below the expected levels, Israel significantly outperforms all countries in the region. When one compares all Arab countries to the other regions, it clearly is not as IIT intensive as Asian or Industrialized countries, and is more similar to the Western Hemisphere distribution. Of all countries in the region, only Israel and Oman have high IIT levels. The level of IIT for Jordan, Morocco, Egypt and Turkey appear fairly close to what should be expected given their per capita income levels, whereas the rest of the countries all have IIT levels well below the norm. Overall, though, Arab countries fall below the levels of IIT expected given their per capita income levels.

The results indicated in the scatter diagram, are mostly confirmed when IIT levels are normalized by regression analysis. Table 3 gives an indication of deviations of actual from predicted IIT levels for Arab and comparator countries. It appears however, that IIT levels for Syria and Kuwait, are perhaps not as low (relative to the mean) as the scatter plot suggests, whereas Turkey falls lower than what is implied by plotting per capita GDP against IIT. More importantly, however, is that the results corroborate the findings that with the exception of Oman and Tunisia, all Arab countries' IIT regressions fall well below the fit.

Table 3. IIT Regression Fit: Deviations from Sample Standard Deviation

(In standard deviations)

Algeria	-1.5
Djibouti	-1.2
Egypt	-1.1
Jordan	-1.3
Kuwait	-0.5
Morocco	-0.5
Oman	1.9
Qatar	-1.2
Saudi Arabia	-1.5
Syrian Arab Rep.	-0.6
Tunisia	0.0
United Arab Emirates	-2.8
Comparator countries:	
Israel	0.5
Turkey	-1.5

The export concentration of manufactures variable has a coefficient slightly below unity indicating that the further advanced the stage of industrial advancement in a country, the more trade is specialized. As expected the trade orientation variable is equally positive and highly significant, indicating that the lower the degree of restrictiveness, the more IIT trade will take place.

The two remaining dummy variables take on opposite signs. The EU coefficient is, as expected, positive confirming common country characteristics effects. The Arab coefficient however is negative and significant, possibly reflecting the economic separation among the countries in the region. Indeed, trade amongst Arab countries represents only 8 percent of their total world trade[11].

The model to some degree explains which characteristics of economies enhance the degree of their specialization in trade. This has inferences for the stage of a country's development, and for their capacity to adapt to a more competitive economic environment. Among the explanatory variables, the largest effects on IIT are attributable to the degree of industrial advancement, as measured by the share of manufactures in exports variable, and the degree of non-restrictiveness, as measured by the trade orientation variable. It is interesting to note, that relative to previous studies, per capita income, though still quite notable, is less significant. This is perhaps attributable to the fact that the manufactures in exports variable and the per capita income both are indicative of the stage of development.

VI. Products in Intra-Industry Trade

Early work in the 1970's undertaken by Lloyd and Grubel indicate that the highest degree of IIT for industrialized countries is observable in chemical products. This also emerges in the analysis of Arab countries and the EU as shown in table 4, where IIT levels in chemicals are respectively 45.7 percent and 91.6 percent, for the period 1992-94. Even though Arab countries as a whole have increased their IIT levels for all categories during 1992-94 relative to 1984-85, it remains apparent that their IIT levels fall well below those of the EU, especially in basic manufactures (SITC category 6), and machinery and transport equipment (SITC category 7). Trade in chemicals averaged only 18 percent of total trade in manufactures for the period 1992-94, but that trade, as well as in miscellaneous manufactures (SITC category 8) has a greater tendency to be trade in similar products. This suggests that the degree of specialization in these categories is more advanced, or that these industries are relatively more developed and present potential gains for increased trade. It is equally possible that there is more room for specialization in other categories, yet the low indices in machinery and transportation equipment lag far behind those in the EU. Thus, the Arab region overall has not yet reached the level of sophistication in this category of products.

Notwithstanding the Arab region's lower IIT indices overall, it is encouraging to view the progress that has been made in IIT in all product categories. Whereas Globerman and Dean's (1990) evidence of slowing IIT in most product categories for North America and Australasia is confirmed for the EU, this is clearly not the case for Arab countries. The EU, having already extremely high IIT indices appear to be reaching a saturation point in most

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[11] See El-Erian, et al (1995).

categories. The Arab region, on the other hand, not having attained the same stage of development, shows impressive increases in IIT indices across all product categories.

Table 4. Intra-Industry Trade by Product Group

		Arab Countries		EU	
SITC code	Product Group	Average 1984-86	Average 1992-94	Average 1984-86	Average 1992-94
5	Chemicals	0.311	0.457	0.890	0.916
6	Basic Manufactures	0.161	0.266	0.865	0.891
7	Machinery and transp. equipment	0.049	0.103	0.846	0.879
8	Miscellaneous manufactured goods	0.200	0.437	0.883	0.878

Source: TARS.

Table 5 presents more disaggregated IIT indices for Arab countries for commodities that reflect a high degree of specialization, and those products that show large increases in IIT. The overall simple average IIT level for the products in table 5 has increased from 24.9 percent in 1984-86 to 49.6 percent in 1992-94. This represents an almost doubling of IIT levels for the Arab region in this specialized group of products, and confirms the potential for competitiveness in these commodities.

Higher levels of IIT are again observed in chemicals, in particular organic chemicals, which at 96 percent have achieved a very high level of specialization. Whereas we have observed that basic manufactures and machinery and transportation equipment are least specialized, this is clearly not true for all products within the respective categories. We observe quite high levels of IIT in metals such as aluminum and lead, as well as in leather manufactures.

More importantly, we can see that significant increases have occurred in IIT levels for many basic manufactures such as crafts and textiles, as well as for several machinery products, which as a group have the lowest IIT levels for the Arab region. Note that many products in these two SITC categories have evolved quite dramatically from IIT levels below 10 percent. These products include glassware, iron and steel shapes, railway rails, iron and steel castings, electrical distributing machines, and electrical machinery. Thus whereas IIT was almost non-existent in these commodities during the mid-1980s, increased industry specialization has led to substantial IIT levels in less than a decade. The high levels of IIT in so many 3-digit SITC products, suggests that the degree of specialization attained enables Arab countries to be competitive in a world market setting.

Table 5. Arab Countries: Intra-Industry Trade Indices in Manufactures for Selected Commodities

	Average 1984-86	Average 1992-94
512 Organic chemicals	0.744	0.964
513 Inorganic elements,oxides,etc	0.670	0.636
521 Coal,Petroleum, etc	0.076	0.444
554 Soaps, cleaning, etc	0.277	0.699
571 Explosives, pyrotech products	0.062	0.416
581 Plastic materials, etc	0.117	0.639
611 Leather	0.128	0.632
612 Leather, etc, manufactures	0.853	0.795
642 Articles of paper, etc	0.146	0.447
656 Textile products, etc	0.119	0.435
657 Floor covering,tapestry, etc	0.247	0.407
661 Cement etc, building products	0.115	0.373
665 Glassware	0.027	0.287
666 Pottery	0.064	0.263
673 Iron and steel shapes	0.040	0.397
676 Railway rails, etc, iron, steel	0.001	0.239
677 Iron, steel, wire excluding wire rod	0.103	0.454
679 Iron, steel castings unworked	0.005	0.168
684 Aluminum	0.759	0.846
685 Lead	0.954	0.856
722 Electrical power machines, switchgear	0.033	0.115
723 Electrical distributing machines	0.058	0.525
729 Electrical machinery	0.028	0.163
735 Ships and boats	0.163	0.488
831 Travel goods, handbags	0.132	0.338
841 Clothing not of fur	0.577	0.841
851 Footwear	0.215	0.527
Simple Average	0.249	0.496

Source: TARS.

VII. Conclusion

The results of the study suggest that the Arab region overall does not have a highly advanced industrial base, with an average IIT index of 0.25 for the period 1992-94. This IIT level falls well below those recorded in industrial countries, and in particular the EU, which has an average IIT index of 0.88. IIT levels for Arab countries are also lower when comparing them to other regions that have already implemented trade agreements, such as NAFTA and APEC, or even in relation to Mercosur, which has comparable per capita income levels. However, the Arab region does show positive signs of rapidly increasing IIT levels over the last decade.

The hypothesis put forth that IIT levels are expected to be lower for oil-exporting than for non-oil exporting countries, is not strongly confirmed by the results. IIT levels for oil-exporting countries were only marginally lower than those of non-oil exporting countries. The explanation could be that although it is expected that oil-exporting countries have less incentives to diversify their economies, these countries generate derivative products and industries like chemicals, which tend to show high IIT indices in all countries.

In addition to having significantly lower IIT levels than the EU in global trade, Arab countries also have lower IIT levels in trade with the EU as opposed to intra-regional trade or in trade with other developing countries. In fact, no single Arab country has higher IIT levels in trade with the EU than with other Arab countries or other developing countries. This suggests that Arab countries have more similar levels of industry specialization, and that they compete more effectively in the intra-regional or multilateral setting than specifically with the EU. Those countries that have relatively high IIT levels with the EU and have a higher ability to compete effectively with the EU, include Oman, Saudi Arabia, Tunisia, U.A.E., and the two comparator countries Israel and Turkey. Nevertheless, the simple average of this more specialized group is still only 25 percent, well below IIT levels of over 85 percent recorded by EU countries. Given that even the more specialized countries have IIT levels that fall well below those registered in the EU, indicates that Arab countries' flexibility to adjust to a more competitive environment will take time. Furthermore, Arab countries' IIT levels are higher for trade within the Arab region and with developing countries than with the EU. This suggests that intra-regional trade and trade with developing countries provides an opportunity for Arab countries to compete in IIT, and could be viewed as reinforcing the position that bilateral trade agreements between the signatory Arab countries and the EU should be accompanied by regional or even multilateral liberalization.

The findings of the cross-country econometric analysis of IIT determinants confirms the hypothesis that IIT levels for Arab countries fall well below those of developed countries. Even more important is the finding that IIT levels for the Arab region are significantly lower than one might expect, given their level of per capita income. Incidentally, relative to previous studies of IIT determinants, the results of our paper give larger magnitudes to the coefficients for trade orientation and exports of manufactures. Overall, these results imply that if Arab countries take measures to increase liberalization and diversify their level of industrial specialization, IIT levels would be much higher. If Arab countries can specialize in existing industries through greater IIT, significant economic gains might be expected while at the same time adjustment costs are minimized.

Our results also show that the most advanced degree of specialization and potential for effective competition lies in chemicals. However, specific commodities in the other manufacturing categories have reached equally high levels of specialization, comparable to that of EU countries. These products include a variety of items in basic manufactures, leather articles, and metals. Furthermore, significant increases have occurred in IIT levels for many basic manufactures and machinery products. The high levels and advances in IIT levels for

many manufacturing products shows that Arab countries can compete effectively in these type of commodities.

Finally, let us comment on the broader implications for global integration of Arab economies. Arab countries' efforts to liberalize depends upon numerous macroeconomic, social and political factors, while benefits from opening Arab economies and seeking outward oriented development strategies depend on their ability to compete in a new environment. The Agreements with the EU are unique and unprecedented in that two distinct regions, with very different economic structures are to enter in a free trade zone. The willingness to do so rests upon the premise that both sides are to gain from this arrangement. Studies conducted by Nsouli, Bisat, and Kanaan (1995), and Havrylyshyn (1996) suggest that some countries are more ready than others, but the consensus appears to be that potential gains are significant to the point that restrictiveness is ruled out. We have presented arguments that increased specialization and IIT can both reduce adjustment costs, as well as increase potential competitiveness in trade. Based on the results of the study, we conclude that increased specialization has been achieved over the last decade in Arab countries as shown by IIT levels, but that a considerable amount of unfulfilled potential remains to be exploited. With all the right market-oriented, and open economy policies combined, this potential could be fulfilled in the form of increased specialization and higher IIT levels. This conclusion holds both for those countries that are or will be engaged in the EU Mediterranean initiative, and for those that would pursue global integration outside of this initiative.

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