



Munich Personal RePEc Archive

Pattern of Comparative Advantage in Middle East and North Africa (MENA)

Roesmara Donna, Duddy and Widodo, Tri and Adiningsih,
Sri

Economics Department, Faculty of Economic and Business,
Universitas Gadjah Mada, Indonesia

1 April 2017

Online at <https://mpra.ub.uni-muenchen.de/78109/>
MPRA Paper No. 78109, posted 07 Apr 2017 10:12 UTC

**Pattern of Comparative Advantage in Middle East and North
Africa (MENA)**

By:

Duddy Roesmara Donna
*Doctoral Program, Faculty of Economic and Business,
Universitas Gadjah Mada, Indonesia*

Tri Widodo*

*Economics Department, Faculty of Economic and Business, Universitas Gadjah
Mada, Indonesia*

Sri Adiningsih

*Economics Department, Faculty of Economic and Business, Universitas Gadjah
Mada, Indonesia*

* Corresponding Author: Faculty of Economics and Business, Gadjah Mada University, Jl. Humaniora No. 1, Bulaksumur, Yogyakarta 55281, Indonesia. Phone: 62 (274) 548510; fax. 62 (274) 563 212. *E-mail address:* kociwid@yahoo.com.

Pattern of Comparative Advantage in Middle East and North Africa (MENA)

Abstract

This paper investigates the comparative advantage pattern of the countries in the Middle East and North Africa (MENA) region for the period 2000 and 2010. Revealed Symmetric Comparative Advantage (RSCA) Index, paired sample F-test, t-test, and Spearman's Rank Correlation are applied. This paper concludes that there are significant differences in comparative advantages among countries in the MENA region for 2000 and 2010 period. In addition, the stronger competition occurred in resource-poor and labor abundant, resource-rich and labor abundant, and resource-rich and labor importing countries.

Keywords: comparative advantage, RSCA, MENA.

JEL: F14, F17.

1. Introduction

Middle East and North Africa (MENA) is one of the potential trade areas in the world. There are several potential factors, i.e. the geographic position (among Asia, Africa, and Europe), oil reserve, potential market for developed countries, importing countries for weapons, regional conflict (due to Arab-Israel Conflict), and the place of big religions and old civilization (Cahyo, 2011). In the World Bank research (World Bank, 2007; Gourdon, 2010; Shui and Walkenhorst, 2010; Gatti, et al, 2013), the members of MENA region consist of Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, United Arab Emirates, West Bank and Gaza, and Yemen, but this research was focused on 14 countries of MENA countries. Djibouti, Iraq, Oman, West Bank and Gaza, and Yemen were removed for this research due to unavailability of data. Based on capital and labor abundance, the countries are divided into three groups (Shui and Walkenhorst, 2010), i.e. (1) resource-rich and labor-importing (RRLI) countries (United Arab Emirates, Saudi Arabia, Qatar, Oman, Libya, Kuwait, and Bahrain), (2) resource-rich and labor-abundant (RRLA)

countries (Yemen, Syria, Iran, and Algeria), and resource-poor and labor-importing (RPLA) countries (Tunisia, Morocco, Lebanon, Jordan, and Egypt).

On the other hand, the performance of trade in MENA is not the same with the potency. MENA's exports proportion to the world are only one third of their potency (Behar and Freund, 2011). The export of MENA countries is dominated by unsophisticated goods (Nasif, 2010). Export and import value dropped significantly in 2009 (Diop, Walkenhors, & Lopez-Calix, 2010). Not only volume, the concentration of export has declined over time (Gourdon, 2010). Share to world export has declined from 8% in 1981 until 2.5% in 2002. It was affected the collapse of oil price in the 1980's (Dennis, 2006). These facts describe that the trade performance in MENA is not good.

Comparative advantage is one of the most important concepts for explaining the pattern of international trade (Widodo, 2010). This concept was first introduced by David Ricardo (1817) then developed by Heckscher (1919) and Ohlin (1933) with releasing some assumptions. Both Ricardo and Heckscher-Ohlin have the same of hypothesis that a country will focus on some products. It is called specialization. The trade pattern in MENA can be described with comparative advantage concept.

This paper aims to describe the pattern of comparative advantage in MENA region and countries in 2000 and 2010 with some classifications. The rest of this paper is organized as follows: section 2 describe literature review, methodology is presented in section 3, section 4 represents result and discussion, and conclusion is presented in section 5.

2. Literature Review

Comparative advantage is defined to exist where the relative costs of producing different commodities differ between countries (Chaudhry, et al., 1994). Traditional trade theories (David Ricardo's theory of comparative advantage and Heckscher Ohlin model of factor endowments) postulate that the main basic for international trade is the comparative advantage of country (Le, 2010). In line with globalization, liberalization and integration process in the world, an interest issue

emerging involves country-specific specialization and the dynamic shifts in patterns of comparative advantage (Widodo, 2009b).

The performance of trade in MENA is not in line with its potency (Behar and Freund, 2011). Some countries in the region are underperforming other countries with similar income levels in discovering new exports. Rouis and Tabor (2013) find that export diversification in MENA countries has been limited. Whether there are systematic changes in the comparative advantage and specialization of trade in the MENA economies or not has been a crucial issue for the future development of the MENA's RTAs. Economic theorists argue that there is a relationship between the factor intensities for specific products and the location for their optimal production. Products using labor-intensive techniques in their productions should normally be produced in poorer, less developed countries where labor cost is relatively low. In contrast, products using capital-intensive techniques in their production should be produced in richer, developed countries where the cost of capital is relatively low (Widodo, 2009a).

Table 1 about here

Balassa and Noland (1989), Dollar and Wolff (1995), Dalumn et al. (1998), Laursen (1998), Wörz (2005), Fertő and Soós (2008), Widodo (2009a), Widodo (2009b), Le (2010), among others, examine this issue. Table 1 provides a summary of these researches. Both developed and developing countries have variation patterns of comparative advantage.

3. Methodology

3.1. Data

This study uses the data on exports published by the United Nations (UN), namely the United Nations Commodity Trade Statistics Database (UN Comtrade) i.e. 3-Digit Standard International Trade Classification (SITC) Revision 2; and focuses on 237 groups of products (as classified under SITC groupings). There are still two groups of products (SITC), which are not included in this research due to the unavailability of data,⁴ i.e. SITC 675 (hoop and strip of iron or steel, hot-rolled or cold-rolled) and 911 (postal packages not classified according to kind). When

discussing industries, the study concentrates on 234 groups of products (SITC—3-Digit level) classified by factor intensities, and uses the classification of industries by the Empirical Trade Analysis (ETA). Based on the UN Conference on Trade and Development (UNCTAD)/World Trade Organization (WTO) classification (SITC Rev. 3), ETA distinguishes the following six products or industries: (1) primary industries (83 SITC); (2) natural resource– intensive industries (21 SITC); (3) unskilled labor– intensive industries (26 SITC); (4) technology-intensive industries (62 SITC); (5) human capital–intensive industries (43 SITC); and (6) others (5 SITC).

This analysis involves 14 countries (Egypt, Jordan, Lebanon, Morocco, Tunisia, Algeria, Irian, Syria, Yemen, Bahrain, Oman, Qatar, Saudi Arabia, and United Arab Emirates) in two periods (2000 and 2010). These years were preferred for minimization of incomplete data. For the same reason, some countries were excluded from this analysis. Data will be analyzed by region and country.

3.2. Revealed Symmetric Comparative Advantage

Formula

Revealed Symmetric Comparative Advantage (RSCA) Index (Laursen, 1998) is used to measure comparative advantage. The RSCA index was developed by the Revealed Comparative Advantage (RCA) or Balassa index (Balassa 1965). The RCA and RSCA indexes are formulated as follows:

$$RCA_{ij} = (x_{ij} / x_{in}) / (x_{rj} / x_{rn}) \quad (1)$$

$$RSCA_{ij} = (RCA_{ij} - 1) / (RCA_{ij} + 1) \quad (2)$$

where RCA_{ij} represents revealed comparative advantage of country i for group of products (SITC) j ; and x_{ij} denotes total exports of country i in group of products (SITC) j . Subscript r represents all countries except country i , and subscript n stands for all groups of products (SITC) except group of product j . To avoid double counting, the country and group of products under consideration is excluded from the measurement so that the bilateral exchange is more exactly represented (Vollrath, 1991; Wörz, 2005; Widodo, 2010).

The range of the RCA index values is from zero to infinity ($0 \leq RCA_{ij} \leq \infty$). RCA_{ij} greater than one means that country has a comparative advantage in group of products j . On the other hand, RCA_{ij} less than one imply that country i has a comparative disadvantage in product j . Since the RCA_{ij} turns out to have values that cannot be compared on both sides of one, the index is made to be a symmetric index (Laursen, 1998) and is called the Revealed Symmetric Comparative Advantage. The $RSCA_{ij}$ index ranges from one to one or ($-1 \leq RSCA_{ij} \leq 1$). $RSCA_{ij}$ greater than zero implies that country i has a comparative advantage in product j . In contrast, $RSCA_{ij}$ less than zero imply that country i has a comparative disadvantage in product j .

Several Tests of RSCA

Several tests are applied for some purposes. F-test (one way anova) is applied to test whether or not comparative advantage have same mean by several classification. Paired sample t-test is applied to show if there is any mean difference of comparative advantage between 2000 and 2010. Spearman's rank correlation is applied across countries to investigate the linear association of the patterns of comparative advantage (Widodo, 2009a and Widodo, 2009b). A higher and positive value of Spearman's rank correlation coefficient implies stronger competition between two countries in the export market (more similar patterns of comparative advantage). A smaller and negative value indicates stronger complementarities (more different patterns of comparative advantage).

4. Results and Discussion

Table 2 shows averages, variances, skewness, and kurtosis of RSCA in MENA region. The analysis is classified by product (ETA and SITC Rev. 2 1 Digit) and country endowment.

Table 2 about here

The increase (decrease) of average means the increase (decrease) of comparative advantage. The increase (decrease) of variance means the increase (decrease) of specialization. The positive (negative) skewed means more concentrated

/specialized on products with low (high) comparative advantages. On the other hand, the increase of kurtosis means the decrease (increase) of specialization.

In general, the averages of RSCA tend to increase. In line with the averages, the decrease of skewness implies that the MENA region in 2010 is more concentrated/specialized on product with high comparative advantage than 2000. The increase of variances means the wider of distribution. The kurtosis value tends to decrease. It indicates that the distribution curve in 2010 flatter than 2010. The decrease of kurtosis value has the same implication with the increase of variance, i.e. indicates specialization.

From the above results can be concluded that most of classifications (both industry and country) tend to de-specialize in 2000-2010 periods. This result supports the previous results, i.e. Wörz (2005), Fertő and Soós (2008), Benedictis et al (2009), Widodo (2009a), and Widodo (2009b).

Based on ETA classification, unskilled labor intensive industry contributes the highest degree of comparative advantage and technology intensive industry are the lowest one. For SITC classification, animal and vegetable oils, fats and waxes have the highest comparative advantage and machinery and transport equipment have the lowest one. Resource poor and labor abundant country are the highest comparative advantage and resource rich and labor importing country are the lowest one.

Table 3 shows the result of F-test in MENA region. For all classifications and periods, the value of F-test are greater than critical value at $\alpha = 1\%$. It means that all of the average of comparative advantage are not the same. There are average variations of comparative advantage among ETA, SITC Rev 2, 1 Digit, Country, and endowment classifications in MENA region both in 2000 and 2010.

Table 3 about here

The next analysis uses country as unit analysis (Table 4). Based on ETA classification, all of RPLA countries except Jordan (2010) and Lebanon (2000 and 2010) do not have the same mean of comparative advantage. For RRLA countries, all of countries except Algeria (2000) have mean variations of comparative advantage. For RRLI countries, Saudi Arabia have the same of comparative

advantage both in 2000 and 2010, but Oman and Qatar do not. So, more than a half of MENA countries have mean variations of comparative advantage. Based on SITC classification, all countries except Bahrain, have F- value greater than critical value at $\alpha = 1\%$ both in 2000 and 2010. It means there are average variations of comparative advantage.

Table 4 about here

Table 5 shows the result of paired sample t-test. As a whole, there are a significant difference (rise) of comparative advantages in MENA region for 2000 and 2010 period. Based on ETA classification, primary industry, natural resource intensive industry, and technological industry have significant difference (rise) of comparative advantage mean. Human capital intensive industry has a difference (rise) but not significant. Unskilled labor intensive industry has an insignificant difference (fall) of comparative advantage. For SITC Rev 2, 1 Digit classification, food and live animals; minerals fuels, lubricants and related materials; manufactured goods classified chiefly by material; and com and transaction not classified elsewhere in SITC have significant difference (rise). On the other hand, chemicals and related industries, nes. and miscellaneous manufactured articles have significant difference (fall).

Table 5 about here

Human capital intensive industries have a difference (rise) but not significant. Unskilled labor intensive industries have an insignificant difference (fall) of comparative advantage. For SITC classification, Food and live animals; mineral fuels, lubricants and related materials; manufactured goods classified chiefly by material; and com and transaction not classified elsewhere in SITC have significant difference (rise). On the other hand, chemicals and related industries, nes and miscellaneous manufactured articles have significant difference (fall). For endowment classification, only RRLA countries have significant difference (rise) of comparative advantage. There is no significant difference in RPLA and RRLI countries.

Table 6 shows mean of comparative advantage (2000 and 2010) for ETA classification. Paired sample t-test is used for the same goal. Generally, for 2000

and 2010, the mean of comparative advantage increases significantly for each country except Lebanon Bahrain, Oman, and United Arab Emirates. For primary industries, the significant increase of comparative advantage happens in Egypt, Morocco, Iran, Syria, and Yemen. On the other hand, Jordan has the significant decrease of comparative advantage. For natural resource intensive industries, only Iran and Syria that have the significant increase of comparative advantage. For unskilled labor intensive industries, only Syria and Saudi Arabia that have the significant increase of comparative advantage. On the other hand, Jordan and Qatar have the significant decrease. For technology intensive industries, Egypt, Morocco, Tunisia, Iran, Syria, and United Arab Emirates have the significant increase. On the other hand, Jordan, Algeria, and Qatar have the significant decrease. The last, for human capital intensive industries, Tunisia, Iran, Syria, Yemen, and Bahrain have the significant increase. On the other hand, Jordan, Lebanon, Oman, and Qatar have the significant decrease. For all classification, Jordan has the decrease of comparative advantage.

Table 6 about here

Table 7, Table 8, and Table 9 show the result of Spearman's rank correlation in RPLA, RRLA, and RRLI countries. This value can investigate the linear association of the patterns of comparative advantage

Table 7 about here

For RPLA countries, all of correlations have positive and significant value. It indicates the stronger competition between five countries in the export market (more similar patterns of comparative advantage).

Table 8 about here

All of cross RRLA countries' correlation have positive and significant value too. It implies the stronger competition between four countries in the export market (more similar patterns of comparative advantage).

Table 9 about here

Like RPLA and RRLA, all of cross RRLI countries' correlation have positive value but not all significant. It indicates the stronger competition between four countries in the export market (more similar patterns of comparative advantage).

5. Conclusion

The MENA region in 2010 is more concentrated/specialized on product with high comparative advantage than 2000. For the same period, the MENA region tends to specialization. In line with Rouis and Tabor (2013) who find that export diversification in MENA countries has been limited. Diop, et.al. (2012) find that MENA's production structures have undergone little diversification over the past 30 years. The relative size of the manufacturing sector hardly increased at all in MENA countries while the relative size of the services sector actually shrank between 1980 and 2010. Agriculture contracted, but did not give way to vibrant and innovative manufacturing and services sectors. While MENA's difficulty in expanding manufacturing is well documented.

There are average variations of comparative advantage among ETA, SITC Rev 2, 1 digit, country, and endowment classifications in MENA region both in 2000 and 2010.

For ETA classification, more than a half of MENA countries have average variations of comparative advantage. For SITC Rev 2, 1 Digit classification, all of MENA countries except Bahrain have average variations of comparative advantage. As a whole, there are significant difference (rise) of comparative advantages in MENA countries for 2000 and 2010 period. For ETA classification, primary, natural resource intensive, and technology intensive products have a significant difference (rise) of comparative advantage. For SITC Rev 2, 1 Digit, only Food and live animals, manufactured goods classified chiefly by material, and Machinery and transport equipment product have significant difference (rise) of comparative advantage. For endowment classification, only RRLA countries have significant difference (rise) of comparative advantage. Generally, for 2000 and 2010, the mean of comparative advantage increases significantly for MENA countries except Lebanon Bahrain, Oman, and United Arab Emirates.

The stronger competition between countries into a group in the export market (more similar patterns of comparative advantage) happens both in resource-

poor and labor abundant, resource-rich and labor abundant, and resource-rich and labor importing countries.

References

- Al Khouri, R. (2008). "EU and US Free Trade Agreements in the Middle East and North Africa". *Carnegie Papers*, 8, 1-24.
- Balassa, B. and Noland, M. (1989). "Revealed Comparative Advantage in Japan and the United States". *Journal of Economic Integration*, 4(2), 8-22
- Behar, A., & Freund, C. (2011). "The Trade Performance of the Middle East and North Africa". Middle East and North Africa Working Paper Series(53).
- Benedictis, L., Gallegati, M., & Tamberi, M. (2009). " Overall Trade Specialization and Economic Development: Countries Diversify". *Review of World Economics*, 145(1), 37-55.
- Cahyo, A. N. (2011). "Tokoh-tokoh Timur Tengah yang Diam-diam Jadi Antek Amerika dan Sekutunya. Yogyakarta: DIVA Press.
- Chaudhry, M.G., Sahibzada, M.A., and Maan, A.H. (1994). "Comparative Advantage in Pakistan's Agriculture: The Concept and the Policies [with Comments]". *The Pakistan Development Review*, 33(4), 803-817.
- Comtrade, U. (t.thn.). Ekspor dan Impor. Dipetik 3 11, 2015, dari UN Comtrade: <http://comtrade.un.org/db/>
- Dennis, A. (2006). "The Impact of Regional Trade Agreements and Trade Facilitation". World Bank Policy Research Working Paper, 3837, 1-24.
- Diop, N., Walkenhors, P., & Lopez-Calix, J. R. (2010). "Trade Reforms for Export Competitiveness: What Are the Issues for the Middle East and North Africa?". In N. Diop, P. Walkenhors, & J. R. Lopez-Calix, (Ed.) *Trade Competitiveness of Middle East and North Africa Policies for Export Diversification* (p. 1-9). Washington DC: The World Bank.
- Diop, N., Marotta, D., & de Melo, J. (2012). "Natural Resource Abundance, Growth, and Diversification in the Middle East and North Africa: The Effect of Natural Resources and the Role of Policies". Washington DC: The World Bank.

- Fertó, I. and Soós, K.A. (2008). "Trade Specialization in the European Union and in Post Communist European Countries". *Eastern European Economics*, 46(3), 5-28.
- Gatti, R., Morgandi, M., Broadmann, S., Urdinola, D. A., Moreno, J. M., Marotta, D., (2013). "Jobs for Shared Prosperity: Time for Action in the Middle East and North Africa". Washington DC: World Bank Publications.
- Gourdon, J. (2010). "FDI Flows and Export Diversification: Looking at Extensive and Intensive Margin". In N. Diop, P. Walkenhors, & J. R. Lopez-Calix (Ed.), *Trade Competitiveness of Middle East and North Africa Policies for Export Diversification* (p. 13-46). Washington DC: The World Bank.
- Laursen, K. (1998). "Revealed Comparative Advantage and the Alternatives of Measures of International Specialisation". *DRUID Working Paper No. 98-30*.
- Le, Q-P., (2010). "Evaluating Vietnam's Changing Comparative Advantage Patterns", *ASEAN Economic Bulletin*, Vol. 27(2), 221-230.
- Özalp, O. N. (2011). "Where is the Middle East? The Definition and Classification Problem of the Middle East as a Regional Subsystem in International Relations". *Turkish Journal of Politics*, 2(2), 5-21.
- Poulson, B. W., & Wallace, M. (1979). "Regional Integration in the Middle East: The Evidence for Trade and Capital Flows". *Middle East Journal*, 33(4), 464-478.
- Shui, L., & Walkenhorst, P. (2010). "Regional Integration: Status, Developments, and Challenges". in N. Diop, P. Walkenhors, & J. R. Lopez-Calix (Ed.), *Trade Competitiveness of Middle East and North Africa Policies for Export Diversification* (p. 267-297). Washington DC: The World Bank.
- Söderling, L. (2005). "Is the Middle East and North Africa Region Achieving Its Trade Potential? ". *IMF Working Paper*, 1-22.
- Vollrath, T. L. (1991). "A theoretical evaluation of alternative trade intensity measures of revealed comparative advantage". *Weltwirtschaftliches Archiv*, 127(2), 265-280.

- Widodo, T. (2009a). "Dynamics and Convergence of Trade". *Journal of Economic Integration*, 24(3), 505-529.
- Widodo, T. (2009b). "Dynamics and Convergence of Trade Specialization in East Asia". *Asia Pacific Journal of Economics & Business*, 13(1), 31-56.
- Widodo, T. (2010). "Book Manuscript: International Trade, Regionalism and Dynamic Market". Yogyakarta: BPFEE .
- World Bank. (2007). "Middle East and North Africa Region: 2007 Economic Developments and Prospects". Washington DC: World Bank.

Table 1 Some Researches on Pattern of Comparative Advantage

| Author, Year | Indicator | Index | Time | Country /Region | Data Source | Aggregate | Result |
|-----------------------------|---|---------------------------------|-------------|---|-------------|------------------------|--|
| Balassa and Noland (1989) | Time series | RCA | 1967-1982 | Japan and US | GATT tapes | 2 countries | Japan has dramatically shifting of specialization but US still maintains. |
| Dollar and Wolff (1995) | Variation | Export specialization (Balassa) | 1970 - 1986 | 9 countries | OECD | 2-digit SITC | Increasing of specialization in 6, decreasing of specialization in 6 sectors. |
| Dalumn <i>et al.</i> (1998) | Standard deviation | Export specialization (Balassa) | 1956 - 1992 | 20 countries | OECD | 20 countries | Decreasing of specialization in 16 out of 20 countries. |
| | Standard deviation | Export specialization (Balassa) | 1956 - 1992 | 20 countries | OECD | 60 industries | Decreasing of specialization in 55 out of 60 industries. |
| Laursen (1998) | Beta | RSCA | 1971 -1991 | 19 countries | OECD | 19 sectors | Stronger decreasing in exports than in patents. |
| Wörz (2005) | Simple regressions of beta | RCA | 1981 - 1997 | 6 regions | UNIDO | 4 groups of industries | De-specialization |
| Fertó and Soós (2008) | Descriptive Statistic | Balassa index | 1995 – 2002 | European Union – 15 | UNTCAD/WTO | 3-digit SITC | The extent of trade specialization exhibits a declining trend. |
| Widodo (2009a) | Mean, standard of deviation, and skewness | RSCA | 1976 - 2005 | Japan, Korea, China, and ASEAN5 countries | UN-COMTRADE | 3-digit SITC | The increases in comparative advantage have been mainly encouraged by de-specialization. |
| Widodo (2009b) | Simple regressions beta and Spearman's rank correlation | RSCA | 1985 - 2005 | Japan, Korea, China, and ASEAN5 countries | UN-COMTRADE | 3-digit SITC | De-specialization together with convergence in the pattern of trade specialization. |

| Author, Year | Indicator | Index | Time | Country /Region | Data Source | Aggregate | Result |
|--------------|-------------|-------|-----------|-----------------|---------------|--------------------------|--|
| Le (2010) | Descriptive | RCA | 1991-2005 | Vietnam | IEDB and UNSD | SITC 1 Digit and 3 Digit | Vietnam's comparative advantage is still largely based on the country's endowments of labor and natural resources. |

Table 2 the Descriptive Statistic of RSCA in MENA Region by Some Classification

| Classification | Mean | | Variance | | Skewness | | Kurtosis | |
|--|-------|-------|----------|------|----------|------|----------|------|
| | 2000 | 2010 | 2000 | 2010 | 2000 | 2010 | 2000 | 2010 |
| Total of MENA | -0.69 | -0.65 | 0.24 | 0.25 | 1.79 | 1.60 | 5.28 | 4.51 |
| Industry Classification by ETA: | | | | | | | | |
| 1. Primary Product | -0.63 | -0.58 | 0.31 | 0.34 | 1.54 | 1.29 | 4.15 | 3.29 |
| 2. Natural Resource Intensive Product | -0.75 | -0.66 | 0.21 | 0.26 | 2.08 | 1.53 | 6.26 | 4.19 |
| 3. Unskilled Labor Intensive Product | -0.55 | -0.58 | 0.30 | 0.27 | 1.16 | 1.16 | 3.13 | 3.49 |
| 4. Technology Intensive Product | -0.78 | -0.74 | 0.15 | 0.17 | 2.46 | 2.20 | 2.20 | 7.38 |
| 5. Human Capital Intensive Product | -0.71 | -0.70 | 0.16 | 0.16 | 1.65 | 1.66 | 5.15 | 5.24 |
| Industry Classification by SITC Rev 2, 1 Digit | | | | | | | | |
| 1. Food and live animals | -0.62 | -0.51 | 0.27 | 0.34 | 1.47 | 1.00 | 0.58 | 2.65 |
| 2. Beverages and tobacco | -0.49 | -0.54 | 0.36 | 0.32 | 0.82 | 1.05 | 2.26 | 2.26 |
| 3. Crude materials, inedible, except fuels | -0.72 | -0.72 | 0.25 | 0.26 | 1.98 | 1.99 | 5.97 | 5.79 |
| 4. Mineral fuels, lubricants and related materials | -0.49 | -0.39 | 0.56 | 0.56 | 1.05 | 0.70 | 2.37 | 1.74 |
| 5. Animal and vegetable oils, fats and waxes | -0.46 | -0.54 | 0.38 | 0.26 | 0.92 | 1.09 | 2.50 | 3.18 |
| 6. Chemicals and related products, n.e.s. | -0.68 | -0.64 | 0.25 | 0.26 | 1.74 | 1.59 | 4.91 | 4.44 |
| 7. Manufactured goods classified chiefly by material | -0.68 | -0.62 | 0.22 | 0.23 | 1.61 | 1.37 | 4.64 | 3.98 |
| 8. Machinery and transport equipment | -0.82 | -0.80 | 0.10 | 0.10 | 2.36 | 2.42 | 8.78 | 9.31 |
| 9. Miscellaneous manufactured articles | -0.66 | -0.69 | 0.25 | 0.22 | 1.67 | 1.73 | 4.85 | 4.99 |
| 10. Com and transc not classified elsewhere in SITC | -0.70 | -0.59 | 0.30 | 0.43 | 2.05 | 1.34 | 6.05 | 3.14 |
| Country Classification by Endowment: | | | | | | | | |
| 1. Resource Poor and Labor Abundant Countries | -0.44 | -0.43 | 0.35 | 0.35 | 0.88 | 0.82 | 2.50 | 2.36 |
| 2. Resource Rich and Labor Abundant Countries | -0.84 | -0.72 | 0.14 | 0.22 | 2.97 | 1.94 | 11.61 | 5.80 |
| 3. Resource Rich and Labor Importing Countries | -0.79 | -0.79 | 0.13 | 0.13 | 2.56 | 2.53 | 9.87 | 9.66 |

Source: UN-COMTRADE, authors' calculation.

**Table 3 F-test by ETA and SITC R2, 1 Digit, 2000 and 2010
in MENA Region**

| Classification | 2000 | 2010 |
|---|-----------|-----------|
| Industry Classification by ETA | 19.21*** | 14.31*** |
| Industry Classification SITC Rev 2, 1 Digit | 11.82*** | 16.94*** |
| Country Classification by Country | 47.56*** | 40.92*** |
| Country Classification by Endowment | 264.46*** | 204.17*** |

Source: UN-COMTRADE, authors' calculation.

**Table 4 F-test by ETA and SITC R2, 1 Digit, 2000 and 2010
in each MENA Countries**

| No | Countries | ETA | | SITC R2, 1 Digit | |
|----------------|------------------|---------|----------|------------------|----------|
| | | 2000 | 2010 | 2000 | 2010 |
| RPLA Countries | | | | | |
| 1 | Egypt | 6.37*** | 6.13*** | 3.72*** | 5.94*** |
| 2 | Jordan | 3.90*** | 1.05 | 3.62*** | 2.66*** |
| 3 | Lebanon | 0.76 | 0.19 | 2.16** | 2.87*** |
| 4 | Morocco | 8.29*** | 6.29*** | 2.91*** | 2.33** |
| 5 | Tunisia | 5.58*** | 5.30*** | 2.42** | 2.53*** |
| RRLA Countries | | | | | |
| 6 | Algeria | 1.85 | 2.57** | 10.94*** | 12.23*** |
| 7 | Iran | 3.53*** | 2.62 ** | 3.16*** | 4.97*** |
| 8 | Syria | 8.22*** | 7.31*** | 3.68*** | 3.26*** |
| 9 | Yemen | 8.77*** | 10.61*** | 9.21*** | 13.71*** |
| RPLI Countries | | | | | |
| 10 | Bahrain | 2.25* | 0.75 | 1.63 | 1.29 |
| 11 | Oman | 3.30*** | 2.16* | 3.53*** | 4.63*** |
| 12 | Qatar | 0.41 | 2.44** | 3.05*** | 8.21*** |
| 13 | Saudi Arabia | 0.65 | 0.91 | 4.50*** | 7.33*** |
| 14 | Un Arab Emirates | 4.38** | 4.70*** | 2.56*** | 3.63*** |

Source: UN-COMTRADE, authors' calculation.

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

Table 5 Paired Sample t-test across Period, 2000-2010

| Classification | t-test |
|--|---------------|
| Total of MENA | -6.31*** |
| Industry Classification by ETA: | |
| 1. Primary Product | -4.85*** |
| 2. Natural Resource Intensive Product | -3.79*** |
| 3. Unskilled Labor Intensive Product | 1.40* |
| 4. Technology Intensive Product | -3.64*** |
| 5. Human Capital Intensive Product | -1.23 |
| Industry Classification by SITC Rev 2, 1 Digit | |
| 1. Food and live animals | -6.56*** |
| 2. Beverages and tobacco | 0.90 |
| 3. Crude materials, inedible, except fuels | -0.35 |
| 4. Mineral fuels, lubricants and related materials | 0.98** |
| 5. Animal and vegetable oils, fats and waxes | 1.19 |
| 6. Chemicals and related products, n.e.s. | 1.85* |
| 7. Manufactured goods classified chiefly by material | -4.44*** |
| 8. Machinery and transport equipment | -2.06** |
| 9. Miscellaneous manufactured articles | 1.94* |
| 10. Com and transc not classified elsewhere in SITC | -1.72* |
| Country Classification by Endowment: | |
| 1. Resource Poor and Labor Abundant Countries | -1.07 |
| 2. Resource Rich and Labor Abundant Countries | -11.16*** |
| 3. Resource Rich and Labor Importing Countries | -1.01 |

Source: UN-COMTRADE, authors' calculation.

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

Table 6 Paired Sample t-test of RSCA's Country by Industry, 2000-2010

| No | Countries | Primary | | | Natural Resource Into | | | Unskilled Labor Into | | | Technology Int | | | Human Capital Int | | | Total | | |
|----|------------------|---------|-------|----------|-----------------------|-------|----------|----------------------|-------|----------|----------------|-------|----------|-------------------|-------|----------|-------|-------|----------|
| | | 2000 | 2010 | t-test | 2000 | 2010 | t-test | 2000 | 2010 | t-test | 2000 | 2010 | t-test | 2000 | 2010 | t-test | 2000 | 2010 | t-test |
| 1 | Egypt | -0.41 | -0.16 | -4.84*** | -0.54 | -0.43 | -1.06 | -0.17 | -0.15 | -0.27 | -0.83 | -0.67 | -3.75*** | -0.59 | -0.49 | -1.71* | -0.54 | -0.38 | -5.87*** |
| 2 | Jordan | -0.34 | -0.44 | 2.16** | -0.61 | -0.66 | 0.85 | -0.02 | -0.37 | 3.81*** | -0.23 | -0.50 | 6.08*** | -0.16 | -0.37 | 3.34*** | -0.28 | -0.46 | 6.97*** |
| 3 | Lebanon | -0.39 | -0.42 | 0.656 | -0.48 | -0.43 | -0.47 | -0.22 | -0.33 | 1.44 | -0.45 | -0.45 | 0.11 | -0.31 | -0.40 | 1.74* | -0.38 | -0.42 | 1.27 |
| 4 | Morocco | -0.47 | -0.34 | -2.81*** | -0.33 | -0.32 | -0.13 | -0.07 | -0.10 | 0.53 | -0.79 | -0.69 | -2.74*** | -0.77 | -0.69 | -1.61 | -0.55 | -0.47 | -3.37*** |
| 5 | Tunisia | -0.52 | -0.51 | -0.29 | -0.53 | -0.45 | -1.59 | 0.01 | 0.07 | -1.36 | -0.61 | -0.48 | -3.32*** | -0.60 | -0.41 | -2.92*** | -0.51 | -0.42 | -3.86*** |
| 6 | Algeria | -0.84 | -0.84 | 0.10 | -0.83 | -0.85 | 0.54 | -1.00 | -0.99 | -0.87 | -0.94 | -0.97 | 2.57** | -0.97 | -0.99 | 1.57 | -0.91 | -0.92 | 1.42 |
| 7 | Iran | -0.67 | -0.53 | -3.86*** | -0.72 | -0.52 | -2.07* | -0.73 | -0.69 | -0.66 | -0.90 | -0.73 | -3.84*** | -0.86 | -0.77 | -2.71*** | -0.78 | -0.64 | -6.35*** |
| 8 | Syria | -0.62 | -0.37 | -5.16*** | -0.90 | -0.63 | -3.56*** | -0.55 | -0.19 | -4.27*** | -0.98 | -0.79 | -4.75*** | -0.94 | -0.68 | -5.89*** | -0.79 | -0.55 | -9.51*** |
| 9 | Yemen | -0.71 | -0.54 | -3.37*** | -0.96 | -0.91 | -0.85 | -0.99 | -0.96 | 3.06*** | -0.97 | -0.92 | -2.20** | -0.95 | -0.83 | -3.34*** | -0.88 | -0.77 | -5.02*** |
| 10 | Bahrain | -0.83 | -0.82 | -0.20 | -0.89 | -0.76 | -1.93* | -0.71 | -0.81 | 1.46 | -0.88 | -0.88 | -0.02 | -0.87 | -0.79 | -2.24** | -0.84 | -0.83 | -0.43 |
| 11 | Oman | -0.66 | -0.68 | 0.84 | -0.83 | -0.76 | -1.11 | -0.79 | -0.87 | 1.30 | -0.89 | -0.81 | -1.62 | -0.73 | -0.85 | 1.91* | -0.77 | -0.77 | 0.26 |
| 12 | Qatar | -0.87 | -0.91 | 1.10 | -0.96 | -0.99 | 0.93 | -0.85 | -1.00 | 2.49** | 2.49 | -0.97 | 2.10** | -0.90 | -0.99 | 2.18** | -0.89 | -0.95 | 3.16*** |
| 13 | Saudi Arabia | -0.83 | -0.76 | -1.53 | -0.89 | -0.87 | -0.50 | -0.92 | -0.89 | -2.26** | -0.82 | -0.78 | -1.60 | -0.84 | -0.79 | -1.66 | -0.84 | -0.80 | -2.64*** |
| 14 | Un Arab Emirates | -0.60 | -0.67 | 1.87 | -0.71 | -0.67 | -0.42 | -0.43 | -0.51 | 1.08 | -0.81 | -0.71 | -2.75*** | -0.59 | -0.59 | 0.03 | -0.65 | -0.64 | -0.36 |
| 15 | MENA | -0.46 | -0.47 | 0.22 | -0.63 | -0.55 | -1.17 | -0.45 | -0.52 | 1.50 | -0.77 | -0.69 | -4.57*** | -0.74 | -0.68 | -2.60** | -0.61 | -0.57 | -2.14** |

Source: UN-COMTRADE, authors' calculation.

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

Table 7 Spearman's Rank Correlation across Resource-Poor and Labor-Abundant (RPLA) Countries

| | Egypt | Jordan | Lebanon | Morocco | Tunisia |
|---------|---------|---------|---------|---------|---------|
| Egypt | 1 | | | | |
| Jordan | 0.43*** | 1 | | | |
| Lebanon | 0.28*** | 0.53*** | 1 | | |
| Morocco | 0.40*** | 0.41*** | 0.43*** | 1 | |
| Tunisia | 0.33*** | 0.43*** | 0.42*** | 0.55*** | 1 |

Source: UN-COMTRADE, authors' calculation.

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

Table 8 Spearman's Rank Correlation across Resource-Rich and Labor-Abundant (RRLA) Countries

| | Algeria | Iran | Syria | Yemen |
|---------|---------|---------|---------|-------|
| Algeria | 1 | | | |
| Iran | 0.32*** | 1 | | |
| Syria | 0.23*** | 0.44*** | 1 | |
| Yemen | 0.38*** | 0.33*** | 0.30*** | 1 |

Source: UN-COMTRADE, authors' calculation.

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$

Table 9 Spearman's Rank Correlation across Resource-Rich and Labor-Importing (RRLI) Countries

| | Bahrain | Qatar | SA | UAE | Oman |
|---------|---------|-------|---------|---------|------|
| Bahrain | 1 | | | | |
| Qatar | 0.08 | 1 | | | |
| SA | 0.39*** | 0.00 | 1 | | |
| UAE | 0.40*** | 0.01 | 0.33*** | 1 | |
| Oman | 0.35*** | 0.11* | 0.51*** | 0.43*** | 1 |

Source: UN-COMTRADE, authors' calculation.

* significant at $\alpha=10\%$, ** significant at $\alpha=5\%$, *** significant at $\alpha=1\%$