# **9** Trade facilitation in the Arab region *Nahil Saqfalhait\**

# Abstract

This chapter aims to assess the progress of trade facilitation in the Arab region, and subsequently tests the effect of trade facilitation on bilateral trade flows within this region. The findings support the fact that the performance of Arab countries' logistics systems in general is still weak and needs to be improved, as indicated by the World Bank's Logistics Performance Index (LPI). Vast divergence and discrepancies among Arab countries can be observed because of differences in income levels and geopolitical conditions. Hence, while some Arab countries try to develop logistics activities to take advantage of opportunities, seeking to establish regional logistics platforms, others are not only ranked among the lowest on the overall index, but are also near the bottom of the list for the different components of the LPI.

The estimations presented here suggest that trade facilitation has positive impacts on intra-regional trade but that its scope is rather limited. Indeed, an improvement in trade facilitation (LPI score) of the exporting country by 1 per cent increases trade flows by 0.7 per cent. This impact could be higher and reach more than 2 per cent when sensitivity analysis is included. An improvement in trade facilitation (LPI score) of the importing country by 1 per cent boosts trade flows by 0.66 per cent. The results of this chapter show that there are slight gains in trade to be made from improving trade facilitation in Arab countries. Despite the fact that the overall LPI score is significant for both exporting and importing countries, the magnitude of that significance is relatively small compared with previous research findings regarding the same measures in other regions. However, the study suggests that trade facilitation could have a greater impact on trade among Arab countries and with other regions and underlines the importance of developing transport and physical infrastructure to enhance regional integration and trade cooperation.

<sup>&</sup>lt;sup>\*</sup> The contents of this chapter are the sole responsibility of the authors and are not meant to represent the position or opinions of the WTO or its members.

# 9.1 Introduction

Trade facilitation has become a major issue in trade negotiations. The WTO defines trade facilitation as "the simplification, modernization, and harmonization of export and import processes" (WTO, 2015). Research reveals that trade facilitation is likely to have positive effects on trade, particularly in developing countries because they have more room for improvements. Indeed, trade facilitation – encompassing both simplified customs procedures and upgrades to transportation infrastructure – enhances a country's ability to compete in international markets by reducing shipping delays and risk and lowering the cost of trading. Accordingly, improvements in trade facilitation measures are expected to translate into gains in trade, which in turn contribute to income growth that enhances human development.

Liapis (2015) provides evidence that many countries across the geographic and income spectrum improved their performance on several trade facilitation variables. He suggests that further enhancements to trade facilitation in many low- and lower-middle-income countries are required if they are to develop better practices. Cattaneo (2013) gives evidence that the removal of obstacles to trade, reduction of customs delays and border procedures, and reduction of transport costs are key priorities for future Aid for Trade (AfT) initiatives in the agro-food sector.

Arvis et al. (2013) suggest that trade facilitation policy should pay special attention to improving transport and logistics performance, particularly in low-income countries and in sub-Saharan Africa, where these could have highly significant impacts on trade costs.

Felipe and Kumar (2010), Fink, Mattoo and Neagu (2005), Hammar (2008), Moïsé (2013), Otsuki (2011) and Wilson, Mann and Otsuki (2003) examine the relationship between trade facilitation and trade flows in various countries. They provide evidence that applying trade facilitation measures will result in substantial benefits that outweigh their costs. Furthermore, Hertel and Mirza (2009) used the World Bank's Logistics Performance Index (LPI) to apply thorough analysis to various trade facilitation dimensions. Overall, using several trade facilitation measures, previous studies have revealed that trade facilitation is expected to enhance trade flows and result in many benefits.

With respect to the Arab region, several studies have assessed trade performance among Arab countries. Al-Atrash and Yousef (2000) estimate a gravity model to reveal whether there is too little intra-Arab trade. Their findings indicate that intra-Arab trade and Arab trade with the rest of the world are lower than the gravity equation predictions. By applying a gravity model, Elafif (2008) analyses the determinants of intra-Arab trade throughout the period 1985–2005. He argues that expanding the possibility of intra-Arab trade needs harmonization of economic policies and trade practices between sub-regional unions of Arab countries specifically, or among all Arab countries in general.

In fact, although Arab countries have made numerous attempts to engage in various practices of regional economic integration, trade between them is still extremely inadequate compared with various other developed and developing regional groupings.

This chapter aims to assess the performance and progress of trade facilitation in Arab economies. Additionally, the relationship between bilateral trade flows and trade facilitation in Arab countries will be examined. In that regard, this study uses the latest available LPI, that of 2014, in addition to all available past periods: 2007, 2010 and 2012. It applies pooled data analysis to capture the effect of trade facilitation on trade volume over time and across Arab countries. To the author's knowledge, there are no applied studies concerning trade facilitation in the region.

The rest of this chapter is organized as follows. Section 2 reviews the measurement of trade facilitation and discusses the state of logistics in the Arab countries. Section 3 discusses the estimation strategy and data. Section 4 presents the results. Section 5 concludes and provides policy implications.

# 9.2 Trade facilitation measurement

The LPI:

"is an interactive benchmarking tool created to help countries identify the challenges and opportunities they face in their performance on trade logistics and what they can do to improve their performance. The LPI [...] allows for comparisons across about 160 countries. The LPI is based on a worldwide survey of operators on the ground (global freight forwarders and express carriers), providing feedback on the logistics 'friendliness' of the countries in which they operate and those with which they trade. They combine in-depth knowledge of the countries in which they operate with informed qualitative assessments of other countries where they trade and experience of [the] global logistics environment. Feedback from operators is supplemented with quantitative data on the performance of key components of the logistics chain in the country of work." <sup>1</sup>

The LPI consists of both qualitative and quantitative measures and helps build profiles of the logistics friendliness of the countries included. It measures performance along the logistics supply chain within a country and offers two different perspectives: international and domestic. So far, it has been calculated for four periods: 2007, 2010, 2012 and 2014.

This chapter uses the International LPI, which provides qualitative evaluations of a country by its trading partners – logistics professionals working outside the country. The latest LPI, for 2014, ranks 160 countries on six dimensions of trade – including customs performance, infrastructure quality and timeliness of shipments – that have increasingly been recognised as being important to development. The data used in the ranking comes from a survey of logistics professionals who were asked questions about the foreign countries in which they operate. The LPI uses standard statistical techniques to aggregate the data into a single indicator that can be used for cross-country comparisons. The score cards demonstrate comparative performance – the dimensions show on a scale from 1 to 5 (lowest score to highest score).

#### State of logistics in the Arab countries

Table 9.1 provides information on the LPI for the Arab countries. Evidently, trade facilitation performance in the Arab countries is relatively low, according to the latest available LPI (2014). When analysing individual Arab countries, significant differences are observed, with their scores ranging between 3.54 and 2.09, ranking them from 27<sup>th</sup> to 155<sup>th</sup>. Obviously, oil-exporting Gulf countries achieve substantially higher scores and the highest rankings among Arab countries, while those countries suffering from wars and unstable political conditions are ranked lowest among Arab countries. Comparing the scores and ranks with previous periods clearly shows that there is deterioration with regard to all trade facilitation measures.

Starting from 2007, the average LPI for all Arab countries was higher than the world average, except for the Logistics Services index, which was a little lower. Considerable improvement was achieved by the year 2010, when the LPI index rose by 2.5 per cent (based on the short-list countries),<sup>2</sup> with all sub-indicators having progressed. Unfortunately, in 2012, the average overall score for all Arab countries was lower than the world average. However, based on the short-list countries, the average LPI score was better than the world average, although registering a 1 per cent decline compared with 2010. This negative trend continued in 2014, when the overall LPI score declined by 3.1 per cent compared with 2010. Clearly, all sub-indicators scored below the world average.

|  |       |         |       |      |          |        | 20           | 07           |              |               |             |              | _     |       |
|--|-------|---------|-------|------|----------|--------|--------------|--------------|--------------|---------------|-------------|--------------|-------|-------|
| Country                                  | Overa | all LPI | Cust  | oms  | Infrastr | ucture | Eas<br>Shipr | e of<br>nent | Logi<br>Serv | stics<br>ices | Eas<br>Trac | e of<br>king | Timel | iness |
|  | Score | Rank    | Score | Rank | Score    | Rank   | Score        | Rank         | Score        | Rank          | Score       | Rank         | Score | Rank  |
| Bahrain,<br>Kingdom of                   | 3.15  | 36      | 3.40  | 22   | 3.40     | 27     | 3.33         | 27           | 2.75         | 59            | 3.00        | 47           | 3.00  | 84    |
| Egypt                                    | 2.37  | 97      | 2.08  | 122  | 2.00     | 121    | 2.33         | 111          | 2.38         | 95            | 2.62        | 72           | 2.85  | 96    |
| Jordan                                   | 2.89  | 52      | 2.62  | 54   | 2.62     | 56     | 3.08         | 39           | 3.00         | 41            | 2.85        | 57           | 3.17  | 68    |
| Kuwait, State<br>of                      | 2.99  | 44      | 2.50  | 59   | 2.83     | 46     | 2.60         | 76           | 3.00         | 47            | 3.33        | 32           | 3.75  | 32    |
| Lebanese<br>Republic                     | 2.37  | 98      | 2.17  | 107  | 2.14     | 102    | 2.50         | 88           | 2.40         | 93            | 2.33        | 101          | 2.67  | 115   |
| Morocco                                  | 2.38  | 94      | 2.20  | 101  | 2.33     | 77     | 2.75         | 64           | 2.13         | 119           | 2.00        | 130          | 2.86  | 95    |
| Oman                                     | 2.92  | 48      | 2.71  | 46   | 2.86     | 43     | 2.57         | 79           | 2.67         | 67            | 2.80        | 63           | 4.00  | 24    |
| Qatar                                    | 2.98  | 46      | 2.44  | 67   | 2.63     | 55     | 3.00         | 46           | 3.00         | 43            | 3.17        | 38           | 3.67  | 38    |
| Saudi Arabia,<br>Kingdom of              | 3.02  | 41      | 2.72  | 45   | 2.95     | 38     | 2.93         | 50           | 2.88         | 51            | 3.02        | 43           | 3.65  | 39    |
| Sudan                                    | 2.71  | 64      | 2.36  | 79   | 2.36     | 73     | 2.67         | 68           | 2.83         | 55            | 2.92        | 51           | 3.17  | 67    |
| Syrian Arab<br>Republic                  | 2.09  | 135     | 2.17  | 108  | 1.91     | 131    | 2.00         | 138          | 1.80         | 145           | 2.00        | 137          | 2.67  | 118   |
| Tunisia                                  | 2.76  | 60      | 2.83  | 39   | 2.83     | 44     | 2.86         | 55           | 2.43         | 88            | 2.83        | 60           | 2.80  | 105   |
| United Arab<br>Emirates                  | 3.73  | 20      | 3.52  | 20   | 3.80     | 18     | 3.68         | 13           | 3.67         | 20            | 3.61        | 23           | 4.12  | 17    |
| Yemen                                    | 2.29  | 112     | 2.18  | 105  | 2.08     | 111    | 2.20         | 123          | 2.22         | 111           | 2.30        | 104          | 2.78  | 108   |
| Total                                    | 38.65 |         | 35.89 |      | 36.74    |        | 38.51        |              | 37.16        |               | 38.77       |              | 45.14 |       |
| Average<br>2007 / Arab                   | 2.76  |         | 2.564 |      | 2.62     |        | 2.7504       |              | 2.65         |               | 2.77        |              | 3.22  |       |
| Total<br>excluding<br>incomplete<br>data | 36.27 |         | 33.69 |      | 34.41    |        | 35.7560      |              | 35.03        |               | 36.77       |              | 42.28 |       |
| Average<br>2007 / Arab*                  | 2.79  |         | 2.59  |      | 2.65     |        | 2.7505       |              | 2.69         |               | 2.83        |              | 3.25  |       |
| Average<br>2007 / World                  | 2.74  |         | 2.556 |      | 2.58     |        | 2.72         |              | 2.71         |               | 2.73        |              | 3.17  |       |

#### Table 9.1 Logistics Performance Index, 2007, 2010, 2012 and 2014

Red denotes a country for which not all data are available.

\* Excluding Iraq, Libya and Morocco because their data are incomplete.

|                             |       |         |       |      |         |         | 20           | 10           |              |                |             |              |       |       |
|-----------------------------|-------|---------|-------|------|---------|---------|--------------|--------------|--------------|----------------|-------------|--------------|-------|-------|
| Country                     | Overa | all LPI | Cust  | oms  | Infrast | ructure | Eas<br>Shipi | e of<br>ment | Logi<br>Serv | stics<br>'ices | Eas<br>Trac | e of<br>king | Timel | iness |
|                             | Score | Rank    | Score | Rank | Score   | Rank    | Score        | Rank         | Score        | Rank           | Score       | Rank         | Score | Rank  |
| Bahrain,<br>Kingdom of      | 3.37  | 32      | 3.05  | 37   | 3.36    | 30      | 3.05         | 54           | 3.36         | 30             | 3.63        | 26           | 3.85  | 39    |
| Egypt                       | 2.61  | 92      | 2.11  | 122  | 2.22    | 106     | 2.56         | 110          | 2.87         | 54             | 2.56        | 101          | 3.31  | 81    |
| Iraq                        | 2.11  | 148     | 2.07  | 130  | 1.73    | 147     | 2.20         | 144          | 2.10         | 140            | 1.96        | 150          | 2.49  | 148   |
| Jordan                      | 2.74  | 81      | 2.31  | 93   | 2.69    | 55      | 3.11         | 49           | 2.49         | 90             | 2.33        | 133          | 3.39  | 78    |
| Kuwait, State<br>of         | 3.28  | 36      | 3.03  | 38   | 3.33    | 32      | 3.12         | 47           | 3.11         | 43             | 3.44        | 34           | 3.70  | 52    |
| Lebanese<br>Republic        | 3.34  | 33      | 3.27  | 29   | 3.05    | 41      | 2.87         | 69           | 3.73         | 19             | 3.16        | 49           | 3.97  | 29    |
| Libya                       | 2.33  | 132     | 2.15  | 116  | 2.18    | 107     | 2.28         | 140          | 2.28         | 121            | 2.08        | 143          | 2.98  | 124   |
| Oman                        | 2.84  | 60      | 3.38  | 24   | 3.06    | 40      | 2.31         | 137          | 2.37         | 108            | 2.04        | 145          | 3.94  | 32    |
| Qatar                       | 2.95  | 55      | 2.25  | 99   | 2.75    | 51      | 2.92         | 63           | 2.57         | 81             | 3.09        | 57           | 4.09  | 22    |
| Saudi Arabia,<br>Kingdom of | 3.22  | 40      | 2.91  | 43   | 3.27    | 33      | 2.80         | 82           | 3.33         | 32             | 3.32        | 42           | 3.78  | 45    |
| Sudan                       | 2.21  | 146     | 2.02  | 139  | 1.78    | 144     | 2.11         | 151          | 2.15         | 135            | 2.02        | 148          | 3.09  | 108   |
| Syrian Arab<br>Republic     | 2.74  | 80      | 2.37  | 83   | 2.45    | 75      | 2.87         | 68           | 2.59         | 75             | 2.63        | 95           | 3.45  | 74    |
| Tunisia                     | 2.84  | 61      | 2.43  | 73   | 2.56    | 65      | 3.36         | 22           | 2.36         | 109            | 2.56        | 102          | 3.57  | 58    |
| United Arab<br>Emirates     | 3.63  | 24      | 3.49  | 21   | 3.81    | 17      | 3.48         | 14           | 3.53         | 27             | 3.58        | 28           | 3.94  | 33    |
| Yemen                       | 2.58  | 101     | 2.46  | 69   | 2.35    | 88      | 2.24         | 142          | 2.35         | 110            | 2.63        | 94           | 3.48  | 68    |
| Average<br>2010 / Arab      | 2.85  |         | 2.62  |      | 2.71    |         | 2.75         |              | 2.75         |                | 2.735       |              | 3.53  |       |
| Average<br>2010 / Arab*     | 2.95  |         | 2.70  |      | 2.82    |         | 2.83         |              | 2.83         |                | 2.85        |              | 3.66  |       |
| Average<br>2010 / World     | 2.74  |         | 2.56  |      | 2.58    |         | 2.72         |              | 2.71         |                | 2.729       |              | 3.17  |       |

## Table 9.1 Logistics Performance Index, 2007, 2010, 2012 and 2014 (continued)

Red denotes a country for which not all data are available. \* Excluding Iraq, Libya and Morocco because their data are incomplete.

|                             |       |         |       |      |          |         | 20           | 12           |              |               |             |              |       |       |
|-----------------------------|-------|---------|-------|------|----------|---------|--------------|--------------|--------------|---------------|-------------|--------------|-------|-------|
| Country                     | Overa | ill LPI | Cust  | oms  | Infrasti | ructure | Eas<br>Shipi | e of<br>nent | Logi<br>Serv | stics<br>ices | Eas<br>Trac | e of<br>king | Timel | iness |
|                             | Score | Rank    | Score | Rank | Score    | Rank    | Score        | Rank         | Score        | Rank          | Score       | Rank         | Score | Rank  |
| Bahrain,<br>Kingdom of      | 3.05  | 48      | 2.67  | 60   | 3.08     | 43      | 2.83         | 72           | 4.10         | 3             | 3.97        | 11           | 3.79  | 31    |
| Egypt                       | 2.98  | 57      | 2.60  | 69   | 3.07     | 45      | 3.00         | 51           | 3.34         | 31            | 3.17        | 46           | 3.40  | 63    |
| Iraq                        | 2.16  | 145     | 1.75  | 152  | 1.92     | 146     | 2.38         | 126          | 2.68         | 84            | 2.98        | 62           | 3.11  | 87    |
| Jordan                      | 2.56  | 102     | 2.27  | 115  | 2.48     | 91      | 2.88         | 63           | 2.80         | 66            | 3.07        | 55           | 3.14  | 82    |
| Kuwait, State<br>of         | 2.83  | 70      | 2.73  | 53   | 2.82     | 61      | 2.68         | 90           | 2.65         | 90            | 2.58        | 96           | 3.42  | 59    |
| Lebanese<br>Republic        | 2.58  | 96      | 2.21  | 124  | 2.41     | 102     | 2.71         | 85           | 2.73         | 78            | 2.69        | 84           | 3.36  | 65    |
| Libya                       | 2.28  | 137     | 2.08  | 135  | 1.75     | 152     | 2.63         | 99           | 2.75         | 74            | 2.83        | 70           | 2.73  | 132   |
| Morocco                     | 3.03  | 50      | 2.64  | 65   | 3.14     | 39      | 3.01         | 46           | 2.50         | 103           | 2.77        | 78           | 2.95  | 104   |
| Oman                        | 2.89  | 62      | 3.10  | 36   | 2.96     | 49      | 2.78         | 77           | 2.55         | 99            | 2.10        | 145          | 2.74  | 130   |
| Qatar                       | 3.32  | 33      | 3.12  | 34   | 3.23     | 34      | 2.88         | 64           | 2.46         | 108           | 2.42        | 119          | 2.84  | 117   |
| Saudi Arabia,<br>Kingdom of | 3.18  | 37      | 2.79  | 51   | 3.22     | 35      | 3.10         | 42           | 2.18         | 136           | 2.48        | 112          | 3.12  | 85    |
| Sudan                       | 2.10  | 148     | 2.14  | 131  | 2.01     | 140     | 1.93         | 150          | 2.16         | 139           | 2.10        | 146          | 2.80  | 119   |
| Syrian Arab<br>Republic     | 2.60  | 92      | 2.33  | 104  | 2.54     | 84      | 2.62         | 100          | 2.00         | 149           | 2.00        | 147          | 2.59  | 141   |
| Tunisia                     | 3.17  | 41      | 3.13  | 33   | 2.88     | 54      | 2.88         | 65           | 2.21         | 131           | 2.26        | 136          | 2.31  | 152   |
| United Arab<br>Emirates     | 3.78  | 17      | 3.61  | 15   | 3.84     | 17      | 3.59         | 15           | 2.03         | 148           | 1.83        | 152          | 2.43  | 148   |
| Yemen                       | 2.89  | 63      | 2.29  | 110  | 2.62     | 74      | 3.14         | 38           | 1.84         | 153           | 1.73        | 153          | 2.19  | 154   |
| Average<br>2012 / Arab      | 2.84  |         | 2.59  |      | 2.75     |         | 2.816        |              | 2.56         |               | 2.56        |              | 2.931 |       |
| Average<br>2012 / Arab*     | 2.92  |         | 2.69  |      | 2.86     |         | 2.85         |              | 2.54         |               | 2.49        |              | 2.932 |       |
| Average<br>2012 / World     | 2.87  |         | 2.66  |      | 2.76     |         | 2.824        |              | 2.82         |               | 2.88        |              | 3.26  |       |

## Table 9.1 Logistics Performance Index, 2007, 2010, 2012 and 2014 (continued)

Red denotes a country for which not all data are available. \* Excluding Iraq, Libya and Morocco because their data are incomplete.

|                             |       |         |       |      |          |         | 20           | 14           |              |               |             |              |       |       |
|-----------------------------|-------|---------|-------|------|----------|---------|--------------|--------------|--------------|---------------|-------------|--------------|-------|-------|
| Country                     | Overa | all LPI | Cust  | oms  | Infrastr | ructure | Eas<br>Shipi | e of<br>ment | Logi<br>Serv | stics<br>ices | Eas<br>Trac | e of<br>king | Timel | iness |
|                             | Score | Rank    | Score | Rank | Score    | Rank    | Score        | Rank         | Score        | Rank          | Score       | Rank         | Score | Rank  |
| Bahrain,<br>Kingdom of      | 3.08  | 52      | 3.29  | 30   | 3.04     | 49      | 3.04         | 58           | 3.04         | 51            | 3.29        | 42           | 2.80  | 119   |
| Egypt                       | 2.97  | 62      | 2.85  | 57   | 2.86     | 60      | 2.87         | 77           | 2.99         | 58            | 3.23        | 43           | 2.99  | 99    |
| Iraq                        | 2.30  | 141     | 1.98  | 149  | 2.18     | 131     | 2.31         | 139          | 2.15         | 147           | 2.31        | 136          | 2.85  | 116   |
| Jordan                      | 2.87  | 68      | 2.60  | 78   | 2.59     | 76      | 2.96         | 65           | 2.94         | 60            | 2.67        | 96           | 3.46  | 58    |
| Kuwait, State<br>of         | 3.01  | 56      | 2.69  | 68   | 3.16     | 43      | 2.76         | 89           | 2.96         | 59            | 3.16        | 50           | 3.39  | 60    |
| Lebanese<br>Republic        | 2.73  | 85      | 2.29  | 124  | 2.53     | 89      | 2.53         | 118          | 2.89         | 67            | 3.22        | 44           | 2.89  | 108   |
| Libya                       | 2.50  | 118     | 2.41  | 104  | 2.29     | 119     | 2.29         | 140          | 2.29         | 131           | 2.85        | 78           | 2.85  | 114   |
| Oman                        | 3.00  | 59      | 2.63  | 74   | 2.88     | 57      | 3.41         | 31           | 2.84         | 73            | 2.84        | 80           | 3.29  | 67    |
| Qatar                       | 3.52  | 29      | 3.21  | 37   | 3.44     | 29      | 3.55         | 16           | 3.55         | 28            | 3.47        | 32           | 3.87  | 34    |
| Saudi Arabia,<br>Kingdom of | 3.15  | 49      | 2.86  | 56   | 3.34     | 34      | 2.93         | 70           | 3.11         | 48            | 3.15        | 54           | 3.55  | 47    |
| Sudan                       | 2.16  | 153     | 1.87  | 155  | 1.90     | 152     | 2.23         | 144          | 2.18         | 144           | 2.42        | 125          | 2.33  | 156   |
| Syrian Arab<br>Republic     | 2.09  | 155     | 2.07  | 142  | 2.08     | 144     | 2.15         | 150          | 1.82         | 159           | 1.90        | 158          | 2.53  | 145   |
| Tunisia                     | 2.55  | 110     | 2.02  | 146  | 2.30     | 118     | 2.91         | 73           | 2.42         | 120           | 2.42        | 124          | 3.16  | 80    |
| United Arab<br>Emirates     | 3.54  | 27      | 3.42  | 25   | 3.70     | 21      | 3.20         | 43           | 3.50         | 31            | 3.57        | 24           | 3.92  | 32    |
| Yemen                       | 2.18  | 151     | 1.63  | 159  | 1.87     | 153     | 2.35         | 134          | 2.21         | 141           | 2.21        | 144          | 2.78  | 124   |
| Average<br>2014 / Arab      | 2.78  |         | 2.52  |      | 2.68     |         | 2.77         |              | 2.73         |               | 2.85        |              | 3.11  |       |
| Average<br>2014 / Arab*     | 2.83  |         | 2.57  |      | 2.75     |         | 2.84         |              | 2.80         |               | 2.89        |              | 3.15  |       |
| Average<br>2014 / World     | 2.89  |         | 2.73  |      | 2.77     |         | 2.86         |              | 2.85         |               | 2.90        |              | 3.25  |       |

## Table 9.1 Logistics Performance Index, 2007, 2010, 2012 and 2014 (continued)

Red denotes a country for which not all data are available. \* Excluding Iraq, Libya and Morocco because their data are incomplete.

When looking at individual countries within the Arab region, massive differences can be observed. The United Arab Emirates is ranked first in the region in all four periods, although its score declined from 3.73 in 2007 to 3.54 in 2014. Qatar's score improved significantly, from 2.98 to 3.52 during the same period, to be ranked second in the region by 2014. In the case of Jordan, a slight decline can be observed between 2007 and 2014, from 2.89 to 2.87, with a low of 2.56 in 2012. Yemen, Sudan and the Syrian Arab Republic (Syria) are ranked lowest, between 151st and 155th in 2014, which reflects the current unstable conditions experienced by those countries.

Indeed, the performance of Arab countries' logistics systems in general is still weak and needs to be improved. Vast divergence and discrepancies among Arab countries can be observed, which is attributable to many factors, including differences in income levels and the unstable political and war conditions experienced by some. Accordingly, while some Arab countries try to develop logistics activities to take advantage of opportunities, seeking to establish a regional logistics platform, others are not only ranked among the lowest in terms of the overall index, but are also among the lowest ranked for different components of the LPI.

#### 9.3 The gravity model

The gravity equation is a simple empirical model for analysing bilateral trade flows. The gravity model for trade is analogous to the Newtonian physics function that describes the force of gravity. The model explains the flow of trade between two countries as being proportional to their economic "mass" (national income) and inversely proportional to the distance between them. The model has a lineage that goes back to Tinbergen (1962) and Poyhonen (1963), who specified the gravity model equation as follows:

$$Trade_{ij} = \alpha \frac{GDP_i GDP_j}{Dist_{ij}}$$
(1)

where:

Trade, is the value of the bilateral trade between countries i and j;

GDP, and GDP, are the respective national incomes of countries i and j;

Dist, is a measure of the distance between the two countries;

 $\alpha$  is a constant of proportionality.

Taking logarithms of the gravity model equation as in (1), the linear form of the model and the corresponding estimable equation are:

$$Log (Trade_{ii}) = \alpha + \beta_1 log (GDP_i GDP_i) + \beta_2 log (distance_{ii}) + u_{ii} (2)$$

where  $\alpha$ ,  $\beta_1$  and  $\beta_2$  are the coefficients to be estimated. The error term (u) captures any other shocks and chance events that may affect trade between the two countries such as weather, tariff shocks, etc. Equation (2) is the core gravity model equation where bilateral trade is predicted to be a positive function of income and negative function of distance.

## Methodology

The present study estimates a modified gravity model equation to analyse the effect of trade facilitation measures and other factors on the flow of exports within the Arab region. The modified model includes several variables that account for other factors that may affect trade in addition to (the natural logarithms of) income and distance.

The estimation is performed as follows:

$$Log (X_{ij}) = \alpha + \beta_1 log (PCGDP_i) + \beta_2 log (PCGDP_j) + \beta_2 log (D_{ij}) + \beta_2 log (POP_i) + \beta_2 log (POP_i) + \beta_4 (Border_{ii}) + \beta_4 (LPl_i) + \beta_4 (LPl_i) + u_{ii}$$
(3)

where i is the exporting country and j denotes the importing country. Xij denotes the value of exports from i to j. The explanatory variables in the gravity model are defined as follows:

POP, or POP, is the population of the country as a measure for the size of the economy;

PCGDP<sub>i</sub> or PCGDP<sub>j</sub> is the per capita income based on purchasing power parity;

 $D_{ij}$  is the distance between country i and country j measured by the air routes using the straight line or great circle measure of distance. This measure seems to be a reasonable measure of averaging across different modes of transportation and works well in practice;

Border<sub>ij</sub> is a dummy variable to identify whether a country shares a border with the importing country to account for the possibility that neighbouring countries may engage in large volumes of border trade, which they often do. The dummy variable is unity when countries i and j share a common border and 0 when they do not;

LPI, or LPI, is the Logistics Performance Index score for the country;

 $u_{ij}$  is a log-normally distributed error term and represents the numerous other influences on bilateral trade.

Additionally, the following variables are used in the following estimation models:

LPI\_S1: Overall LPI score for the exporter;

LPI\_S2: Overall LPI score for the importer;

CUS\_S1: Customs score for the exporter;

CUS\_S2: Customs score for the importer;

INFRA\_S1: Infrastructure score for the exporter;

INFRA\_S2: Infrastructure score for the importer;

LOGSERV\_S1: Logistics Services score for the exporter;

LOGSERV\_S2: Logistics Services score for the importer;

SHIP\_S1: Ease of Shipment score for the exporter;

SHIP\_S2: Ease of Shipment score for the importer;

TIME\_S1: Timeliness score for the exporter;

TIME\_S2: Timeliness score for the importer;

TRACK\_S1: Ease of Tracking score for the exporter;

TRACK\_S2: Ease of Tracking score for the importer.

## Study sample

The dependent variable in the following analysis is the natural logarithm of total exports measured in current international prices (US\$ value). The trade data are derived from the United Nations Commodity Trade Statistics Database (UN Comtrade)<sup>3</sup> and cover the Arab countries. Observations for all variables are taken in four periods (2007, 2010, 2012 and 2014), as the LPI is available only for these years.

The data source for POP and PCGDP is the World Economic Outlook published by the International Monetary Fund (IMF).<sup>4</sup> Bilateral distance is measured, in miles, as the great circle distance between the two capital cities of the trading partners. Bilateral distance is sourced from the data set developed by FreeMapTools.<sup>5</sup>

# 9.4 Estimation results

## Estimation technique

The estimation technique derives from Gujarati and Porter (2009). Pooled data can be estimated using fixed effects models (FEM) or random effects models (REM). The choice between them depends upon the likely correlation between the crosssection specific error component e, and the regressors Xs. If it is assumed that e, and Xs are uncorrelated, REM may be appropriate, whereas if e, and Xs are correlated, FEM may be appropriate. Additionally, the choice between FEM or REM depends upon whether there is a short panel or long panel. In the analysis by Gujarati and Porter (2009), it is a short panel, i.e. the number of cross-sectional subjects (185) is greater than the number of time periods (4). Gujarati and Porter (2009) explain that even the Hausman formal test that was developed in 1978 (H-test) to choose between FEM and REM can be applied, but in this case, REM estimators are more efficient than FEM estimators. Therefore, results presented here are based on REM estimation (Table 9.2). Equation (3) is estimated using the generalized least squares technique (GLS) with panel data for the period (2007-2014). GLS is fully efficient and yields consistent estimates of the standard errors, since it eliminates serial correlation and heteroskedasticity.

# Stationarity of the variables

Levin and Lin (1992, 1993) and Levin, Lin and Chu (2002) provide results on panel unit root tests. The latter developed a procedure using a pooled t-statistic of the estimator to evaluate the hypothesis that each individual time series contains a unit root against the alternative hypothesis that each time series is stationary. To conduct the Levin-Lin-Chu (LLC) panel unit root test, panels have to be balanced. All panels in this study are balanced, since each cross-sectional unit has the same number of time series observations, which enable conduct of the LLC test. Table 9.2 reports results of this test for variables' levels. It is clearly shown that the null hypothesis of a unit root is rejected at extremely low probability of obtaining type I error for all cases. Thus, all variables are trend stationary series.

#### Table 9.2 Results of LLC panel unit root test

|              | Statistic | Prob.** |
|--------------|-----------|---------|
| INFL1        | -27.0529  | 0.0000  |
| INFL2        | -40.9404  | 0.0000  |
| LNINFRA_S1   | -8.92671  | 0.0000  |
| LNINFRA_S2   | -17.3463  | 0.0000  |
| LNCUS_S1     | -5.85014  | 0.0000  |
| LNCUS_S2     | -44.386   | 0.0000  |
| LNEXP1       | -48.4313  | 0.0000  |
| LNLOGSERV_S1 | -13.5548  | 0.0000  |
| LNPCGDP1     | -51.7084  | 0.0000  |
| LNLOGSERV_S2 | -16.2406  | 0.0000  |
| LNPCGDP2     | -22.6619  | 0.0000  |
| LNPOP1       | -9.33882  | 0.0000  |
| LNPOP2       | -3.60771  | 0.0002  |
| LNLPI_S1     | -7.9834   | 0.0000  |
| LNLPI_S2     | -31.5491  | 0.0000  |
| LNSHIP_S1    | -9.85054  | 0.0000  |
| LNSHIP_S2    | -11.4627  | 0.0000  |
| LNTIME_S1    | -91.9953  | 0.0000  |
| LNTIME_S2    | -41.2811  | 0.0000  |
| LNTRACK_S1   | -13.8152  | 0.0000  |
| LNTRACK_S2   | -16.968   | 0.0000  |
|              |           |         |

Null Hypothesis: Unit root (common unit root process) Levin, Lin and Chu t\*

Note: LN signifies the Log of the variables.

## **Correlation matrix**

As can be seen in Table 9.3(a), the basic gravity model variables are not strongly correlated. To ensure that there is no multicollinearity in the model, the variance inflation factor (VIF) test is applied, where its value is found to be less than 4 for all possible scenarios, which provides sufficient evidence that no statistical problem will result from including the variables in the same model.

On the other hand, as Table 9.3(b) shows, the LPI sub-measures are extremely correlated. Therefore, any specification that involves all six components of the LPI will suffer from multicollinearity problems. Essentially, this will result in statistically insignificant estimators or may cause an opposite sign. To prevent this problem, they were applied separately in different regression models, keeping other main and control variables. Table 9.4 presents the results in summary.

|            | LNDIST_FLY | LNLPI_S1 | LNLPI_S2 | LNPCGDP1 | LNPCGDP2 | LNPOP1 | LNPOP2 | INFL1 | INFL2 | BORDER |
|------------|------------|----------|----------|----------|----------|--------|--------|-------|-------|--------|
| LNDIST_FLY | 1          |          |          |          |          |        |        |       |       |        |
| LNLPI_S1   | 0.13       | 1        |          |          |          |        |        |       |       |        |
| LNLPI_S2   | 0.19       | -0.07    | 1        |          |          |        |        |       |       |        |
| LNPCGDP1   | -0.32      | -0.61    | 0.06     | 1        |          |        |        |       |       |        |
| LNPCGDP2   | -0.29      | 0.03     | -0.68    | -0.06    | 1        |        |        |       |       |        |
| LNPOP1     | 0.25       | 0.42     | -0.04    | -0.70    | 0.04     | 1      |        |       |       |        |
| LNPOP2     | 0.19       | -0.01    | 0.41     | 0.05     | -0.65    | -0.07  | 1      |       |       |        |
| INFL1      | -0.01      | 0.16     | -0.03    | -0.30    | 0.01     | 0.46   | -0.06  | 1     |       |        |
| INFL2      | 0.09       | -0.01    | 0.32     | 0.01     | -0.36    | -0.02  | 0.32   | -0.03 | 1     |        |
| BORDER     | -0.35      | -0.04    | -0.05    | 0.06     | 0.08     | 0.06   | 0.11   | 0.00  | -0.01 | 1      |

#### Table 9.3(a) Correlation matrix for the basic model

| InderA_S2         UnderServa         Mucosserva         Mulange         Mulange         Mulange           1 </th <th>Index_sol         IndexErv_sl         IndexErv_sl</th> <th>INDERSEN-<br/>S1         UNCESEN-<br/>S2         UNCESEN-<br/>LUC         UNCHIP_S1         UNCHIP_S1         UNCHIP_S2         UNTME_S1         UNTME_S1           1        </th> | Index_sol         IndexErv_sl         IndexErv_sl | INDERSEN-<br>S1         UNCESEN-<br>S2         UNCESEN-<br>LUC         UNCHIP_S1         UNCHIP_S1         UNCHIP_S2         UNTME_S1         UNTME_S1           1 |
|--|---|--|
| NLOGSBRU-<br>20         LNLPI_S1         LNLPI_S2         LNSHIP_S1         LNSHIP_S2           1         -  | NLOGSBRV         INLP_SI         INSHIP_S2         UNTME_S1           1         -0.02         1         -0.05         1   | NLOGSBRV-<br>S2         INLP_S1         INLP_S0         INTME_S1         INTME_S1           1         -0.02         1         -0.05         1                      |
| LPI_SI LNLPI_S2 LNSHP_S1 LNSHP_S2  | LEI_SI LULEI_S2 LUSHIP_S1 LUSHIP_S2 LUTIME_S1   | LP_SI INLP_S2 LNSHP_S1 LNSHP_S2 LNTME_S1 LNTME_S2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1  |
| 2 INSHP_S1 INSHP_S2  | 2 LNSHP_S1 LNSHP_S2 LNTME_S1  | 2 LNSHIP_S1 LNSHIP_S2 LNTIME_S1 LNTIME_S2  |
| S2 altsvi  | LNSHP_S2 LNTIME_S1  | LNSHP_S2 LNTIME_S1 LNTIME_S2   |
|  | LUTIME_S1   | LNTIME_S1  |
| LNTIME_S2 LNTRACK_S1   | LNTRACK_S1  |  |

Table 9.3(b) Correlation matrix between the LPI sub-measures

#### **Results**

Table 9.4 shows the results from the estimation. The results are in line with the results found previously in the literature. All estimated coefficients are statistically significant with the expected signs in the economic theory. The size of the trading partners represented by population positively impacts on trade flows. GDP per capita has a positive and a statistically significant impact on trade flows. The estimated coefficients are individually highly significant, as the p-values (which help to determine the significance of the results) are so low. The F statistics are also very high, suggesting that, collectively, all variables are statistically important. R-squared (the number that indicates the proportion of the variance in the dependent variable, that is predictable from the independent variable) is reasonable, providing plausible explanatory power.

The key variable of interest is LPI score. It is found that an improvement in trade facilitation (LPI score) of the exporting country by 1 per cent increases trade flows by 0.70 per cent. Trade facilitation of the exporter has a slightly higher impact on trade flows than does trade facilitation of the importer. An improvement in trade facilitation (LPI score) of the importing country by 1 per cent increases trade flows by 0.66 per cent. The results show that there are slight gains in trade to be made from improving trade facilitation in Arab countries.

The impact of the individual components of the LPI are also tested. As mentioned above, due to potential multicollinearity, separate models are used for each of the LPI measures. Estimation results are presented in Table 9.4. Coefficients on other variables are qualitatively similar to the benchmark results reported when applying the overall LPI score.

Customs efficiency of the exporter has an impact on trade flows for both the importer and the exporter. The results show that an improvement in customs efficiency of the exporting country by 1 per cent improves trade flows by 0.69 per cent, and improvement in customs efficiency of the importing country by 1 per cent improves trade flows by 0.56 per cent. Improvement of infrastructure seems to have greater impact for the exporting country by 1 per cent improves trade flows by 0.82 per cent, and improvement in the infrastructure of the exporting country by 1 per cent improves trade flows by 0.82 per cent, and improvement in the infrastructure of the importing country by 1 per cent improves trade flows by 0.60 per cent.

|                    | Mode        | el 1   | Mode        | el 2   | Mode        | el 3   | Mode        | si 4   | Mod         | el 5   | PoM         | el 6   | Mode        | 17     |
|--------------------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|
| Variable           | Coefficient | Prob.  |
| U                  | 4.645444    | 0.0263 | 4.468018    | 0.0319 | 5.812289    | 0.0063 | 4.390749    | 0.0268 | 4.272077    | 0.0343 | 3.817062    | 0.0581 | 3.615354    | 0.086  |
| BORDER             | 0.634198    | 0.0224 | 0.600312    | 0.0311 | 0.632793    | 0.0214 | 0.658686    | 0.0126 | 0.631957    | 0.0191 | 0.590487    | 0.0278 | 0.596431    | 0.0359 |
| LNDIST_FLY_        | -1.152594   | 0.0000 | -1.167179   | 0.0000 | -1.177623   | 0.0000 | -1.112239   | 0.0000 | -1.154871   | 0.0000 | -1.141896   | 0.0000 | -1.133202   | 0.0000 |
| LNPCGDP1           | 1.03636     | 0.0000 | 1.04636     | 0.0000 | 0.981047    | 0.0000 | 1.01994     | 0.0000 | 1.079752    | 0.0000 | 1.09161     | 0.0000 | 1.113424    | 0.0000 |
| LNPCGDP2           | 0.622341    | 0.0000 | 0.652563    | 0.0000 | 0.58587     | 0.0000 | 0.680158    | 0.0000 | 0.639742    | 0.0000 | 0.733811    | 0.0000 | 0.722837    | 0.0000 |
| LNPOP1             | 0.817591    | 0.0000 | 0.842987    | 0.0000 | 0.800979    | 0.0000 | 0.804875    | 0.0000 | 0.821744    | 0.0000 | 0.847352    | 0.0000 | 0.854394    | 0.0000 |
| LNPOP2             | 0.710679    | 0.0000 | 0.735477    | 0.0000 | 0.693227    | 0.0000 | 0.721984    | 0.0000 | 0.724874    | 0.0000 | 0.749501    | 0.0000 | 0.752868    | 0.0000 |
| LNLPI_S1           | 0.702158    | 0.0513 |             |        |             |        |             |        |             |        |             |        |             |        |
| LNLPI_S2           | 0.662204    | 0.0686 |             |        |             |        |             |        |             |        |             |        |             |        |
| LNCUS_S1           |             |        | 0.69421     | 0.0051 |             |        |             |        |             |        |             |        |             |        |
| LNCUS_S2           |             |        | 0.563282    | 0.0287 |             |        |             |        |             |        |             |        |             |        |
| LNINFRA_S1         |             |        |             |        | 0.817049    | 0.0041 |             |        |             |        |             |        |             |        |
| LNINFRA_S2         |             |        |             |        | 0.597891    | 0.0304 |             |        |             |        |             |        |             |        |
| LNLOGSERV_S1       |             |        |             |        |             |        | 0.683749    | 0.0061 |             |        |             |        |             |        |
| LNLOGSERV_S2       |             |        |             |        |             |        | 0.301173    | 0.1562 |             |        |             |        |             |        |
| LNSHIP_S1          |             |        |             |        |             |        |             |        | 0.328233    | 0.2676 |             |        |             |        |
| LNSHIP_S2          |             |        |             |        |             |        |             |        | 0.811476    | 0.0091 |             |        |             |        |
| LNTIME_S1          |             |        |             |        |             |        |             |        |             |        | 0.339346    | 0.1404 |             |        |
| LNTIME_S2          |             |        |             |        |             |        |             |        |             |        | -0.025246   | 0.9129 |             |        |
| LNTRACK_S1         |             |        |             |        |             |        |             |        |             |        |             |        | 0.182099    | 0.4219 |
| LNTRACK_S2         |             |        |             |        |             |        |             |        |             |        |             |        | 0.199296    | 0.2877 |
| R-squared          | 0.475       | 3088   | 0.477       | 013    | 0.480       | 389    | 0.481       | 686    | 0.476       | 690    | 0.472       | 2144   | 0.463       | 345    |
| Adjusted R-squared | 0.463       | 3442   | 0.467       | 439    | 0.470       | 877    | 0.472       | 198    | 0.466       | 477    | 0.462       | 2481   | 0.454       | 03     |
| S.E. of regression | 0.580       | 0439   | 0.575       | 792    | 0.578       | 977    | 0.593       | 994    | 0.585       | 293    | 0.59        | 278    | 0.577       | 379    |
| F-statistic        | 49.04       | 1514   | 49.82       | 313    | 50.50       | 182    | 50.76       | 488    | 49.63       | 1487   | 48.85       | 974    | 47.25       | 79     |
| Prob(F-statistic)  | 0.00        | 000    | 00.00       | 00     | 0.00        | 00     | 00.0        | 00     | 0.00        | 00     | 0.00        | 00     | 0.00        | 00     |

Table 9.4 Regression results for the gravity model (all countries)

Shipment efficiency matters only for the importing country, where enhancement of shipment efficiency of the importing country by 1 per cent improves trade flows by 0.81 per cent, while it is insignificant for the exporting country. In contrast, logistics efficiency matters only for the exporting country, where improvement in logistics efficiency of the exporting country by 1 per cent increases trade flows by 0.68 per cent, while it is insignificant for the importing country. Finally, track and time efficiencies are insignificant for either the exporter or the importer. Clearly, various aspects of trade facilitation impact on trade differently.

The estimation results discussed above suggest that trade facilitation plays a weak role in enhancing trade flows between Arab countries. Even though the overall LPI score is significant for both exporting and importing countries, the magnitude of that significance is relatively small compared with previous research findings regarding the same measures in other regions.

#### Robustness

To check the robustness of these findings, the estimations for only four countries of the sample - the Kingdom of Bahrain, Egypt, Jordan and Oman – are presented. The choice of countries is based on the availability of consistent data for these countries for all variables and all years (2007, 2010, 2012 and 2014), while all other countries are missing data for certain years and/or some variables.

Table 9.5 shows the results from the estimation. The results are in line with those found in Table 9.4.<sup>6</sup> Not only are all the estimated coefficients statistically significant with the expected signs in the economic theory, but also the estimated models are preferable in terms of their explanatory power and the magnitudes of LPI parameters. The size of the trading partners represented by population positively impacts on trade flows. GDP per capita has a positive and a statistically significant impact on trade flows. The estimated coefficients are individually highly significant, as the p-values are so low. The F statistics are also very high, suggesting that, collectively, all variables are statistically important. R-squared is reasonable, providing plausible explanatory power.

The key variable of interest is LPI score. It is found that an improvement in trade facilitation (LPI score) of the exporting country by 1 per cent increases trade flows by 2.04 per cent. Trade facilitation of the exporter has a much higher impact on trade flows than does trade facilitation of the importer. An improvement in trade facilitation (LPI score) of the importing country by 1 per cent increases trade flows by only 0.78 per cent. These results for the four-country sample show that there are significant gains in trade to be made from improving trade facilitation in the exporting country.

| Maniadala          | Mode        | el 1   | Mode        | 12     | Mode        | el 3   | Mode        | el 4   | Mode        | el 5    | Mode        | el 6    | Mode        | 17     |
|--------------------|-------------|--------|-------------|--------|-------------|--------|-------------|--------|-------------|---------|-------------|---------|-------------|--------|
| variable           | Coefficient | Prob.   | Coefficient | Prob.   | Coefficient | Prob.  |
| U                  | 5.361275    | 0.0248 | 6.912691    | 0.0043 | 7.550554    | 0.0019 | 5.08303     | 0.0338 | 5.556232    | 0.0201  | 5.102857    | 0.0373  | 5.368743    | 0.0264 |
| BORDER             | 0.805263    | 0.0027 | 0.742916    | 0.0053 | 0.778478    | 0.0035 | 0.849716    | 0.0017 | 0.807857    | 0.0023  | 0.757455    | 0.0046  | 0.783218    | 0.0037 |
| LNDIST_FLY_        | -0.931617   | 0.0000 | -0.956135   | 0.0000 | -0.955554   | 0.0000 | -0.926959   | 0.0000 | -0.951707   | 0.0000  | -0.956999   | 0.0000  | -0.946651   | 0.0000 |
| LNPCGDP1           | 0.508174    | 0.0065 | 0.439273    | 0.0249 | 0.434678    | 0.0226 | 0.663106    | 0.0003 | 0.643749    | 0.0004  | 0.70285     | 0.0001  | 0.687521    | 0.0002 |
| LNPCGDP2           | 0.821177    | 0.0000 | 0.881219    | 0.0000 | 0.778108    | 0.0000 | 0.870742    | 0.0000 | 0.846603    | 0.0000  | 0.93444     | 0.0000  | 0.914758    | 0.0000 |
| LNPOP1             | 0.698427    | 0.0000 | 0.697717    | 0.0000 | 0.686813    | 0.0000 | 0.703341    | 0.0000 | 0.702883    | 0.000.0 | 0.726334    | 0.000.0 | 0.715776    | 0.0000 |
| LNPOP2             | 0.858098    | 0.0000 | 0.901884    | 0.0000 | 0.848454    | 0.0000 | 0.848451    | 0.0000 | 0.864198    | 0.0000  | 0.898031    | 0.000.0 | 0.889287    | 0.0000 |
| LNLPI_S1           | 2.039378    | 0.0004 |             |        |             |        |             |        |             |         |             |         |             |        |
| LNLPI_S2           | 0.776393    | 0.0476 |             |        |             |        |             |        |             |         |             |         |             |        |
| LNCUS_S1           |             |        | 1.143679    | 0.0009 |             |        |             |        |             |         |             |         |             |        |
| LNCUS_S2           |             |        | 0.470523    | 0.084  |             |        |             |        |             |         |             |         |             |        |
| LNINFRA_S1         |             |        |             |        | 1.315562    | 0.0004 |             |        |             |         |             |         |             |        |
| LNINFRA_S2         |             |        |             |        | 0.80302     | 0.0073 |             |        |             |         |             |         |             |        |
| LNLOGSERV_S1       |             |        |             |        |             |        | 0.908049    | 0.0024 |             |         |             |         |             |        |
| LNLOGSERV_S2       |             |        |             |        |             |        | 0.206849    | 0.3984 |             |         |             |         |             |        |
| LNSHIP_S1          |             |        |             |        |             |        |             |        | 0.528452    | 0.1351  |             |         |             |        |
| LNSHIP_S2          |             |        |             |        |             |        |             |        | 0.700368    | 0.0454  |             |         |             |        |
| LNTIME_S1          |             |        |             |        |             |        |             |        |             |         | 0.240964    | 0.4098  |             |        |
| LNTIME_S2          |             |        |             |        |             |        |             |        |             |         | -0.096521   | 0.7042  |             |        |
| LNTRACK_S1         |             |        |             |        |             |        |             |        |             |         |             |         | 0.137949    | 0.5885 |
| LNTRACK_S2         |             |        |             |        |             |        |             |        |             |         |             |         | 0.081198    | 0.7062 |
| R-squared          | 0.62        | 553    | 0.618       | 926    | 0.631       | 795    | 0.615       | 534    | 0.614       | :197    | 0.601       | 294     | 0.602       | 123    |
| Adjusted R-squared | 0.610       | 0476   | 0.603(      | 306    | 0.616       | 993    | 0.600       | 078    | 0.598       | 1687    | 0.585       | 1266    | 0.586       | 128    |
| S.E. of regression | 0.477       | 2093   | 0.480       | 186    | 0.473       | 625    | 0.485       | 512    | 0.493       | 1038    | 0.496       | 3001    | 0.497       | 436    |
| F-statistic        | 41.55       | 5223   | 40.40(      | 297    | 42.68       | 255    | 39.82       | 251    | 39.60       | 089     | 37.51       | 434     | 37.64       | 431    |
| Prob(F-statistic)  | 00.00       | 000    | 0.00(       | 00     | 0.00        | 00     | 0.00        | 00     | 00.00       | 00      | 0.00        | 00      | 0.00        | 8      |

Table 9.5 Regression results for the gravity model (reduced sample)

The impacts of the individual components of the LPI are also tested. As mentioned above, due to potential multicollinearity, separate models are used for each of the LPI measures. Estimation results are presented in Table 9.5. Coefficients on other variables are qualitatively similar to the benchmark results reported when applying the overall LPI score.

Customs efficiency of the exporter has a significant impact on trade flows for the exporter, while it is only significant at 8 per cent for the importer. The results show that an improvement in customs efficiency of the exporting country by 1 per cent improves trade flows by 1.14 per cent, while improvement in customs efficiency of the importing country by 1 per cent improves trade flows by only 0.47 per cent. Improvement of infrastructure seems to have a greater impact for the exporting country by 1 per cent improves trade flows by 1.32 per cent, and improvement in infrastructure of the importing country by 1 per cent increases trade flows by 0.80 per cent.

Shipment efficiency matters only for importing country, where enhancement in shipment efficiency of the importing country by 1 per cent improves trade flows by 0.70 per cent, while it is insignificant for the exporting country. In contrast, logistics efficiency matters only for the exporting country, where improvement in logistics efficiency of the exporting country by 1 per cent increases trade flows by 0.91 per cent, while it is insignificant for the importing country. Finally, track and time efficiencies are insignificant for either the exporter or the importer. Clearly, various aspects of trade facilitation impact on trade differently. These impacts are strongly in line with previous findings in the original model but with different magnitudes, confirming the importance of trade facilitation measures for the exporting country.

Indeed, these estimation results suggest that trade facilitation measures in exporting countries play a somewhat stronger role in enhancing their exports than such measures play in importing countries. Even though the overall LPI score is significant for both exporting and importing countries, its magnitude is much smaller for the importer compared with the exporter.

Evidently, in both samples, the estimated coefficients are individually highly significant, for the p-values are so low (except for some LPI sub-measures). The F statistics are also very high, suggesting that, collectively, all variables are statistically important.

# 9.5 Conclusions

Estimation results discussed above propose that trade facilitation plays a positive but limited role in enhancing trade flows between Arab countries. Even though the overall LPI score is significant for both exporting and importing countries, its magnitude is relatively small compared with previous research findings regarding the same measures in other regions.

For the small sample with a more sophisticated data set, the estimation results suggest that trade facilitation measures in exporting countries play a somewhat stronger role in enhancing their exports than such measures play in importing countries. Even though the overall LPI score is significant for both exporting and importing countries, its magnitude is smaller for the importer than for the exporter.

Indeed, Arab countries should benefit from their geography and stimulate investment in infrastructure, in addition to encouraging public-private partnerships. Efforts should be made to encourage WTO member countries to fulfil the commitments they have entered into, and to encourage other non-members to do so. In fact, there is great potential for expansion of trade with other regions, such as Europe, Asia and Africa. Thus, developing transport and physical infrastructure are fundamental prerequisites to enhancing regional integration and trade cooperation. Additionally, improving intra-Arab trade requires addressing the various structural issues impeding trade development, such as removing the remaining tariff barriers and full implementation of the commitments under the Greater Arab Free Trade Area. Finally, it is vital to enhance productive capacities in the region and to develop the financial sector in order to boost investment in the Arab region and improve intra-Arab trade.

# **Endnotes**

- 1. http://lpi.worldbank.org/
- 2. The short list excludes Iraq, Libya and Morocco because their data are incomplete (see Table 9.1).
- 3. http://comtrade.un.org/
- 4. http://www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx
- 5. www.freemaptools.com/how-far-is-it-between.htm

**6.** It should be mentioned that the results need to be interpreted with some caveats as some countries in the region that are relatively more diversified are not included in the sample.

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