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Analysis of Iran's Export Market Potential Using Gravity Model: Evidence from Date Market

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ABSTRACT

This study aimed at annual analysis of Iranian date export, using the gravity model and cross-section data for each year from 1994 to 2013. The estimated results of gravity equation show the negative effects of geographical distance and landlocked location, and the positive effects on Iran's date export of re-export, political relations, social and commercial ties and access to high seas. The date export relative prices and per capita GDP of partners show that most of Iran's date has been exported at low prices and to countries with low per capita income. Moreover, the calculated date export potential indicates that, on average, Iran's export has been close to its full export potential in Central Asia, Africa, and the Middle East, while it has exploited only 76 percent of its export potential to European countries. More than half of the export potential to Germany, Italy, Denmark, and Sweden has remained unexploited. The lifting of trade sanctions, adherence to international hygienic standards, and investment in packaging industries are the most important suggestions to increase the share of Iran's date in the world market.

Keywords: Aagricultural exports, Cross-section data, Non-oil exports, Re-export**.**

INTRODUCTION

Considering that non-oil exports play a vital role in economic development of any country, it is important to recognize export potentials. One of Iran's export advantages lies in its agricultural products. In view of Iran's high rank in world date production and exports, it constitutes an important part of agricultural exports and estimating the date export potential would help identify target markets and take export decisions. Iran has always been at the top of the major date exporting countries (FAO). Value of Iranian date export increased from 62,358 thousand USD in 1994 to 74695 thousand USD in 2013 with an annual average growth rate of 9.97% which is more than the world average of 8.63% (Figure 1).

In 1994-2013 period, Iran accounted for 15% of production, 18% of harvested area, and 17% of the world's date export. The most important competitors of Iran in the world market of dates are Tunisia, Pakistan, Iraq, and the UAE. In 1994, more than 80% of Iran's date was exported to Turkey, Germany, Russia, England, Pakistan and the UAE, where it was packaged and re-exported to other markets. While the number of importing countries has increased from 73 to 81 during 2004 to 2013, this share was fallen from 61% to 43% of the total export. The maximum amount of Iran's export value during this period belongs to the UAE, Pakistan, Russia, and Turkey, accounting for over half of Iran's total date value (FAO).

This study utilizes a gravity model to examine the export potential and investigates whether there is any unexploited export potential between Iran and selected European, Asian, and African import partner countries.

The gravity model is one of the most

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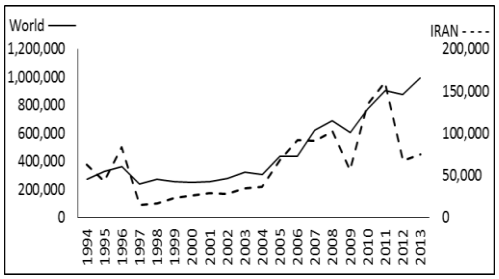

Source: FAO

Figure 1. Iran and world date export value (1,000 US$) over1994-2013.

successful approaches to explain bilateral trade relationships and estimate export potentials (Tho, 2013).

The model came to be used in the latter half of the 19th century to explain migration and other social flows in terms of the gravitational forces of human interaction (Eita and Jordaan, 2007). Tinbergen (1962), Poyhonen (1963), and Linneman (1966) were the pioneers of the gravity model who applied it to international trade literature for the first time in the early 1960s. Krugman (1991, 1996) proposed the gravity equation to study bilateral trade and market potential with a new economic-geography model based on microeconomics. Redding and Venables (2004) and Hanson (2005) were the first to apply empirically the implications of the Krugman-type economic geography model. Their studies provide measures of Market Access (MA), Supplier Access (SA), and market potential. Head and Mayer (2004) provided Real Market Potential (RMP) based on previous studies. Rahman (2010) predicted trade potential for Australia using the gravity models and cross-section data of 50 countries. The results show that Australia's bilateral trade was influenced positively by per capita GDP, openness, and common language, and negatively by the distance between the trading partners. Karagoz and Saray (2010) examined Turkey's trade potential with APEC (Asia-Pacific Economic Cooperation) countries, except Laos, Cambodia and Myanmar, for 2001 to 2006 with the help of the gravity model. The results indicate that Turkey's trade was positively affected by the economic size of partner countries while distance had a negative impact on trade. Kaur and Nanda (2010) estimated India's export potential with six SAARC (South Asian Association for Regional Cooperation) members with the gravity model for the years 1981–2005. India had not exploited all the export potentials in trading with these countries. Head and Mayer (2011) evaluated market potential by generalizing the theoretical and empirical finding of Redding and Venable (2004) for 180 countries over 1965–2003. They also showed that market potential was a powerful driver of increases in income per capita. Farazmand *et al*. (2013) investigated trade potential of agricultural products between Iran and selected Latin American countries: Argentina, Brazil, Chile, Uruguay, and Mexico. They used cross-sectional data of 1992-2010 and analyzed them with a gravity model and OLS method. The findings showed Iran's trade potential was positively affected by the size of the economies and population of its partner countries, while distance played a negative role on trade. Also, there was export potentials between Iran and Brazil, Chile, and Mexico. Nasiri and Haji Hasani (2013) estimated the trade potential of Iran and 167 countries in 2011. The trade potential and the gap between actual and potential trade was calculated using a gravity model and cross-sectional data. Their findings showed Iran had exceeded its export potential in trading with 94 countries and had not exploited trade potential with 67 countries in the world. Thanh Binh *et al*. (2013) analyzed bilateral trade activities among Vietnam and 60 countries with the gravity model for the years 2000–2010. The results revealed that economic size and market size of foreign partners, distance, and culture played an important role in Vietnam's trade flow while it had trade potentials especially with some new markets such as Africa and Western Asia. Mortazavi *et al*. (2014) estimated Iran's shrimp export potential to the EU with the gravity model over the years 1991–2011. According to their findings, Spain was over-

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exported by Iran and Germany had the lowest trade capacity utilization.

The aim of this study was to provide reliable information about export potential by calculating the annual value of the export potential of Iran with each trade partner country to previous local works that have provided same data for the whole studied period.

MATERIALS AND METHODS

Theoretical Framework

This study uses the gravity model and applies very closely the Head and Mayer (2011) theoretical method of estimating market potential. Using this method, the trends and fluctuations in Iran's export potential are taken into account and the years that Iran had export potential are individualized.

The index of market potential (Redding and Venables (2004), Head and Mayer (2004) and Hanson (2005) develop very similar terms with one notable difference that Φ^* is defined in terms of expenditure shares rather that total expenditures.) is $\Phi^*= \sum_j \frac{\varphi_{ij} s_j^X}{\Phi_j}$ (1)

Considering an exporter country *i* and an importer country *j*, φ_{ij} represents the ease of access to market *j* to exporters in *i* ($0 \leq \varphi_{ij} \leq 1$). s_j^X defines country *j*'s share of the world expenditure and Φ_j presents the degree of competition in the market of country *j*. In fact, market potential Φ^* is an expenditure-weighted average of relative access.

Since $s_j^X = \frac{X_j}{X}$, index of market potential can also be written as:

$\Phi_i^* = (1/X) \sum_j \varphi_{ij} (X_j /\Phi_j)$ (2)

Taking the Log of the bilateral trade Equation (2) yields:

$\text{Ln}X_{ij} = \text{Ln}A_i + \text{Ln}\varphi_{ij} + \text{Ln} (X_j /\Phi_j)$ (3)

Redding and Venables (2004) discovered that the last two terms in this equation were precisely what we need to calculate to estimate market potential. The φ is estimated by the trade cost vector and the Ln (X_j /Φ_j) is estimated as fixed effects for each of the importing countries denoted as FE_j. Therefore, the Real Market Potential (RMP) can be constructed as

$RMP_i = \text{X}\ \widehat{\Phi_i^*} = \sum_j \widehat{\varphi_{ij}} \exp (\widehat{FE_j})$ (4)

RMP is a weighted sum of importer fixed effects estimated in a bilateral trade equation.

Empirical Gravity Model and Data

The data are annual in nature for Iran and her 32 importing partners for the period 1994 to 2013. These countries were chosen for being located in the Central Asia, Europe, Africa, and the Middle East and their importance as Iran's importing partners. The *i* index is used for Iran; and the countries selected as Iran's date importing countries are denoted by *j* and include Afghanistan, Armenia, Austria, Azerbaijan, Bahrain, Belgium, Bulgaria, Switzerland, Germany, Denmark, France, England, Hungary, India, Iraq, Italy, Kazakhstan, Kyrgyzstan, Lebanon, Netherland, Norway, Pakistan, Poland, Romania, Russia, South Africa, Sweden, Tajikistan, Turkey, Ukraine, the United Arab Emirates, and Uzbekistan.

Exports from Iran to 32 selected importing partner countries are regressed each year on GDP per capita, relative export prices, geographical distances, and a set of dummies, so the gravity model of Equation (3) becomes:

$\text{Ln}\ (X_i) = \text{c} + \lambda_j\ ptn_j + \delta_1 \text{Ln}\ (dist_{ij}\ ) + \delta_2 \text{Ln}\ (gdpc_j\ ) + \delta_3 \text{Ln}\ (\frac{p_i}{p_j}) + u_{ij}$ (5)

Where, X_i is a dependent variable and denotes the value of different variety of date exports from Iran to importing partner countries, $dist_{ij}$ is distance between Iran and importing partner countries, $gdpc_j$ is the real GDP per capita of the importing partner countries (at constant 2010 US $), (

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$\frac{p_i}{p_j}$) is the average of Iran's date export relative prices to competing exporting countries for different varieties, ptn_j is the characteristics of the importing countries that are not directly visible and are captured with dummies; and u_{ij} is the expression of random error.

Geographical distance between the trading countries reflects transportation costs and has a negative impact on trade flow (Orindi, 2008). The GDPs of importing countries represent the economic sizes of the countries and their potential demand for imports (Bergstrand, 1989).

The price variable in the Gravity equation was used for the first time by Bergstrand as a variable that has a significant effect on the trade flow (Bergstrand, 1985 and 1989). Also, using the relative export prices instead of export prices reduces the collinearity of the variables (Gholami Jafarabadi and Fotros, 2016). Dummy variables can have either a facilitating or restricting influence on the trade flow between countries, so, they determine the trade costs (Armstrong, 2012). Components of ptn_j include Iran's date re-exporting countries; political and commercial ties between Iran and importing countries, and land-locked countries, denoted by Rex, Max, and Lnd, respectively. The impact of political events on Iran's trade cannot be ignored because of the major role of Iran in the geopolitics of the Middle East and also political tensions between Iran and EU such as the sanctions Europe imposed against Iran in 2007-2008. Commercial ties represent Regional Trade Agreement (RTA) and Free Trade Area (FTA) between Iran and importing countries for reducing trade barriers thereby increasing the export share (Khaksar Astaneh *et al.*, 2014).

All variables are annual, except the dummy variables, and are expressed in natural logarithms. Gravity models using geographical variables do not consider the different qualities for each date variety and suppose that all date is homogenous.

Iran's date exporting annual dollar value data was obtained from the Islamic Republic of Iran's Customs Administration website, Gregorian calendar equivalent is considered. The per capita GDP of the importing countries comes from the World Development Indicators (WDIs) database of the World Bank, and the relative export prices from the FAO. Dummy variables' value will be equal to 1 if they promote Iran's export, and 0 otherwise. If growth value of Iran's exports with each importing country is positive in any year, the value of political and commercial ties dummy will be determined 1 for that year. Land-lock and distance between capitals are obtained from the CEPII (Centre d'Études Prospectives et d'Informations Internationales (French Research Center in International Economics)); and re-exporter countries are determined by analyzing the production, import and export data of countries obtained from the FAO.

RESULTS AND DISCUSSION

In the first stage, Equation (5) is estimated for each year from 1994 to 2013 using the Ordinary Least Squares (OLS) method with cross-section data of 32 countries. Table 1 presents the OLS regression results of Equation (5) in 2013.

The significant coefficient for distance is -0.71. It indicates that 1 percent increase in geographical distance of importing countries will decrease 0.71 percent of Iran's date export value.

The negative sign of GDP coefficient implies that as the importing partners become richer, they tend to buy more processed dates from Iran's competitors (like Tunisia). (FAO, 1994-2013). Therefore, it can be concluded that Tunisia exports dates after adding value: 70 percent of its date export is processed (Mbaga *et al*., 2012). Moreover, since imported dates are processed in high-income importing countries [60% of the imported dates in European countries are processed (Ghane, 2011)], Iran's export dates at low prices are

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Table 1. OLS Regression results of Export Equation (2013).

Variables	Coefficient	Prob.
C	23.282	0.000 **
Ldis	-0.712	0.102 *
Lgdp	-0.690	0.001 **
Lp	-0.257	0.460
Max	1.481	0.018 *
Rex	1.744	0.002 **
Lnd	1.231	0.030 *
R – squared	0.74	

[a]Source: Research finding. **/* Denote statistical significance at the 1 and 5% levels respectively.

considered inferior compared to Tunisian dates.

The coefficient of relative export price is expected to be negative because if a country's export price is higher than that of its competitor the demand for its import will decrease (Bahmani–Oskoee and Goswawi, 2004). But, considering that the coefficient of relative export prices is statistically insignificant over time, it cannot be considered as an explanatory variable for Iran's date exports since almost 90% of Iran's date export is at low wholesale prices without packaging.

The coefficients of the re-exporting countries and political and commercial ties dummies imply that Iran's date exports to re-exporting countries and the countries with which Iran has political and commercial ties is, respectively, 1.7 and 1.4 times higher compared to the rest of the importing countries. Moreover, the estimated coefficient of land-lock is 1.23, which means that exports to countries having open access to sea is more than land-locked countries.

The average coefficients for distance, re-exporting countries, political and commercial ties, and land-lock are statistically -0.46, 1.95, 2.18, and 0.76, respectively, during the period 1994-2013. The coefficient of re-export has been decreasing over the recent years due to packaging, since Iran's packaging industry is still not considered competitive enough. The most positive impact of variables on Iranian exports is because of the improvement of Iran's political and trade relations with importing countries.

Estimating Iran's Date Export Potential

In the second stage of annual evaluation of Iran's date exports potential, the coefficients obtained from the estimated gravity Equation (5) are substituted in the index of market potential (4) of each year's sample. Next, the success in exporting to the 32 countries under study was analyzed by comparing the actual export values with the potential export values.

Figure 2 shows the trend of Iran's annual date export potential to 32 countries and its comparison to the actual export.

The result of export potentials in Figure 2 are categorized into two groups: the first group is characterized by an over-export situation and the second reflects the potential to develop export. As shown in Figure 2, Iran's export value to the UAE, Armenia, France, Lebanon, and Russia was more than its export potential value in most of the years. Besides, Iran exceeded its export potential in trading with Norway, India, the Netherlands, Poland and Tajikistan in the second half of the period. Actual export and export potentials are almost equal in Bulgaria, Hungary, and Romania over the sample period, indicating that Iran's exports were close to its potential. The UAE, the main re-exporter of Iran's date, Russia, with large population showing a preference for Iranian date, and having economic and social ties with Lebanon, India and Tajikistan, were behind Iran's success in date export. But, in other countries, there has been over-exporting by Iran, perhaps for two reasons. Analysis of trend of consumption and imports of importing countries and the performance of Iranian date exports competitor countries show that there is no scope for Iran to export more. First, for countries like France, in the French market because of differences in the

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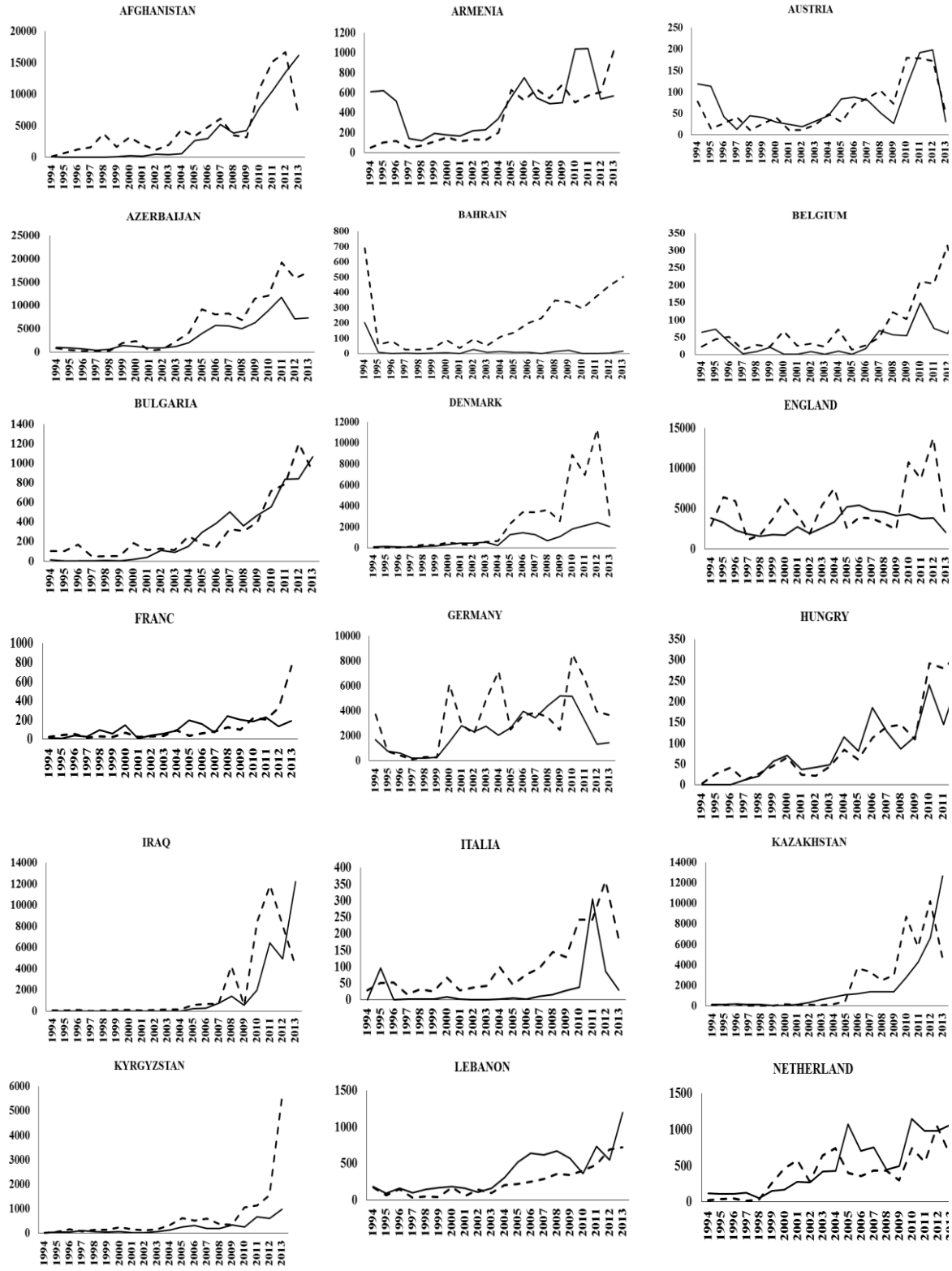

Figure 2. Iran's actual and potential date export (1,000 US$) 1994–2013.

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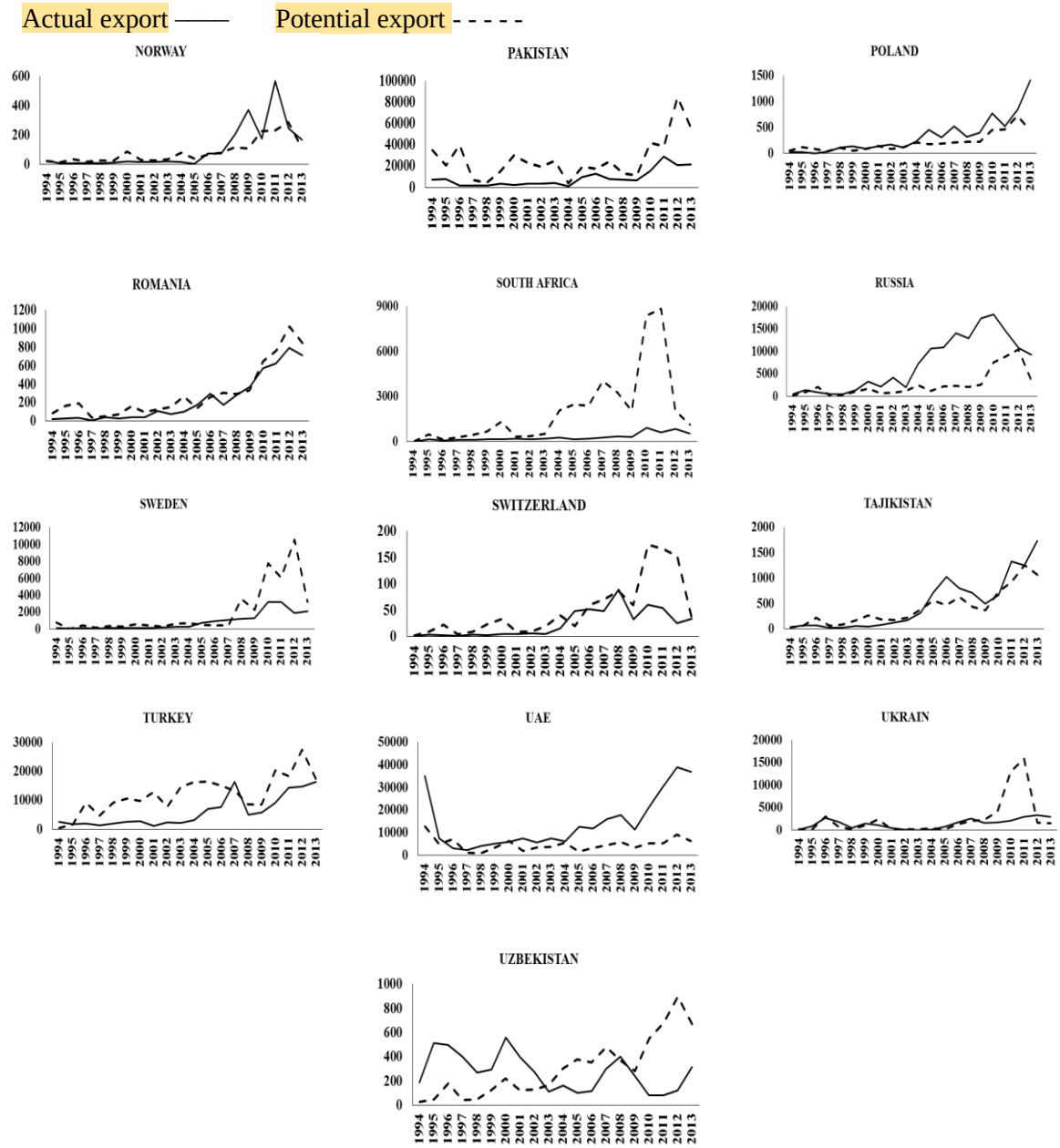

Source: Research finding.

Continued of Figure 2. Iran's actual and potential date export (1,000 US$) 1994–2013.

quality of dates. Second, countries like Armenia, Hungary, Norway, Netherlands, and Poland have a low demand for date because of their food habits and small population size.

The second group includes countries with which Iran has an export potential. As shown in Figure 2, Iran's export potentials are underutilized in Afghanistan, Bahrain, Belgium, Italy, Kyrgyzstan, Pakistan, South Africa, and Turkey in most of the years. Pakistan, as a re-exporter of Iran's date, and consumer of 10.5% of global date (FAO), still has unused export potential. The unexploited export potential of Iran's export

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of date to Turkey, Italy, and Belgium as re-exporter countries to other European regions can be due to the fact that Iran has just covered 25, 1.4, and 1% of date import in these countries and the remaining is supplied by competing countries such as Tunisia, the UAE, and France (FAO). Kyrgyzstan's low potential export market can be explained by factors such as geographical closeness and its market monopoly by Iran. Since actual export of Afghanistan, Bahrain, and South Africa is low, there is large unused export potential. Moreover, according to Figure 2, export potentials for Azerbaijan, Denmark, Switzerland, and Uzbekistan have increased since 2004 and for Iraq, Kazakhstan, Sweden, and Ukraine since 2007.

In the case of England, Germany, and Austria, there are underutilized export potentials, but Iran does not follow a specific pattern because of instability in political ties with them.

Estimating Total Export Potential

According to Table 2, countries are divided by regions into two groups: 'Europe' and 'Central Asia, Africa, and Middle-East'. This grouping is used in order to analyze Iran's date export potential and to account the percent of unused capacity of Iran's date export. Results of Iran's date export potential have covered the period 1994–2013. The ratio of Actual export (A) and export Potential (P) is obtained by the model. Then, (A/P) is calculated to analyze Iran's export potential. Iran has export potential with countries whose values of (A/P) are less than one (Rahman, 2009). The value of [1- (A/P)] is the unused export potential.

Table 2 reports the average values of the (A/P) for Europe (0.76) compared to Central Asia, Africa and Middle East (0.98). It indicates that Iran has exploited 76% of its export potential in Europe; and Iran's exports have been close to their potential in Central Asia, Africa, and Middle East.

Over 1994–2013, Iran had the highest export potential with Germany, Iraq, and Bahrain. Iran can potentially attain fourteen times more trade with Germany and Iraq, twelve times more trade with Bahrain, seven times more trade with South Africa, three times more trade with Italy, Pakistan, and Kyrgyzstan, and two times more trade with Denmark, Sweden, Switzerland, and Turkey.

Among the European importing partners, Iran has a potential for export expansion in Belgium, Denmark, Germany, Italy, Romania, Sweden, Switzerland, Ukraine and UK, and especially in Germany, Italy, Denmark, and Sweden with more than half the export potential remaining unused. On the other hand, Austria, Bulgaria, France, Hungary, the Netherlands, Norway and Poland are with 100% or more of shares of actual export from the total export potential of Iran's date.

Among the Central Asia, Africa, and Middle Eastern importing partners, trade potential exists in Azerbaijan, Bahrain, Iraq, Kazakhstan, Kyrgyzstan, Pakistan, Turkey, South Africa and Uzbekistan. However, Iran trades more than its potential with Armenia, India, Lebanon, Pakistan and the UAE. Considering that the maximum of the total actual export goes to the UAE, Russia, and India, Iran has been successful in its export to them.

CONCLUSIONS

The main objective of this study was to estimate Iran's date export potential using the gravity model with data pertaining to 1994 to 2013. The results show negative effects of geographical distance, landlocked location, and GDP of partners and positive effects of re-exporting, political and commercial ties on Iran's date export. The relative date export prices do not affect Iran's date export. Therefore, most of Iran's export has been at low prices and concentrated in low per capita income countries.

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Based on the results, Iran's date export potential was found to be more in Europe than Central Asia, Africa, and the Middle East. More than half of the export potential to Germany, Italy, Denmark, and Sweden as re-exporter countries in the European region has been unexploited. For Central Asia, Africa, and the Middle East as a whole, Iran's exports was close to their export potential, although estimates showed there was still high potential in the neighbouring countries such as Azerbaijan, Bahrain, Iraq, Pakistan, South Africa, and Turkey. Therefore, long geographical distance, as a negative factor, increased export price.

In addition, in the absence of any bilateral agreement between the EU and Iran, and because of restrictions in European countries on Iran's export because of inadequate sanitary and phyto-sanitary measures, the imposition of sanctions, and the fact that most of Iran's export is unpackaged, the European re-exporter countries are considered suitable markets for Iran. However, this is not an opportunity for Iran, since the main profit goes to the re-exporting countries.

Therefore, Iran should focus on markets of the neighbouring countries that have high export potential by decreasing tariff barriers, introducing trade representatives, and having bilateral trade agreements. Iran can also promote its share in European markets by investing in transformational and complementary industries such as packaging, observance of international sanitary standards, expanding exporters' knowledge of marketing and advertising, and registering international brands.

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بررسی پتانسیل صادراتی ایران، مدل جاذبه: مطالعه موردی خرما

پ. صادقی، س. ص. حسینی، و ر. مقدسی

چکیده

هدف از این مطالعه بررسی صادرات خرمای ایران با استفاده از مدل جاذبه و داده های مقطعی برای دوره ۱۹۹۴ الی ۲۰۱۳ است. نتایج تخمین سالانه معادله جاذبه، اثرات منفی فاصله و اثرات مثبت صادرات مجدد، روابط سیاسی، اجتماعی و تجاری، و دسترسی به آب های آزاد را بر صادرات خرمای ایران نشان می دهد .قیمت های نسبی صادراتی و تولید ناخالص داخلی سرانه شرکای تجاری ایران نشان می دهد که تمرکز صادرات خرمای ایران بر کشورهای کم درآمد و با قیمت های پایین بوده است. همچنین نتایج برآورد پتانسیل صادراتی خرمای ایران نشان می دهد که صادرات کنونی ایران به

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کشورهای آسیای مرکزی، آفریقا و خاورمیانه به طور متوسط بیش از پتانسیل صادراتی است، در حالیکه از پتانسیل صادراتی ایران به اروپا در حدود ۷۶ درصد بهره برداری شده است و بیش از نیمی از پتانسیل صادراتی ایران به آلمان، ایتالیا، دانمارک و سوئد مورد استفاده واقع نشده است. برداشتن موانع تجاری، رعایت استانداردهای بین المللی بهداشتی و سرمایه گذاری در صنعت بسته بندی از جمله مهمترین پیشنهادات برای افزایش سهم خرمای ایران از بازار جهانی می باشد.

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