Asian Economic and Financial Review
ISSN(e): 2222-6737
ISSN(p): 2305-2147
DOI: 10.18488/journal.aefr.2020.1010.1077.1087
Vol. 10, No. 10, 1077-1087.

URL: www.aessweb.com

THE IMPACT OF THE GEOGRAPHICAL DIVERSIFICATION OF SAUDI EXPORTS: AN INTENSIVE AND EXTENSIVE MARGIN APPROACH

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Article History
Received: 24 July 2020
Revised: 27 August 2020
Accepted: 30 September 2020
Published: 12 October 2020

Keywords
Oil-abundant countries
Geographical diversification
Intensive margin
Extensive margin
Gravity model
PPML estimator.

JEL Classification :
F13; F12; C13.

ABSTRACT

This paper investigates the impact of the diversification of Saudi exports on countries and sectors' performance using the geographical extensive margin approach. This concept suggests that the diversification strategy is based on two aspects—a country exporting old products to new markets and new products to new markets. A multiplicative gravity model that includes traditional control variables, such as economic size and geographical distance between trade partners, was used to estimate the determinants of Saudi exports. This model was augmented by a concentration index as an additional barrier to trade. This estimation used the Poisson Pseudo Maximum Likelihood (PPML) method in order to cover Saudi partners during the period 1999–2018. This technique deals with data such as the zero observed dependent variable, and it provides consistent and robust estimations. The study's analysis found that the Old Product New Destination strategy led to an increase in export value as a result of the emergence of new market demand in China and India. On the other hand, the New Product New Destination strategy is limited and doesn't contribute to the diversification of Saudi exports.

Contribution/Originality: Export diversification is a new field of research in Saudi Arabia. In fact, it was the lack of studies in this area that led to this paper tackling the effects of export diversification on performance through the geographical extensive margin approach. For this purpose, an extended nonlinear gravity model was estimated using the PPML estimator, which leads to a consistent and robust estimation and is original and suitable for data with zero observed dependent variables.

1. INTRODUCTION

Since the creation of the Kingdom of Saudi Arabia (KSA), on September 23, 1932, the economy has been strongly dependent on oil production. In 2018, the KSA produced more than 12.8 million barrels per day and exported 6.25 million barrels, which represented 16% of the total crude oil exports in the world. The value of their oil exports was 294 billion dollars, which constituted 79% of KSA's total exports and 30% of its gross domestic product (GDP). The excessive prominence of oil revenues exposed the country to high volatility in terms of commodity prices and demand shocks. To minimize the dependence of the economy on a single commodity and to achieve a greater contribution of non-oil sectors to KSA's GDP, Saudi authorities focused their export policies on two methods. First, they diversified oil partners by responding to the increase in international demand, especially from China and India. In fact, consumption in China and India has increased from 2.3 and 1.1 in 1990 to 14 and 4.5

million barrels per day in 2018[1], respectively. Second, they developed and promoted the competiveness of non-oil exports through specialized programs[2] and integration into several bilateral and multilateral trade agreements. For instance, Saudi Arabia has been a member of the World Trade Organization (WTO) since 2005 and the Greater Arab Free Trade Area, which grants it privileged access to 17 countries in the MENA region.

In this context, Saudi exports require a new framework of analysis that considers geographical factors and new markets when diversifying in order to attenuate demand shocks and boost the country's productivity. According to Amurgo-Pacheco and Pierola (2008), geographic diversification takes place when a country exports old products to new markets or new products to new markets. Several empirical studies have analyzed the margin of new markets in the exports of developing countries. Evenett and Venables (2002) note that the exporting of old goods to new markets represented around one third of export growth in developing countries between the period 1970–1997. Amurgo-Pacheco and Pierola (2008) used highly disaggregated trade data to investigate geographical and product diversification patterns across a group of developing nations between 1990 and 2005, which showed that geographical diversification is more important than product diversification. In 2018, an International Monetary Fund (IMF) study on the Gulf Cooperation Council (GCC) countries find that non-hydrocarbon exports in the region have increased, with shifts from raw materials to intermediate goods; however, the value-added and diversification of non-oil exports remain relatively low.

Few papers have attempted to empirically examine the link between export value and geographical diversification in abundant resource-developing countries. Costa and Romeu (2011) analyzed the role of export diversification in determining trade outcomes in Latin America during the global financial crisis of 2007/2008. Applying an extended gravity trade model, the diversity of both export sectors and products within sectors had a positive effect on export performance. However, diversifying exports across many different trade partners did not significantly affect trade outcomes.

In the same way, Rahmouni (2018) suggested that, for African countries that are predominantly producing and exporting energy and agriculture commodities, it appeared that the higher the degree of export concentration by destination, the greater the negative impact on exports. However, during the global and financial crisis, this concentration ensured steady export revenues because of the nature of products exported by the continent.

Studies about diversification in Saudi Arabian exports are scarce. A pioneering paper was written by Altowaim (2019), who assessed industrial and export structures in KSA and discussed possible diversification opportunities for Saudi Arabia; however, he didn't explore the effects of diversification on the performance of exports.

This paper is an attempt to continue and extend the efforts of Altowaim (2019) by analyzing the achievement of Saudi exports between 1999 and 2018 and exploring the effect of geographical diversification on the value of exports using a panel of Saudi partners. An extended gravity model estimates exports determinants using the PPML model, proposed by Silva and Tenreyro (2006); Silva and Tenreyro, (2011). This article is structured as follows: The next section presents a literature review of export diversification; Section Three describes certain stylized facts about Saudi exports and their degree of diversification; Section Four presents the empirical approach used with a gravity model; Section Five discusses the empirical results of the study; and Section Six concludes the paper.

[1] Source: U.S. Energy Information Administration. www. https://www.eia.gov

[2] Programs commenced by the foundation of The Saudi Fund of Development (SFD) in 1974 and the most important programs were launched in 1999 following the establishment of The Saudi Export Program (SEP).

2. LITERATURE REVIEW OF EXPORT DIVERSIFICATION

Prebisch (1959) and Singer (1950) were pioneers in terms of emphasizing the importance of export diversification and its effect on the growth of developing countries. They considered the fact that exports are concentrated on only a few products — particularly commodities with a highly volatile international demand. Thus, developing countries have to diversify their export composition in a similar way to the "the portfolio theory", in order to achieve more stable income inflows.

The 'old' trade theory, based on Armington's (1969) model of nationally differentiated goods, assumes that products are differentiated by their country of origin, and each country produces a fixed variety of goods. Thereby, the theory points out the intensive margins of trade, as a product's export value depends on the size of the exporting economy, but the variety of the goods exported will not be large.

The 'new' trade theory uses the monopolistic competition models presented by Krugman (1980; 1981) and Helpman and Krugman (1985), and extended by Melitz (2003), to analyze the international trade benefits of product diversification on both a consumption and production level. Thus, this theory emphasizes the extensive margin, which states that the range of goods being produced and exported depends on the exporting economy size.

An increased availability of data made it feasible to apply new approaches. Thus, by using more disaggregated data, Amurgo-Pacheco (2006) and Baldwin and Di Nino (2006) suggested investigating a geographic dimension omitted by the traditional classification that focused on products. They noted that the degree of diversification depends on destination-specific factors, such as trade costs, and the market size of the destination, so they revisited intensive and extensive analyses and incorporated the geographic dimension of diversification. The intensive margin refers to exporting "Old Products"[3] to "Old Destinations" (OPOD), and the extensive margin includes exporting "Old Products" to "New Destinations" (OPND), "New Products" to "New Destinations" (NPND), and "New Products" to "Old Destinations" (NPOD). Thus, the geographical extensive margin is the sum of OPND and NPND, and the product extensive margin is the sum of NPOD and NPND.

Several studies have focused on the determinants of export diversification in intensive and extensive margin dimensions (Anderson & Van Wincoop, 2003; Baldwin & Harrigan, 2007; Hummels & Klenow, 2005) without exploring geographical dimensions. Shepherd (2010) filled this void by exploring important determinants of geographical diversification in developing countries, such as export costs, tariffs, and international transport costs. Shepherd referred to several empirical studies that focused on the importance of geographical export diversification as an integration mechanism for developing countries in the world trading system (Amurgo-Pacheco & Pierola, 2008; Brenton & Newfarmer, 2007; Evenett & Venables, 2002).

3. SAUDI EXPORTS: STYLIZED FACTS

This section presents stylized facts about Saudi exports and their diversification of countries and products. According to the "Statistical Review of World Energy 2019", developed by the British Petroleum Company in 2018, the KSA owns more than 17% of global oil stocks. Moreover, it was the world's second biggest oil producer and one of the biggest oil exporters in the world, accounting for around 13% of the total global supply of oil.

This situation means that the Saudi economy and exports are strongly dependent on oil exports and prices.[4] Figure 1 shows the high positive correlation between exports revenues and oil prices. In fact, when the oil price increases, exports also increase, and when the oil price decreases, Saudi exports decrease as well.

[3] Amurgo-Pacheco and Pierola (2008) considered old products, which are all products that were exported at least three years before a breaking point year, whether consecutively or not. New products are defined as products that were exported at least five times after the same breaking point year.

[4] This paper uses the nominal oil price of the OPEC.

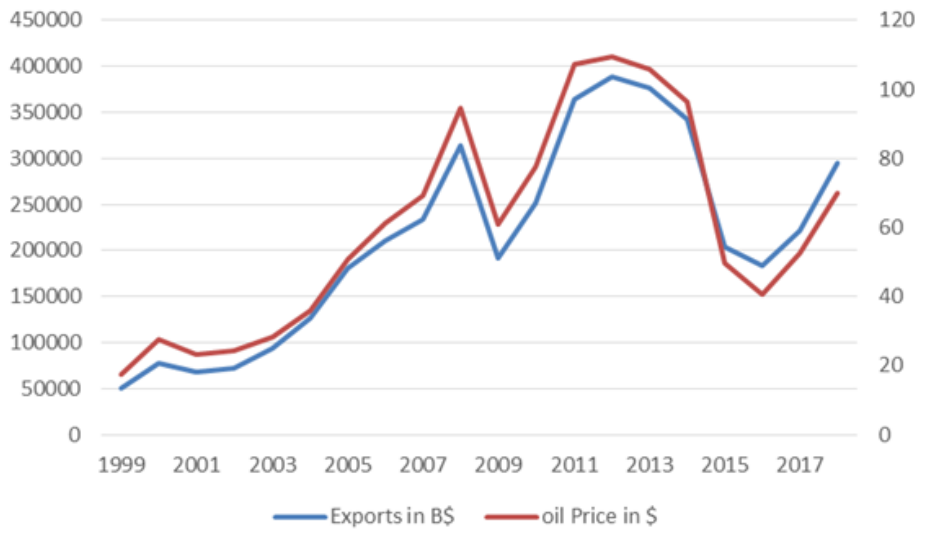

Figure 1. The evolution of Saudi exports and oil prices

These results can be explained by the significant percentage of the mineral sector in aggregate exports. Table 1 represents the sectors[5] within Saudi's exports, and mineral represents more than three quarters of Saudi's total export value. The chemical and plastic sectors do not even exceed 8%. Other sectors, such as foodstuffs, base metals and electrical machines, are all below 2%. These results show the weakness of the product extensive margin dimension and the concentration of Saudi exports on "Old Products". Thus, the analysis of flows must focus on two aspects: The intensive margin (OPOD) and the geographical extensive margin (OPND).

Table 1. The composition of Saudi exports

Year	Mineral	Foodstuffs	Chemical	Plastic	Base Metals	Electrical Machines	Other Exports	Re-exports
2004	87.98%	1.95%	1.31%	0.45%	0.95%	2.64%	3.95%	0.77%
2008	89.78%	1.83%	0.87%	0.54%	0.89%	2.27%	3.07%	0.76%
2012	86.94%	1.90%	0.80%	0.29%	0.63%	3.97%	4.58%	0.88%
2016	74.40%	4.33%	1.65%	0.49%	1.90%	8.07%	7.18%	1.97%
2018	78.97%	2.87%	1.02%	0.36%	1.77%	7.09%	6.74%	1.17%

Table 2 presents the evolution of the distribution of the top 20 importers from the KSA over the last 20 years. This list of partners can be divided into old partners and new partners; the old partners includes developed countries, such as the USA, certain Asian countries (Japan, South Korea and Singapore), and countries within the European Union, and the new partners includes China, India and the GCC. In 1999, the main partners were the USA (16.42%) and Asian countries, particularly Japan, South Korea, and Singapore (26.5%). The aggregate share of European countries was 16%; however, exports to India, China, and the GCC did not exceed 5%. During the period 1999–2018, the USA's share has decreased to 8.7% because of an increase in American mineral production of shale gas. However, the dependence of Japan, South Korea, Singapore and European countries on Saudi oil has remained similar; the shares of these countries in 2018 was 24% and 14%, respectively. The share of GCC countries increased to 12% as a result of new product exports (foodstuffs, chemical or plastic commodities); however, this progression has been blocked by the Qatari crisis. Nevertheless, exports to India and China have grown exponentially to 24% due the strong economic growth in these countries.

[5]Mineral sector= Crude Oil + Refined Products, Petrochemicals= Chemical + Plastic, Foodstuffs = Agriculture, animal and food products, Base Metals = Base Metals and articles of Base Metals and Electrical Machines = Electrical Machines + Equipment of Tools.

Table 2. The evolution of the distribution of the top 20 importers from the KSA

Country	1999		2009		2018
USA	16.42%	Japan	15.13%	China	13.33%
Japan	12.58%	USA	11.88%	Japan	11.24%
S. Korea	9.02%	China	11.17%	India	8.97%
Singapore	4.90%	S. Korea	9.48%	S. Korea	8.87%
India	3.61%	India	7.35%	USA	8.69%
Holland	3.46%	UAE	4.43%	UAE	5.64%
France	3.30%	Singapore	4.36%	Singapore	3.96%
Bahrein	2.45%	Bahrein	3.41%	Holland	3.23%
UAE	2.08%	Thailand	1.93%	Belgium	2.66%
Italy	1.95%	Holland	1.87%	Bahrein	2.51%
Spain	1.50%	Spain	1.70%	Thailand	1.99%
Indonesia	1.46%	France	1.60%	Egypt	1.77%
Philippines	1.25%	Jordan	1.54%	France	1.76%
Pakistan	1.13%	Indonesia	1.54%	Italy	1.75%
China	1.04%	S. Africa	1.41%	Spain	1.70%
Greece	1.02%	Italy	1.34%	S. Africa	1.59%
Brazil	0.98%	Pakistan	1.32%	Indonesia	1.18%
Thailand	0.93%	Belgium	1.22%	Turkey	1.16%
Turkey	0.86%	Egypt	1.16%	Pakistan	1.12%
Germany	0.83%	Qatar	1.00%	Jordan	1.09%

In conclusion, the share of the intensive margin dimension on Saudi exports fell as a result of the reduction in American imports from the KSA. However, the OPND of the geographical extensive margin aspect realized a significant increase as a result of Chinese and Indian demand. The other component of the geographical extensive dimension NPND, represented by exports to GCC countries, remains very weak and doesn't contribute towards significant export diversification.

4. GRAVITY MODEL

Introduced by Tinbergen (1962), a basic gravity model has been used to explain international trade movements. Following the model, trade flows between countries are positively correlated to economic size, represented by the GDP of each country, and negatively correlated to trade costs, which are measured by geographical distance.

Based on microeconomic foundations, Anderson (1979) provided a theoretical basis for the gravity model. This structural pattern relies on the differentiation of goods by country of origin and consumer preference with the constant elasticity of substitution (CES). In other words, a national income is the total value of local and foreign demand for the unique good produced by each country. Trade costs are considered as "iceberg" costs that are linearly and negatively correlated to distance. Then, Bergstrand (1985; 1989) added a monopolistic competition concept developed by Krugman (1980) to the model, in which similar countries trade differentiated goods because consumers have a preference for variety. Thus, goods are differentiated by firm instead of country. The contributions of Deardorff (1998), Eaton and Kortum (2002), and Evenett and Keller (2002) have demonstrated that the gravity model can emerge from theoretical models of international trade, such as the Ricardo or Heckscher-Ohlin specification.

Thus, in its general formulation, the model proposes that the total exports of an economy are equal to the sum of the volume of exports of each firm in this economy. Thus, the gravity Equation 1 has the following multiplicative form:

$$X_{ij} = G\, S_i\, M_j\, \emptyset_{ij}\, e_{ij} \quad (1)$$

Where X_{ij} is the value of exports from *i* to *j*; G is a variable that does not depend on *i* or *j* (such the level of liberalization); S_i includes exporter-specific factors that represent the aggregate amount exporters are willing to provide, such as the exporter's GDP; M_j denotes importer-specific factors that determine the total demand of the importing country, such as the importer's GDP; and $\emptyset_{ij}$ represents the ease of exporter *i* to access market *j*, i.e. the inverse of bilateral trade costs. *The disturbance* e_{ij} is independent and its expectation E (e_{ij}) = 1.

The contribution of Anderson and Van Wincoop (2003) highlighted the importance of controlling the relative trade costs in the gravity model. They suggested that bilateral trade depends on relative trade costs, or multilateral trade-resistance terms (MRT). These MRT are divided into three components: Bilateral trade barriers between country i and country j, i's resistance to trade with all countries, and j's resistance to trade with all countries.

Thus, the model proposed by Anderson and Van Wincoop, in the context of a world of N countries and a variety of goods differentiated by the country of origin, takes the following form:

$$X_{ij} = \frac{Y_i Y_j}{Y} \left(\frac{t_{ij}}{\pi_i P_j}\right)^{1-\sigma} e_{ij} \qquad (2)$$

Where Y is world GDP; Y_i and Y_j are the GDP of countries *i* and *j*, respectively; t_{ij} denotes the trade cost for country *j* to import product *i*; σ >1 is the elasticity of substitution; and π_i and P_j represent the exporter and importer ease of market access or the MRT for country *i*'s exports and country *j*'s imports. MRTs or obstacles to trade can be determined by physical factors, such as the distance from large markets, and policy factors, such as high tariff barriers or other trade costs.

5. ESTIMATION METHODS AND RESULTS

5.1. Estimation Methods

The traditional procedure to estimate a gravity equation is to use the natural logarithms of all variables on both sides of equation. This log-linear Equation 3 can be estimated using an ordinary least squares (OLS) regression, as follows:

$$lnX_{ij} = lnG + \ln S_i + lnM_i + ln\emptyset_{ij} + \varepsilon_{ij}\,. \qquad (3)$$

With the Anderson and van Wincoop specification, the model can be written as:

$$lnX_{ij} = a_0 + a_1\, lnY_i + a_2\, lnY_j + a_3\, lnt_{ij} + a_4\, ln\pi_i + a_5\, lnP_j + \varepsilon_{ij} \qquad (4)$$

Where a_0 is a constant, $a_3 = 1 - \sigma$, and ε is the error term.

This specification allows for an easy interpretation of the estimated parameters. For example, they could indicate the elasticities of trade to the GDP of country *i* or *j*.

In empirical studies, trade costs $\emptyset_{ij}$ are typically estimated using bilateral distances. Nevertheless, other variables are usually included using dummies that capture trade costs such as common borders or landlocked countries. In addition to these conventional variables, Costa and Romeu (2011) incorporated concentration

measures as a proxy for trade costs. In fact, product diversity increases a country's productivity (Feenstra & Kee, 2008) and trade diversification across multiple countries can attenuate export demand shocks.

In practice, there are several ways to measure export diversification, such as concentration indexes, counts of exported products or indexes that take into account the productivity content of exports (Hausmann & Klinger, 2006). In this study, the Herfindal concentration index will be used. Moreover, the quality of human capital in exporter countries can be an important driver of service exports. The Penn World Table proposed a proxy of this variable using an index of human capital per person, which was constructed based on the extent of the population's schooling (Barro & Lee, 2013) and returns to education (Psacharopoulos, 1994). Finally, the widely used method to estimate MTRs is a country fixed effects for exporters and importers (Baldwin & Taglioni, 2006; Rose & Van Wincoop, 2001).

ε_{ij} is likely heteroskedastic and its expected value depends on at least one of the explanatory variables making the OLS estimator biased and inconsistent. The solution involves adopting another estimation methodology, such as Poisson and Hekman's methodology. However, it is more appropriate to apply the PPML estimator, as it provides a consistent estimation of the nonlinear gravity model, even in the presence of importer and exporter effects (Silva & Tenreyro, 2006). Furthermore, the PPML estimator can include a zero observed trade value because using the OLS estimator produces a biased sample selection when such observations are dropped because the logarithm of zero is not defined. Hence, the PPML gravity model is expressed as:

$$X_{ij} = \exp\left(a_0 + a_1\, lnY_i + a_2\, lnY_j + a_3\, lnt_{ij} + a_4\, ln\pi_i + a_5\, lnP_j\right) e_{ij} \qquad (5)$$

In this form, X_{ij} probably follows a Poisson rather than a lognormal distribution, and the model's parameters can be estimated using a conditional maximum likelihood under the Poisson model (Silva & Tenreyro, 2006). This paper uses the PPML version developed by Silva and Tenreyro (2011), which provides estimators' standard errors to general forms of serial correlation and heteroscedasticity that are clustered by importer countries.

5.2. Estimation Model

The gravity model estimated the determinants of Saudi exports during the period of 1999–2018. The data was composed using a panel of 44 countries. Sources of the data are explained in Table 3 and the descriptive statistics of variables are represented in Table 4. The estimated equation is as follows:

$$X_{jt} = \exp\left(a_0 + a_1\, KGDP_t + a_2\, IMGDP_{it} + a_3 Dist_j + a_4\, Coml_j + a_5\, lnExchan_{jt} + a_6\, lnOilp_t + a_7 Humcap_t + a_8 Hcountry_t + a_9 Hsector_t + \varepsilon_i + \vartheta_t\right) e_{ijt} \qquad (6)$$

The dependent variable X_{ij} represents the current export value in US dollars. This variable was explained using traditional control variables: The natural log of Saudi's GDP (KGDP), the natural log of the importer's GDP as a proxy of the importer demand (IMGDP), the natural log of the geographical distance between the KSA and its partners (Dist), and common language (Coml). The model was augmented by other variables, such as the natural log of the bilateral nominal exchange rate (the importer country's currency relative to the US dollar) (Exchan) and the log of the OPEC oil nominal price (lnOilp). Time-fixed effects were added to these variables in order to control the macroeconomic effects. The estimated elasticities of oil price on the value of Saudi exports and the exchange rate is expected to be positive.

The estimated effect of the KSA's human capital index (Humcap) as a driver of service exports could be non-significant because of the weak share of this sector in exports.

The explanatory variables of interest are geographical and sectorial diversification. These variables are measured by Herfindal's concentration indexes (H). The Herfindal-country, or Herfindal-sector, is the sum of the squared share (s) of the export's partner sector (j) on the total. Therefore, the index can vary between 0 (highly diversified) and 1 (highly concentrated), and it can be written as:

$$H = \sum_{j=1}^{n} s_j^2. \qquad (7)$$

Finally, the country-importer fixed effects were introduced to control the MRTs.

Table 3. Sources of variables

Variable	Source
Saudi Exports	Saudi Arabian Monetary Authority Database
Gross Domestic Product	World Bank's World Development Indicators Database
Distance	CEPII Database on Gravity
Common Language	CEPII Database on Gravity
The Nominal Exchange Rate	World Bank's World Development Indicators Database
The Nominal Oil Price of OPEC basket	Saudi Arabian Monetary Authority Database
Human capital index	Groningen Growth and Development Centre. Groningen University

Table 4. Descriptive statistics of variables

Variable	Obs	Mean	Std. Dev.	Min	Max
icountry	860	22	12.41689	1	43
year1	860	10.5	5.769637	1	20
exports	860	4634.331	8620.039	0	55557.07
Hsector	860	0.7382086	0.0776185	0.5681882	0.838651
Hcountry	860	0.0846754	0.0090395	0.0695061	0.1043312
Coml	860	0.2790698	0.4488029	0	1
lnOilp	860	3.95657	0.5524237	2.861057	4.695468
KGDP	860	26.75161	0.5446546	25.80911	27.38574
IMGDP	855	26.40542	1.725501	22.61351	30.65116
Dist	860	8.209588	0.9433423	6.052585	9.608446
lnExchan	858	1.907645	2.548778	-1.313682	9.563595
Humcap	860	0.8978625	0.0612142	0.7906114	0.9896636

6. RESULTS

Table 5 presents the results of the estimations. The estimated coefficient of Herfindal's concentration index is negative and statistically significant at the 1% level. Thus, a 1% increase in the diversification index of the trade partner increases Saudi's export value by 0.12%. This result highlights the relevance of the OPND component of the geographical extensive margin, which is explained by the increased demand from China and India.

However, the estimated parameter of sectoral concentration is positive and statistically significant at 1% level. This result confirms the weakness of the NPND geographical extensive dimension because an increase of 1% in the sectoral exports diversification index reduces the value of Saudi's exports by 0.02%. This finding can be explained by the prevalence of the oil sector in the total export value, relative to other sectors. Thus, when mineral exports fall as a consequence of a demand shock in a crisis period or a decrease in oil price, it is impossible to replace the damage using revenue from other sectors.

The non-significance of the Humcap estimated coefficient as a driver of service export performance confirms the absence of this kind of export, thereby confirming the previous finding.

Traditional determinants presented the expected results. The elasticities of exports on the economic size of the KSA and importer countries are positive. Geographical distance as a measure of trade costs is still an important obstacle to trade, with an elasticity estimated as -1.12. This result can be explained by the high fixed cost of oil transportation. Similarly, the estimated bilateral nominal exchange rate effect on the value of exports is positive and equal to 0.32. However, common language has a non-significant effect, as the export value to other Arabic countries is not significant.

Table 5. Estimations results

	(1)	(2)
Variables	**OLS**	**PPML**
LnOilp	0.534	0.346**
	(0.713)	(0.143)
KGDP	0.323	0.693***
	(1.110)	(0.213)
IMGDP	0.662***	0.532***
	(0.0373)	(0.152)
lnDist	-0.677***	-1.255***
	(0.0835)	(0.193)
lnExchan	0.0727***	0.320**
	(0.0185)	(0.146)
Coml	-0.100	0.750
	(0.176)	(0.568)
Hsector	0.00910	0.0274***
	(0.0402)	(0.00614)
Hcountry	-0.199*	-0.125***
	(0.121)	(0.0338)
Humcap	-5.104	0.731
	(8.234)	(4.217)
Constant	-9.858	-18.22***
	(24.87)	(6.912)
Observations	831	853
R-squared	0.375	0.977

Note: Robust standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

7. CONCLUSION

The paper examines the impact of geographical and sector diversification on the performance of Saudi exports through an extended non-linear structural gravity model using a robust PPML estimator. The negative result in terms of the effect of estimated sector diversification on the value of exports shows that Saudi's exports strongly depend on the oil sector; the contribution of other sectors is very weak. As a result, when the share of mineral exports decreases, the aggregate value of Saudi's exports also decreases. Moreover, the estimated positive effect of geographic diversification on the value of exports indicates that Saudi's exports depend on the growth in the international demand of oil in developing countries, such as China and India, as such countries represent nearly a quarter of Saudi's exports in 2018, thus highlighting the relevance of OPND in the geographical extensive margin.

In order to analyze the weakness of Saudi's diversification policy, future studies are recommended to explore non-oil sectors using more disaggregated data at a product level. Furthermore, it is important to pay attention to obstacles such as productivity, competitiveness, and the labor market at a firm level; however, the main obstacle of this potential research is the lack of available data.

Funding: The researcher thanks the Deanship of Scientific Research at Al Imam Mohammad Ibn Saud Islamic University, Saudi Arabia, for financing this project under grant no. 371108.
Competing Interests: The author declares that there are no conflicts of interests regarding the publication of this paper.

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