COGENT ECONOMICS & FINANCE
2025, VOL. 13, NO. 1, 2480641
https://doi.org/10.1080/23322039.2025.2480641

ENERGY ECONOMICS | RESEARCH ARTICLE

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The impact of oil prices on import demand in an oil-rich country: a multisectoral Bayesian approach

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ABSTRACT

This study examines Qatar's import demand function across sixteen economic sectors, employing a Bayesian approach to estimate the price, income and oil price elasticities. The findings reveal that import demand is predominantly price inelastic (−0.079 to −0.21), reflecting the country's heavy reliance on imported goods due to limited domestic alternatives. In contrasts, income elasticities are highly elastic (4.582 to 6.353), indicating that import demand rises sharply with increasing income levels. Additionally, oil prices positively influence import demand in sectors such as Metals and Machinery/Electrical, highlighting that higher oil prices, which typically correlate with increased government revenues, lead to higher industrial imports. However, this dependence on oil revenues poses economic valnerabilities due to oil price fluctuations. Comparisons with oil-dependent economies such as Saudi Arabia, Kuwait, and the UAE confirm this pattern, whereas Norway's sovereign wealth mechanisms mitigate such volatility. The findings indicate that price-based policies (e.g. tariffs) alone are insufficient to manage import volumes, emphasizing the need for structural economic reforms including diversification and enhanced domestic production. Given the high-income elasticities, strategic infrastructure investmentsin trade logistics and port facilities, are crucial to handle growing import volumes. Finally, by drawing parallels with other resource-rich economies, this research provides broader policy insights for oil exporting nations, stressing diversification, fiscal stabilization and trade resilience.

IMPACT STATEMENT

This study provides critical insights into Qatar's import demand dynamics, revealing the country's strong reliance on imports and its sensitivity to income and oil price fluctuations. By employing a Bayesian approach, the research highlights the limitations of price-based policies in managing import volumes and underscores the need for structural economic reforms, including diversification and domestic production enhancement. The findings offer valuable policy implications for oil-exporting economies, emphasizing the importance of trade resilience and fiscal stability in mitigating risks associated with oil price volatility. These insights contribute to a deeper understanding of economic sustainability in resource-dependent nations.

ARTICLE HISTORY
Received 1 January 2025
Revised 27 February 2025
Accepted 13 March 2025

KEYWORDS
Import demand; oil prices; price elasticity; income elasticity; Bayesian estimation; multisectoral analysis; trade policy

SUBJECTS
Economics; Industry & Industrial Studies; Finance

1. Introduction

The estimation of import demand price and income elasticities is a critical endeavor in economic research, particularly for countries with unique economic structures such as Qatar. Price elasticity of import demand measures the responsiveness of the quantity of imports demanded to change in the price of imported goods, while income elasticity gauges the responsiveness to changes in national income. Understanding these elasticities is pivotal for several reasons. First, accurate estimates of these elasticities are essential for formulating effective trade policies as policymakers and researchers rely on these estimates to predict how changes in import tariffs, exchange rates or other economic policies will

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Supplemental data for this article can be accessed online at https://doi.org/10.1080/23322039.2025.2480641.

influence import volumes and the overall trade balance (Ozturk & Faizi, 2023). For instance, in a scenario where the government considers tariff adjustments, knowledge of price elasticity will help forecast the likely impact on import demand and, by extension, on government revenue and consumer prices (Chow et al. 2023; Goldstein & Khan, 1985; Ozturk et al. 2024). Second, from a macroeconomic perspective, import demand elasticities provide insights into the consumption patterns and economic behavior of a country. High-income elasticity of import demand suggests that as the country's income grows, there will be a proportionally larger increase in import consumption. This relationship is particularly significant for Qatar, given its status as a high-income, resource-rich economy. Lastly, in the context of a rapidly expanding global economy, understanding import demand elasticities plays a pivotal role in shaping corporate strategies and guiding investment decisions (Ferguson & Smith, 2022; Grübler et al., 2022; Muhammad & Riaz, 2018). Analyzing import demand patterns enables businesses to identify potential market opportunities, assess consumer preferences and tailor their product offerings to meet the specific needs of diverse international markets (Tsionas & Christopoulos, 2004).

Qatar's unique economic structure, characterized by a heavy reliance on hydrocarbon exports and a significant inflow of foreign labor, makes the estimation of import demand elasticities particularly relevant. The nation's economic policies and strategic planning are deeply interconnected with global oil and gas markets, which inherently affect its income level and price dynamics. A thorough understanding of how these factors shape import demand is crucial for maintaining economic stability and achieving long-term development objectives.

Qatar's ambitious national development strategy, as outlined in the Qatar National Vision 2030 (General Secretariat For Development Planning, 2008), emphasizes economic diversification and substantial investments in infrastructure healthcare, and education. This shift seeks to reduce the country's reliance on hydrocarbon revenues (Kularatne, 2024). To support this transition, Qatar has allocated significant resources to developing non-hydrocarbon sectors, including manufacturing, services and agriculture (ITA, 2022a). Furthermore, major infrastructure projects, such as the development of Hamad Port – one of the world's largest green ports – reflect Qatar's commitment to improving trade logistics and reducing dependency on traditional shipping routes (ITA, 2022b; Invest Qatar, n.d). The country has also established free trade zones aimed at boosting reexports and attracting foreign investment. Despite challenges such as the regional diplomatic and trade blockade imposed by neighboring countries in 2017, Qatar has demonstrated significant economic resilience. It successfully rerouted its trade flows and forged new alliances, highlighting the adaptability of its economic framework (Al-Abdelmalek et al., 2023). These efforts underscore the importance of understanding import demand elasticities, especially in the context of large-scale projects like Hamad Port, which require substantial imports of machinery, construction materials and advanced technologies. Accurate estimates of import demand elasticities are critical for policymakers to anticipate and manage the economic impacts of such projects. These estimates enable the government to mitigate risks associated with external shocks or trade imbalances, thereby supporting sustainable growth (International Monetary Fund (IMF), 2019). Moreover, in the context of global economic integration, robust elasticity estimates play a pivotal role in negotiating trade agreements and fostering international economic relations. Qatar's strategic location and status as a major energy exporter position it as a vital partner in the global economic arena.

This study aims to estimate Qatar's import demand function at a multisectoral level using a Bayesian estimation approach. To the best of our knowledge, this is the first research to estimate Qatar's import demand function at a disaggregated level. The central research question addresses how price and income changes influence import demand across various sectors of the Qatari economy. By adopting a Bayesian framework, this study seeks to generate more accurate and robust estimates, accounting for the inherent uncertainties and variability in the data. These insights are expected to empower policymakers with a nuanced understanding of import demand behavior, facilitating the design of effective trade policies, sustainable economic growth and enhanced integration into the global economy.

2. Literature review

Classical foundations in this area were established by Goldstein and Khan (1985), who emphasized the importance of price and income effects in foreign trade and demonstrated that import demand is

typically price-inelastic but income-elastic, which laid the groundwork for further research. Deyak et al. (1989) expanded this understanding by examining the demand for imports into the United States across various economic strata. Their findings revealed shifting responsiveness to income and price fluctuations over time, with increasing income elasticity and decreasing price elasticity, alongside instability in specific economic classes corresponding with changes in exchange rates. The study highlighted the variability in elasticity across different segments of the economy. Several region and country-specific studies have been conducted since then. The same authors, Deyak et al. (1993) estimated both short and long-run elasticities for Canada and found similar results. Tang and Nair (2002) used the Unrestricted Error Correction Model – Bounds Test Analysis to examine the long-run elasticities of import demand from 1970 to 1998 for Malaysia. They found that income and relative prices significantly influence import demand, aligning with the theory of Import Demand Function. Similarly, Dutta and Ahmed (2004) investigated India's aggregate import demand from 1971 to 1995 using the same econometric model. They found that real GDP, relative import prices and import volumes are cointegrated, with real GDP being the primary driver of import demand. Wang and Lee (2012) utilized the Autoregressive Distributed Lag (ARDL) method along with cointegrating regressions to investigate China's import demand elasticity. Their findings showed that real imports are cointegrated with global risk perceptions, real effective exchange rate and domestic economic activity, indicating that domestic income positively impacts imports, while a decline in external competitiveness negatively affects them. Amiri et al. (2013) examined OPEC members and found that factors like real exchange rate, oil prices, exports and domestic demand, alongside price and income, significantly affect import demand. Durmaz and Lee (2015) studied Turkey's import demand using an error-correction model and found long-term relationships between GDP components and import demand, with most factors having inelastic impacts on imports except for total consumption. Some studies focused on specific sectors. For instance, Islam et al. (2022) explored the demand for minerals in the top nine mineral-importing nations, Australia, Brazil, Canada, Chile, Mexico, South Africa, Russia, Ukraine and the USA, from 1996 to 2019, analyzing the impact of the shift to renewable energy. Their study demonstrated a positive long-term response to solar and wind energy production, with exchange rates affecting mineral demand, but oil price substitution effects not being sustained. Şişman and Öztürk (2021) examined the price and income elasticities of crude oil in Turkey with different data frequencies and found that data frequency affects the results. Gonzales and Varona (2024) investigated the determinants of food imports in Peru from 1980 to 2021, finding that long-term economic growth positively affects food imports, while short-term factors like relative prices and exchange rates also have a beneficial effect. A similar analysis was conducted for Turkey's food market (Ozturk 2020) and cotton market (Ozturk 2017).

In the Middle East and North Africa (MENA) region, Awad et al. (2007) studied palm oil imports using the ARDL technique, found that palm oil pricing, exchange rates and national income significantly influence import demand. Ibrahim (2017) analyzed Egypt's merchandise imports from 1970 to 2014, identifying GDP, inflation and international reserves as key long-term determinants of import demand, with a negative correlation to the real effective exchange rate. Aljebrin and Ibrahim (2012) focused on Gulf Cooperation Council (GCC) countries, including Saudi Arabia, Bahrain, UAE, Kuwait, Oman and Qatar. They found that import demand is positively correlated with real income, private consumption, international reserves and gross capital formation, while the relative cost of imports to domestic prices and government consumption negatively impacts long-term import demand. Ibrahim (2015) examined Saudi Arabia's import demand from 1975 to 2011, finding that GDP, GNP, private and public consumption expenditures, and import prices relative to domestic prices are positively correlated with import demand. Al-Abri et al. (2023) investigated the connection between import demand and foreign exchange reserves for Oman, using the ARDL model to analyze the impact of real income, domestic prices, and foreign exchange reserves. They found that real income drives demand for goods imports, while domestic prices significantly impact overall imports, but foreign exchange reserves had no effect, suggesting other factors like foreign asset leakage and currency peg stabilization might undermine the relationship.

For Qatar, Kaitibie et al. (2024) examined these issues using Chambers and Pope's exact nonlinear aggregation approach and the ARDL cointegration framework. They investigated the short- and long-term determinants of food imports, including aggregate food, meats, dairy and grains, providing critical insights into Qatar's import dynamics in the face of external shocks.

The literature on import demand elasticities is extensive and diverse, covering global, regional and country- and sector-specific analyses. Classical studies provide foundational insights, while contemporary research highlights the necessity of sectoral differentiation and advanced estimation methods. To our knowledge, a comprehensive estimation of Qatar's import demand function has yet to be fully developed. This study aims to fill that research gap by providing comprehensive, multisectoral import demand elasticity estimates for Qatar, utilizing a robust Bayesian framework to address the inherent uncertainties and sectoral variations in the data.

3. Methodology

3.1. Data collection

Import quantity, import price, real gross domestic product and oil price are the variables selected for this study based on the theory, and empirical literature. Import quantity and price data were obtained from the Planning and Statistics Authority of Qatar, while the GDP and Oil Price variables were obtained from the World Bank (World Bank Open Data n.d.), World Development Indicators and World Bank Prospects Group (Table 1).

This article is based on macro panel data, which has 16 sectors covering the year 2012–2022. The sectors presented in Table A1 (Supplementary Material) include Animal and Animal Products, Vegetable Products, Foodstuffs, Mineral Products, Chemicals and Allied Industries, Plastics/Rubbers, Raw Hides; Skins; Leather, and Furs, Wood and Wood Products, Textiles, Footwear/Headgear, Stone/glass, Metals, Machinery/Electrical, Transportation, Miscellaneous and other.

The descriptive statistics in Table 2 provide an overview of the data used. The number of total observations is 132 for all variables. Quantity and import prices seem skewed to the right while GDP and oil prices have almost normal distribution. The standard deviations are also very high, indicating that the observations are far from the mean value. The kurtoses show that quantity and imported price have outliers due to their high value. The logarithmic (LN) forms have been used, as the variables are in different measurements.

Table 3 shows that there is no discernible link between the independent variables in the correlation matrix displayed above, indicating that there is no multicollinearity among the variables. To verify this, the Variance Inflation Factor (VIF) is also carried out. As Table 4 illustrates, there is no multicollinearity as all values are significantly smaller than 10.

3.2. Model specification

To estimate the import demand function, this study utilizes a Bayesian estimation approach, leveraging its robustness in handling uncertainties and variations within the data.

The general form of the Import Demand Function proposed by Gafar (1988) as follows:

$$M_t = f(Y_t, P_t^m, P_t^d) \tag{1}$$

where M_t is the import demand which is a function of domestic income measured by real GDP, (Y_t), prices for imported goods and services (P_t^m) and prices for domestic goods and services, (P_t^d). When the price ratio (PR) between the import PR index and the domestic PR index is incorporated, the model takes the following form:

$$M_t = f(Y_t, \mathrm{PR}) \tag{2}$$

Table 1. Description of variables.

Variable	Description	Source	Exp. sign
MQ	Imported quantity	Planning and Statistics Authority of Qatar	
MP	Imported price	Planning and Statistics Authority of Qatar	−
GDP	Real gross domestic product	Word development indicators	+
OP	Oil price	Word development indicators	+

Table 2. Descriptive Statistics.

	Mean	Minimum	Maximum	S.D.	Kurt	Skew
MQ	474508110	2552382	6012512880	790101478	15.77	3.43
MP (QAR)	3.92E + 08	106.02	5.07E + 09	9E + 08	7.11	2.72
GDP (bn QAR)	6.43248E + 11	5.57495E + 11	6.86288E + 1	3746377681	0.207	−1.162
OP ($/bbl)	74.752	43.333	112.011	24.629	−1.467	0.276

Table 3. Correlation matrix.

	LNQUAN	LNGDP	LNIMPPR	LNOIL
LNMQ	1			
LNGDP	0.2511	1		
LNMP	−0.1480	−0.0407	1	
LNOP	−0.1579	−0.5828	0.0255	1

Table 4. VIF.

Variable	VIF	1/VIF
LNOIL	1.52	0.659647
LNGDP	1.51	0.660314
LNIMPPR	1.00	0.998337
Mean VIF	1.34	

Expressing this in a liner regression equation:

$$M_t = \alpha_0 + Y_t + \mathrm{PR}_t + \mathcal{E}_t \tag{3}$$

In the Bayesian framework, the model is further detailed by Carrington and Zaman, (1994) as follows:

$$Y_{it} = \beta_i X_{it} + \varepsilon_{it} \tag{4}$$

where Y is the dependent variable. In our case, it is quantity imported, i stands for the sector and t the number of periods. On the right-hand side, X is a vector of independent variables; in our case it is import price, GDP and oil price. β is the vector of the slope coefficient. Equation (4) can be represented as

$$Y_i = \begin{bmatrix} y_{i1} \\ y_{i2} \\ \cdot \\ \cdot \\ \cdot \\ y_{it} \end{bmatrix}_{t\times 1}, X_{it} = \begin{bmatrix} x_{i1} \\ x_{i2} \\ \cdot \\ \cdot \\ \cdot \\ x_{it} \end{bmatrix}_{t\times k}, \varepsilon_{it} = \begin{bmatrix} \varepsilon_{i1} \\ \varepsilon_{i2} \\ \cdot \\ \cdot \\ \cdot \\ \varepsilon_{it} \end{bmatrix}_{t\times 1} \text{ and } X_{it} = \begin{bmatrix} X_{it}^1 & X_{it}^2 & \ldots\ldots & X_{it}^k \end{bmatrix}_{k-Regressors}$$

$\varepsilon = N\left(0, \delta_i^2\right)$ is the random error component.

$$\text{The density of the data is } \frac{\hat{\beta}_i}{\beta} \sim N(\beta, \Omega_i) \tag{5}$$

$$\text{and the prior density is } \beta \sim N(\mu, \Lambda) \tag{6}$$

$$\text{hence the posterior density becomes as } {}^{\beta}/_{\hat{\beta}_i} \sim N(m_i, V_i) \tag{7}$$

The model measures the vector and variance co-variance matrix of the posterior density, and they are given as follows.

$$m_i = V_i\left(\Omega_i^{-1}\hat{\beta}_i + \Lambda^{-1}\mu\right) \quad \text{and} \quad V_i = \left(\Omega_i^{-1} + \Lambda^{-1}\right)^{-1} \tag{8}$$

The Classical Bayes estimator is the mean of the posterior. Therefore, Equation (8) can be shown as

$$\hat{\beta}_{i(CB)} = V_i\left(\Omega_i^{-1}\hat{\beta}_i + \Lambda^{-1}\mu\right) \quad \text{and its variance-covariance matrix is} \quad V_i = \left(\Omega_i^{-1} + \Lambda^{-1}\right)^{-1} \tag{9}$$

The two hyper-parameters, that is, μ and Λ are unknown. In Classical Bayes (CB) the two hyper-parameters are taken from any sources other than the data. However, if these two are estimated from the data, then $\hat{\beta}_{i(CB)}$ will be termed Empirical Bayes estimator, and Equation (6) becomes as

$$\hat{\beta}_{i(EB)} = \hat{V}_i\left(\hat{\Omega}_i^{-1}\hat{\beta}_i + \hat{\Lambda}^{-1}\hat{\mu}\right) \tag{10}$$

where the values of Equation (10) are as $\hat{\Lambda} = (\sum_{i=1}^{n} \Omega_i^{-1})^{-1}$ and $\hat{\mu} = \hat{\Lambda}(\sum_{i=1}^{n} \hat{\Omega}_i^{-1}\hat{\beta}_i)$ are the two hyper-parameters estimated from the data.

The Bayesian estimation approach offers two primary advantages: it accounts for sectoral variations and produces smaller standard errors compared to traditional methods. This is particularly beneficial in the context of Qatar's diverse import sectors, where sector-specific factors can significantly influence demand elasticity (Zaman, 1996). Moreover, it produces significantly fewer standard errors when compared to other methods (Zaman, 1996). By employing this rigorous methodology, the study aims to provide robust, sector-specific import demand elasticity estimates.

4. Results

The estimation of import demand elasticities for 16 sectors in Qatar reveals significant insights into the responsiveness of import demand to price changes within each sector. The coefficients and their corresponding standard errors are provided in Table 5, with the significance of each coefficient indicated by one to three stars, signifying a high level of statistical significance.

Starting from price elasticities, the negative signs of all estimated elasticities indicate that a rise in the relative price of imports leads to a decrease in the quantity of imports demanded for each sector, consistent with economic theory. The magnitude of the elasticities, ranging from −0.079 to −0.21, suggests that all sectors exhibit inelastic demand. Even the highest elasticities, such as those for Foodstuffs (−0.201) and Transportation (−0.21), are closer to zero than to −1, indicating inelastic behavior. This means that a 1% increase in import prices results in less than a 1% decrease in the quantity of imports demanded, demonstrating a relatively low sensitivity to price changes across all sectors. This inelastic nature of import demand indicates that Qatar relies heavily on imported goods across all sectors. This suggests that there are limited domestic substitutes available, and consumers and businesses are willing to absorb price increases rather than reduce consumption significantly. This high dependency can pose risks to economic stability, especially if global supply chains are disrupted or if import prices rise sharply.

Looking closely at each sector, 3. Foodstuffs (−0.201) and 14. Transportation (−0.21) sectors exhibit the highest price elasticities, suggesting that these sectors are more sensitive to price changes. A 1% increase in import prices would lead to a reduction of approximately 0.20% and 0.21% in the quantity demanded for these sectors, respectively. This relatively higher sensitivity could be due to the availability of domestic substitutes. Most sectors, including Animal and Animal Products (−0.134), Vegetable Products (−0.136), Mineral Products (−0.137), Chemicals and Allied Industries (−0.141), Plastics/Rubbers (−0.143), Raw Hides, Skins, Leather and Furs (−0.139), Wood and Wood Products (−0.141), Textiles (−0.141), Stone/Glass (−0.147) and Machinery/Electrical (−0.146), exhibit moderate price elasticities ranging from −0.13 to −0.15. These sectors are somewhat sensitive to price changes, indicating that price increases would lead to a modest reduction in import demand. The Footwear/Headgear (−0.109), Metals (−0.120) and Miscellaneous (−0.145) sectors show relatively lower price elasticities, suggesting less sensitivity to price changes. Lastly, the other (−0.079) sector exhibits the lowest elasticity, implying the least responsiveness to price fluctuations.

Table 5. Coefficient estimations.

	Animal	Vegetable pr	Food	Mineral	Chemical	Plastic	Raw	Wood
LNMP	−0.134***	−0.136***	−0.201***	−0.137***	−0.141***	−0.143***	−0.139***	−0.141***
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
LNGDP	5.5782***	5.839***	4.582***	5.593***	5.749***	5.851***	5.704***	5.781***
	(0.421)	(0.427)	(0.395)	(0.431)	(0.427)	(0.425)	(0.433)	(0.431)
LNOP	0.125	0.119	0.091	0.133	0.134	0.132	0.132	0.122
	(0.076)	(0.077)	(0.071)	(0.078)	(0.077)	(0.077)	(0.078)	(0.778)
Const	−122.4***	−129.1***	−95.1***	−122.7***	−126.7***	−129.2***	−129.2***	−125.5***
	(11.25)	(11.21)	(10.38)	(11.31)	(11.21)	(11.16)	(11.38)	(11.32)

Standard errors in parentheses.
***$p < .01$; ** $p < .05$; *$p < .1$.

	Textile	Footwear	Stone and glass	Metals	Machinery	Transportation	Misc	Other
LNMP	−0.141***	−0.109***	−0.147***	−0.120***	−0.146***	−0.21***	−0.145***	−0.079***
	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.007)	(0.008)	(0.006)
LNGDP	5.772***	5.917***	5.483***	6.353***	5.871***	5.661***	5.724***	5.861***
	(0.421)	(0.427)	(0.418)	(0.373)	(0.426)	(0.425)	(0.428)	(0.428)
LNOP	0.122	0.123	0.124	0.159**	0.143*	0.132	0.144*	0.118
	(0.076)	(0.077)	(0.075)	(0.067)	(0.077)	(0.077)	(0.078)	(0.077)
Const	−127.2***	−131.6***	−119.7***	−142.6***	−129.8***	−123.3***	−125.9***	−130.6***
	(11.25)	(11.21)	(10.97)	(11.31)	(11.19)	(11.16)	(11.25)	(11.23)

Standard errors in parentheses.
***$p < .01$; ** $p < .05$; *$p < .1$.

As for income elasticities, the positive signs of all estimated income elasticities indicate that an increase in income leads to an increase in the quantity of imports demanded for each sector. The magnitudes of the income elasticities, ranging from 4.582 to 6.353, suggest that all sectors exhibit high elastic demand with respect to income. This means that a 1% increase in income results in more than a 4.5% increase in the quantity of imports demanded, demonstrating a high sensitivity to changes in income across all sectors. Having high income elasticities for import demand across all sectors suggests that as Qatar's economy grows and income levels rise, the demand for imports is likely to increase significantly. This underscores the importance of maintaining robust and efficient supply chains to meet the rising demand for imported goods.

Looking at each sector, the Metals (6.353) sector shows the highest income elasticity, indicating that it is extremely responsive to changes in income. A 1% increase in income leads to a 6.353% increase in import demand, highlighting the importance of this sector in terms of consumption and economic growth. The footwear/Headgear (5.917) sector also exhibits a very high-income elasticity, suggesting that as incomes rise, consumers significantly increase their spending on these goods. Animal and Animal Products (5.5782), Vegetable Products (5.839), Foodstuffs (4.582), Mineral Products (5.593), Chemicals and Allied Industries (5.749), Plastics/Rubbers (5.851), Raw Hides, Skins, Leather and Furs (5.704), Wood and Wood Products (5.781), Textiles (5.772), Stone/Glass (5.483), Machinery/Electrical (5.871), Transportation (5.661), Miscellaneous (5.724) and Other (5.861). All these sectors demonstrate high-income elasticities, indicating that import demand for these goods increases substantially with rising incomes.

As for oil price coefficients, the analysis shows that while several sectors exhibit a positive relationship between oil prices and import demand, only the Metals, Machinery/Electrical, and Miscellaneous sectors demonstrate statistically significant results. This indicates that these sectors are particularly responsive to changes in oil prices. The coefficient for the Metals sector (0.159) is positive and statistically significant. This indicates that an increase in oil prices is associated with a significant increase in import demand for metals. This sector is particularly responsive to changes in oil prices, likely due to the role of metals in construction and infrastructure projects that are often funded by oil revenues. For instance, Qatar's investments in infrastructure for the FIFA 2022 World Cup – including the construction of eight mega stadiums, extensive road networks, and a metro system – exemplify the sector's sensitivity to oil price fluctuations. Machinery/Electrical sector (0.143) also shows a positive and statistically significant relationship with oil prices. As oil prices rise, import demand for machinery and electrical goods increases, reflecting investments in technology and infrastructure that typically accompany higher oil revenues. The positive and significant coefficient for the Miscellaneous sector (0.144) suggests that import demand in this category also increases with rising oil prices. This could encompass a broad range of goods that increased demand during periods of economic expansion fueled by higher oil prices. For the remaining sectors, while the coefficients are positive, they are not statistically significant. This means that the relationship between oil prices and import demand for these sectors is not strong enough to draw definitive conclusions. The lack of significance suggests that for these sectors, oil price fluctuations may not have a consistent or strong impact on import demand.

5. Discussion

The findings of this study highlight the significant role of income and oil prices in shaping import demand across various sectors in Qatar. The finding that all sectors in Qatar exhibit inelastic import

demand highlights a critical aspect of the nation's economy: a substantial reliance on imported goods. Inelastic demand, where the quantity demanded does not significantly decrease with an increase in price, suggests that domestic substitutes are either unavailable or insufficient to meet the needs of consumers and businesses. This reliance on imports, while providing necessary goods and services, also exposes Qatar to several risks. Moreover, the inelastic nature of import demand implies that even in the face of rising import prices, Qatar will continue to import similar volumes of goods. While this ensures a stable flow of imports, it also means that the country could face significant trade balance issues if global prices rise sharply. The stability of import volumes, despite price changes, can be beneficial for government revenue through import duties and taxes. However, it also means that a rising cost of imports could strain the nation's financial resources, particularly if not offset by corresponding increases in export revenues. Furthermore, the heavy dependency on imports underscores the importance of economic diversification for Qatar. Reducing reliance on imports by enhancing domestic production capabilities can mitigate risks associated with global supply chain disruptions or significant price volatility in international markets. This is particularly crucial for sectors like foodstuffs and transportation, which, despite their higher elasticities, still demonstrate inelastic demand. Policy measures should focus on strengthening domestic industries, improving self-sufficiency, and finding alternative suppliers to enhance economic resilience. Furthermore, given the inelastic nature of import demand, price-based policies alone may not be effective in managing import volumes. Instead, Qatar should invest in non-price measures such as developing domestic industries, advancing technology, and improving infrastructure. These strategies can reduce the economy's vulnerability to external shocks and improve the efficiency of import processes. For sectors with moderate inelasticity, such as chemicals, plastics, and textiles, policies that stabilize import prices or enhance domestic production could have a positive impact, though the overall sensitivity to price changes will remain limited.

In contrast, income elasticities show uniformly high values across all sectors, with the 'Metals' sector exhibiting the highest elasticity (6.353). This indicates that as income rises, sectors tied to infrastructure and industrial development experience a more pronounced growth in import demand. This trend mirrors findings from Dutta and Ahmed (2004) for India and Wang and Lee (2012) for China, where sectors associated with industrial development displayed higher income sensitivity. This similarity underscores the shared characteristics of emerging economies with significant infrastructure investment needs. However, the results also emphasize Qatar's distinct context as a high-income, resource-rich nation, further amplified by its reliance on hydrocarbon revenues This relationship between income growth and import demand has several important implications for Qatar. First, Qatar's economic expansion is likely to drive substantial increases in import demand across all sectors. This trend underscores the importance of maintaining robust and efficient supply chains to accommodate the growing volume of imports. Policymakers must plan for this growth by investing in critical infrastructure, such as ports, customs and logistics, to ensure that the country can manage the increasing demand efficiently. Second, while rising incomes are likely to boost import demand, this also presents an opportunity to develop domestic industries that can meet some of this demand locally. By encouraging domestic production, Qatar can improve its trade balance, create employment opportunities, and contribute to overall economic stability. Lastly, the high-income elasticities across sectors reflect an improving standard of living in Qatar, with consumers showing a growing preference for a diverse range of imported goods. This suggests that as incomes continue to rise, demand for both essential commodities and luxury items will increase.

The relationship between oil prices and import demand presents another nuanced dimension. While oil price changes significantly influence sectors like 'Metals' (0.159), 'Machinery/Electrical' (0.143) and 'Miscellaneous' (0.144), this is less apparent in others. These findings suggest that oil price fluctuations primarily affect sectors tied to construction, infrastructure, and technology – areas directly impacted by government revenue generated from hydrocarbon exports. This observation is consistent with Amiri et al. (2013), who noted similar sectoral sensitivity in OPEC nations. However, unlike previous research, this study identifies the varying degree of oil price dependence at a disaggregated sectoral level, contributing new evidence to the literature.

Additionally, the inelastic nature of import demand across all sectors aligns with earlier studies such as Ibrahim (2015) and Kaitibie et al. (2024), reinforcing the understanding that oil-exporting economies often lack sufficient domestic substitutes for critical imports.

From a policy perspective, the results emphasize the need for targeted strategies to mitigate economic vulnerabilities. For instance, sectors like 'Transportation' and 'Foodstuffs' with relatively higher price elasticities could benefit from incentives to boost domestic production capabilities. Conversely, sectors with high income elasticities, such as 'Metals' and 'Machinery/Electrical', require robust infrastructure and trade logistics to handle growing import demands as income levels rise. Furthermore, the strong dependency on oil revenues to fund imports underscores the necessity of economic diversification to reduce risks associated with oil price volatility.

While these findings are specific to Qatar, they align with broader trends observed in other oil-exporting economies, particularly in the GCC region. Studies on Saudi Arabia, Kuwait, and the UAE have shown that import demand is strongly linked to oil revenues, as government expenditures, infrastructure projects, and private consumption are closely tied to oil price fluctuations (Aljebrin & Ibrahim, 2012; Ibrahim 2015). Similar to Qatar, these economies exhibit high-income elasticities of import demand, suggesting that economic growth leads to a surge in imports, particularly in capital goods and consumer products.

However, a contrasting example can be found in Norway, which has successfully buffered its import demand against oil price fluctuations through the Norwegian Sovereign Wealth Fund (Norwegian Ministry of Finance, 2023). Unlike Qatar and other GCC countries, where fiscal policies are more reactive to oil price cycles, Norway's countercyclical policies and diversified economy have mitigated the impact of oil revenue volatility on trade patterns. This comparison suggests that while oil-exporting nations generally exhibit high-income elasticity in their import demand, fiscal management and economic diversification strategies can significantly influence the degree of oil dependence.

The results of this study carry important policy implications, particularly for Qatar and other resource-dependent economies. The inelastic price response of import demand suggests that price-based policies, such as tariffs or exchange rate adjustments, may be insufficient to regulate import volumes. Instead, a more structural approach – including domestic production incentives and industrial diversification – may be required to reduce import dependence.

Moreover, the strong link between oil revenues and import demand highlights the importance of fiscal stabilization mechanisms. Qatar, along with other GCC nations, could benefit from policies that smooth government expenditures over oil price cycles, similar to Norway's approach. Implementing sovereign wealth fund mechanisms and countercyclical spending strategies can help mitigate trade imbalances and economic volatility.

Finally, given the high-income elasticities, infrastructure planning and logistics development should remain a priority. As Qatar's economy grows, the increasing import demand necessitates enhancements in port capacity, customs efficiency and trade facilitation measures to prevent bottlenecks and inefficiencies in supply chains.

6. Conclusion

This study investigates Qatar's import demand function across 16 economic sectors using a Bayesian estimation approach. By analyzing price, income, and oil price elasticities, the research provides a comprehensive understanding of the country's import dynamics and the implications for economic policy. Utilizing a robust Bayesian estimation approach, we analyzed macro panel data encompassing sixteen import sectors from 2012 to 2022. The variables included import quantity and price data from the Planning and Statistics Authority of Qatar and GDP and oil price data from the World Bank.

The findings demonstrated that import demand in Qatar is generally price inelastic across all sectors, with estimated price elasticities ranging from -0.079 to -0.21. This indicates the Qatar's heavy reliance on imported goods and the limited availability of domestic substitutes. While price-based policies may have minimal effects on reducing import volumes, these results highlight the importance of non-price measures, such as boosting domestic production capacity and diversifying the economy to reduce dependency on imports.

Conversely, the income elasticities across sectors are highly elastic, which suggests that rising income levels are likely to drive significant increases in import demand. This relationship suggests that Qatar's ongoing economic growth will require strategic planning to accommodate rising import volumes. Investments in logistics, port infrastructure and supply chain efficiency are critical to sustaining this growth. At the same time, these findings present an opportunity to develop domestic industries that can meet some of this demand, thereby reducing the trade deficit and enhancing self-sufficiency.

The study also reveals sector-specific sensitivity to oil price fluctuations, with significant impacts on 'Metals', 'Machinery/Electrical' and 'Miscellaneous' sectors. These results demonstrate the role of oil revenues in driving import demand for goods tied to infrastructure and industrial development. However, this reliance on oil revenues highlights the risks posed by volatile oil prices, underscoring the need for diversification into renewable energy and non-oil sectors to achieve long-term economic stability.

By situating Qatar's experience within the broader context of oil-exporting economies, the findings underscore both commonalities and differences in trade behavior among resource-rich nations. The study highlights the need for diversification, fiscal stabilization and infrastructure investment to enhance economic resilience. These insights offer valuable guidance not only for Qatar but also for other economies seeking to balance resource dependence with long-term trade and economic sustainability.

While this study provides a detailed sectoral analysis of Qatar's import demand, future research could extend the analysis to a broader set of oil-dependent economies using a comparative panel data approach. Examining import demand elasticities across multiple oil-exporting countries would allow for a more robust evaluation of policy responses to oil price fluctuations and income growth. Additionally, incorporating exchange rate dynamics, global supply chain shifts, and trade agreement effects could provide further insights into the mechanisms shaping import demand in resource-rich nations.

Acknowledgment

This article is developed from the authors' following preprinted work.

Ozcan Ozturk & Miranda Canga. (2024, September 18). The impact of oil prices on import demand in an oil-rich country: A multisectoral Bayesian approach, Preprint (Version 1). Available at Research Square. https://doi.org/10.21203/rs.3.rs-5107636/v1.

Authors' contribution

CRediT: **Ozcan Ozturk**: Conceptualization, Project administration, Supervision, Investigation, Formal analysis, Writing – reviewing and editing; **Miranda Canga**: Data curation, Software, Methodology, Visualization, Writing – original draft.

Disclosure statement

The authors declare no conflicts of interest related to this publication.

No potential conflict of interest was reported by the author(s).

Funding

No funding was received.

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Data availability statement

The data that support the findings of this study are available from the corresponding author, Ozcan Ozturk, upon reasonable request.

The data that support the findings of this study are also publicly available at:
https://www.psa.gov.qa/en/statistics1/Pages/default.aspx
https://databank.worldbank.org/reports.aspx?source=2&country=ARE

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