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# Rising import supply base concentration in a resource-dependent economy: Evidence from Kuwait and the role of China

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**Background:** Resource-dependent economies with limited domestic manufacturing capacity rely almost entirely on imports for consumer goods, food and industrial inputs. Despite the growing literature on supply chain risk and supply base management, the import source concentration patterns of such economies have received little empirical attention.

**Objectives:** This study characterised the evolution of import source concentration in Kuwait, a trade-dependent, resource-based economy, over 25 years; decomposed the drivers of rising concentration; and tested whether oil revenue dynamics influence sourcing patterns.

**Method:** Monthly bilateral import data for Kuwait from 217 partner economies over 2000–2024 (50 709 observations) were obtained from the IMF Direction of Trade Statistics. Concentration was measured using the Herfindahl-Hirschman Index (HHI), Concentration Ratios (CR4, CR10) and Theil Entropy Index. Trend analysis with Newey–West standard errors, Chow structural break tests and Granger causality analysis were employed.

**Results:** Import concentration rose 47% over 25 years (HHI: 468–687), accelerating from 4.0 points per year in 2000–2007 to 20.2 in 2020–2024. China's share rose from 3.7% to 18.0%, displacing European suppliers. Oil prices Granger-caused China's share ($p < 0.001$), with no reverse causality. Findings were robust to alternative measures and sub-period analysis.

**Conclusion:** Kuwait's import supply base is concentrating at an accelerating rate, creating measurable supply chain vulnerability that warrants policy intervention.

**Contribution:** This study provides a high-frequency empirical characterisation of import supply base concentration in a Gulf Cooperation Council economy, bridging the supply chain risk literature and the trade dependency challenges of resource-based economies.

**Keywords:** import concentration; supply base management; Herfindahl–Hirschman Index; Kuwait; supply chain risk; bilateral trade; resource dependence; China.

## Introduction

Kuwait imports over 90% of its food, virtually all manufactured goods and most industrial inputs required to sustain its population of 4.9 million, including 3.4 million expatriate residents (International Monetary Fund [IMF] 2025; World Bank 2024). The economy is structurally dependent on a continuous, diversified flow of imports across every sector: consumer goods, construction materials, machinery, vehicles, pharmaceuticals and foodstuffs. Yet the structure of this critical import supply base, which countries supply what, how concentrated the sources are and how these patterns have evolved over time, has received remarkably little systematic analysis. This represents a supply chain vulnerability of national significance. As Christopher and Peck (2004) argued in their seminal work on supply chain resilience, vulnerability arises not merely from the occurrence of disruption events but from the structural properties of the supply network that amplify their consequences. When an economy sources a growing proportion of its imports from a shrinking number of partners, it exposes itself to a range of partner-specific shocks, including trade sanctions, logistics bottlenecks, diplomatic disputes and pandemic-induced shutdowns. The capacity to redirect sourcing at short notice diminishes correspondingly as alternative partners exit or scale back their regional presence.

The practical relevance of this vulnerability is not hypothetical. Kuwait experienced acute supply disruptions during the coronavirus disease 2019 (COVID-19) pandemic, when shipping delays and port closures disproportionately affected its most concentrated supply corridors (Baldwin & Freeman 2022; Ivanov 2022; Notteboom, Pallis & Rodrigue 2021), and survey evidence from the same period indicates that firms with weaker risk management practices experienced sharper resilience losses (El Baz & Ruel 2021). The 2017 Gulf diplomatic crisis, during which Saudi Arabia, the United Arab Emirates (UAE) and Bahrain severed diplomatic and trade ties with Qatar, demonstrated that intra-regional supply disruptions can materialise rapidly and without warning in the Gulf Cooperation Council (GCC) context (Ulrichsen 2020). Against this backdrop, Kuwait Vision 2035, the national development strategy known as New Kuwait, identified economic diversification and supply chain security as strategic priorities. However, the strategy has thus far focused on export diversification and domestic production development, with no systematic attention to the diversification of import sources. Craighead et al. (2007) demonstrated that supply chain disruption severity is a function of both the density of the supply network and the availability of alternative sourcing pathways. If Kuwait's import supply base is concentrating, the economy's exposure to severe disruption outcomes is increasing irrespective of the probability of any individual triggering event.

The supply chain risk literature has extensively studied supply base concentration at the firm level. Choi and Krause (2006) established that a firm's supply base complexity, measured in terms of the number of suppliers, their differentiation and the degree of inter-relationship, is a fundamental determinant of transaction costs, risk exposure and innovation capacity. Treleven and Schweikhart (1988) conducted the foundational risk–benefit analysis of single versus multiple sourcing strategies, demonstrating that concentration reduces transaction costs but increases vulnerability to disruption. Subsequent empirical work has confirmed this trade-off across industries. The Herfindahl–Hirschman Index (HHI), originally developed for industrial market concentration analysis (Rhoades 1993), has become a standard metric for quantifying supply base concentration in the supply chain management literature (Bode & Wagner 2015). Recent empirical evidence has reinforced the vulnerability hypothesis at the global supply chain level: Inomata and Hanaka (2024) develop new reference statistics that measure network concentration risk through both volume and frequency dimensions, showing that exposure to concentrated suppliers' compounds along production paths. Bibliometric analyses confirm the growing research attention to supply chain disruption risk (Xu et al. 2020).

However, the application of supply base concentration concepts to national-level import dependency remains limited. The trade economics literature has measured HHI primarily for export diversification. Cadot, Carrère and Strauss-Kahn (2011) analysed the hump-shaped relationship between income levels and export concentration, while Agosin, Alvarez and Bravo-Ortega (2012) examined the determinants of export diversification across 79 countries. Parteka and Tamberi (2013) extended this analysis to imports, finding that imports tend to be more diversified than exports at lower development stages, but their focus remained on product diversification rather than on source concentration. The few studies that have examined import source concentration as a supply chain risk metric have relied on annual data and focused on broad cross-country comparisons rather than deep single-country analysis (International Monetary Fund [IMF] 2025). The GCC region is particularly understudied despite its extreme import dependence. Hvidt (2013) and Al-Kawaz (2008) have documented the economic diversification challenges facing GCC economies, but their analyses address output and export diversification rather than import source risk.

This gap is significant for three reasons. Firstly, for economies such as Kuwait with negligible domestic manufacturing capacity, import source concentration translates directly into supply chain vulnerability without the buffer that domestic production provides in more diversified economies. Secondly, the monthly frequency of bilateral trade data, as captured in the IMF Direction of Trade Statistics (DOTS), permits analysis at a temporal resolution far exceeding that of annual aggregate studies. The dataset of 50 709 bilateral-month observations across 217 trading partners over 25 years represents a high-frequency analysis of import concentration in a GCC economy. Thirdly, the resource-dependent nature of GCC economies creates a distinctive channel through which oil revenue dynamics may drive import sourcing patterns, a mechanism that has not been empirically examined.

Recent contributions sharpen the relevance of these issues. Freund et al. (2024) document a partial reshaping of global supply chains in response to United States trade policy and show that concentration risk has migrated rather than disappeared, with China-centric value chains being substituted by indirect routings through Vietnam, Mexico and the Gulf. The post-pandemic supply chain risk literature (Pournader, Kach & Talluri 2020; Sodhi, Tang & Willenson 2023) underscores that single-partner dependencies translate into measurable disruption costs, motivating empirical assessments of partner concentration in trade-dependent economies. The export-diversification literature provides a complementary perspective, identifying institutional quality, factor endowments and trade openness as drivers of concentration outcomes (Agosin et al. 2012; Parteka & Tamberi 2013), insights that translate naturally to the import side examined here.

The conceptual framework for this study draws on supply base management theory as developed by Choi and Krause (2006) and the resource curse literature (Frankel 2012). At the firm level, HHI of the supply base is a standard risk metric: a higher HHI indicates greater dependence on fewer suppliers and, consequently, higher disruption risk.

This concept is applied at the national level by treating Kuwait's import partners as analogous to a firm's supplier portfolio. Rising HHI indicates that Kuwait's import 'supply base' is concentrating, reducing the economy's supply chain resilience as conceptualised by Jüttner, Peck and Christopher (2003) and operationalised by Wieland and Wallenburg (2013). The transformative supply chain management perspective (Wieland 2021) emphasises that supply chains must be understood as social-ecological systems embedded in broader political-economic structures, a framing particularly apt for a resource-dependent economy such as Kuwait. Systematic reviews of the supply chain resilience literature confirm that analytical capability and structural factors jointly determine resilience outcomes (Dubey et al. 2021; Hosseini, Ivanov & Dolgui 2019; Şerbetçioğlu & Oflaç 2024). The conceptual framework further hypothesises that oil revenue creates a 'procurement convenience' channel.

When oil revenues spike, the volume of imports surges and procurement by both government and private sector actors gravitates towards the most price-competitive and logistically accessible supplier. In the contemporary global trading system, the supplier is increasingly China. This mechanism is consistent with behavioural supply chain management theory, in which time pressure and cognitive load lead to satisficing rather than optimising supplier selection (Carter, Kaufmann & Michel 2007). Over repeated oil revenue cycles, this satisficing behaviour accumulates into structural import concentration.

The aim of this study is to characterise the evolution of import supply base concentration in Kuwait, a highly trade-dependent, resource-based economy, over the 25-year period from 2000 to 2024. This period was selected because it spans the full arc of China's integration into the global trading system following its World Trade Organisation accession in 2001, encompasses multiple oil price cycles, and covers the major disruption events (the 2008 financial crisis, the 2014 oil price collapse, the COVID-19 pandemic) that have reshaped global trade patterns.

Accordingly, the study addresses the following research question: How has Kuwait's import supply base concentration evolved between 2000 and 2024, what factors have driven this evolution and how does Kuwait's trajectory compare with that of its principal regional peers? To answer this question, four specific objectives guide the analysis:

- Measure and decompose import concentration trends using multiple indices (HHI, CR4, CR10, Theil entropy).
- Identify which trading partners have been displaced and by whom, characterising the geographic recomposition of Kuwait's import supply base.
- Test whether oil revenue dynamics drive import concentration patterns through Granger causality analysis.
- Benchmark Kuwait's concentration trajectory against Saudi Arabia and the UAE to assess whether the observed patterns are Kuwait-specific or reflect broader GCC trends.

It should be emphasised that the analysis covers the full population of Kuwait's import partners, 217 countries and territories reporting bilateral trade flows over the study period, rather than a pre-selected subset. The prominence of China in the discussion that follows is therefore an empirical finding emerging from the data. References to the United Arab Emirates and Saudi Arabia in the comparative analysis are similarly chosen on substantive grounds (size and structural similarity to Kuwait), and traditional partners such as the United States, Japan, Germany and the United Kingdom are tracked throughout. Kuwait is the importer in every bilateral pair analysed here; mentions of oil exports appear only where they help explain how oil revenue cycles shape the import side of Kuwait's external accounts.

# Research methods and design

## Study design

This study employs a longitudinal time-series design to analyse the evolution of Kuwait's bilateral import concentration using high-frequency (monthly) trade data over a 25-year period (January 2000 to December 2024). The research design is descriptive-analytical: it measures concentration trends, decomposes their drivers, tests for Granger-causal relationships with oil prices and benchmarks findings against two regional comparators. This design was chosen because the research question, how has import source concentration evolved and what drives it, requires temporal depth, high frequency and multi-measure robustness rather than experimental or quasi-experimental inference.

## Setting

Kuwait is one of six GCC member states, situated at the north-western corner of the Persian Gulf. With a gross domestic product (GDP) of approximately USD 160 billion (2023), a population of 4.9 million (of whom approximately 70% are expatriates) and oil exports accounting for roughly 90% of government revenue, Kuwait represents an extreme case of resource dependence (IMF 2025). The country has virtually no domestic food production, with agricultural land constituting less than 1% of total area, and limited manufacturing capacity, making it one of the most import-dependent economies globally. This structural profile makes Kuwait an ideal setting for studying import source concentration as a supply chain risk phenomenon: the economy cannot substitute imports with domestic production, so any concentration in import sources translates directly into supply chain vulnerability. Kuwait's port infrastructure is dominated by the Shuwaikh and Shuaiba commercial ports, with the planned Mubarak Al-Kabeer port intended to expand logistics capacity and potentially establish Kuwait as a regional trade hub. Saudi Arabia (GDP approximately USD 1.1 trillion, population 36 million) and the UAE (GDP approximately USD 500 billion, population 10 million) serve as regional benchmarks, sharing Kuwait's GCC membership, oil dependence and high import reliance but differing in economic scale and logistics infrastructure (IMF 2025; eds. Seznec & Kirk 2011). Kuwait's reform efforts,

including energy subsidy restructuring and attempts to develop non-oil revenue sources, have had a limited impact on structural diversification (Shehabi 2020). Cross-country panel evidence further indicates that energy-import dependency erodes macroeconomic resilience in emerging economies, reinforcing the case for diversification along both export and import dimensions (Sahu & Mahalik 2026).

## Data collection

The primary dataset was obtained from the IMF DOTS, accessed via the IMF Data Portal (https://data.imf.org). Direction of Trade Statistics (DOTS) provides monthly bilateral import values on a cost, insurance and freight (CIF) basis in current US dollars for Kuwait from 217 partner countries, covering January 2000 to December 2024. The dataset yields 50 709 bilateral-month pairs with positive trade values. Identical DOTS data were obtained for Saudi Arabia (49 707 observations) and the UAE (53 161 observations) to enable benchmarking. Monthly Brent crude spot price data were obtained from the US Federal Reserve Economic Data (FRED) database (https://fred.stlouisfed.org) to serve as the oil price variable. All data are publicly available and were accessed in January 2025 (FRED 2025; IMF 2025).

## Data analysis

Four categories of analysis were conducted. *Firstly*, import concentration was measured monthly using the following complementary indices:

- **The Herfindahl–Hirschman Index:** $HHI = \Sigma_i s_i^2 \times 10\,000$, where $s_i$ is partner i''s share of total monthly imports. The Herfindahl-Hirschman Index ranges from near zero (perfectly dispersed) to 10 000 (single source), with higher values indicating greater concentration.
- **Concentration ratios:** CR4 and CR10 represent the combined import share of the top four and top ten partner countries, respectively.
- **The Theil Entropy Index:** $T = \Sigma_i s_i \ln(s_i/\bar{s})$, where $\bar{s}$ is the mean share. Higher values indicate greater concentration (Theil 1967).

Secondly, the Herfindahl–Hirschman Index was decomposed following the methodology of Cadot et al. (2011): HHI_all represents the full index, HHI_nochina is computed excluding China and China's contribution is defined as HHI_all minus HHI_nochina. This decomposition isolates how much of the observed concentration is attributable to China's growing share versus broader structural shifts in the composition of Kuwait's import supply base. The decomposition is analytically important because policy responses differ depending on whether concentration is driven by a single dominant partner, which would require bilateral diversification measures, or by a general narrowing of the supply base, which would require systemic trade facilitation reforms.

*Thirdly*, structural break tests using the Chow (1960) methodology were conducted at five candidate break points, 2004 (China's World Trade Organisation accession effects), 2008 (global financial crisis), 2011 (Arab Spring), 2014 (oil price collapse) and 2020 (COVID-19 pandemic) to identify discontinuities in the concentration trend.

*Fourthly*, Granger causality testing was applied to examine whether past movements in oil prices help to predict subsequent movements in import concentration. In intuitive terms, a Granger test asks whether knowing the recent history of one variable improves the forecast of another beyond what the second variable's own past already explains. A finding of Granger causality, therefore, indicates temporal precedence and predictive content rather than structural or behavioural causation. Bivariate Granger (1969) causality tests were performed between the natural logarithm of the Brent crude oil price and China's import share, and between the oil price and HHI, at lag orders 3, 6, 9 and 12 months. Both directions were tested to assess reverse causality. Regression analysis estimated the oil price elasticity of China's import share: $China_share_t = \alpha + \beta_1 \ln(Oil_{t-k}) + \beta_2 Trend_t + \varepsilon_t$, with Newey–West standard errors (Newey & West 1987).

Displacement analysis computed annual Pearson correlation coefficients between the change in China's import share and changes in each other's partner's share, identifying which countries' import shares move inversely with China's expansion. All analyses were conducted in Python using the statsmodels and scipy libraries.

# Results

## Objective 1: Concentration trends

The first objective of this study was to measure and decompose import concentration trends across the 25-year study period

**TABLE 1:** Descriptive statistics of Kuwait's monthly bilateral import data, 2000–2024.

| Variable | Observations | Mean | Standard deviation | Minimum | Maximum |
|---|---|---|---|---|---|
| Bilateral imports (USD millions) | 50 709 | 22.40 | 91.60 | 0.001 | 2498.30 |
| Monthly HHI | 300 | 554.80 | 68.70 | 402.100 | 807.40 |
| CR4 (%) | 300 | 37.80 | 3.60 | 30.100 | 50.30 |
| CR10 (%) | 300 | 63.00 | 3.20 | 55.200 | 73.80 |
| Theil entropy index | 300 | 1.69 | 0.17 | 1.230 | 2.16 |
| Active partners per month | 300 | 160.00 | 24.00 | 98.000 | 206.00 |
| China import share (%) | 300 | 12.80 | 4.70 | 2.100 | 22.60 |
| Brent crude oil price (USD per barrel) | 300 | 71.20 | 28.90 | 19.300 | 132.70 |

*Source*: Adapted from International Monetary Fund (IMF), 2025, *Direction of trade statistics*, viewed 10 January 2025, from https://data.imf.org
HHI, Herfindahl–Hirschman Index; CR, concentration ratios.

using multiple indices. Table 1 presents the descriptive statistics for Kuwait's monthly bilateral import data over the 2000–2024 study period. The dataset encompasses 50709 bilateral-month observations with positive trade values from 217 partner countries, with a mean monthly bilateral import value of USD 22.4 million (standard deviation: USD 91.6 million), reflecting the highly skewed distribution typical of bilateral trade data. The monthly HHI averaged 554.8 (standard deviation: 68.7), with values ranging from 402.1 to 807.4. The number of active trading partners per month averaged 160, with a minimum of 98 during the 2003 Iraq War period and a maximum of 206 in 2019.

Table 1 should be read row by row. The first row reports that the dataset comprises 50709 bilateral-month observations of positive trade values, with a mean monthly bilateral import value of USD 22.4 million and a standard deviation of USD 91.6 million. The wide dispersion (a minimum of approximately USD 1000 and a maximum of USD 2.5 billion) reflects the well-known skew in bilateral trade flows, in which a small number of partners account for a disproportionate share of total imports. The next four rows summarise the four concentration measures across the 300 monthly observations: HHI averages 554.8 (ranging from 402 to 807), CR4 averages 37.8% (ranging from 30% to 50%), CR10 averages 63.0% and the Theil entropy index averages 1.69. The remaining rows describe the supply network and the oil-price environment: an average of 160 active partner countries per month, China's import share averaging 12.8% with a maximum of 22.6% and a Brent crude oil price averaging USD 71.2 per barrel with a range of roughly USD 19 to USD 133 over the period. Together, these statistics establish the variability that the subsequent trend, decomposition and causality analyses exploit.

Figure 1 displays the monthly HHI trajectory for Kuwait over the study period. Import concentration increased substantially from an HHI of 468 in January 2000 to 687 in December 2024, representing a 47% rise. The 12-month moving average reveals a clear upward trend punctuated by cyclical fluctuations that track oil price movements. All four concentration measures confirm this trajectory: CR4 rose from 34.3% to 43.9%, CR10 from 59.4% to 66.1% and the Theil entropy index from 1.53 to 1.83 over the same period.

Figure 1a shows the monthly HHI for Kuwait's imports between 2000 and 2024, together with a 12-month moving average that smooths short-term volatility and isolates the underlying trend. The series moves persistently upward, with brief downward episodes coinciding with the 2008–2009 global financial crisis, the 2014–2016 oil price collapse and the 2020 pandemic shock. Figure 1b decomposes the index into the contribution attributable to China and the contribution attributable to all other partners, making clear that the bulk of the rise after 2010 is driven by the China component rather than by a uniform narrowing across remaining suppliers.

Table 2 reports the linear trend estimates with Newey–West standard errors. The monthly HHI trend coefficient is 0.745 ($p < 0.001$), equivalent to an annual increase of 8.94 HHI points. All four concentration measures exhibit statistically significant upward trends at the 1% level. The Augmented Dickey–Fuller test (Dickey & Fuller 1979) statistic for the HHI series is −1.27 ($p = 0.84$), confirming the presence of a unit root and indicating that the concentration trend is stochastic rather than deterministic; the series does not revert to a stable mean.

The HHI decomposition shown in Figure 1 disentangles China's contribution to overall concentration. In 2000,

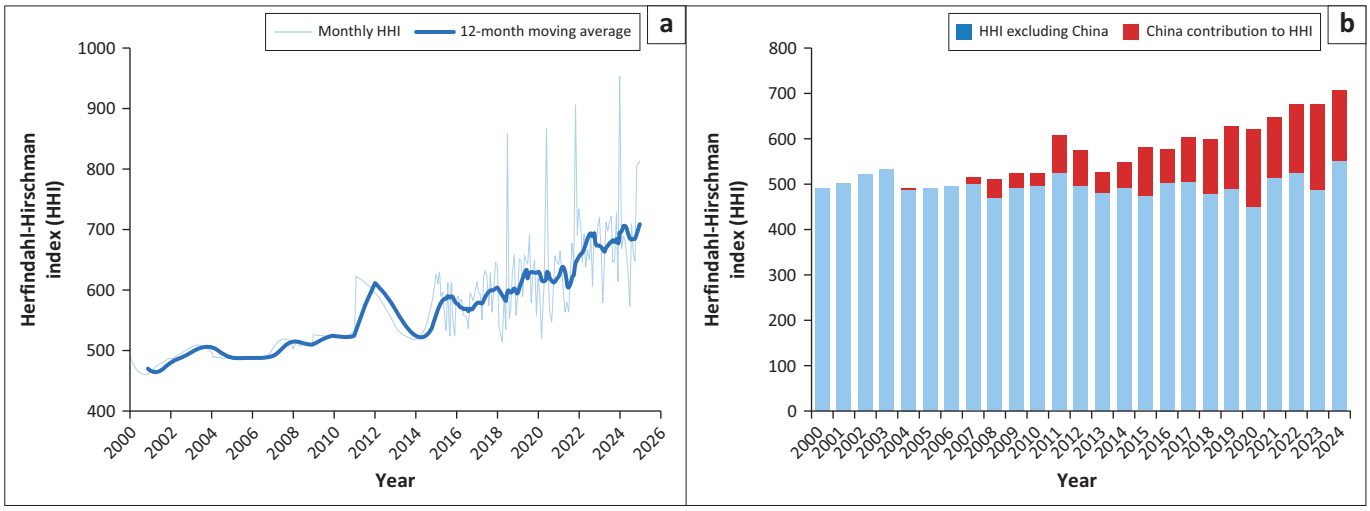
**TABLE 2:** Linear trend estimates for import concentration measures, 2000–2024.

| Measure | Monthly trend ($\beta$) | Annual equivalent | Standard error | $p$ |
|---|---|---|---|---|
| HHI | 0.745 | 8.940 | 0.073 | < 0.001* |
| CR4 (%) | 0.028 | 0.330 | 0.003 | < 0.001* |
| CR10 (%) | 0.017 | 0.200 | 0.003 | < 0.001* |
| Theil index | 0.001 | 0.009 | 0.000 | < 0.001* |

Note: Newey–West heteroskedasticity and autocorrelation consistent standard errors with 12-lag bandwidth.

HHI, Herfindahl–Hirschman Index; CR, concentration ratio.

*, $p < 0.01$.




*Source*: Adapted from International Monetary Fund (IMF), 2025, *Direction of trade statistics*, viewed 10 January 2025, from https://data.imf.org

**FIGURE 1:** (a) Monthly import concentration (Herfindahl–Hirschman Index) for Kuwait, 2000–2024, with 12-month moving average and (b) HHI decomposition showing China's contribution versus the rest of the world.

China's contribution to HHI was −22 points; its small and diversifying presence actually reduced overall concentration marginally. By 2024, China's contribution had risen to +155 points, accounting for approximately 70% of the total HHI increase. However, the HHI computed excluding China also rose from 491 to 552 over the period, indicating that concentration is increasing beyond China, driven in part by the UAE's growing share as a re-export hub.

## Objective 2: Displacement of traditional suppliers

Figure 2 traces the import share trajectories of Kuwait's seven largest trading partners. China's share rose from 3.7% in 2000 to 18.0% in 2024, an increase of 14.3 percentage points, representing the single largest bilateral shift in Kuwait's import profile over the study period. The UAE's share rose from 5.1% to 11.7% (+6.6 percentage points), driven by its expanding role as a regional re-export and logistics hub (Hvidt 2013). Japan, historically Kuwait's dominant import partner, declined from 9.6% to 7.7% (−1.9 percentage points), while the United States fell from 12.8% to 7.3% (−5.5 percentage points).

Table 3 reports Kuwait's top 15 import partners by 2024 share, together with their corresponding 2000 shares and the percentage-point change, providing a fuller picture of the import basket beyond China. Table 3 makes clear that although China is the single largest partner, the United Arab Emirates, Saudi Arabia, the United States, Japan, India, the Republic of Korea and several European economies continue to supply material volumes. Concentration has therefore risen at the top of the distribution, with no single partner dominating outside China, and the remaining shares are distributed across a broad set of regional and extra-regional suppliers.

Displacement correlation analysis identifies the partners most strongly displaced by China's rise. Germany exhibits the strongest inverse correlation ($r$ = −0.79), followed by Australia ($r$ = −0.60), the United Kingdom ($r$ = −0.56) and Italy ($r$ = −0.49). These findings indicate that China has predominantly displaced European and traditional Western suppliers rather than Asian or regional partners.

Figure 2 presents the geographic recomposition by region. Europe's aggregate import share declined from 25.4% to 16.1% (−9.3 percentage points), while the Americas fell from 13.2% to 7.5% (−5.7 percentage points). East and South Asia rose from 24.0% to 32.8% (+8.8 percentage points), and the GCC/Middle East and North Africa (MENA) region rose from 10.6% to 19.3% (+8.7 percentage points). The extensive margin, the number of active trading partners, expanded from 150 in 2000 to a peak of 206 in 2019, before contracting to 178 in 2024, suggesting that the post-pandemic period has seen both intensive concentration (rising shares for

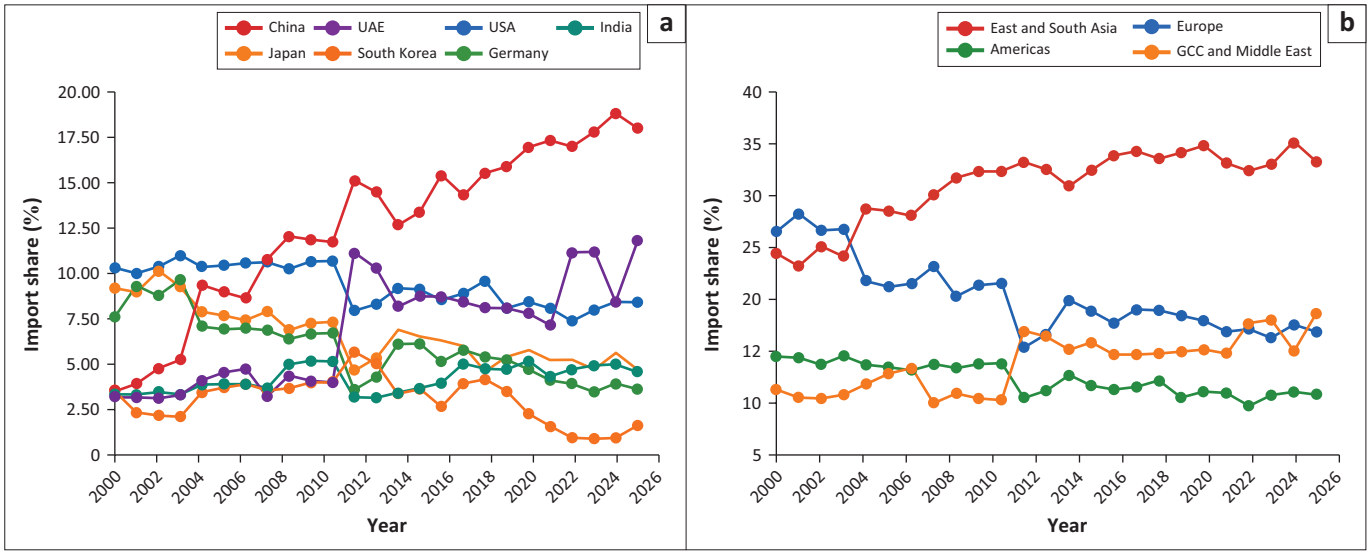
**TABLE 3:** Kuwait's top 15 import partners, share comparison 2000 versus 2024.

| Rank | Partner country | Region | Share (%) | | Change (pp) |
|---|---|---|---|---|---|
| | | | 2024 | 2000 | |
| 1 | China | East Asia | 18.0 | 3.7 | +14.3 |
| 2 | United Arab Emirates | GCC | 11.7 | 5.1 | +6.6 |
| 3 | Saudi Arabia | GCC | 7.9 | 5.4 | +2.5 |
| 4 | Japan | East Asia | 7.7 | 9.6 | -1.9 |
| 5 | United States | Americas | 7.3 | 12.8 | -5.5 |
| 6 | India | South Asia | 5.4 | 4.0 | +1.4 |
| 7 | Germany | Europe | 4.5 | 7.1 | -2.6 |
| 8 | Republic of Korea | East Asia | 3.4 | 2.6 | +0.8 |
| 9 | Italy | Europe | 2.9 | 4.6 | -1.7 |
| 10 | United Kingdom | Europe | 2.6 | 4.4 | -1.8 |
| 11 | France | Europe | 2.3 | 3.2 | -0.9 |
| 12 | Turkey | Europe and MENA | 2.1 | 0.9 | +1.2 |
| 13 | Switzerland | Europe | 1.8 | 1.7 | +0.1 |
| 14 | Netherlands | Europe | 1.5 | 2.0 | -0.5 |
| 15 | Australia | Oceania | 1.4 | 2.6 | -1.2 |

*Source*: Adapted from International Monetary Fund (IMF), 2025, *Direction of trade statistics*, viewed 10 January 2025, from https://data.imf.org

Note: Shares are calculated from monthly bilateral imports aggregated to the calendar year. Partners outside the top 15 in 2024 are omitted.

MENA, Middle East and North Africa.




*Source*: Adapted from International Monetary Fund (IMF), 2025, *Direction of trade statistics*, viewed 10 January 2025, from https://data.imf.org

GCC, Gulf Cooperation Council; UAE, United Arab Emirates; USA, United States of America.

**FIGURE 2:** (a) Import share trajectories of Kuwait's top seven trading partners, 2000–2024; (b) Regional import share shift by geographic grouping.

top partners) and extensive contraction (exit of marginal partners).

## Objective 3: Oil price channel

The third objective examined whether oil revenue dynamics drive import concentration patterns. Table 4 reports the Granger causality test results. Oil prices Granger-cause China's import share at all tested lag orders: the F-statistics are 8.816 ($p < 0.001$) at 3 months, 5.503 ($p < 0.001$) at 6 months and 2.868 ($p = 0.001$) at 12 months. The reverse direction, China's share Granger-causing oil prices, is insignificant at all lags ($p$-values ranging from 0.251 to 0.821). Oil prices also Granger-cause the aggregate HHI at all lags ($F = 7.933$, $p < 0.001$ at 3 months). This asymmetric pattern supports the interpretation that oil revenue dynamics drive import concentration rather than the reverse.

Table 5 reports the oil price regression results. A 1% increase in the Brent crude oil price is associated with a 1.78 percentage point increase in China's import share at the contemporaneous level (standard error: 0.530, $p = 0.001$), controlling for a linear time trend. This elasticity is robust across lag specifications: the coefficient ranges from 1.670 (3-month lag) to 1.909 (6-month lag), all significant at the 1% level. The time trend coefficient is also significant and positive (approximately 0.044 per month, $p < 0.001$), indicating that China's share rises independently of oil price fluctuations, consistent with secular shifts in global manufacturing competitiveness. The combined interpretation is that oil revenue booms fund infrastructure and consumption spending that disproportionately benefits China as the most price competitive and logistically accessible supplier of construction materials, machinery, consumer electronics and vehicles.

This mechanism is consistent with the procurement convenience hypothesis outlined in the conceptual framework: Under conditions of surging demand driven by oil revenue, procurement agents in both the public and private sectors default to the supplier offering the most competitive combination of price, variety and delivery speed, which is increasingly China across virtually all non-specialised import categories.

## Objective 4: Gulf Cooperation Council benchmarking

The fourth objective benchmarked Kuwait against Saudi Arabia and the UAE to determine whether the observed concentration is Kuwait specific or a broader regional trend. Figure 3 compares the HHI trajectories across Kuwait, Saudi Arabia and the UAE from 2000 to 2024. All three GCC economies exhibit rising import concentration, confirming that the trend is not Kuwait specific. However, the magnitude differs substantially: Kuwait's HHI grew by 47% (from 468 to 687), Saudi Arabia's by 13% (from 505 to 571) and the UAE's by 9% (from 523 to 570). Kuwait thus exhibits the

**TABLE 4:** Granger causality tests and oil price regression results: Panel A – Granger causality tests.

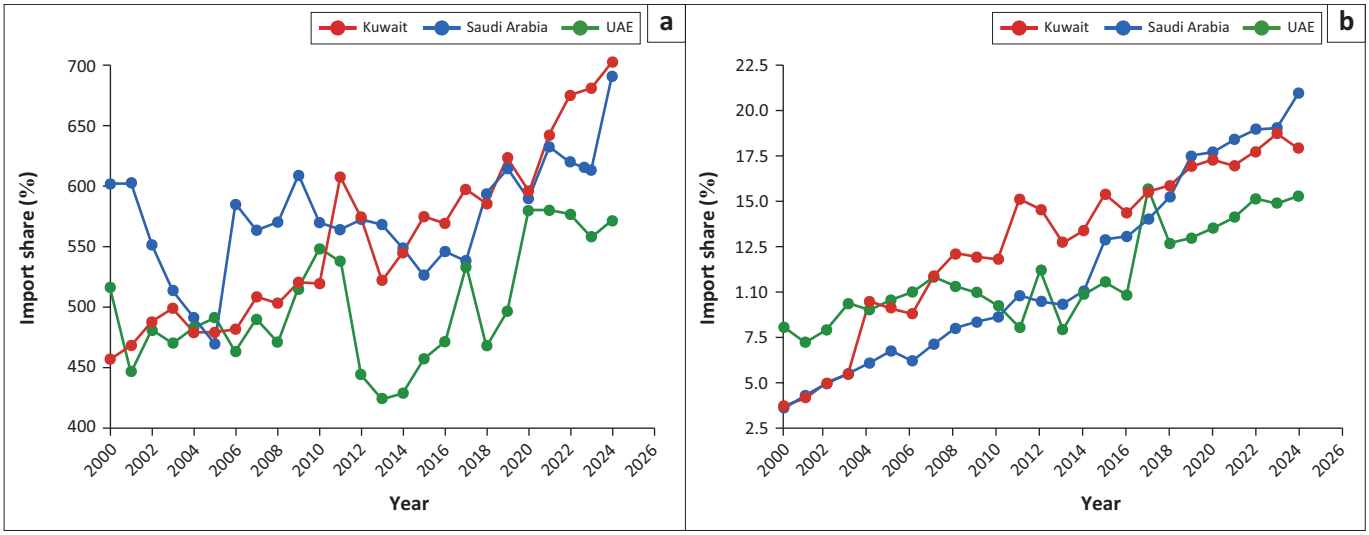
| Direction | Lag 3 | | Lag 6 | | Lag 12 | |
|---|---|---|---|---|---|---|
| | *F* | *p*-value | *F* | *p*-value | *F* | *p*-value |
| Oil price → China share | 8.816 | < 0.001* | 5.503 | < 0.001* | 2.868 | 0.001* |
| China share → Oil price | 1.161 | 0.325 | 1.314 | 0.251 | 0.624 | 0.821 |
| Oil price → HHI | 7.933 | < 0.001* | 5.259 | < 0.001* | 2.418 | 0.006* |

Note: Panel A reports Granger causality $F$-statistics.
*, $p < 0.01$.

**TABLE 5:** Granger causality tests and oil price regression results: Panel B – Oil price regression.

| Specification | β (oil price) | Standard error | *p*-value | Time trend β |
|---|---|---|---|---|
| Contemporaneous (k = 0) | 1.780 | 0.530 | 0.001* | 0.044* |
| 3-month lag (k = 3) | 1.670 | 0.540 | 0.002* | 0.044* |
| 6-month lag (k = 6) | 1.909 | 0.560 | 0.001* | 0.043* |
| 12-month lag (k = 12) | 1.752 | 0.610 | 0.004* | 0.044* |

Note: Dependent variable: China's import share, percentage points. Panel B reports OLS with Newey–West standard errors (12-lag bandwidth).
*, $p < 0.01$.




*Source*: Adapted from International Monetary Fund (IMF), 2025, *Direction of trade statistics*, viewed 10 January 2025, from https://data.imf.org
GCC, Gulf Cooperation Council; UAE, United Arab Emirates.

**FIGURE 3:** (a) Import concentration (HHI) comparison across Kuwait, Saudi Arabia and the United Arab Emirates, 2000–2024; (b) China's import share comparison across the three Gulf Cooperation Council economies.

fastest rate of import concentration among the three benchmarked economies.

Figure 3 compares China's import share across the three economies. Saudi Arabia has actually overtaken Kuwait in China dependence, reaching 21.0% in 2024 compared with Kuwait's 18.0%, having started at a near-identical level (3.6% vs. 3.7% in 2000). Saudi Arabia's higher China share likely reflects its larger construction sector and mega-project pipeline, which generate substantial demand for Chinese-manufactured building materials, steel and industrial machinery. The UAE shows the lowest China dependence (15.3% in 2024) and the lowest HHI, consistent with its logistics hub model that naturally diversifies import sources by attracting re-export flows from a broad partner base. The UAE also maintains the highest number of active trading partners (214 on average), reinforcing the diversification benefits of hub logistics infrastructure. The gap between Kuwait and Saudi Arabia in China's import share has reversed: Kuwait led by approximately 5 percentage points during 2010–2015, but Saudi Arabia now leads by 3 percentage points, with the gap narrowing at −0.12 percentage points per year ($p = 0.053$).

## Robustness checks

A comprehensive set of robustness checks was conducted to verify the stability of the primary findings. Table 6 summarises seven robustness checks. All primary findings, rising concentration, China as the dominant driver, oil price Granger-causality and the accelerating trend, are robust to: (1) alternative concentration measures (CR4, CR10, Theil), all confirming upward trends at $p < 0.001$; (2) exclusion of the UAE to remove entrepôt re-export effects, which actually strengthens the results (HHI from 491 to 723; China share from 3.9% to 20.5%); (3) Chow structural break tests at five candidate dates, all significant at $p < 0.001$ with the strongest break at the 2014 oil price collapse ($F = 12.78$); (4) sub-period stability, with positive and accelerating trends in all four sub-periods; (5) oil lag sensitivity, with Granger-causality significant at all tested lags (0, 3, 6 and 12 months); (6) reverse causality tests, confirming that China's share does not Granger-cause oil prices at any lag and (7) GCC benchmarking, confirming that all three economies are concentrating but Kuwait at the fastest rate.

**TABLE 6:** Summary of robustness checks.

| Check | Specification | Result | Verdict |
|---|---|---|---|
| Alternative measures | CR4, CR10, Theil entropy | All trend upward, $p < 0.001$ | Confirmed |
| Exclude UAE | Remove entrepôt re-exports | HHI: 491 → 723; China: 3.9% → 20.5% | Confirmed |
| Structural breaks | Chow tests at 5 candidate dates | All significant ($p < 0.001$); strongest at 2014 ($F = 12.78$) | Break at 2014 |
| Sub-period stability | Four sub-periods | Positive trend in all; accelerating (+ 4.0 to + 20.2/year) | Confirmed |
| Oil lag sensitivity | 0, 3, 6 and 12-month lags | Oil → China shares significant at all lags | Confirmed |
| Reverse causality | China share → Oil price | Insignificant at all lags ($p = 0.25$–$0.82$) | No reverse |
| GCC benchmark | Kuwait vs Saudi Arabia vs UAE | All three concentrating; Kuwait fastest (+ 47%) | Not Kuwait specific |

GCC, Gulf Cooperation Council; UAE, United Arab Emirates; CR, Concentration ratio.

# Discussion

## Key findings

This study provides a high-frequency empirical characterisation of import supply base concentration in a GCC economy. The principal finding is that Kuwait's import supply base has concentrated substantially over the 25-year study period, with the HHI increasing by 47% (from 468 to 687), China's import share rising from 3.7% to 18.0%, and the concentration trend accelerating fivefold across the four sub-periods. The concentration is structurally linked to oil price dynamics, as demonstrated by asymmetric Granger causality running from oil prices to China's import share ($p < 0.001$ at all tested lags) but not in the reverse direction. Traditional European and North American suppliers have been systematically displaced, with Europe's aggregate share declining by 9.3 percentage points and the Americas' by 5.7 percentage points.

## Discussion of key findings

The HHI increased from 468 to 687, indicating a rise in market concentration. However, the Kuwaiti market remains well within the 'unconcentrated' category under the 2010 U.S. Department of Justice and FTC Horizontal Merger Guidelines. While these thresholds were designed for industrial market concentration, the adaptation to national import concentration provides a useful interpretive benchmark. An HHI of 687 implies that Kuwait's import portfolio is equivalent to one dominated by approximately 15 equal-sized partners, a significant narrowing from the roughly 21 implied by the initial HHI of 468. The direction and acceleration of this trend are unambiguous.

The acceleration of the concentration trend is itself a significant finding. If concentration were merely increasing at a constant rate, the policy response could be gradual and incremental. The observed fivefold acceleration instead suggests that the process is self-reinforcing: As China's share grows, the infrastructure, relationships and logistics pathways supporting trade develop further, making it progressively easier and cheaper to source from China and progressively harder to maintain viable alternative supply corridors. This positive feedback dynamic implies that delayed policy intervention will face increasingly steep reversal costs.

The oil price–China shares Granger causality is the study's most robust econometric finding and its most novel contribution. It suggests a 'procurement convenience' mechanism: during oil revenue booms, the volume of imports surges as government capital expenditure and private consumption increase simultaneously. Under these conditions, procurement gravitates towards the most price-competitive and logistically efficient source, overwhelmingly China, which offers competitive pricing across virtually every import category from construction steel to consumer electronics. This is consistent with

behavioural supply chain theory: Carter et al. (2007) demonstrated that under conditions of complexity and time pressure, supply chain managers default to satisficing strategies rather than optimal diversification. When this mechanism operates at the national scale over repeated oil cycles, the cumulative effect is structural import concentration.

The displacement of European suppliers by China mirrors findings in other contexts. Autor, Dorn and Hanson (2013) documented the 'China syndrome', the displacement of domestic manufacturing in the United States by Chinese imports and their subsequent analysis confirmed that these trade-induced labour market effects persisted for nearly a decade after the shock plateaued (Autor, Dorn & Hanson 2021); the mechanism identified here operates in import markets rather than in domestic production. For Kuwait, this displacement carries implications beyond market share percentages. Decades of trading relationships with European suppliers have established quality certification frameworks, after-sales service networks, spare parts inventories, technical training partnerships and regulatory alignment with European standards, institutional capital that cannot be rapidly reconstructed once eroded. Ivanov and Dolgui (2021) have emphasised that supply chain resilience depends not only on the theoretical availability of alternative suppliers but also on the pre-existence of operational relationships with those suppliers; the subsequent viable supply chain model (Ivanov 2022) integrates agility, resilience and sustainability as complementary dimensions of supply chain viability, a framework with direct implications for structurally import-dependent economies. When a European supplier's share of Kuwait's market falls below the threshold at which maintaining a regional sales office, warehouse or service centre is commercially viable, the supplier exits and with it disappears an option for rapid sourcing diversification in a crisis. This 'option value' of maintaining diversified supplier relationships is a dimension of supply chain risk that aggregate concentration measures do not fully capture. Baldwin and Freeman (2022) argue that exposure to foreign shocks in global supply chains is substantially higher than direct trade indicators suggest, precisely because of these interdependencies between trading relationships and logistics infrastructure.

The UAE's lower concentration despite higher absolute import volumes supports the argument that logistics hub development and re-export infrastructure create structural import diversification. The UAE's role as the region's primary trade hub means that goods from diverse origins pass through its ports and free zones, naturally broadening its recorded import base. This finding has direct implications for Kuwait's Mubarak Al-Kabeer port development project and its aspirations to develop a logistics hub role under Vision 2035 (eds. Seznec & Kirk 2011). Dolgui and Ivanov (2021) have argued that supply chain network topology fundamentally determines vulnerability to disruption cascades; the UAE's hub topology appears inherently more resilient than Kuwait's linear import structure.

## Strengths and limitations

This study offers four principal strengths. Firstly, it provides a monthly frequency for a GCC trade concentration analysis, with 50709 observations, enabling the identification of short-run dynamics and cyclical patterns that are invisible in annual data. Secondly, the 25-year coverage (2000–2024) spans multiple oil price cycles, geopolitical events and structural shifts, enabling robust long-run trend identification. Thirdly, the comprehensive robustness framework, with seven distinct checks including alternative measures, structural breaks, reverse causality and regional benchmarking, substantially increases confidence in the findings. Fourthly, the conceptual framing bridges the supply chain risk literature and the trade dependency challenges of resource-based economies, a connection that has been largely absent from both literatures.

Four limitations should be acknowledged. Firstly, DOTS data are aggregated at the country level and do not distinguish commodity categories; consequently, the analysis cannot determine whether concentration is driven by specific product types such as machinery, food or vehicles or is distributed uniformly across import categories. Product-level analysis using UN Comtrade data at the Harmonised System 6-digit level would complement the present findings. Secondly, the study is descriptive-analytical rather than structurally causal.

While Granger causality is informative about temporal precedence, it does not establish structural causation; the oil–China relationship could reflect confounding factors such as global commodity demand cycles. Thirdly, UAE re-export intermediation means that some imports recorded as 'from the UAE' were originally sourced from China or other countries, which could understate true China dependence and overstate UAE dependence. The robustness check excluding the UAE partially addresses this, but a definitive resolution would require transit trade data not available in DOTS. Fourthly, the study examines only one GCC economy in depth; while Saudi Arabia and the UAE serve as benchmarks, a comprehensive six-country GCC analysis would strengthen the generalisability of the findings.

## Implications and recommendations

For supply chain policymakers, Kuwait's import supply base concentration is a measurable and growing risk that warrants policy intervention. A systematic import source diversification strategy, analogous to firm-level supply base management as articulated by Choi and Krause (2006), should be considered. Specific measures could include preferential trade agreements with underrepresented supplier nations (African Union states, South American economies), requirements for public procurement to maintain minimum supplier diversity thresholds and investment in trade facilitation infrastructure with emerging market partners. Frankel (2012) has argued

that resource-dependent economies must adopt counter-cyclical policies to mitigate distortions caused by commodity price volatility; this argument is extended here to the import sourcing domain. The trade-concentration patterns documented here are consistent with the broader export-diversification literature, which identifies oil dependence as a structural driver of trade concentration in resource-rich economies (Agosin et al. 2012; Parteka & Tamberi 2013).

Several broader developments are consistent with the reorientation of Kuwait's supply base towards Asia and away from traditional Western partners. China's expanding economic footprint in the Gulf has coincided with lower transaction costs for Chinese suppliers, and successive bilateral agreements have institutionalised trade-facilitation, investment and currency-cooperation channels (Chaziza 2025; Fulton 2019). The 2017 GCC diplomatic episode disrupted intra-regional trade and accelerated diversification towards extra-regional partners (Ulrichsen 2020). Geopolitical alignment between trading partners reinforces their trade ties, with security and alliance relationships measurably raising the probability of bilateral trade agreements (Eichengreen, Mehl & Chițu 2021); the Gulf's deepening strategic engagement with China is therefore consistent with its reorientation towards Chinese suppliers. While firm-level studies have documented supplier-based diversification as a typical response to geopolitical risk (Zhu et al. 2025), the country-level pattern observed here reflects offsetting structural and bilateral factors. Together, these developments help explain why the acceleration of concentration has been steepest in the post-2017 sub-periods, even after controlling for oil-price effects.

For supply chain practitioners, firms operating in Kuwait should recognise that their individual supply chains are embedded within a nationally concentrated import system. Firm-level diversification may be insufficient if the national logistics infrastructure, shipping routes, port berth allocations, customs clearance procedures, banking relationships and trade finance arrangements are increasingly oriented towards a single dominant supplier corridor. When 18% of a nation's imports flow through one bilateral channel, that channel develops economies of scale in logistics, financing and customs processing, making it progressively cheaper relative to alternatives, creating a self-reinforcing concentration dynamic (Belhadi et al. 2021). This represents a systemic risk, analogous to the systemic risk concept in financial markets (Bode & Wagner 2015), that individual firms cannot fully mitigate independently.

For researchers, this study demonstrates that supply base management concepts developed at the firm level can be meaningfully applied at the national level using high-frequency trade data. The methodological approach, monthly DOTS data combined with HHI decomposition, Newey–West trend estimation, Granger causality and regional benchmarking, is transferable to any trade-dependent economy. The finding that oil prices Granger-cause import concentration opens a new research avenue linking the resource curse literature with supply chain risk management (Pournader et al. 2020).

## Conclusion

This study has provided a comprehensive, high-frequency empirical analysis of import supply base concentration in a GCC economy. Kuwait's import supply base has concentrated substantially over the 25-year period from 2000 to 2024, with China emerging as the dominant import partner by a considerable margin. The accelerating trend documented in the results section is robust across four alternative concentration measures, seven robustness checks, multiple estimation approaches and four sub-periods.

The study's central empirical contribution is the demonstration that oil price dynamics Granger-cause import concentration through a 'procurement convenience' channel. When oil revenues rise, import volumes surge and procurement concentrates on the most price-competitive source, predominantly China. This mechanism operates asymmetrically: oil prices drive China's import share, but China's share does not drive oil prices. The displacement of traditional European and North American suppliers by China is extensive, with Germany, the United Kingdom, Australia and the United States all exhibiting significant inverse correlations with China's share trajectory.

This concentration represents a supply chain risk that has not previously been quantified for Kuwait or the broader GCC region. Unlike manufacturing economies that can partially substitute imports with domestic production, Kuwait's negligible manufacturing base means that import source concentration translates directly into supply chain vulnerability without a buffer. The COVID-19 pandemic and the 2017 Gulf diplomatic crisis have demonstrated that such vulnerabilities can materialise into acute disruptions with limited warning.

Five specific policy actions follow directly from the analysis. Firstly, targeted bilateral trade agreements should be pursued with under-represented but capable supplier economies, particularly Brazil for agricultural commodities and proteins, India and Vietnam for pharmaceuticals and consumer goods and Turkey for construction materials and intermediate manufactures. Secondly, public procurement rules for state agencies and state-owned enterprises should incorporate a supplier-diversity threshold, capping the single-country share of any major contract category at a level consistent with international supply chain resilience benchmarks. Thirdly, strategic reserves for food and pharmaceuticals should be calibrated against partner-concentration metrics, with reserve days of cover increasing as the share of any single supplier rises beyond defined trigger points. Fourthly, the Mubarak Al-Kabeer port project should be positioned not only as a national gateway but as a regional re-export and trans-shipment hub, which would broaden the effective supplier base by allowing Kuwait to source intermediated

through third-country logistics nodes. Fifthly, a national concentration monitoring dashboard, maintained by the Central Statistical Bureau or the Public Authority for Industry, should publish quarterly partner-share and HHI statistics so that policy reviews can act on real-time indicators rather than retrospective annual data.

The food import channel deserves particular attention, as Kuwait sources virtually all of its food requirements from abroad, and the available country-level data do not permit a direct decomposition by commodity category. Although the analysis cannot identify which partners supply which products, the rising share of regional partners such as the United Arab Emirates and Saudi Arabia in Kuwait's overall imports is consistent with their role as trans-shipment hubs for food and consumer goods, while Brazil, India and Australia remain prominent suppliers of grains, proteins and dairy. Concentration in the global industrial food system is itself a structural source of food security risk, particularly for import-dependent economies (Clapp 2023). Concentration at the partner level, therefore, has direct implications for food security even where product-level disaggregation is unavailable, and a product-level extension of this study is identified in the future research agenda as a priority next step.

Future research should pursue four extensions. Firstly, disaggregation by commodity category, food, machinery, consumer goods, construction materials and pharmaceuticals, would identify which supply chains are most concentrated and therefore most vulnerable. Food imports are of particular concern given Kuwait's negligible domestic agricultural production and the strategic importance of food security. Secondly, the methodology should be extended to all six GCC economies at a quarterly frequency to assess whether the patterns observed in Kuwait are representative of the broader region and to examine whether intra-GCC trade agreements and the customs union have influenced import concentration patterns. Thirdly, a formal supply chain risk model that integrates import concentration metrics with logistics capacity data, national strategic reserve holdings and inventory buffer estimates would provide an operational tool for policymakers seeking to manage import supply base risk. Fourthly, qualitative research engaging procurement decision-makers in Kuwaiti government agencies and private sector firms would test the procurement convenience mechanism identified in this study and could identify institutional and behavioural barriers to import source diversification.

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### CRediT authorship contribution

Abdulaziz Alshlafan: Conceptualisation, Data curation, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. The author confirms that this work is entirely their own, has reviewed the article, approved the final version for submission and publication and takes full responsibility for the integrity of its findings.

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This article followed all ethical standards for research without direct contact with human or animal subjects.

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### Data availability

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