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Wealth Without Stability: Oil Revenue Volatility and the Limits of Saudi Fiscal Diversification, 1980–2000

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Abstract: This paper argues that the central problem between 1980 and 2000 was not oil wealth itself, but oil revenue volatility and the fiscal choices it induced. It examines the post-1981 contraction, the 1986 price collapse, and the 1998 crash through a mixed-methods approach combining econometric analysis with archival evidence. A five-year rolling volatility variable is constructed from annual changes in petroleum export revenues and then tested using time-series OLS, sector-year panel regressions, and an interaction model measuring fiscal oil dependence. The results show that volatility damaged non-oil activity broadly rather than producing the tradable vs. non-tradable divergence predicted by standard Dutch Disease theory. The fiscal interaction is negative in the predicted direction for manufacturing, although the econometric evidence is suggestive rather than independently conclusive. Saudi Arabian Monetary Agency reports, Five-Year Development Plans, and IMF consultations clarify the mechanism: across all three crises, the state protected current expenditures while cutting development, infrastructure, subsidized credit, and industrial support more deeply. These repeated allocation decisions weakened the sectors on which diversification depended and compounded the effects of successive revenue shocks. The Saudi resource curse, therefore, emerged not mechanically from resource abundance but from recurring fiscal choices under pressure, demonstrating how revenue volatility and spending composition reshaped the kingdom's economic trajectory.

Author keywords: Resource curse; oil revenue volatility; Saudi Arabia; fiscal policy; Dutch Disease

Introduction

During the late twentieth century, oilexporting countries experienced a paradoxical position with respect to the global economy. Oil wealth allowed for fiscal capacity, provided funding for development, and cushioned against global macroeconomic downturns. However, many oil-rich states experienced a contrary effect, suffering from economic instability, stagnation, and inflation during a period when global oil markets expanded and became more integrated. This contradiction, known as the "Resource Curse," refers to the failure of many resource-rich countries to benefit fully from their natural resource wealth and of governments in these countries to respond effectively to public welfare needs.

Between 1981 and 1986, Saudi Arabia's petroleum export revenues fell by more than two-thirds.[1(pp. 28–30)] The government was in a position of running sustained budget deficits after financing one of the most ambitious state-led development programs in the postwar world. Non-oil sectors also suffered during this contraction, as manufacturing output stagnated and agricultural investment plateaued. Meanwhile, the services sector absorbed a growing share of what diminished government spending remained because the state had fewer resources to allocate elsewhere. While oil prices partially recovered in the early 1990s—driven in part by the Gulf War supply disruption—the non-oil economy did not recover with them.[2,3(pp. 24–27; pp. 36–42)] This damage, in which downturns caused lasting harm that price surges failed to reverse, persisted across two decades and three distinct crisis episodes.

The analysis is organized around these three crisis episodes: the early 1980s post-boom contraction, the mid-to-late 1980s oil price collapse, and the 1990s volatility culminating in the 1998 price crash. Together, these episodes supply sufficient intra-country variation to test the thesis without relying on cross-country comparison flattening the institutional differences between states. The study employs a mixed-methods approach in which econometric regression analysis establishes correlations between revenue instability and non-oil performance. In conjunction, archival evidence from Saudi Arabian Monetary Authority (SAMA) reports, Five-Year Development Plan reviews, and IMF Article IV consultations portrays the context of these fiscal mechanisms, which the regressions cannot fully explain within a limited timeframe. Therefore, the econometric results are treated throughout as corroborating evidence within a historical argument, not as proof in themselves.

This study first argues that the relevant variable is not oil wealth but rather oil revenue volatility, defined as the degree of instability in the Saudi state's petroleum export

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earnings over time. Revenue reflects the intersection of price movements, production decisions, and the fiscal mechanisms through which the state captures petroleum rents—which are the difference between price based on value and production cost. Given that the Saudi government owned Aramco outright during the 1980–2000 period, petroleum exports serve as a proxy for government oil revenues. This paper, then, asks to what extent oil revenue produced uniform sectoral damage in Saudi Arabia between 1980 and 2000, and whether the fiscal policy of the Saudi state mediated the severity of this effect.

The paper argues that while oil revenue volatility broadly damaged Saudi Arabia's non-oil economy, the state's limited fiscal diversification was the primary mechanism through which revenue instability translated into economic decline. The econometric evidence showcases that this damage did not concentrate in tradable sectors the way the Dutch Disease framework would predict, but rather affected all non-oil sectors, with the severity of contraction depending on how concentrated in petroleum exports the Saudi economy was at the time.

Historical background

Saudi Arabia's economic structure approaching the 1980s was defined by the dependence of the state's fiscal capacity on petroleum revenues. Unlike most developing economies—in which governments finance operations through a combination of taxation, borrowing, and commodity exports—the Saudi government derived a vast majority of its income through a single state-owned enterprise: Aramco. The nationalization of Aramco was completed between 1976 and 1980, and it meant that by the start of the period of this study, Saudi Arabia did not merely tax oil production but rather owned the entire revenue stream outright.[4(pp. 631–652)] This arrangement eliminated the intermediary between global markets and the national budget. When prices rose, government revenues rose in almost direct proportion, and when they fell, the budget also contracted with equal magnitude. This is because there was no meaningful tax base, no diversified export sector, and no established tradition of domestic borrowing to cushion the impact, creating an environment of volatility.

The 1970s oil boom had given the Saudi government the resources and the ambition to transform this structure. The Second and Third Five-Year Development Plans (1975–1980 and 1980–1985) committed enormous public investment to industrialization, infrastructure, and the creation of human capital. The government built two entirely new industrial cities in Jubail and Yanbu, expanded port capacity, constructed a national road and electricity grid, and financed the establishment of petrochemical and steel manufacturing through the Saudi Arabian Basic Industries Corporation (SABIC). In fact, between 1970 and 1981, government expenditure increased more than tenfold.[5(pp. 32–34)] For context, Saudi GDP grew from approximately $15 billion in 1973 to nearly $184 billion in 1981.[6] This meant that the state spending was growing so fast that it was on pace to exceed the economy as a whole. In other words, the state believed it was priming itself for future success, despite taking significant risks in doing so.

The problem, however, was that the non-oil economy built during this period never became self-sustaining. Manufacturing firms depended on government subsidies for energy and credit. Meanwhile, agricultural expansion was extremely reliant on state financing of irrigation and price supports rather than on comparatively competitive production. The services sector, which was always the largest component of non-oil GDP, grew primarily because government employees spent their salaries domestically, not because private demand was actually generating independent economic growth. In other words, the entire non-oil economy was dependent on the government budget, and the government budget was dependent upon oil revenues. This created a chain in which any instability in petroleum export earnings would spread through the fiscal system and therefore into every non-oil sector, and while the Five-Year Plans attempted to call for diversification, the state did not have the sustained public investment to actually carry it out.

Additionally, two structural conditions exacerbated this vulnerability. First, the Saudi Riyal was pegged to the U.S. dollar throughout the period under study, which meant that the government could not use exchange rate adjustments to hedge the domestic economy against rapid price swings. As a result, when oil revenues fell, the real exchange rate remained elevated, reinforcing the economy's dependence on petroleum. Second, Saudi Arabia's role within OPEC meant that production decisions were not simply domestic. The Kingdom's absorption of production cuts to stabilize global prices meant that the Saudi output dropped from 10 million barrels per day in 1980 to under 3.5 million in 1985.[7(pp. 28–30)] As a result, Saudi revenue swings became larger than price swings alone, and is a key factor in the reasoning for volatility variable construction in the analysis.

By 1985, the structural conditions were set for the crisis that followed. The state had built an economy in which every non-oil sector depended on continued government expenditure, yet the funding for that expenditure was prone to unpredictable outcomes. Thus, the question was not whether instability would damage the non-oil economy, but how that damage would be distributed across sectors and whether the state's fiscal response would mitigate or amplify this effect.

Literature Review

The resource curse as a foundation

The claim that resource-abundant countries tend to grow more slowly than resource-poor countries made its most influential development in a 1995 working paper by Jeffrey Sachs and Andrew Warner. At the time, both authors were affiliated with the Harvard Institute for National Development, where much of the integral foundational framework on growth determinants was being produced.[8] By conducting cross-country regressions covering 1970–1990, their analysis demonstrated a negative correlation between a country's share of natural resource exports in GDP and its subsequent growth rate (controlling for initial income, trade policy, investment, and institutional quality).[8(pp. 6–12)] The finding was key to establishing the resource curse as a paradox within developmental economics. However, the limitation of their specification is that it discusses resource dependence as a variable which was measured at a single point in time. Specifically, according to their model, a country with an abundance of resources that produces a stable source of revenue was treated the same as a country with an abundance of resources that has an extremely unstable source of revenue. Thus, while the analysis may be extremely useful in framing the resource curse within a scale of global economics, it disregards the difference between wealth and volatility.

Alan Gelb, a developmental economist who spent much of his career at the World Bbank, adds nuance to the topic from a study that preceded Sachs and Warner, providing additional evidence on how different oil-exporting countries actually allocated the revenues from the 1970s price increases.[9] He did this by documenting a common pattern across a multitude of factors—public investment, real appreciation, and neglect of the non-oil economy after an oil discovery—in countries that had drastically different economic conditions (e.g., Algeria, Venezuela, Trinidad and Tobago).[9(pp. 72–96)] His comparative approach, however, lacks the econometric analysis that the present question requires because it largely highlights countries and governments while falling short on sector-specific analysis. Nevertheless, Gelb still has notable authority on the topic due to both the fact that his analysis is densely inclusive of the scholarship at the time but it is also densely inclusive of information that he obtained from his time at the World Bank in 1988. Taken together, Sachs and Warner and Gelb illustrate that the resource curse is indeed measurable, leaving countries that export oil susceptible to economic downturns. However, they do not address with specificity how resource dependence leads to economic downturns, providing a more cursory correlation than this project aims to establish.

Dutch disease model and its volatility limitations

When trying to address explanations for the resource curse phenomenon, many scholars turn to the Dutch Disease model, which was formalized in 1982 by W. Max Corden and J. Peter Neary. Both were trade economists who focused mainly on the interplay between a given booming sector and small economies.[10] Their framework identifies metrics by which a booming resource sector has the potential to damage the rest of the economy: if resource revenues are spent domestically, demand for non-tradable (domestic-only) goods increases and therefore the price of those goods rises accordingly. The caveat is that tradable goods prices, which are significantly lower, are determined on world markets, meaning that this spending indirectly erodes the competitiveness of the non-tradable goods sector. While the model was developed in response to the economic experiences of the Netherlands after its discovery of natural gas in the North Sea, its logic still holds true to any economy in which a single export sector booms disproportionately to the rest and generates significant domestic spending.[10(pp. 826–833)] This makes it the standard methodological framework for understanding sectoral effects, specifically decline, in oil-exporting countries.

While the Corden–Neary Model provides the theoretical framework for sectoral analysis, the model contains a bias because it assumes that a given boom occurs for greater than 6 months. Specifically, the model operates given a persistent shift in prices and demands, and the scholars do not address what happens if a boom is less than this six month framework. This matters because rebuilding manufacturing capacity carries a cost when oil prices fall because skilled workers who are laid off do not automatically return, even though they are assumed to do so. Thus, companies that close production lines face sunken costs that prevent re-entry right away if oil were to be discovered or an oil boom occurs (for a discussion of sunk costs and re-entry barriers in the context of exchange rate volatility and tradable-sector decline).[10(pp. 840–844)] In this environment of extremely volatile revenues, the tradable sector will suffer a deindustrialization in which, during each bust phase, the costs of re-entry exceed the costs of initial destruction. In that case, oil volatility produces damage that their model would underestimate because if a boom is sustained, the industrial capacity shrinkage discussed does not play a role.

Volatility: theory vs. evidence

Expanding on the importance of industrial shrinkage, the theoretical and empirical argument for treating volatility as its own central variable is accredited by primarily two complementary studies, both of which have had a cornerstone effect on the oil industry. Dani Rodrik, a Turkish-born economist at Harvard's John F. Kennedy School of Government, has been among the most widely cited scholars in the field of economics since the 1990s. He published an analysis of growth collapses that provides a key foundation.[11] Rodrik argues that declines in prices of commodities in conjunction with social conflict produce sustained losses. His econometric analysis highlights how neither price shocks nor social conflict can explain the pattern of collapse on their own, but rather produce this result when paired.[11(pp. 392–400)] For OPEC states that experienced large and constant price shocks during his period of study, Rodrik's framework uses GDP growth as the dependent variable.[11(pp. 386–388)] Therefore, an opportunity to continue Rodrik's efforts in a more focused way exists by asking whether this volatility and price shock case operates uniformly across sectors.

Working also to explain the role that volatility played, Christopher Blattman, Jason Hwang, and Jeffrey Williamson created the most direct empirical framework for designing a study that can answer this research question. Using 35 countries from 1870 to 1939, they prove that terms-of-trade volatility highlights a significant negative effect on growth that is distinct from the effect of terms-of-trade levels. Their identification strategy highlights the change in makeup of export commodities in multiple different countries.[12] Their central finding posits that volatility, not simply the movement of commodity prices, is what drives the negative growth effect. This has huge potential to be replicated when addressing the current question. If the tradable sector growth deficit gets bigger while the non-tradable sector remains stagnant, the result would prove how oil revenue volatility exists independently of price and is therefore a meaningful indicator. In other words, this study presents a way to identify why oil revenue volatility is the correct variable for this analysis (Blattman, Hwang, and Williamson do not test for sectoral differences in the volatility effect; their dependent variable is aggregate GDP per capita growth).[12(pp. 169–172)]

Institutions and fiscal transmission

In a given econometric analysis, assume the first stage establishes that volatility produces uniform sectoral damage, the second stage then, in theory, should explain why that damage changes on a country-to-country basis if oil prices are held relatively constant. The answer to this phenomenon lies in the quality of a governing institution and the ways in which price shocks affect the specific economy. Terry Lynn Karl, a political scientist at Stanford University whose work in Venezuela gave her direct access to the policymaking changes, provides an informative account of this variable.[13] Karl argues that oil-exporting states have developed a distinct institutional "mindset" that eliminates their incentive to develop non-oil-related parts of their economies and results in undiversified and volatile sources of revenue. Under these conditions of volatility, these weaknesses become especially apparent because the state lacks the conviction to continuously spend during a boom cycle.[13(pp. 44–58)] However, in a separate work, economists Benn Eifert, Alan Gelb, and Nils Tallroth expand on this insight by classifying said susceptible countries into governance categories to evaluate their own institutional capacity, similar to a corporate governance score assigned by the ESG ratings. By doing this, they were able to highlight how these behaviors were even more pronounced in regimes scoring lower on governance, highlighting the effects that behavior can have on less observable behaviors such as oil revenue.[14] Both of these studies work in conjunction with a study done by Giles Atkinson and Kirk Hamilton, economists at the London School of Economics whose work on accounting led them to develop the concept of using genuine savings as an empirical tool. This was significant in them eventually proving that the resource curse is closely related to negative genuine savings (losing funds periodically over a long period of time) because it suggests that an increase in volatility causes a decrease in long-term investment returns.[15] This is pertinent to the research topic because genuine savings are an effective way to track government spending, which ties back to the way that the leaders of a given country or institution are behaving, making decisions, and evaluating risk. That said, there still lies a great potential for the exploration into other intangible factors not mentioned (e.g., foreign pressure and conflict) that also could have affected leaders' decisions.

Situating the contribution

Expanding on the direction that the field is taking, Frederick van der Ploeg, a Dutch economist at the University of Oxford whose work spans public finance, macroeconomics, and public policy, published a 2011 survey in the Journal of Economic Literature that provides the most up-to-date synthesis of the resource curse field.[16] Van der Ploeg's review confirms that the literature has moved past the question of whether the resource curse exists as a curse or a blessing, mentioning that among the unexplored conditions that he identifies is the specific role of revenue and commodity price volatility. He notes that these variables specifically have received significantly less econometric and regression attention than resource dependence, institutional quality, or the Dutch Disease Model.[16(pp. 397–404)]

This project is therefore positioned precisely in this gap, and its contribution is defined by three key features that distinguish it entirely. First, it applies the volatility thesis to a specific sample: Saudi Arabia from 1980 to 2000. This maximizes the possibility for variety within the independent variable while also remaining specific and targeted in my analysis. Second, this lens disaggregates the dependent variable to the sectoral level, testing whether the damage done by volatility is concentrated in the tradable non-oil sector rather than estimating and assuming a uniform growth effect. Finally, it uses a two-step methodological structure that first establishes a correlation between volatility and sector quality and then introduces the variable of institutional quality as a possible explanation. Also, this process is possibly reproducible within the scholarly field because it provides a ground for cross-country analysis.

Methodology

This study uses regression analysis because the central research question requires isolating the effect of oil revenue volatility on non-oil economic performance while holding other macroeconomic factors constant. Narrative evidence from archival sources can document how fiscal behavior changed during each crisis episode, but it cannot determine whether the observed relationship is a product of volatility itself. Regression allows the analysis to control for extraneous factors such as inflation, trade openness, and shifts in production levels, ensuring that a relationship between volatility and manufacturing performance is not a result of broader macroeconomic trends. Furthermore, the multistage structure of this regression is designed to increase in specificity as it progresses. It goes from questioning the importance of using a volatility variable, to testing that variable against a host of metrics to find correlation. However, it should be taken into account that these econometric results serve as evidence within a historical framework. They strengthen the narrative by quantifying relationships that many archived sources describe qualitatively.

The empirical analysis proceeds in four stages. The first stage constructs the independent volatility variable. The second stage tests whether volatility has any detectable effect

Table 1. Variable definitions and data sources

Variable	Source	Definition/Units
Petroleum exports	OPEC Annual Statistical Bulletin	Saudi crude petroleum export value, millions of current USD
Volatility (σt)	Author's calculation from OPEC export data	5-year trailing rolling standard deviation of log changes in petroleum exports
Manufacturing VA	World Bank, World Development Indicators	Manufacturing value added as % of GDP, Saudi Arabia
Agriculture VA	World Bank, World Development Indicators	Agriculture value added as % of GDP, Saudi Arabia
Services VA	World Bank, World Development Indicators	Services value added as % of GDP, Saudi Arabia
GDP growth	World Bank, World Development Indicators	Annual GDP growth rate, Saudi Arabia (%)
Inflation	World Bank, World Development Indicators	Consumer price inflation, annual %, Saudi Arabia
Trade openness	World Bank, World Development Indicators	Trade as % of GDP (exports + imports), Saudi Arabia
Crude production	OPEC Annual Statistical Bulletin	Saudi crude oil production, thousand barrels per day
PetroShare	Author's calculation from OPEC data	Ratio of petroleum exports to total Saudi exports (0–1)
Tradable (dummy)	Author's construction	Binary variable: 1 if sector is manufacturing or agriculture, 0 if services

Note: All currency values are in current USD unless specified otherwise. All regressions were estimated in Python using Jupyter Notebook, and all figures were generated in the same environment. Regression code and the underlying Excel data files are available upon request.

on non-oil economic performance. The third stage disaggregates that same effect to a sectoral level, and the fourth introduces fiscal composition as a mediating variable. Every variable used across the four stages, together with its definition, units, and source, is listed in Table 1.

Stage 1: constructing the oil revenue volatility variable

Revenue volatility does not exist as a variable in any dataset. It has to be built from raw petroleum export data. However, because the Saudi government owned Aramco outright during the 1980–2000 period, petroleum export values from the OPEC Annual Statistical Bulletin serve as a close proxy metric for government oil revenues, as the state captures nearly the full revenue stream.[7(pp. 36–42),17(pp. 38–44)] This assumption would not hold for OPEC members with mixed ownership, such as Nigeria, but for Saudi Arabia this claim is defensible. This construction proceeds in two steps, first computing the year-over-year log change in Saudi petroleum exports each year, given in Eq. (1):

$$\Delta \ln R_t = \ln R_t - \ln R_{t-1} \tag{1}$$

The log transformation makes changes proportional regardless of absolute revenue size, so that a drop from \$100 billion to \$50 billion is treated equivalently to a drop from \$50 billion to \$25 billion. This produces 20 observations, because 1980 has no prior year from which to calculate a change. This allows for phase two, in which a rolling standard deviation of these log changes is computed over a five-year trailing window, as given in Eq. (2):

$$\sigma_t = \sqrt{\frac{1}{4}\sum_{j=0}^{4}\left(\Delta \ln R_{t-j} - \overline{\Delta \ln R}\right)^2} \tag{2}$$

The standard deviation measures the degree of distribution of revenue changes within a given window. A high value means revenues were in flux, and a low value indicates stability. The five-year window was chosen because it smooths out one-time shocks while remaining short enough to capture the meaningful shifts under study. It also aligns with the Saudi Five-Year Development Plan cycles, which are key primary documents in the historical analysis section of this study. This produces 16 usable observations, because the first four years of the log-change series lack a five-year trailing window. The constructed volatility series was validated using a KPSS stationarity test, which assumes the series is stationary and looks for contrary evidence to disprove it. The test found no such evidence ($p > 0.10$); therefore; the data are consistent and can be used directly in regression without differencing. This specific test was chosen over the more conventional Augmented Dickey–Fuller test because the test has low power in small samples. Sixteen observations, by any standard, constitute a small sample, and therefore a different test would be more appropriate.

Table 2 reports the resulting series in full. For each year from 1980 to 2000 it gives the Saudi petroleum export value in millions of current USD, the natural logarithm of that value, the year-over-year log change computed from Eq. (1), and the five-year rolling volatility computed from Eq. (2). Fig. 1 plots both components of the construction. The upper panel shows the annual log changes, in which the sustained contraction of 1982–1986 appears as a run of negative bars reaching −0.4912 in 1983, and the 1998 collapse appears as the deepest single-year decline in the series at −0.4934. The lower panel plots the volatility score itself, which begins at 0.2305 in 1985, falls to a sample minimum of 0.1042 in 1986 as the window fills with uniformly negative changes, and climbs to a sample maximum of 0.3729 in 2000 as the 1998 collapse and the 1999–2000 recovery enter the same window. This series is the independent variable used in every specification that follows.

Stage 2: time-series OLS regression

This stage tests whether the constructed volatility variable had a detectable effect on non-oil economic performance. The original design called for a panel fixed-effects regression across multiple OPEC countries, using country fixed effects to absorb everything unique to a given state and year fixed effects to absorb global shocks common to all countries. With only Saudi Arabia in the sample, this is not possible, and as a result, the model collapses to a standard ordinary least squares time-series regression. In OLS, a best-fit line is created that minimizes the total distance between the line drawn and every observation in the series. Model A is specified in Eq. (3):

$$\text{Manufacturing VA}_t = \alpha + \beta_1\sigma_t + \beta_2\text{Inflation}_t + \beta_3\text{Trade}_t + \varepsilon_t \tag{3}$$

Manufacturing is the primary tradable non-oil sector in Saudi Arabia, and its performance is the central prediction of the Dutch Disease framework, which is why it is the dependent variable selected. Manufacturing value added as a percentage of total GDP carries one caveat. Due to the denominator being inclusive of oil GDP, sharp drops in oil revenue can raise the manufacturing share even when manufacturing itself is not growing. Model B, given in Eq. (4), however, substitutes GDP growth as the dependent variable while holding all controls constant, testing the broader macroeconomic impact of volatility rather than the sectoral effect:

$$\text{GDP Growth}_t = \alpha + \beta_1\sigma_t + \beta_2\ \text{Inflatio n}_t + \beta_3\text{Trade}_t + \varepsilon_t \tag{4}$$

Model C, given in Eq. (5), returns to manufacturing value added as the dependent variable, adding Saudi crude oil production (in thousands of barrels per day) as a fourth control variable. Introducing production as a control isolates

Table 2. Stage 1 volatility construction—annual petroleum exports, log changes, and rolling volatility

Year	Petroleum exports (USD m)	Log exports	Log change	5-yr volatility
1980	101,421	11.5270	—	—
1981	111,546	11.6222	0.0952	—
1982	73,263	11.2018	−0.4204	—
1983	44,829	10.7106	−0.4912	—
1984	36,282	10.4991	−0.2115	—
1985	25,930	10.1632	−0.3359	0.2305
1986	18,060	9.8015	−0.3617	0.1042
1987	20,427	9.9246	0.1232	0.2338
1988	20,205	9.9137	−0.0109	0.2102
1989	24,095	10.0898	0.1761	0.2532
1990	40,129	10.5999	0.5101	0.3159
1991	43,607	10.6830	0.0831	0.1987
1992	46,527	10.7478	0.0648	0.2043
1993	38,621	10.5616	−0.1862	0.2515
1994	38,138	10.5490	−0.0126	0.2569
1995	43,547	10.6816	0.1326	0.1247
1996	54,272	10.9018	0.2202	0.1545
1997	53,343	10.8845	−0.0173	0.1561
1998	32,569	10.3911	−0.4934	0.2757
1999	44,880	10.7117	0.3206	0.3191
2000	70,866	11.1685	0.4568	0.3729

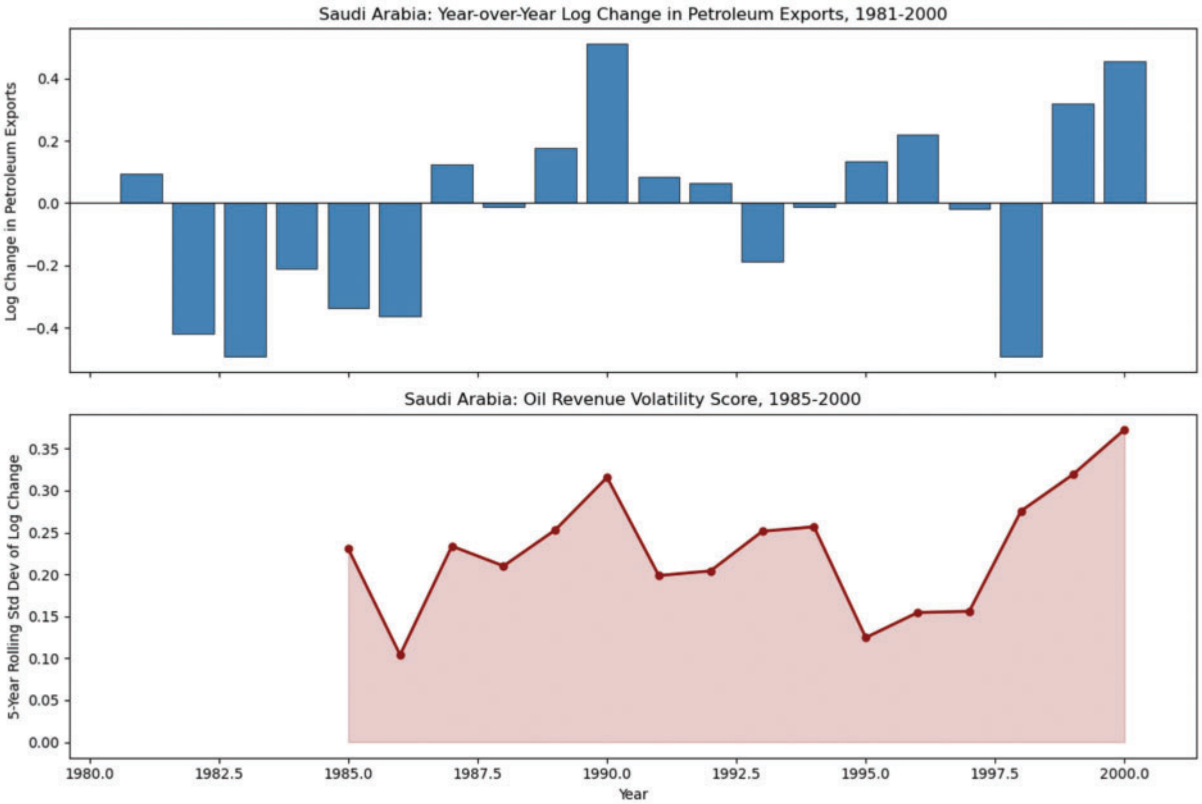

Figure 1. Five-year rolling standard deviation of log changes in Saudi petroleum export revenue

the effect of revenue instability from the mechanical effect of output swings on the composition of GDP. This is because Saudi production fell from roughly 10 million barrels per day in 1980 to under 3.5 million barrels in 1985, a shift large enough to reshape sectoral shares regardless of what was happening to prices or revenues:

$$\text{Manufacturing VA}_t = \alpha + \beta_1\sigma_t + \beta_2\text{Inflation}_t + \beta_3\text{Trade}_t + \beta_4\text{Production}_t + \varepsilon_t \tag{5}$$

Estimates for Eqs. (3)–(5) are reported in Tables 3–5, with the corresponding diagnostic panels in Figs. 2–4.

Stage 3: sector-year panel

This stage tests whether oil revenue volatility harms tradable sectors (manufacturing and agriculture) more than non-tradable sectors (services), which is the thesis from the Corden–Neary Dutch Disease framework. Given that the study focuses exclusively on Saudi Arabia, cross-country variation is being replaced by within-country variation across sectors. Each year contributes three observations (one per sector), producing a panel of 48 sector-year observations. The dependent variable is sector value added as a percentage of GDP for the sector s in year t, and Model A estimates the baseline sector difference specification given in Eq. (6):

$$Y_{s,t} = \alpha + \beta_1\sigma_t + \beta_2\text{Tradable}_s + \beta_3\left(\sigma_t \times \text{Tradable}_s\right) + \beta_4\text{Inflation}_t + \beta_5\text{Trade}_t + \delta_s + \varepsilon_{s,t} \tag{6}$$

The "tradable" variable is a binary dummy variable that equals one for manufacturing and agriculture and zero for services. The sector fixed effects δs absorb the structural fact that services are inherently a larger share of Saudi GDP than manufacturing or agriculture. The most important coefficient is $\beta 3$, the interaction term between volatility and the tradable dummy. A negative and significant $\beta 3$ would indicate that volatility does indeed cause disproportionate damage to tradable sectors, which is consistent with the Dutch Disease prediction. Model B then adds in crude oil production to Eq. (6) as an additional control variable to ensure that the results are not driven by the mechanical effect of output swings on GDP composition. Model C, given in Eq. (7), uses year-over-year changes rather than levels as the dependent variable, stripping out the structural fact that services hold a larger GDP share and focusing purely on whether tradable sectors lose ground at a faster rate during volatile periods:

$$\Delta Y_{s,t} = \alpha + \beta_1\sigma_t + \beta_2\text{Tradable}_s + \beta_3\left(\sigma_t \times \text{Tradable}_s\right) + \beta_4\text{Inflation}_t + \beta_5\text{Trade}_t + \delta_s + \varepsilon_{s,t} \tag{7}$$

Estimates for Eq. (6), for Eq. (6) augmented with the crude oil production control, and for Eq. (7) are reported in Tables 6–8, with the corresponding diagnostic panels in Figs. 5–7.

Stage 4: fiscal composition interaction

This stage tests whether the degree of Saudi Arabia's oil dependence mediates the damage that volatility inflicts on non-oil economic performance. With only Saudi Arabia, institutional quality scores from the ICRG lack sufficient

Table 3. Stage 2 Model A—OLS regression of manufacturing value added (% of GDP) on volatility, with controls for inflation and trade openness [Eq. (3)]

Variable	Coefficient	Std. error	t-statistic	p-value
Const	14.129	1.962	7.201	<0.001
Volatility	2.774	2.646	1.048	0.294
Inflation	0.140	0.080	1.752	0.080
Trade % GDP	−0.089	0.028	−3.187	0.001
Statistic		**Value**		
R-squared		0.458		
Adjusted R-squared		0.323		
F-statistic		3.812		
F p-value		0.040		
N (observations)		16		
Dependent variable		Manufacturing VA (% of GDP)		

Table 4. Stage 2 Model B—OLS regression of GDP growth (%) on volatility, with controls for inflation and trade openness [Eq. (4)]

Variable	Coefficient	Std. Error	t-statistic	p-value
Const	−10.262	11.104	−0.924	0.355
Volatility	11.940	13.230	0.902	0.367
Inflation	0.919	0.597	1.539	0.124
Trade % GDP	0.140	0.151	0.931	0.352
Statistic		**Value**		
R-squared		0.365		
Adjusted R-squared		0.206		
F-statistic		2.536		
F p-value		0.106		
N (observations)		16		
Dependent variable		GDP Growth (%)		

Table 5. Stage 2 Model C—OLS regression of manufacturing value added (% of GDP) on volatility, with controls for inflation, trade openness, and crude oil production [Eq. (5)]

Variable	Coefficient	Std. Error	t-statistic	p-value
const	11.315	1.355	8.348	<0.001
volatility	1.738	2.399	0.724	0.469
inflation	0.028	0.073	0.378	0.705
trade_pct_gdp	−0.065	0.017	−3.804	<0.001
crude_production_kbd	2.23e-4	7.90e-5	2.826	0.005

variation to produce a meaningful result. The substitute is a directly observable fiscal composition variable: the ratio of petroleum exports to total exports, known as PetroShare. PetroShare is computed from the OPEC Annual Statistics Bulletin, and in years when this ratio is higher, the Saudi economy is more concentrated in oil and the state has less fiscal cushion from non-oil revenue sources. For example, this ratio changes from 0.732 in 1988—when non-oil exports were relatively high at $20.2 billion—to 0.869 when oil exports were approximately $55.0 billion, reflecting total oil dependence.[18(pp. 38–42)] The key coefficient is the interaction term $\beta 3$, which measures whether the effect of volatility on economic performance is amplified in years of greater oil dependence. The dependent variable in Model A is manufacturing value added as a percentage of GDP, the same as Stage 2 Models A and C, with the addition of the PetroShare

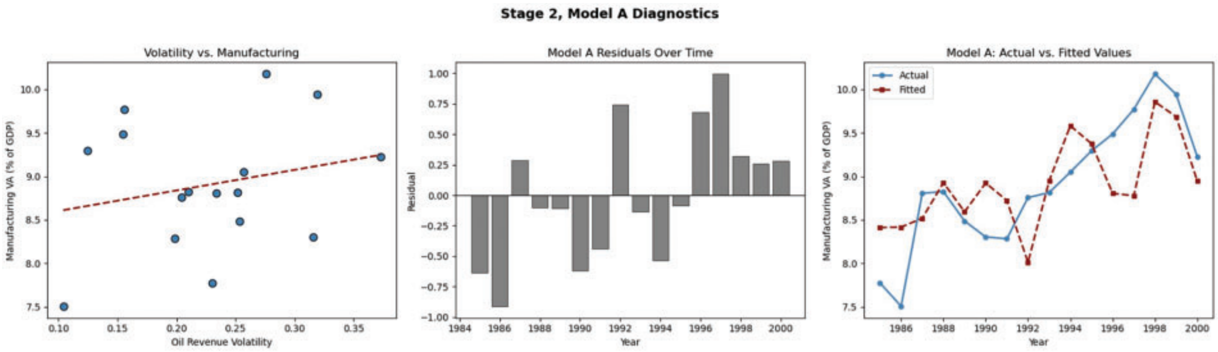

Figure 2. Actual and fitted values of manufacturing value added (% of GDP) from Stage 2 Model A

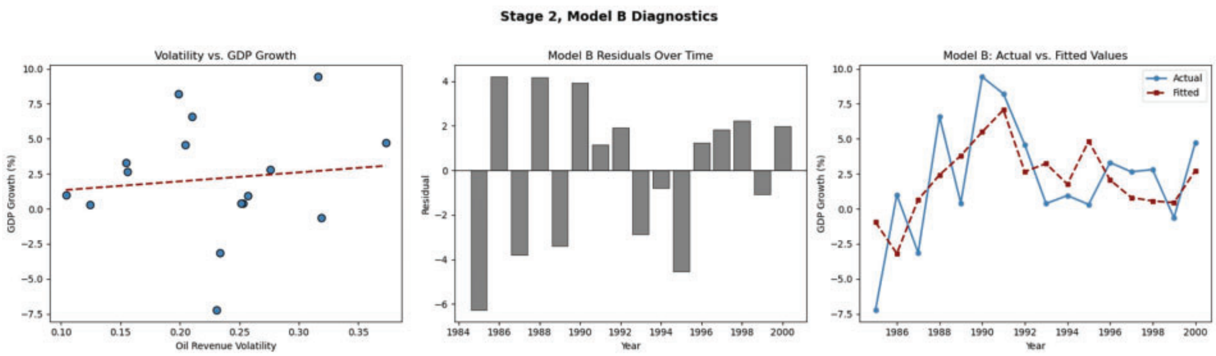

Figure 3. Actual and fitted values of GDP growth (%) from Stage 2 Model B

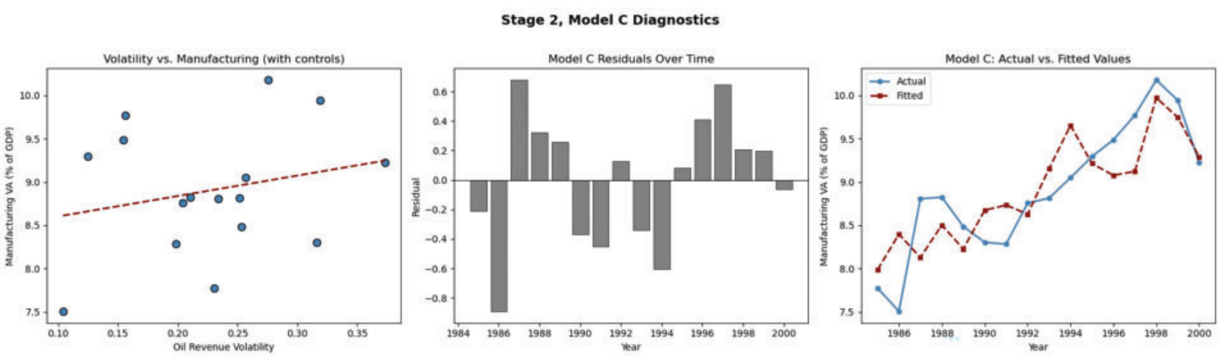

Figure 4. Actual and fitted values of manufacturing value added (% of GDP) from Stage 2 Model C, including crude oil production as a control

interaction with volatility, as given in Eq. (8):

$$\text{Manufacturing VA}_t = \alpha + \beta_1\sigma_t + \beta_2\text{PetroShare}_t + \beta_3(\sigma_t \times \text{PetroShare}_t) + \beta_4\text{Inflation}_t + \beta_5\text{Trade}_t + \varepsilon_t \quad (8)$$

The coefficient of interest is $\beta 3$, the interaction between volatility and PetroShare. A negative $\beta 3$ would indicate that volatility damages manufacturing more severely in years when the Saudi economy is more concentrated in petroleum exports, which is exactly what the fiscal transmission thesis predicts. Model B, given in Eq. (9), substitutes GDP growth as the dependent variable, testing whether this fiscal composition mechanism operates at the aggregate level as well:

$$\text{GDP Growth}_t = \alpha + \beta_1\sigma_t + \beta_2\text{PetroShare}_t + \beta_3(\sigma_t \times \text{PetroShare}_t) + \beta_4\text{Inflation}_t + \beta_5\text{Trade}_t + \varepsilon_t \quad (9)$$

Estimates for Eqs. (8) and (9) are reported in Tables 9 and 10, with the corresponding diagnostic panels in Figs. 8 and 9.

The importance of archival evidence

The econometric results produced by these four stages are suggestive but not conclusive, a limitation created by the small sample size (16 usable annual observations) as well as the absence of any cross-country variation. The regression

Table 6. Stage 3 Model A—sector-year panel regression of sector value added (% of GDP) on volatility, the tradable dummy, their interaction, and controls [Eq. (6)]

Variable	Coefficient	Std. error	t-statistic	p-value
Const	55.364	6.629	8.352	<0.001
Volatility	−19.426	17.547	−1.107	0.268
Tradable	−29.540	3.127	−9.446	<0.001
Vol. ∗ Tradable	19.244	17.616	1.092	0.275
Inflation	−0.291	0.241	−1.207	0.228
Trade % GDP	−0.055	0.068	−0.814	0.416
Agriculture Sector	−16.460	1.571	−10.476	<0.001
Manufacturing Sector	−13.080	1.585	−8.251	<0.001
Statistic		**Value**		
R-squared		0.979		
Adjusted R-squared		0.976		
F-statistic		269.030		
F p-value		<0.001		
N (observations)		48		
Dependent variable		Sector VA (% of GDP)		

Table 7. Stage 3 Model B—sector-year panel regression with crude oil production added in as a control [Eq. (6) with production control]

Variable	Coefficient	Std. error	t-statistic	p-value
Const	65.527	7.747	8.459	<0.001
Volatility	−15.685	16.184	−0.969	0.332
Tradable	−29.540	2.904	−10.174	<0.001
Vol. ∗ tradable	19.244	16.225	1.186	0.236
Inflation	0.114	0.261	0.437	0.662
Trade % GDP	−0.141	0.074	−1.901	0.057
Crude Production	-8.07e-4	3.35e-4	−2.407	0.016
Agriculture Sector	−16.460	1.480	−11.120	<0.001
Manufacturing Sector	−13.080	1.496	−8.746	<0.001
Statistic		**Value**		
R-squared		0.982		
Adjusted R-squared		0.979		
F-statistic		276.479		
F p-value		<0.001		
N (observations)		48		
Dependent variable		Sector VA (% of GDP)		

results can identify correlations and establish directions of effect, but they cannot completely reconstruct the mechanism through which revenue instability translated into specific fiscal decisions, which then went on to affect specific sectors, making archival and narrative evidence integral.

SAMA annual reports and Five-Year Development Plan reviews document how the composition of government spending changed during each of the three crisis episodes, specifically documenting whether the state maintained or withdrew capital expenditures (investments in industry, infrastructure, and human capital) relative to current expenditures (salaries, transfers, and subsidies). IMF Article IV consultation reports provide external assessments of Saudi fiscal policy choices and their effects on the non-oil economic performance during each episode. U.S. diplomatic cables from the Reagan and Bush Presidential Libraries offer additional documentation of Saudi fiscal constraints and policy responses during the 1980s that neither SAMA

Table 8. Stage 3 Model C—sector-year panel regression using year-over-year changes in sector value added (percentage points) as the dependent variable [Eq. (7)]

Variable	Coefficient	Std. error	t-statistic	p-value
Const	10.812	4.645	2.328	0.020
Volatility	−18.001	8.275	−2.175	0.030
Tradable	−1.609	1.201	−1.339	0.180
Volatility ∗ tradable	15.070	8.516	1.770	0.077
Inflation	0.013	0.110	0.118	0.906
Trade % GDP	−0.115	0.070	−1.654	0.098
Agriculture Sector	−0.810	0.614	−1.319	0.187
Manufacturing Sector	−0.799	0.620	−1.290	0.197

Statistic	**Value**
R-squared	0.309
Adjusted R-squared	0.200
F-statistic	2.732
F p-value	0.026
N (observations)	45
Dependent variable	Δ Sector VA (percentage points)

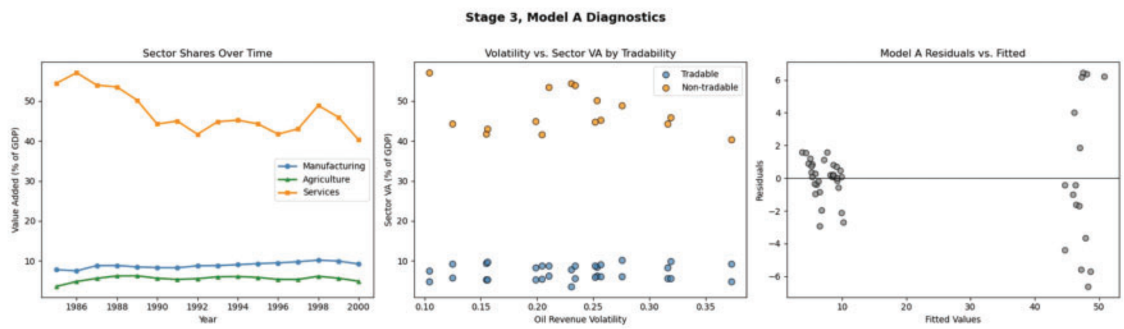

Figure 5. Manufacturing, agriculture, and services value added as percentages of Saudi GDP, 1985–2000. Services dominate by structural composition

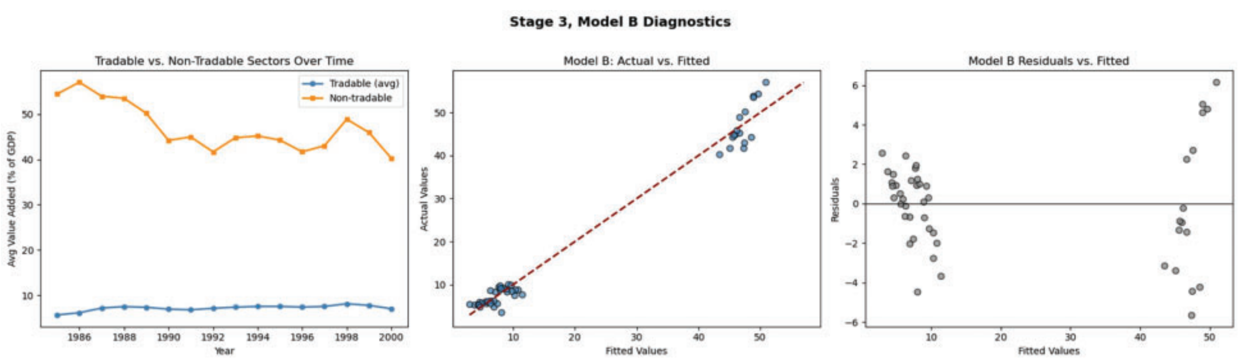

Figure 6. Year-over-year changes in sector value added (percentage points) for (services) and non-tradable (manufacturing, agriculture) sectors

reports nor IMF consultations fully capture. Together, these sources reconstruct the fiscal transmission mechanism that the regressions identify: when revenues fell, the state cut developmental expenditures disproportionately to current expenditures, and those cuts propagated through the non-oil economy in ways the volatility coefficient cannot explain.

Analysis

Time-series estimates of the volatility effect

Table 3 reports the estimates of Eq. (3), in which manufacturing value added as a percentage of GDP is regressed

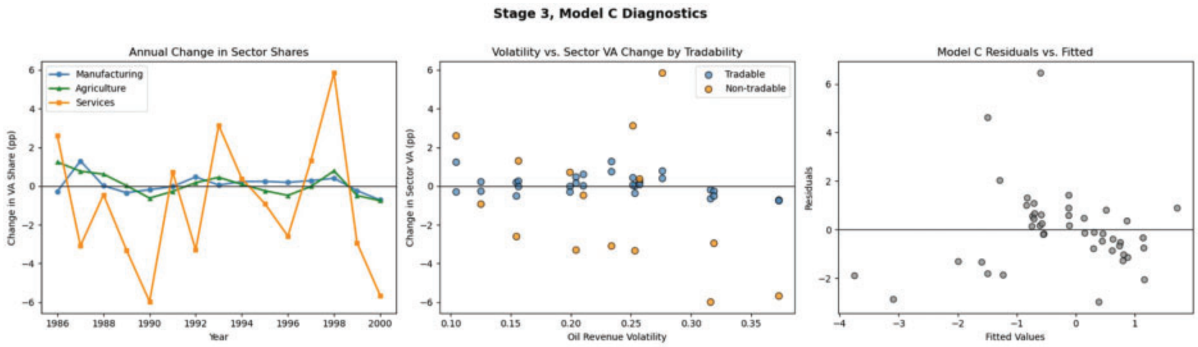

Figure 7. Year-over-year changes in sector value added (percentage points) for manufacturing, agriculture, and services

Table 9. Stage 4 Model A—OLS regression of manufacturing value added (% of GDP) on volatility, PetroShare, their interaction, and controls [Eq. (8)]

Variable	Coefficient	Std. error	t-statistic	p-value
Const	−7.202	12.881	−0.559	0.576
Volatility	87.405	51.950	1.682	0.092
PetroShare of Exports	25.827	15.302	1.688	0.091
Volatility x PetroShare	−103.190	64.425	−1.602	0.109
Inflation	0.098	0.083	1.185	0.236
Trade % GDP	−0.086	0.024	−3.534	<0.001
Statistic		**Value**		
R-squared		0.576		
Adjusted R-squared		0.365		
F-statistic		6.219		
F p-value		0.007		
N (observations)		16		
Dependent variable		Manufacturing VA (% of GDP)		

Table 10. Stage 4 Model B—OLS regression of GDP growth (%) on volatility, PetroShare, their interaction, and controls [Eq. (9)]

Variable	Coefficient	Std. error	t-statistic	p-value
Const	79.431	83.006	0.957	0.339
Volatility	−358.844	309.944	−1.158	0.247
PetroShare of Exports	−106.727	94.133	−1.134	0.257
Volatility ∗ PetroShare	451.487	373.030	1.210	0.226
Inflation	1.088	0.723	1.505	0.132
Trade % GDP	0.107	0.208	0.512	0.609
Statistic		**Value**		
R-squared		0.433		
Adjusted R-squared		0.149		
F-statistic		1.713		
F p-value		0.219		
N (observations)		16		
Dependent variable		GDP Growth (%)		

on volatility with controls for inflation and trade openness. The volatility coefficient is positive but statistically insignificant ($\beta1 = 2.774$, p = 0.294), while trade openness is negative and significant ($\beta3 = -0.089$, p = 0.001) and inflation is marginally significant ($\beta2 = 0.140$, p = 0.080). The specification explains 45.8 percent of the variation in the manufacturing share ($R2 = 0.458$), and the overall F-statistic is significant at the five percent level (p = 0.040) across 16

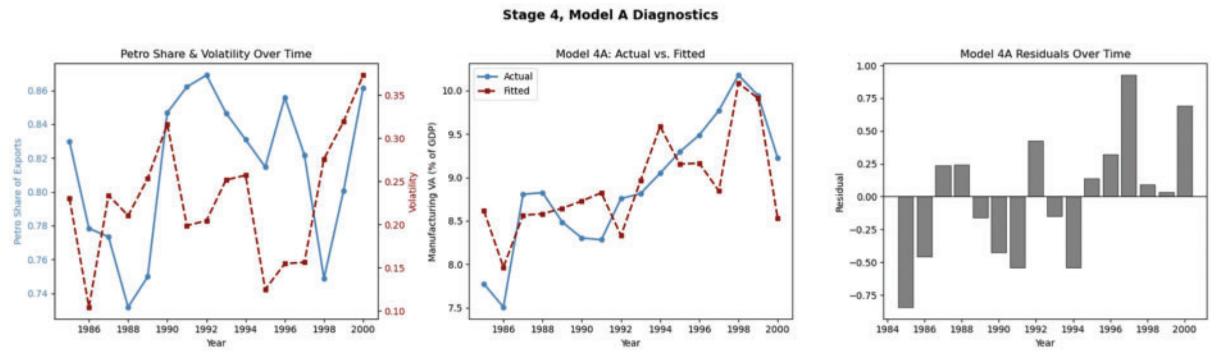

Figure 8. Actual and fitted values of manufacturing value added (% of GDP) from Stage 4 Model A

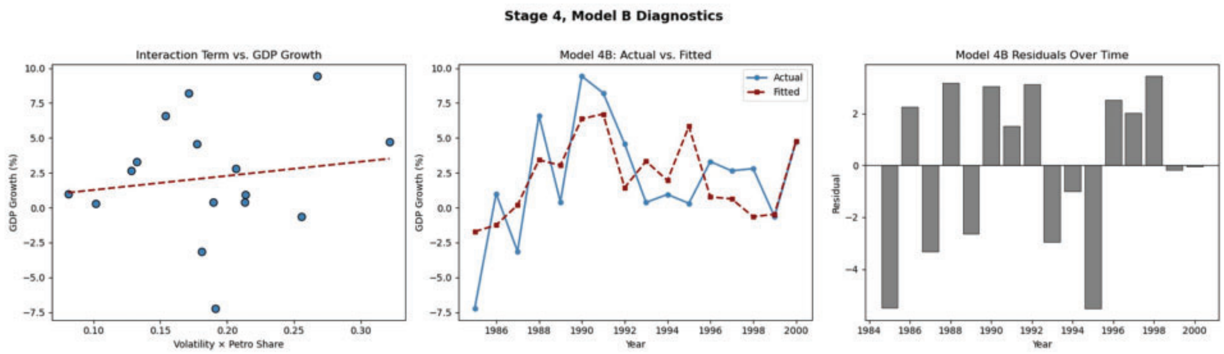

Figure 9. Actual and fitted values of GDP growth (%) from Stage 4 Model B

observations. Fig. 2 presents the corresponding diagnostics. The scatter of volatility against manufacturing value added shows only a weak upward slope, the residuals fluctuate around zero without a visible trend, and the actual-versus-fitted panel follows the general rise in the manufacturing share from 1986 to 1998 while missing the sharper year-to-year movements.

Table 4 reports Eq. (4), which substitutes GDP growth for manufacturing value added while holding the controls constant. No coefficient in this specification reaches conventional significance, including volatility itself ($\beta 1 = 11.940$, $p = 0.367$), and the model as a whole is insignificant ($R2 = 0.365$, F p-value $= 0.106$). Fig. 3 shows why. The fitted series moves within a narrow band of roughly zero to five percent while actual GDP growth swings from below -7 percent to nearly 10 percent, so the specification captures very little of the aggregate variation. This aggregate null anticipates the Stage 4 result discussed below, in which the same dependent variable again fails to register a mechanism that is detectable at the sectoral level.

Table 5 reports Eq. (5), which adds Saudi crude oil production as a fourth control to separate revenue instability from the mechanical effect of output swings on the composition of GDP. Crude production enters positively and significantly ($\beta 4 = 2.23\text{e}{-4}$, $p = 0.005$) and trade openness remains negative and significant ($\beta 3 = -0.065$, $p < 0.001$), while volatility remains insignificant ($\beta 1 = 1.738$, $p = 0.469$). Adding the production control raises explanatory power to $R2 = 0.639$, the strongest fit of the three time-series specifications, and Fig. 4 shows that improvement directly, with the fitted series tracking both the 1994–1998 rise and the 2000 downturn more closely than the equivalent panel in Fig. 2. Taken together, these three specifications establish that volatility carries no independent effect on the aggregate manufacturing share once standard macroeconomic controls are included, which is what motivates disaggregating the dependent variable to the sectoral level in the stage that follows.

Establishing a broader effect

Oil revenue volatility damaged the Saudi non-oil economy broadly rather than through the non-uniform sectoral channel that the Dutch Disease theory predicts, as tradable sectors did not lose ground relative to non-tradables during high-volatility years. The Corden–Neary model assumes that booming resource revenues—when spent domestically—raise demand for non-tradable goods and inflate their prices while leaving tradable goods prices bound to the world market. This, in turn, destroys the competitiveness of manufacturing and agriculture relative to services. The model implies that during high-volatility years, the tradable share of GDP should fall relative to the non-tradable share. The sector-year panel constructed from the World Bank Development Indicators and the volatility series built in Stage 1 does not produce that result.[6] Across the three specifications tested on the 1985–2000 sample, the interaction term between volatility and the tradable dummy is never negative and never reaches a magnitude consistent with the Corden–Neary prediction (Tables 6–8; author's calculations). In other words, the binary tradable versus non-tradable distinction does not exist the way Corden and Neary predicted because both agriculture and manufacturing were sustained by state subsidy and protection rather than exposed to world price competition.

The key coefficient in this stage is the interaction term, which captures whether the marginal effect of volatility on a sector's GDP share differs depending on whether that sector is tradable. In the levels specification of Eq. (6), this term is $\beta 3 = 19.244$ with a p-value of 0.275, meaning it is positive and statistically insignificant (Table 6; author's calculations). The tradable dummy itself is large and highly significant ($\beta 2 = -29.540$, $p < 0.001$), but this only accounts for the fact that services make up roughly thirty percentage points more of Saudi GDP than manufacturing or agriculture across the entire sample. In other words, the model's R-squared (R2) of 0.979 is driven almost entirely by the structural difference between sectors and not by any effect relating to volatility. Fig. 5 makes that structural difference visible: services move between roughly 40 and 57 percent of GDP across the sample while manufacturing and agriculture never exceed 11 percent, and the residual plot separates into two clusters corresponding to those two groups rather than showing any volatility-driven pattern.

Table 7 reports the same specification with crude oil production added as a control, and the result is unchanged in substance. The interaction term remains positive and insignificant ($\beta 3 = 19.244$, $p = 0.236$), while crude production itself enters negatively and significantly ($p = 0.016$), confirming that the null on the interaction is not an artifact of output swings reshaping the composition of GDP. Fig. 6 shows the tradable and non-tradable averages diverging by a roughly constant margin across the whole period, with the actual-versus-fitted panel again clustering into the two structural groups.

Moving to a stricter specification produces the most informative null. By regressing year-over-year changes in sector shares (in percentage points) on volatility, Eq. (7) strips out the structural fact that services are always larger and isolates the question of whether tradable sectors lose ground at a faster rate during high-volatility years. However, they do not. The interaction term is $\beta 3 = 15.070$ with a p-value of 0.077, meaning it is positive and significant at the ten percent level (Table 8; author's calculations). At first, this coefficient appears to indicate that during high-volatility years tradable sectors gained share relative to services. However, the study is unable to completely rely on this finding because the sample is small and the effect is only marginally significant. Nevertheless, the direction of the result is the opposite of what Dutch Disease predicts and is therefore sufficient to reject the mechanism as the main cause of economic downturn for Saudi Arabia during this period. Moreover, what this specification does establish is that volatility damages the non-oil economy uniformly rather than selectively. The standalone volatility coefficient in the year-over-year change model is $\beta 1 = -18.001$ with a p-value of 0.030, meaning it is negative and statistically significant (Table 8; author's calculations). This coefficient measures the average effect of a one-unit increase on the change in any sector's share of GDP. The negative sign means that across all three sectors, higher volatility predicts contraction in non-oil GDP shares. Fig. 7 displays those annual changes sector by sector, showing that the largest year-to-year swings belong to services rather than to manufacturing or agriculture. Therefore—due to the interaction term being positive rather than negative—the magnitude of volatility affects services as much as manufacturing and agriculture, and the sectoral channel is also not the way in which volatility damages the Saudi economy.

This finding does not invalidate the resource curse literature as applied to Saudi Arabia. Rather, it refines the channel through which the curse operates. Saudi Arabia between 1980 and 2000 moved through three distinct volatility episodes, and within each one the boom–bust cycle was too short for the sustained labor and capital reallocation the Dutch Disease model requires. However, it is important to note that the kingdom's industrial policy was built on subsidized credit and protected domestic markets administered only by state agencies. This insulates manufacturing from the relative-price mechanism and makes it unable to serve as the correct channel of transmission for economic downturn.

Thus, the precondition pertaining to the remainder of the analysis is that volatility does indeed damage the Saudi non-oil economy, but the damage is not being caused through relative prices or sectoral reallocation. It is flowing through a different channel that affects all non-oil sectors uniformly. The subsequent section examines whether that channel is fiscal, examining if the degree of state dependence on petroleum revenues determines the severity of volatility's damage.

Fiscal interaction analysis

The severity of volatility's damage was conditioned by the degree of fiscal oil dependence, as years in which petroleum exports dominated saw volatility inflict greater harm on manufacturing. The fiscal transmission channel predicts that volatility's damage is conditioned by the degree of state dependence on oil revenue, because a state more concentrated in oil has less cushion from non-oil revenue sources to absorb a revenue shock. In that scenario, a given level of volatility produces sharper spending cuts in years of greater oil dependence, and those cuts fall on manufacturing investment, subsidized credit, and industrial policy. The variable that operationalizes this prediction is the petroleum share of total exports (PetroShare), computed from the OPEC Annual Statistical Bulletin. In years when this ratio is higher, the Saudi state is more concentrated in oil. The ratio moved from 0.732 in 1988—when non-oil exports were relatively high—to 0.869 in 1992, when oil dependence was nearly total.[18(pp. 38–42)] Also, as described in the Methodology section, PetroShare replaces the ICRG institutional quality index. This substitution is methodologically sound because PetroShare is computed from primary export data and varies meaningfully at the year level for a single country (ICRG is intended for cross-country analysis). The interaction term $\beta 3$ in Eq. (8), which is between volatility and PetroShare, is the coefficient that tests the fiscal transmission prediction.

If the thesis is correct, this term should be negative because higher volatility should cause greater damage in years of greater dependence.

Stage 4 Model A produces a coefficient that aligns closely with the thesis. The interaction term is largely negative and approached significance at the 10 percent level at $\beta 3 = -103.190$ with a p-value of 0.109 (Table 9; author's calculations). Trade openness remains the strongest predictor with $\beta 5 = -0.086$, $p < 0.001$, consistent with Stages 2 and 3 (Tables 3 and 5; author's calculations). The model explains 57.6 percent of the variation in manufacturing value added, which is an improvement over Stage 2 Model A ($R2 = 0.458$) but lower than Stage 2 Model C ($R2 = 0.639$) (Tables 3, 5, and 9; author's calculations). The overall F-statistic is significant ($p = 0.007$) as it explains that the whole model has explanatory power (a significant F-statistic indicates that the model as a whole explains a non-trivial share of variation in the dependent variable, even when individual coefficients do not reach conventional significance thresholds.[19(pp. 147–149)] As Fig. 8 shows, the residuals are small and show no pattern over time, which indicates a good model fit, and the actual-vs.-fitted panel shows close tracking, with the model accurately outputting the general upward trend in GDP from 1985 to 1998, and then quickly catching the downturn in 2000. The coefficient being negative is the sign the thesis predicts, but the p-value approaches without ever crossing the conventional 10 percent threshold. The regression evidence, therefore, is highly suggestive of the fiscal composition mechanism, yet is not conclusive on its own. It is a result that points in the direction the thesis predicts, but warrants the archival backup that the succeeding stage provides. The standalone volatility and PetroShare coefficients are both significant at the ten percent level ($\beta 1 = 87.405$; $p = 0.092$; $\beta 2 = 25.827$, $p = 0.091$), but they are not to be interpreted in isolation because the presence of an interaction term means that the marginal effect of each variable is dependent upon the level of the other (Table 9; author's calculations).

Model fit improves substantially over the equivalent specification without the fiscal interaction. The R2 rises from 0.458 in Stage 2 Model A to 0.576 in Stage 4 Model A, meaning the PetroShare interaction explains an additional twelve percentage points of variation in the manufacturing share of GDP (Tables 3 and 9; author's calculations).

Stage 4 Model B was designed as a parallel test to determine whether the fiscal composition mechanism also operates at the aggregate level. This result is extremely important precisely because it fails. The interaction term in Eq. (9) is $\beta 3 = 451.87$ with a p-value of 0.226, which is large and positive but statistically insignificant (Table 10; author's calculations). The model explains only 43.4 percent of the variation in GDP growth ($R2 = 0.433$), and its adjusted value drops to 0.149 after penalizing for five regressors. The actual-vs.-fitted panel in Fig. 9 shows the fitted values barely moving while the actual ones fluctuate much more. This result is consistent with Stage 2 Model B because GDP growth in Saudi Arabia during this period is dominated by oil production volume swings that overwhelm any fiscal channel through non-oil sectors. The fiscal transmission channel is detectable at the sectoral level because manufacturing is small enough relative to oil production that fiscal effects are not drowned out by it. In other words, the same channel is too small to surface again against the noise of the oil sector itself.

The two specifications produce a result consistent with the thesis at the sectoral level and an intentional null at the aggregate level. The fiscal composition interaction term in Model A is negative and large in the predicted direction, and the same term is insignificant in Model B because GDP growth is the wrong place to look for a sectoral fiscal channel. What the regression evidence cannot do on its own, however, is prove that the mechanism operates because the interaction term in Model A does not reach the conventional significance. Thus, the analysis must also rely on archival evidence to confirm that the fiscal behavior implied by the regression actually occurred. Seeking to establish that the fiscal transmission channel operates as the regression suggests, Section IV utilizes these archives to document the spending decisions made during each of the three crisis episodes.

Archival evidence and analysis

Archival records from SAMA annual reports confirm the fiscal transmission mechanism that regressions identify, as the state systematically prioritized current expenditure over developmental expenditure during each of the 3 crisis episodes. The regression evidence in the previous stages narrows the explanation for volatility's damage to the fiscal channel without establishing that the channel actually operated. The fiscal composition interaction in Stage 4 Model A points in the direction the thesis predicts, but the archival record can actually illustrate and provide the context behind the decisions that the mechanism reflects. In all 3 episodes, a pattern is evident: during each contraction, the state reduced developmental and infrastructure expenditure while protecting current expenditure on defense, public sector wages, and human services. The composition of the cuts, then, is the evidence for the transmission argument.

The post-1981 contraction sets this pattern. Saudi petroleum export revenue fell from Rls 328,494 million in 1981 to Rls 88,425 million in 1985—a cumulative drop of 73 percent over four years.[5(pp. 30–32)] The Third Five-Year Development Plan, published at the start of this contraction, opens with stated long-term goals that include "reducing] dependence on the production of crude oil as the primary source of national income".[20(p. 3)] The plan's strategy then details how they will commit to "accelerating] diversification, which is one of the dominant structural objectives of the whole economic process".[20(p. 7)] In other words, the document framing Saudi economic policy at the start of the contraction had clearly expressed its commitment to non-oil expansion in the future, but the spending pattern that ensued works directly against this commitment. The IMF's retrospective analysis of this episode also notes that real Saudi GDP dropped by "a cumulative 25 percent from 1981–1985," driven at first by oil GDP but eventually extending into non-oil GDP as the contraction progressed.[21(p. 14)] The state began the contraction with substantial financial buffers (estimated net financial assets around 60 percent of GDP at the start of 1980), but those assets were "run down by the early 1990s" despite "sharp government expenditure reductions".[21(pp. 15–16)] Thus, the Third Plan's diversification objective did not survive the contraction because the spending cuts fell on the developmental categories on which diversification depended.

The 1986 collapse repeats the same pattern at an even greater magnitude. Oil revenue fell from Rls 88,425 million in 1985 to Rls 42,624 million in 1986, a single-year drop of 52 percent.[5(p. 30)] The deficit-to-GDP ratio climbed from 16.1 percent in 1985 to 22.5 percent in 1986 and then to a peak of 25.3 percent in 1987.[1(pp. 38–40),21(p. 14)] The IMF retrospective explains that Saudi Arabia had cut crude production from 10.4 million barrels per day in 1981 to 3.5 million barrels per day in 1983 in an attempt to defend prices.[21(p. 12)] Then, they reversed their course in 1986 and increased production into the price collapse. SAMA's own interpretation of the fiscal year is direct, as the Twenty-Fifth Annual Report states that "the Kingdom's oil income in 1405/06 was only Rls 87.7 billion, 27.7 percent lower than in the previous year. Compared with the peak income of Rls 328.6 billion in 1401/02, the oil income in 1405/06 was only a little more than one fourth".[1(p. 28)] Total government spending declined by 16.1 percent in 1405/06 to Rls 181.5 billion.[1(p. 30)] The composition of those cuts is what establishes the fiscal transmission channel. The 1407/08 (1987–88) budget set total expenditure at Rls 170 billion, of which "Rls 50.00 billion are for project expenditures and Rls 120.00 billion for non-project expenditures".[1(p. 32)] In other words, current expenditure was set at 70 percent of the total budget while developmental expenditure was compressed to 29 percent. This imbalance is further documented in the Twenty-Fifth Annual Report: "Appropriations for project expenditures are 18.8 percent lower while those for non-project expenditures remain unchanged".[1(p. 32)] The sectoral breakdown of the 1407/08 budget, which is reported in Table 2.3 of the exact same report, allocates 35.7 percent of total spending to defense and security and 14.0 percent to human resource development. Simultaneously, however, infrastructure development receives 2.5 percent, lending institutions 2.1 percent, and economic resource development 5.0 percent.[1(Table 2.3, p. 33)] The pattern persisted the following year, as the 1408/09 budget set defense and security at 35.5 percent of total expenditure and infrastructure development at 2.5 percent.[22(p. 35)] Furthermore, SAMA's framing of the multi-year contraction during this crash is unambiguous. In the Twenty-Sixth Annual Report, the authority frames this period as "the adjustment which had become inevitable after the end of the hectic growth of over a decade," and reports negative non-oil GDP growth rates of 2.7, 6.7, and 2.4 percent in those three years.[22(pp. 22,28–30)] Therefore, during this period, the state was cutting developmental expenditure during the same years that non-oil sectors were contracting, which is also the pattern that the regression evidence detects in Section II.

The 1998 crash is yet another instance in which archival records document this mechanism in narrative evidence. The Thirty-Fifth SAMA Annual Report opens its Saudi Economic Developments chapter with the statement that "the performance of the Saudi economy during 1418/19 (1998) reflected the adverse impact of the sharp decline in oil prices caused by slowdown in the world economy mainly due to the financial crises in Asia and Russia".[23(p. 18)] Also, during this time, the average price of Arabian Light fell from $18.8 per barrel in 1997 to $12.2 per barrel in 1998, a drop of 35 percent.[23(p. 24)] Oil revenue fell from Rls 159,985 million in 1997 to Rls 79,998 million in 1998, a drop of 50 percent in a single fiscal year.[23(p. 26)] The actual deficit climbed from Rls 15.8 billion in 1997 to Rls 48.5 billion in 1998, or from 2.9 percent of GDP to 10.0 percent of GDP.[23(p. 30)] What this shows is that the composition of the state's response is the direct evidence for the fiscal transmission argument. The 1999 budget—which was announced directly after the revenue collapse—projected total revenue to fall 32.0 percent and total expenditure to fall 15.8 percent year-over-year. As a result, the expenditure cuts were not distributed evenly. According to SAMA, "appropriations for 'transport and communications', 'domestic subsidies', 'public utilities' and 'economic resource development' registered the highest rates of decline of 39.0 percent, 34.6 percent, 34.3 percent, and 24.1 percent respectively".[23(p. 36)] These are the developmental and infrastructure categories of the state budget. The categories that were cut least were "human resource development . . . health services and social development . . . [and] defence and national security, all of which fell by 5.9 percent, 7.6 percent, and 12.2 percent.[23(p. 36)] Such evidence is key in noticing that the composition of cuts in 1998–99 is the same composition that the 1987–88 budget constructed. This, in turn highlights how during a crash, developmental categories absorb the majority of the contraction while the current categories are protected, regardless of when that crash occurred in the given timeframe.

The IMF's retrospective analysis also reaches this conclusion, only through different evidence. For example, the 2015 Saudi Arabia Selected Issues paper, prepared by the IMF staff for the Article IV consultation, finds that the 1998–99 episode began with a fiscal deficit of about 3 percent of GDP and outstanding debt of around 70 percent of GDP.[21(p. 18)] This left the government no option but to cut spending into the revenue collapse, as the state was facing a complete fiscal implosion. The IMF then concludes that the starting fiscal position is "one important determinant of the macroeconomic and financial impact" across the three episodes it analyzes, and that the weaker starting position which the government faced in 1998 forced cuts that hurt non-oil growth at an unprecedented magnitude.[21(p. 19)] However, it is important to note that the IMF analysis was constructed for a different purpose, being a macroeconomic assessment of the 2014 price decline. Nevertheless, it independently identifies the same mechanism which Section III points towards.

Therefore, across the three episodes, the pattern clearly holds. The Saudi state in each contraction cut developmental expenditure faster and deeper than its current expenditure, even when its planning documents committed to diversification as well as when the cuts undermined the industrial policy that diversification required. Manufacturing lost ground to services because the state's industrial policy was the limiting factor to its growth, and as a result the fiscal composition mechanism that the regression evidence suggested is documented in the archival record.

Conclusion

The Saudi resource curse from 1980 to 2000 was not a property of oil wealth itself, but rather it emerged from the way in which the state allocated spending when oil revenue contracted. In each of the three contractions the paper examines, the same allocation pattern appeared: developmental categories were compressed more severely than current categories, and the non-oil sectors that were dependent upon this developmental spending lost ground due to these cuts. This pattern repeated across two decades and three revenue shocks that originated under different conditions and reached different magnitudes, further indicating that the study has identified an underlying fiscal tendency rather than a single-case crisis response.

The significance of this finding lies in its qualifying of what the resource curse actually means for a state like Saudi Arabia. The dominant framing in the literature treats the curse as a structural feature of resource-rich economies that are subject to slow-moving institutional compositions. The Saudi evidence between 1980 and 2000 points elsewhere. The damage to the non-oil economy was produced by the fiscal allocation decisions made under extreme revenue pressure. Those decisions are not the kind of variable that an institutional index was built to capture, yet they are still integral to the trajectory of the country. Thus, reading the period in this way preserves the agency of the Saudi state in producing its own economic outcomes, which a structural reading would inherently obscure or even neglect.

This distinction also has great importance for how Saudi economic history of the period can be read. The Third Five-Year Development Plan opened the era with an explicit commitment to reducing oil dependence, and the plan was backed by genuine resource allocation in its early years. But the commitment failed not due to a lack of capital, but rather because the contractions that followed produced spending patterns that worked against this goal. Thus, reading the 1980s and 1990s as a story of just the resource curse misses the historical specificity of what actually happened. The Saudi state attempted to diversify and then made fiscal choices during three revenue contractions that compounded into the non-oil damage the paper has documented. The history of the period, then, is that of choices under pressure, where fiscal decisions reshaped Saudi Arabia's economic trajectory.

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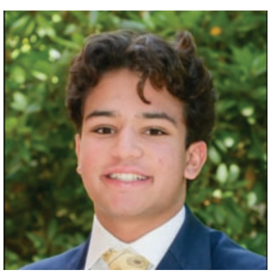

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