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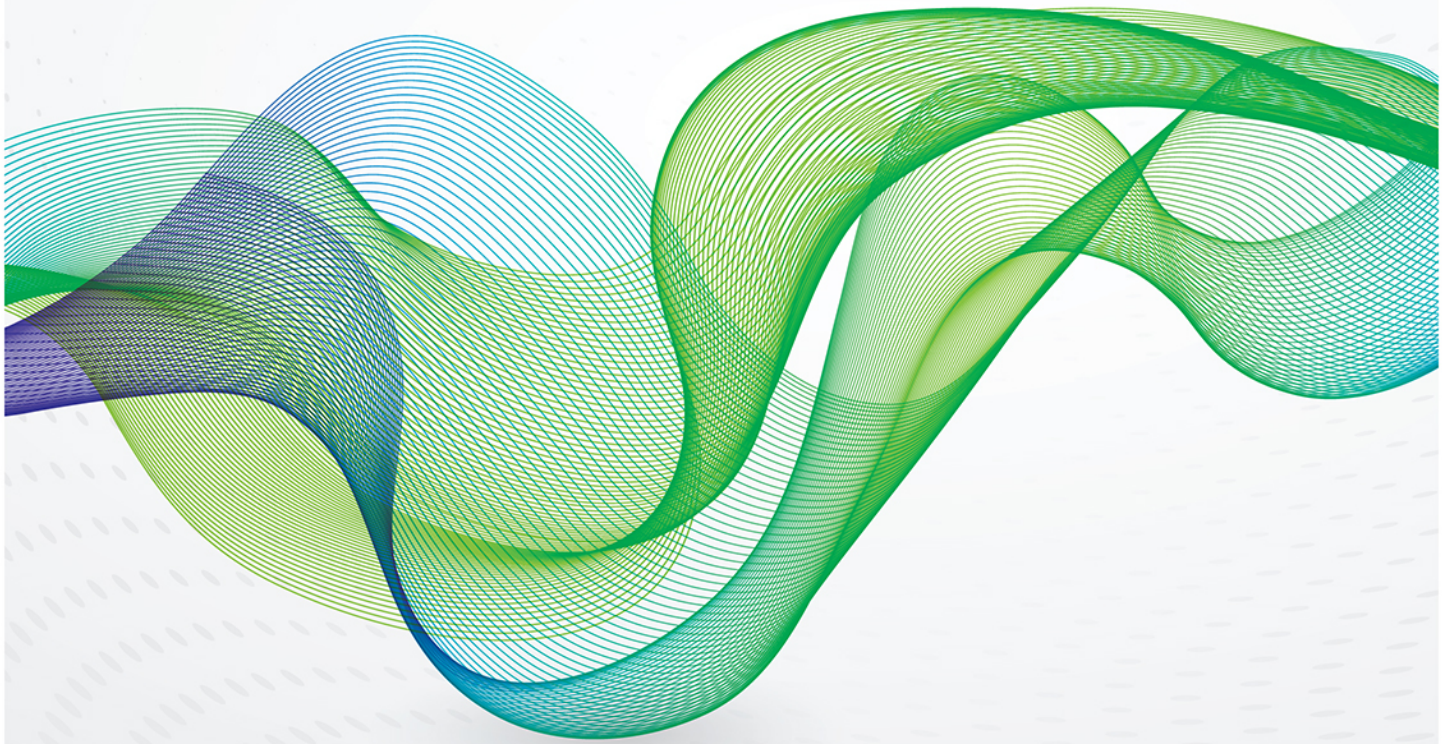
Quantifying Dutch disease effects and asymmetry in economic responses to oil price volatility in Kuwait



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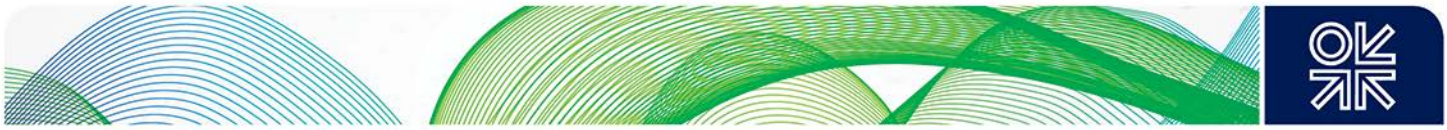

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Contents

Tables

Figures

Abstract

The motivation for this study is to fill existing gaps in the understanding of the economic impacts of oil price volatility on Gulf Cooperation Council (GCC) economies and to assist in the management of recent oil price shocks following the COVID-19 pandemic. To that end, this paper employs an economy-wide general equilibrium model that embodies Kuwait's economic structure and accounts for its political and economic constraints to quantify asymmetric responses of terms of trade shocks in Kuwait. It highlights impacts on non-energy sectors and 'second-best effects' to draw potentially-applicable lessons for the GCC. The results show that, consistent with expectations in the literature, there is potentially an asymmetric response between equi-proportional terms of trade shocks; yet in the current economic policy environment, this asymmetry is either non-existent for some economic variables or very limited and is significantly smaller than the asymmetry shown to exist in other resource-dependent and specialized economies. The potential asymmetry is mitigated by idiosyncratic adjustment mechanisms, namely the sovereign wealth funds (SWFs) and expatriate labour movement, especially when oligopolies are regulated. Contrary to theory expectations, the results also show there is a weak and limited (reverse) Dutch disease dynamic: specifically, there is a strong resource movement effect of the Dutch disease in Kuwait but an almost non-existent de-industrialization effect. Booms expand mainly nontraded oligopolies' markup along with the energy sector and the SWFs, and raise rent distribution payments to the public. Busts reduce distribution payments and markups of oligopolistic firms, but the latter do not expand into the export market despite the depreciating real exchange rate. The regulation of oligopolies reduces rent-seeking behaviour and renders the economy more open and efficient at managing both high and low oil prices. The economic story behind these dynamics is that economic efficiency is largely reduced due to a high concentration of oligopolies in the public energy, as well as in the private non-energy, sectors; these oligopolies capture terms of trade shocks' rents that detract from growth-enhancing innovation, hampering economic efficiency, competitiveness, and growth. Oligopolistic behaviour is enabled by (a) access to government subsidies; (b) access to expatriate labour whose wages are lower than those of national labour, have flexible contracts, and are therefore able to enter or exit the market with little cost to firms or repercussions to unemployment; (c) limited regulation; and (d) limited incentive to regulation because SWFs have been set up as quasi-industries, offering the government an alternative to industrial expansion and economic diversification. The sterilization of oil revenue through the SWF reduces available investments, further eroding potential reverse Dutch disease dynamics. The implication of this is that Dutch disease during high oil price episodes is not inevitable, but a result of policy choice, the downside of which is that reverse Dutch disease effects remain weak. There are important policy implications from this study which indicate that, even with oil price recovery, GCC's existing economic policy regimes and procyclical fiscal management of oil rents are unsustainable and cannot produce the stated desired economic diversification. Although politically difficult, industrial regulation is a potential path in the GCC's transformation plans to raise economic efficiency, manage oil and non-oil rents, expand non-energy sectors, and enhance economic resiliency in light of continuous oil price volatility.

JEL classification: C68, D43, D58, F41, L13, L43, L51, O53, Q43, P28

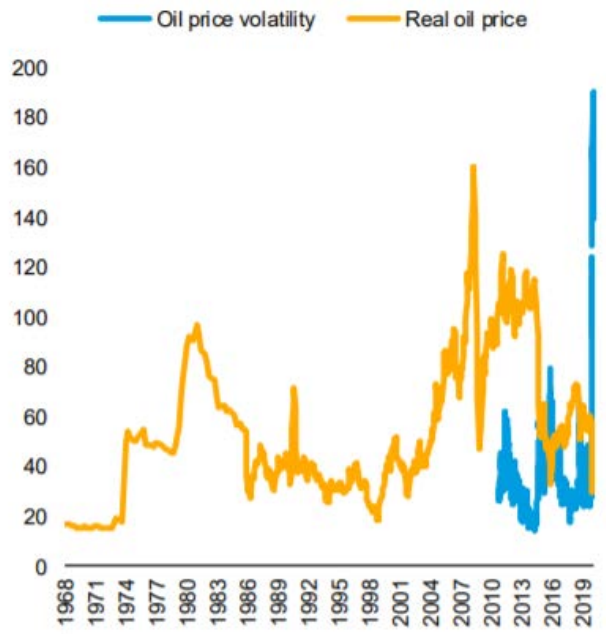
Keywords*:* Oil price; energy; Dutch disease; asymmetry; oligopoly; regulation; general equilibrium; CGE; international trade; expatriate labour; Kuwait; Gulf; Middle East

1. Context and research question

Despite its ability to generate large rents, dependence on an inherently-volatile commodity exposes hydrocarbon-exporting economies to terms of trade shocks (sizable changes in the index of export prices and the index of import prices) and boom and bust cycles, threatening their long-term economic sustainability. These effects are especially evident in the Gulf Cooperation Council (GCC) states—namely Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). These states are overdependent on hydrocarbon rents: oil revenue contributes at least half of gross domestic product (GDP), while oil exports have contributed between 78 per cent (in the UAE) and 91 per cent (in Kuwait) of exports and between 60 per cent (in the UAE) and 90 per cent (in Qatar and Kuwait) of government budget. Terms of trade shocks following oil price volatility cause real exchange rate volatility, comparatively high investment risk, price and production level changes, and real income decline despite the GCC's high income levels.[1] These effects are further exacerbated by their unique economic features which limit non-oil sectoral expansion (Shehabi, 2020). Said features are pervasive public and private sector oligopolies, high and rigid government expenditures, low taxes, and high subsidies.

The severe economic effects of the unprecedented collapse of oil prices in March–April 2020 place the management of boom–bust cycles at the forefront of policy making. Devising effective policy responses requires an understanding of the effects of oil price volatility and proper management of oil rents—; and these factors motivate this study.

Figure 1: Oil price volatility



Note: Left hand side is 2020 USD per barrel; right hand side is Oil Price Volatility Index, which measures the market's expectation of 30-day volatility of crude oil prices.
Source: Bloomberg Finance LP; IMF (2020).

True to its inherent nature, oil prices have undergone unprecedented volatility (Figure 1) in the last decade during two main crises. The first occurred mid-2014; prices collapsed from $103/barrel (bl) in January 2014 to US $30/bl in January 2016. Prices partially recovered until their unpreceded collapse in early 2020, following the global spread of COVID-19. This ongoing pandemic generated a demand-

[1] GCC states are classified are high-income countries by the World Bank (2020).

side shock triggered by lockdown measures, halting of economic activities, and travel bans in a range of efforts attempting to contain the pandemic.[2] A supply-side shock followed, when attempts by OPEC+ to prevent further price declines failed and the OPEC+ agreement collapsed in March 2020, triggering a temporary oil price war and overproduction. In March 2020, the Brent price and WTI dropped to a level more than 50 per cent below that of March 2019 (the lowest since 2002), to $22.4/bl and $19.92/bl, respectively. Prices collapsed further by April 2020, with WTI reaching negative levels due to oversupply, the rise of stockpiles, and the saturation of available storage. Indeed, the scale of this oil price shock is unprecedented, exacerbating the challenges facing GCC states domestically from the effects of COVID-19. Oil prices have rebounded in June 2020, partially due to OPEC+ supply cuts, with the Brent price closing on $42.19/bl on 19 June, 2020. But the future is uncertain, with continuous fears of a second COVID-19 wave and uncertain demand.

While unprecedented, these price movements are part of larger existing trends of inherent volatility. This fact yields the questions:

- Can negative effects be reversed and economic stability restored once oil prices recover?
- Can the terms of trade shocks be moderated, or even prove advantageous?
- And what does the management of cycles of terms of trade shocks tell us about the necessary policy responses required to manage the recent oil price shocks?

In contrast with industrial countries which have tended to pursue countercyclical (or at worst acyclical) fiscal policies, GCC states have historically followed a procyclical policy regime in managing terms of trade shocks.[3] They increase spending and harness any remaining excessive rents acquired during booms and use them, along with expenditure cuts, to cushion the economy during busts. Downside risks (such as fiscal pressures and economic contraction following the mid-2014 oil price collapse) have been managed through decreases in expenditures (including eliminating some energy subsidies in 2015–2016) and access to foreign financing. Negative effects have also been moderated by adjustment mechanisms (acting to cushion the economy). These mechanisms are the flexibility in the expatriate labour market; as well as investments in, or fiscal commitments to maintain contributions to, sovereign wealth funds (SWFs) which sterilize oil revenue and offer savings used during busts and fiscal deficits (Shehabi, 2017). Following oil price recovery in 2016, GCC states accelerated multi-year development plans (*Visions*) through large increases in expenditures to achieve economic transformation away from hydrocarbons.

This procyclicality is problematic, as it exacerbates the underlying business cycles. In the current oil price shock, the responses of GCC states seem to follow similar trends. Cuts of committed expenditures and allocated budgets have been announced (such as by 5 per cent in Saudi Arabia and Oman), and SWF savings and foreign reserves have been used to support committed expenditures. Addressing the halt in economic activity caused by lockdown and COVID-19 response measures, GCC states announced sizable economic packages[4] and debt facilitating measures to stimulate the local economy. While such commitments can potentially facilitate economic recovery, they will deepen the fiscal effects of oil price shocks and reduce available financing for economic transformation plans, likely leaving GCC states with very limited non-oil revenue alternatives.

Further, there is evidence in the literature that terms of trade shocks can have an asymmetric effect on an economy, in that the effects of price upswings are unequal to the corresponding effects of price downswings.[5] The nature of this asymmetry is very informative about the economy and policy solutions.

[2] Together with the ensuing anticipated global recession, global oil demand is expected to decrease by a record 9.3 million barrels per day (mbpd) year-on-year in 2020 (IEA, 2020).
[3] Examples of fiscal procyclicality are shown empirically by studies on oil producing economies (Fouad et al., 2007; Abdih et al., 2010; Villafuerte & Lopez-Murphy, 2010) and a study on 28 developing oil producing countries (Erbil, 2011).
[4] These have been valued at $13 billion in Saudi Arabia, $20.5 billion in Qatar, $21 billion in Oman, and $26 billion in Kuwait.
[5] Asymmetry can also arise from irreversible shocks and policy responses associated with factor stocks of capital or expatriate labour, policy changes, and external conditions. Such irreversibilities are not included in this analysis.

It can mean that oil price downswings can be more harmful to an economy than upswings are beneficial (or the opposite). Also, in the GCC the existence of asymmetry is important as it reflects the extent to which there is benefit (or loss) from terms of trade changes. The asymmetry can inform on the extent to which there could be opportunities for countercyclical expansion in non-oil industries (Dutch disease). Such opportunities can moderate negative shocks or allow them to become advantageous, or even be large enough to reverse the pattern of trade.

This expansion of non-oil industries largely depends on (among other factors) the existing industrial structure, competition, barriers of entry, and private sector dynamics. GCC industries tend to be dominated by a small number of firms—public and/or private sector firms from the merchant class—hence their classification as oligopolistic. This oligopolistic nature affects asymmetric responses and non-oil expansion.

To fill existing gaps in the understanding of the economic impacts of oil price volatility on GCC economies, this paper employs an economy-wide general equilibrium model that embodies Kuwait's economic structure and accounts for political and economic constraints, to quantify the responses of terms of trade shocks in Kuwait and draw potentially applicable lessons for the wider GCC. Kuwait offers an informative case given similarities among GCC economies—mainly in hydrocarbon dependence, income levels, institutional structures, expatriate labour policies, fiscal structure, and economic features.

Employing the model of Shehabi (2017), this paper undertakes two types of analysis to examine the extent to which asymmetry would exist in Kuwait in response to terms of trade shocks. The first analysis concerns short- and long-run impacts of equi-proportional terms of trade shocks without change in any policy instruments. The second simulation concerns impacts of terms of trade shocks if oligopolies are regulated. Performed in the short run, this simulation therefore takes the first shock plus the implementation of a hypothetical anti-monopoly policy that includes price cap regulations—the kind of policy that could be implemented by the Kuwaiti Competition Protection Authority. Given the collapse of the April 2020 oil price, the extent to which consequences for GDP, welfare, and economic diversification can be mitigated is important.

To the author's knowledge, this is the first paper to examine the effects of both booms and busts in Kuwait, as well as their impacts on non-energy sectors and second-best effects—which is a major contribution of this study. The paper makes important contributions to the understanding of economic dynamics in the GCC.

First, consistent with expectations in the literature, there is potential asymmetry in Kuwait's economic response to terms of trade shocks; however, under the current economic policy environment it is either non-existent for some economic variables or very limited. It is also significantly smaller than the asymmetry shown to exist in other resource-dependent economies, mitigated by idiosyncratic adjustment mechanisms.

Second, contrary to standard Dutch disease theory expectations and Kuwait-specific literature, Dutch disease effects are weak and reverse Dutch disease is very limited. Critically, there is a strong resource movement effect of the Dutch disease but an almost non-existent de-industrialization effect. Instead, oligopolistic firms extract rents from the terms of trade changes.

Third, a noticeable asymmetry would occur if oligopolies were regulated, entailing that both positive and negative terms of trade shocks can be advantageous. By enabling substantial efficiency gains that can be potentially captured economy-wide, regulation enhances the economy's ability to weather oil price volatility.

The economic story here is that economic efficiency during terms of trade shocks is largely reduced, due to a high concentration of oligopolies in the public and private sectors which capture terms of trade shocks' rents. Oligopolistic firms price their products at levels significantly higher than average costs, causing a large part of the current economic efficiency to be captured by their rents. Their sustained

rents detract from growth-enhancing innovation, hampering economic efficiency, competitiveness, and growth. Factors that enable their ability to capture rents are: (a) access to government subsidies; (b) access to expatriate labour with flexible contracts and lower wages than national labour; and (c) limited regulation of oligopolistic collusion or pricing. The impact on the economy is as follows.

- Booms expand mainly the energy sector and the SWFs, and raise rent redistribution payments to the public (pro-cyclical fiscal policy). Terms of trade improvements are captured as higher rents by only a small number of firms in a few oligopolistic industries (even if firms can enter/exit the market).
- Busts, by contrast, reduce redistribution payments and increase SWF withdrawals. Oligopolistic firms' markups decline but they do not expand their exports, despite them being more competitive owing to the depreciating real exchange rate. Instead, they cut costs by reducing expatriate labour employment, at relatively low cost and without repercussions for unemployment.

Regulating oligopolies renders the economy more open and efficient at managing both high and low oil prices. Yet there has been little incentive for such regulation because SWFs have been set up as quasi-industries, offering governments an alternative to industrial expansion and economic diversification that detracts from domestic investment and erodes potential reverse Dutch disease dynamics.

Important policy implications arise. The results suggest that Dutch disease during high oil price episodes is not inevitable, but rather a result of policy choice, the downside of which is that the potentially adjusting forces of reverse Dutch disease remain weak. The results show that even with oil price recovery the economy is unsustainable, given its existing economic policy regimes and procyclical fiscal policy in managing oil rents. Although politically difficult, industrial regulation is a potential policy option for the GCC's transformation plans aimed at raising economic efficiency, managing oil and non-oil rents, expanding non-energy sectors, and enhancing economic resiliency to manage continuous oil price volatility.

The next section offers a brief description of the Kuwaiti economy; it is followed by a summary of the literature on asymmetric responses to oil price shocks and on the Dutch disease. The next section contains a description of the model and is followed by findings from the two simulations. Lessons and policy implications conclude the paper.

2. Overview of the Kuwaiti economy

Kuwait's heavy dependence on hydrocarbons was facilitated by low production costs relative to other regions thanks to favourable geological circumstances, coupled with abundant resources. [6] Hydrocarbon production is managed through the fully state-owned Kuwait Petroleum Company (KPC). Key economic advantages stemmed from rapid accumulation of oil rents and very liberal trade policies for goods and services, capital, and labour. On entering the GCC in 1981, Kuwait adopted the regional economic, trade, and fiscal integration plans. Kuwait's primary macroeconomic objective has been maintaining low inflation (1.5 per cent). Fiscal policy is the main instrument of macroeconomic stabilization, supported by substantial foreign asset accumulation in its SWFs which also in turn stabilize the nominal exchange rate (pegged to a basket of currencies). More broadly, local political economy dynamics are a key determinant of economic policy concerning taxes and subsidies, labour, energy, and industrial regulation. At the centre of the political economy is the welfare state and rent distribution, as well relations between the government, political representatives through the National Assembly, and a strong merchant class (Crystal, 1989; Nosova, 2016).

[6] Kuwait has proven reserves estimated at 101.5 billion barrels of crude oil and 1,784 billion cubic meters natural gas (Al-Abdullah, Shehabi, & Sreekanth, 2020).

Notwithstanding its uniqueness, the economic structure of Kuwait is similar to those of other GCC states and has the following key features (detailed in Shehabi 2017, 2020).

- ***Sectoral composition***. The first feature is the dominance of oil production and refining, which constitutes more than 62 per cent of GDP and more than 90 per cent of exports (estimated at US$61 billion in 2018). Second, there exists significant but mostly non-tradable non-oil sectors (approximately 32 per cent of GDP, with 'Other services' industry being the second-highest value-adding industry). Third, there is limited but expandable non-oil exportation capacity as well as import-competing industries (namely, the 'Chemicals', 'Other network services', and 'Transport' industries generate 14 per cent of exports, each exporting approximately one-third of its output). Imports, however, dominate consumption in final (by households) and intermediate demand.
- ***Fiscal structure and welfare state*.** Negligible tax rates are applied on labour and corporate income (Shehabi (2017) offers details). Kuwait has yet to implement a 1.5 per cent value added tax per a GCC-wide agreement. There is a very generous domestic redistribution system to citizens, which includes various mechanisms and subsidies for transferring oil rents to nationals, and covers a wide range of products and services, including energy.
- ***Labour market***. There is a highly fragmented labour market, consisting of primarily two markets. Expatriates dominate the total labour force (83 per cent in 2018) (Public Authority for Civil Information, 2018). Expatriates are employed largely in the private sector at lower wages for similar levels of education and technical training than those for national labour. The remaining portion are national labour, most of whom work in guaranteed jobs in the public sector.
- ***Public sector dominance.*** This dominates the economy and controls not only the largest energy industries (oil, gas, and refined products), but also many services and manufacturing operations. It also funds a large part of the private sector, or operates through various public–private partnerships.
- ***Capital accumulation.*** A main feature of the Kuwaiti economy is the substantial foreign asset accumulation in its SWFs, estimated at $534 billion in May 2020(SWF Institute, n.d.). The Kuwait Investment Authority (KIA) manages the General Reserve Fund (GRF) for fiscal stabilization purposes, and the Future Generations Fund (FGF) for future saving purposes.
- ***Pervasive oligopolies***. This feature is critical to this analysis. Industries in the Kuwaiti economy are dominated either by public entities (for example, in the hydrocarbon as well as water and electricity sectors) or by a small number of private firms that are members of the politically influential merchant elite (for information on the role of the merchant elite, see Crystal, 1989; Herb, 2016; Nosova, 2016). The pervasiveness of oligopolies, identified by high levels of concentration, is evident when examining industries' capital market, showing its concentration within a few companies, as shown in the following table.

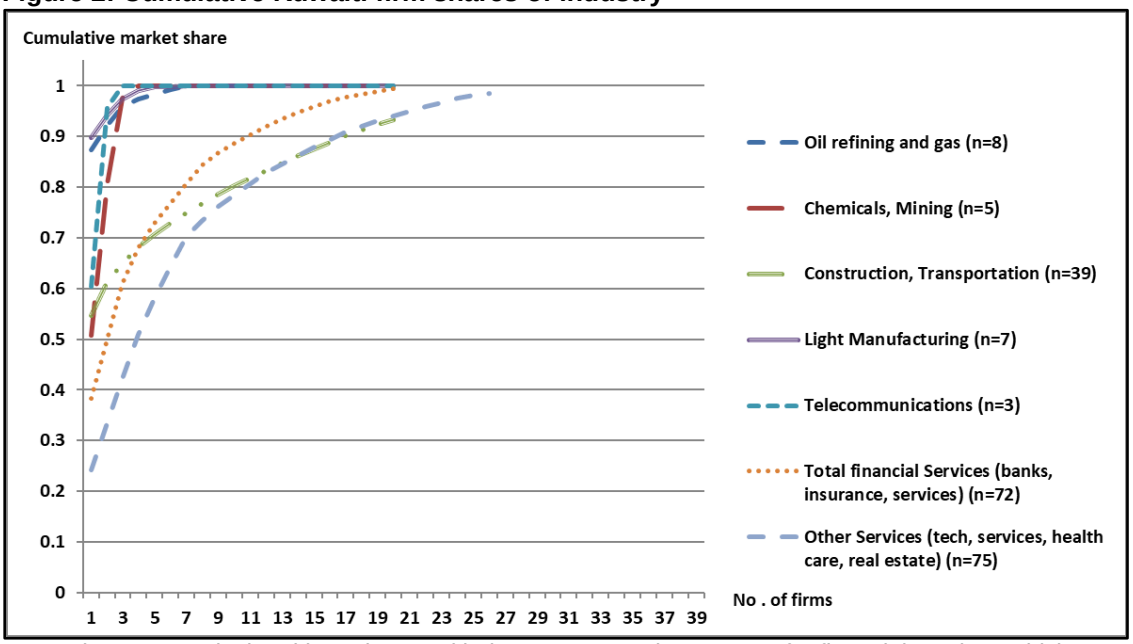
Table 1: Listed firms' concentration 2014

Sector (as listed in the Kuwaiti Stock Exchange)	Total number of listed firms	Percentage of total firms owning 60% of industry's capital	Percentage of total firms owning 80% of industry's capital
Oil refining and gas	8	38%	63%
Chemical and mining	5	40%	40%
Light manufacturing	7	14%	14%
Telecommunications	3	33%	33%
Construction and transportation	36	14%	36%
Financial services (banks, insurance, other services)	72	8%	14%
Other services (real estate, technology, health care, other)	75	8%	15%

Source: Author's analysis using data from the Kuwaiti Stock Exchange.

To further demonstrate the high concentration of industries' revenue within a few companies, Figure *2* depicts this concentration by reference to the cumulative market share.

Figure 2: Cumulative Kuwaiti firm shares of industry



Note: Shares are calculated based on total industry revenue data, except for financial services which are calculated based on net profit (due to the lack of revenue data). The vertical axis shows the cumulative share, and the horizontal axis shows the number of total firms n.
Source: Author's analysis using data from the Kuwaiti Stock Exchange.

Similar concentration trends are evident when examining revenue for an aggregate representative sample[7] of all (listed and unlisted) Kuwaiti companies across industries. Table 2 below summarizes the concentration of firms for each industry.

Table 2: Total (listed and unlisted) firms' concentration 2012

Sector	Number of reported firms (public and private) [a]	Percentage of reported firms with approximately 60% of industry's revenue [b]	Percentage of reported firms with approximately 80% of industry's revenue [b]
Oil, gas, and oil refining	**8**	**17%**	**17%**
Chemical	**80**	**16%**	**26%**
Light manufacturing	**3,760**	**8%**	**18%**
Heavy manufacturing	**1,661**	**7%**	**16%**
Other network services	**41**	**4%**	**7%**
Construction	**1,448**	**0%**	**2%**
Transport	**722**	**1%**	**2%**
Financial services	**435**	**4%**	**12%**
Other services	**32,352**	**3%**	**6%**

[a]: The numbers are provided from the summary of the CSB Establishment Surveys.
[b]: Percentages are calculated from data in the summary of the CSB representative firm data.
Source: Author's analysis using data from various firm surveys by Kuwaiti CSB.

Like other GCC states, Kuwait identified its Vision 2035 'New Kuwait' (Vision 2035), outlining various policy reforms and targets for economic diversification away from petroleum. Nevertheless, the country's economic structure, fiscal, labour, and energy dynamics in 2020 were not largely different from those of 2013. Further, oil exports have continued to dominate Kuwait's exports, contributing more than 90 per cent in both years (2013 and 2018).

Relevant to the objectives of this paper, the available (albeit limited) evidence shows that Kuwait follows procyclical fiscal policies. Erbil (2011) finds that expenditure in high-income countries (which include Kuwait) is countercyclical, while its specific components move in different directions: consumption is procyclical, while capital expenditure is countercyclical.8 Herrera et al. (2019) argue that cases of the UAE, Saudi Arabia, and Kuwait are countercyclical, but their analysis does not control for investments in SWFs, potentially skewing the results. Meanwhile, Frankel, Vegh, & Vuletin (2013) find that in the period 1960–2009, and specifically during 1999–2009, Kuwait had a positive correlation between the cyclical components of its real government expenditure and real GDP, reflecting a procyclical fiscal policy. These results are consistent with expenditure trends, as explained in the previous section. Such procyclicality is partly explained by Kuwait's budget structure and external financial constraints. There are higher investments in its SWFs during booms, while there are cuts on expenditures, energy subsidies, and capital expenditures on non-oil industries during busts (both in real terms and in model projections by Shehabi (2017, 2020)).

[7] The sample includes all firms as well as a representative sample of firms with less than 20 employees.
[8] These results reflect a correction of the endogeneity bias between the fiscal variables and the output variable.

3. Existing literature on asymmetric responses and the Dutch disease

3.1 Asymmetric responses

The 1973 oil price shocks and subsequent recession of the US economy sparked attention on the relationship between oil prices and economic output. In his seminal article, Hamilton (1983) showed that all but one of the eight recessions in the USA following World War II were preceded by rising oil prices and could not be explained by other business cycle variables—a relationship supported by other studies (Burbridge & Harrison, 1984; Gisser & Goodwin, 1986; and Ferderer, 1996). Oil price changes have been shown to have asymmetric effects—whereby the effects of price upswings are unequal to the corresponding effects of price downswings—on the US economy (Mork, 1989; Mory, 1993; Ferderer, 1996; Brown & Yücel, 2002; Hamilton, 2003; Lardic & Mignon, 2008) and, to a lesser extent, on other industrialized nations (Darby, 1982; Burbidge & Harrison, 1984). The asymmetry depends on whether an economy is a net-importer or net-exporter of oil (Mork et al. 1994). Oil price hikes negatively affect the GDP of advanced net-importers (Papapetrou, 2001; Jiménez-Rodríguez & Sanchez, 2005).

In the context of resource exporters, work on Australia's economy shows evidence of asymmetry in responses to commodity price shocks which depends on the structure of the whole economy, industrial regulation, and government policy responses (Tyers, 2015). A robust relationship has been shown between commodity prices and real exchange rates for most emerging economies, while results for other macroeconomic variables have been inconclusive (Olomola, 2006; Nikbakht, 2010; Bouchaour & Al-Zeaud, 2012). This relationship is important, for it constitutes a departure from the Obstfeld and Rogoff puzzle, which claims a disconnect between the two, confirming that commodity price shocks have a significant effect on real economic aggregates. Impacts of oil price shocks on investment have been shown to be weak (Farzanegan & Markwardt, 2009). Mismanagement of negative terms of trade shocks contribute to poor economic performance in Africa (Svedberg, 1991), while the magnitude of oil reserves matters for the sustainability of oil incomes in the medium term (Esfahani, Mohaddes, & Pesaran, 2014). Asymmetry can result from a lack of the institutional mechanisms de-linking fiscal expenditure from current revenue in heavily oil-dependent countries (Mehrara, 2008).

In the context of the Middle East, fewer empirical studies exist. Using data from MENA in the period 1952–2005, Berument, Ceylan, and Dogan (2010) conclude that there is an asymmetrical relationship between GDP and the oil price. Mehrara and Oskoui (2007) find that price shocks explain GDP fluctuations in Iran and Saudi Arabia, while supply shocks explain the fluctuations in Kuwait and Indonesia. In a study on six major oil exporting countries, three of which are in MENA (Iran, Kuwait, and Saudi Arabia), Esfahani et al. (2014) show that positive oil export price shocks significantly increase real output, and their results suggest a much higher historical oil price volatility in Kuwait (largely due to the 1990 Iraqi invasion of Kuwait). Abdel-Latif, Osman, and Ahmed (2018) find significant symmetric short-run, and asymmetric long-run, effects of oil price shocks on government expenditures in health and education sectors. Mrabet, Alsamara, Al-Marri, and Al-khayat (2019) find evidence of incomplete and asymmetric effects on long-term price levels: price increases moderate inflation while declines reduce imports and production prices. Notably, these effects are also reflective of the economic distortions of highly subsidized prices and of the existing exchange rate regimes.

3.2 Dutch disease

An important feature of commodity-based economies is the Dutch disease phenomenon—the effect of a boom in the natural resources sector on the non-resource sector. *Dutch disease* refers to instances when a boom in the exports of natural resources leads to a significant appreciation of the nominal (and of the real) exchange rate (or inflation in countries with fixed exchange rates regimes), which in turn adversely affects the non-resources tradable sectors and can cause a secondary boom in non-traded services sectors (Corden, 1960, 1984, 2012; Gregory, 1976; Snape, 1977; Corden & Neary, 1982; Venables & van der Ploeg, 2010; van der Ploeg, 2011; Tyers & Walker, 2016). Dutch disease effects include the process of de-industrialization caused by an appreciation of the real exchange rate, due to the *spending effect* (Forsyth & Kay, 1980) as well as the *resource movement effect* (Corden & Neary,

1982), whereby factor inputs of labour and capital are drawn out of both the non-resource traded and nontraded sectors to the expanding natural resource sector. The incidence of Dutch disease can be explained through the traditional international trade theory.[9]

For Kuwait, Al-Sabah (1988), Alsabah (1985), and Looney (1991) suggest that there is strong evidence for Dutch disease effects following episodes of export price hikes. Using an economy-wide model for Kuwait, Shehabi (2017) identifies required adjustments following oil price shocks in Kuwait, including limited Dutch disease dynamics (in addition to the seldom discussed expatriate labour exit, the SWFs, and oligopoly rents). In GCC states, the collapse of the oil price is robustly contractionary, since their non-energy sectors are small and feasible price changes would be unlikely to yield a reversal (Shehabi, 2017, 2020).

Dutch disease dynamics pose policy conundrums to the GCC and commodity exporters, especially regarding options for the uses of oil windfalls. The performance of the non-oil sectors in oil economies might be expected to be countercyclical, because negative shocks can induce re-industrialization under conventional Dutch disease behaviour. Yet Shehabi (2020) shows that reverse Dutch disease effects in Kuwait are limited following a decline of the oil price. This is due to structural constraints and economic distortions—these include Kuwait's fiscal structure (negligible taxation), high subsidies, captive capital in the energy sector and the SWFs, public sector dominance in the economy, and the concentration of national labour in the public sector.

The working hypothesis of this paper, therefore, is that Dutch disease effects have countercyclical impacts in Kuwait. Given the magnitude of the downturn in the oil price in April 2020, the extent to which these effects might mitigate the consequences for GDP and welfare is important. To that end, terms of trade shocks are simulated in the CGE model, described in the next section.

4. Economy-wide model and data overview

In a highly distorted economy such as that of a GCC state, the effects of a given shock can be understood by observing the sum of its direct impact on economic variables plus its second-best effects in correcting or exacerbating the effects of existing distortions. Economy-wide models are best suited to offer such insights, because they capture interactions between industries in a second-best environment, which can only be measured by economy-wide CGE models.

To that end, this research employs the model of Shehabi (2017): a two-region (Kuwait and the Rest of the World) economy-wide, CGE model with oligopolistic behaviour that embodies key features of Kuwait's economy (and common across GCC states). This model extends that of Shehabi (2017) and builds on Asano and Tyers (2019) which represents oligopoly behaviour and its regulation explicitly. Accounting for political economy dynamics, the model embodies unique features of Kuwait's economic structure, namely:

- high specialization in petroleum sector activity;
- public sector dominance in the economy and its interventions;
- its welfare system, including large consumption and industrial subsidies;
- investments into, and withdrawals from, the sovereign wealth funds;
- particularities of Kuwait's labour market; and
- oligopolistic industrial structures.

[9] It builds upon the vintage Heckscher–Ohlin model, incorporating the Factor–Price Equalization Theorem, the Stolper–Samuelson Theorem, and the Rybczynski Theorem.

In modelling economic constraints and possible policy solutions, the model explicitly incorporates key elements of the local political economy, namely: rent distributive measures (such as welfare payments and subsidies), national labour employment (through the labour market modelling assumptions), and dynamics of the merchant class through oligopolistic industrial representation.

The model is calibrated to Kuwait's economic data in 2013 (being the last year when oil prices were high).[10] The following summarizes the data and model aspects pertinent to this paper, while Shehabi (2017, 2020) offer details of the model, the database, and the calibration.

4.1 Data overview

The model is calibrated to a database in the form of a Social Accounting Matrix (SAM) constructed specifically by the author for the purposes of this model. The SAM depicts all sectors in an economy and the interactions between them within a given period, displaying all transactions as contributing to a circular flow of an economy's incomes and expenditures. It is a matrix presentation of the combined national income and product account, government accounts, and balance of payments accounts, combined with the country's input–output table to capture inter-industry flows. The constructed SAM reflects features of Kuwait's economy detailed above and draws on various official data sources[11] for 2013 (the most recent year for which data are available when oil prices were high), most notably national accounts, input–output table, and supply-use table.

The constructed SAM aggregates official CSB data from 50 economic sectors to 14, of which six are energy or energy-intensive industries, and disaggregates the crude oil and gas sector into two: crude oil, and gas and petro-services. It also disaggregates factor rewards to seven primary factors: physical capital, skilled Kuwaiti labour, skilled non-Kuwaiti labour, unskilled Kuwaiti labour, unskilled non-Kuwaiti labour, arable land, and energy resources (petroleum in the ground). Factor shares and input–output coefficients from these 2013 data are then combined with detailed bilateral trade, transport, and trade protection data (such as tariffs), as well as country-specific data such as national accounts and balance of payments. Both KIA funds are represented in the database as receiving payments from the government directly, rather than from the petroleum sector, but withdrawals are allowed in the form of government borrowing. Appendix A.1 summarizes key elements of the SAM.

4.2 Model structure

The model is comparative static, comparing economic outcomes of endogenous variables (such as real prices and wages at different equilibrium states) that result from changes in exogenous variables, such as external economic conditions (like oil prices) or policy instruments that can be shocked in simulations. Although comparatively static, it uses different assumptions in modelling both the labour and capital markets to allow changes in capital and labour mobility to simulate different time horizons. This approach fits the purposes of this paper because the intertemporal allocation is not the main concern of the research question.

The model incorporates various core features. The Kuwaiti economy is characterized as an 'almost small' open economy (following Harris (1984) and Dixon et al. (1982)), a feature common in economy-wide national modelling. The economy is open in trade and has a price-taking behaviour for imports, along with constant elasticity downward-sloping foreign demand curves for exports which are differentiated from competing products (Harris, 1984). Openness extends to financial markets via endogenous saving and investment and open capital and current accounts. The Armington (1969) assumption of national product differentiation, a standard feature in trade policy applications, is

[10] To resolve this shortcoming, it would be insightful to analyse the effects following the 2008 oil price decline (as a bust) compared with the 2013 data (a boom). Nevertheless, input–output data for either 2008 or 2009 are not available to perform such analysis reliably.

[11] Data sources include Kuwait's Central Statistical Bureau (CSB), Public Authority for Civic Information (PACI), Kuwait's Ministry of Planning, Central Bank of Kuwait, Kuwait Petroleum Corporation, and the Kuwaiti Stock Exchange.

incorporated. The model, like that of Balistreri and Markusen (2009), includes the standard Armington[12] constant elasticity of substitution (CES), nesting structures at the sub-national (firm) level that imply product differentiation between home and foreign products. Similar differentiation applies between common home products supplied by oligopolistic firms, though elasticities of substitution are larger in this case. The model breaks away from traditional frameworks through its representation of oligopoly behaviour, summarized below but detailed in Shehabi (2017) and following Asano and Tyers (2019).

Firms in 14 industries rent capital, hire workers, and supply products and services for demand. The model adopts neoclassical features in characterizing consumption preferences and the variable costs of production, including the optimization of representative agent behaviour, full input substitutability, and flexible product and factor prices.

On the demand side, there are five sources of demand: final, intermediate, investment, government, and foreign demands. Each demand source consumes domestic products that are differentiated by variety via CES nests, which are further differentiated from imported foreign varieties. The elasticity of collective demand is then a weighted average of the elasticities of demand in the five markets in which products and goods are supplied. Appendix A.1 includes demand shared per industry, drawing upon the SAM data.

On the supply side, firms' production technology is Cobb–Douglas in variable factors and intermediate inputs, so that industries can substitute between the variable factors and the intermediates. Intermediate inputs, in turn, are composites (CES nests) of home and imported products and services. Firms in all economic sectors, private and state-owned firms, are oligopolistic (or monopolistic). The representation of oligopolistic behavioural structure in the model is incorporated from Shehabi (2017), based on Asano and Tyers (2019), which is based on earlier work done by Tyers (2015), Gunasekera and Tyers (1990), Harris (1984), Horridge (1987), and Tyers (2005), and is similar to that of Devarajan & Rodrik (1991). In this representation, all firms in all economic activities have oligopoly power in product and input markets.[13] Firms in industry *i* collude on prices (p) to varying extents, and their collusion is parametrized through conjectural variations parameters (μ_i) that indicate the influence of pricing choices by any individual firm *k*, on the price set by firm *j:*

$$\mu_i = \frac{\partial p_{ij}}{\partial p_{ik}}, \qquad (1)$$

capturing the degree of price-setting collusion that occurs between the firms in a given industry. The value of μ_i ranges from 0 in the Nash equilibrium case (which each firm chooses its price, taking the prices of all other firms as given) which is a non-collusive differentiated Bertrand oligopoly, to 1 (unity) when all firms act as a cartel or when industries are dominated by a public sector firm. Parameter values between 0 and 1 represent collusive Bertrand oligopoly. In the model, larger firms are subject to pricing surveillance regulation, and the conjectural variation parameters also reflect the extent of existing regulatory surveillance. These relationships are complex; Shehabi (2017) and Tyers (2015) detail their analytics.

Further, all firms in all economic activities operate in differentiated product markets and adopt profit maximizing rules. As such, each firm carries fixed capital and labour costs that can lead to the potential for unrealized economies of scale and to the occurrence of pure (economic) profits (or losses) at market levels. As such, each firm in industry *i* exploits its monopoly over the supply of its own product variety through selecting the price relative to average variable cost, and therefore its markup that maximizes its profit. The average markup that a firm earns locally takes into account the total elasticity of demand facing the firm (being the weighted average of elasticities of demand of the aforementioned five demand

[12] According to Armington's (1969) theory, home and foreign goods (imports) are imperfect substitutes in the aggregate production of a given industry. Thus, tariff reduction or exchange rate appreciations will make home goods relatively less expensive, thus shifting the composition of the aggregate output towards imports. The Armington specification in the model allows the economy to produce, import, and export products with the same sectoral classification.
[13] Firms do not have oligopsony power in the markets for purchased inputs or primary factors.

sources). The elasticity of each demand source, in turn, depends on component elasticities of substitution, the number of 'effective' (strategically interacting) active firms in a given industry, conjectural variation parameters in industry *i* (μ_i) that indicate the extent of collusion in price setting, and further sets of shares.

The number of 'effective' (strategically interacting) firms in each industry, and the corresponding parameters governing competitive behaviour, are roughly determined in the calibration process using a large number of data sources. The determination of these parameters depends on firm concentration as measured by revenue and market capitalization, as presented above in Section 2. Also taken into account are the number of establishments in each industry, the diversity of firm sizes and products, the number of missing private firms, and the extent of regulatory surveillance limiting the full exploitation of oligopoly power. Appendix A.2 shows a list of the effective number of firms and the calibrated conjectural variation parameters per industry.

There are seven primary factors of production: physical capital, Kuwaiti unskilled labour, Kuwaiti skilled labour, expatriate unskilled labour, expatriate skilled labour, arable land, and natural resources. Solving the firm's cost minimization problem with Cobb Douglas technology in variable factors and inputs yields the volumes of each intermediate demand. Unit input demands are Leontief input–output coefficients determined by substitution behaviour (between domestic and imported inputs), and are thus dependent on product and input prices.

Critical to the analysis of terms of trade shocks are real exchange rate changes, which are endogenous. The real exchange rate represents the common currency ratio of the home price of a bundle of (traded and non-traded) goods and services at home relative to that abroad, and is modelled accordingly. The model, thus, calculates the real exchange rate as the ratio of the home price (P_Y) of a bundle of (traded and non-traded) goods and services at home relative to that abroad (P^*_Y), as follows:

$$e_R = \frac{P_Y}{\left(\frac{P_Y^*}{E}\right)} = E\frac{P_Y}{P_Y^*}, \qquad (2)$$

where e_R is the real exchange rate and E is the nominal exchange rate, *both* expressed according to the financial convention. Therefore, it is sensitive to both the performance of the traded industries and to that of the non-traded services sector.

As modelled, financial agents manage portfolios of domestic and foreign assets, impacting the inflow and outflow of financial investments. The model takes into account Kuwait's external financial flows, primarily flows to and from the KIA. These mimic, to the extent possible, the KIA's role as a source of government funds following oil price shocks. To complete the external financial accounts, the model represents both foreign direct investments and official foreign reserve accumulations through the KIA. To allow changes in investment flows in the model, capital representation includes capital used locally, as well as the portion of capital owned by Kuwaiti citizens, calculated after subtracting foreign owned capital from total capital. Capital is mobile across sectors as well as internationally. The long-run version is naturally Walrasian, in that prices and interest rates adjust to ensure that product, factor, and financial markets all clear.[14]

The government is fully represented in the model through a full representation of government accounts and macroeconomic elements. These include endogenous saving and investment, open capital and current accounts, and a complete system of expanded consumption subsidies and of taxes—both direct taxes (on capital, labour income, land, and resource rents) and indirect taxes (on trade and consumption expenditures). The government also makes direct transfers to the collective household, which can be

[14] Notwithstanding assumed rigidities in parts of the labour market, as these can be adjusted by closure changes in the model.

made fixed or endogenized. Welfare transfers are captured through transfers to households as well as subsidies, treated as negative taxes, which vary by industry.

4.3 Closures

Model closures dictate the length of run to be analysed and represent market clearance assumptions and other assumptions about which variables are free to change in response to shocks and which variables can adjust in responses to shocks. The short-run period spans the period during which capital stocks are unable to adjust. In the long-run simulations, prices and interest rates adjust to ensure that product, factor, and financial markets all clear. The length of the long-run analysis is the time (or number of years) required for the capital market (capital levels and interest rates) to adjust and firms to enter/exit the market once the shock is fully achieved, absent any other shocks. The closures critical to this study are as follows.

The labour market closures[15] are structured to represent the flexibility of expatriate worker contracts and the inflexibility of the majority of national workers—who are likely to remain employed in the public sector in current government policies, yet are sectorally mobile. As such, expatriate employment of both skilled and unskilled labour is endogenous in both the short- and long-run analyses, while Kuwaiti employment is fixed in both. The real expatriate skilled and unskilled production wage rates (relative to an index of *producer* prices) are held fixed, while the real Kuwaiti skilled and unskilled production wages are endogenous. Notably, assuming rigidity in national worker supply is important, but may constrain model solutions.

Fiscal closures determine the elements of government revenue or expenditure that are held constant and the ones that adjust. The adopted closure allows the government deficit and welfare payments to adjust, while government spending on goods and services is held constant. Government saving varies, driving the current account deficit. There are exogenous consumption subsidy rates and corporate tax rates.

The financial capital market closures determine whether capital use adjusts with exogenous required rates of return or is fixed at the industry level. In the short run, capital is fixed at the industry level, while rates of return vary across industries and are changeable in response to various shocks. In the long-run simulations, total capital stock of the economy is mobile, as is the level of capital use in each industry, so it adjusts (rises or falls) to maintain a fixed rate of return in all industries, with implications for financial flows on the balance of payments.[16] Payments to the KIA, and withdrawals from it, are endogenous.

The market structure (oligopoly) closure, which either requires a fixed number of firms and endogenous profitability, or adjusts by allowing firms to enter and exit to sustain constant profitability as per Chamberlinian monopolistic competition. The oligopoly sub-closure retains constant firm numbers and endogenous profitability in the short run. This setting is occasionally reversed in long-run applications.

The following simulations build on Shehabi (2017) which quantifies the drop in the oil price in Kuwait without change in any policy instruments in the short and long runs. It also identifies the adjustment mechanisms of the Kuwaiti economy: KIA savings, the flexibility of labour contracts, reverse Dutch disease dynamics, and oligopoly markups (Shehabi, 2017). Of these four adjustment mechanisms, only

[15] Labour market closures distinguish between the effects of shocks that either yield changes in real wages combined with full employment, or hold real wages fixed with changes in employment. The adopted closure accounts for the long-run flexibility of expatriate worker contracts, given that the stock of expatriate workers can fall with a decline in labour demand in both the short and long runs. Notably, assuming such rigidity in Kuwaiti worker supply is important: although in reality national workers' mobility can be achieved if needed through labour policy changes, the rigidity reflects actual labour market rigidities caused by the dynamics of the Kuwaitization and public sector employment policies (See Shehabi, 2018).

[16] The total stock of physical capital varies in the long run and the home-owned share of it depends on corresponding long-run changes in domestic real income and on the share of wealth held abroad. The home-owned share of domestic capital is important because it affects the level of factor income outflow associated with profit repatriation.

oligopoly markups can feasibly be regulated in Kuwait given the country's political system and economic structure. Therefore, the impact of oil price volatility is examined only under varying oligopolistic closures and regulatory policies. The other adjustment mechanisms are captured in the adopted closures.

5. Simulation 1: equi-proportional terms of trade shocks in unregulated oligopoly

To illustrate impacts of oil price volatility on the Kuwaiti economy, equi-proportional terms of trade shocks are imposed in the model, starting from the original 2013 equilibrium. This occurs by shocking the price of crude and refined petroleum in both the short and long runs by values ranging between –10 per cent and +10 per cent, while all existing economic policy regimes remain in effect. Imposing shocks both positively and negatively allows observation of the kind of asymmetry that can emerge where countercyclical Dutch disease effects are strong. The adopted fiscal, labour, and capital closures applied in the short and long runs are described in Section 4.3 above. Shocks are applied under the standard unregulated oligopoly sub-closure, adopting fixed numbers of firms in the short run and free entry and exit of firms in the long run. Importantly, feasible solutions do not exist when the oil price is shocked negatively below 10 per cent, while all economic policies remain in effect.[17]

5.1 Short-run analysis

Model results show that in the short run, a striking asymmetry exists in the response of real GDP to the shocks: for a positive shock, the improved terms of trade raise economic activity (measured in real GDP) only marginally, while a negative shock reduces real GDP by significantly larger magnitudes. Reasons for the asymmetry are detailed below. Nonetheless, this asymmetry is relatively small in comparison with the magnitude of the imposed shocks. Further, there is almost symmetry in the response of the better measures: real GNP, the real exchange rate, welfare measured in real household disposable income, and other variables. Figure 3 (parts a–d) shows this asymmetry.

[17] Upon relaxing economic constraints, simulating oil price shocks of larger magnitude becomes possible. This result suggests the unviability of current economic policies at persistently low petroleum prices—a statement that echoes official assessments of the country's economic future.

Figure 3: Short-run effects of terms of trade shocks (resulting from oil price volatility on the horizontal axis) under current economic policies

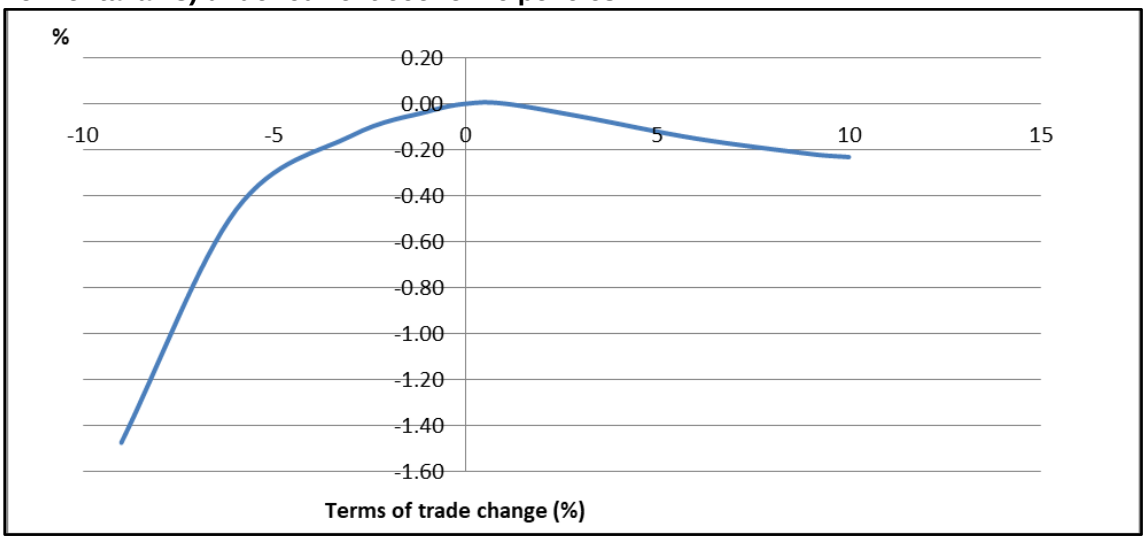


Figure 3-a. Real GDP

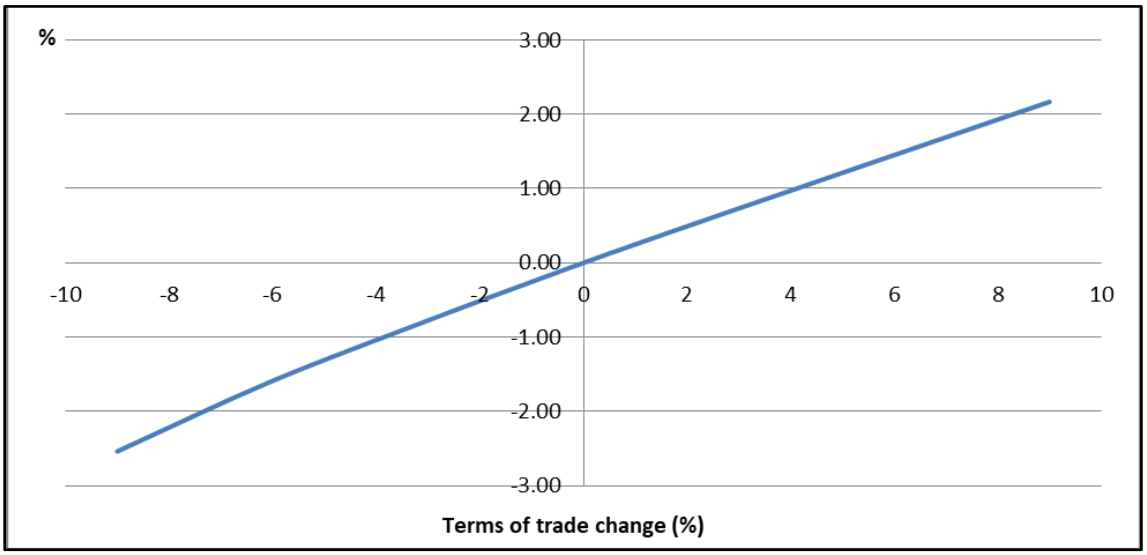


Figure 3-b. Real GNP

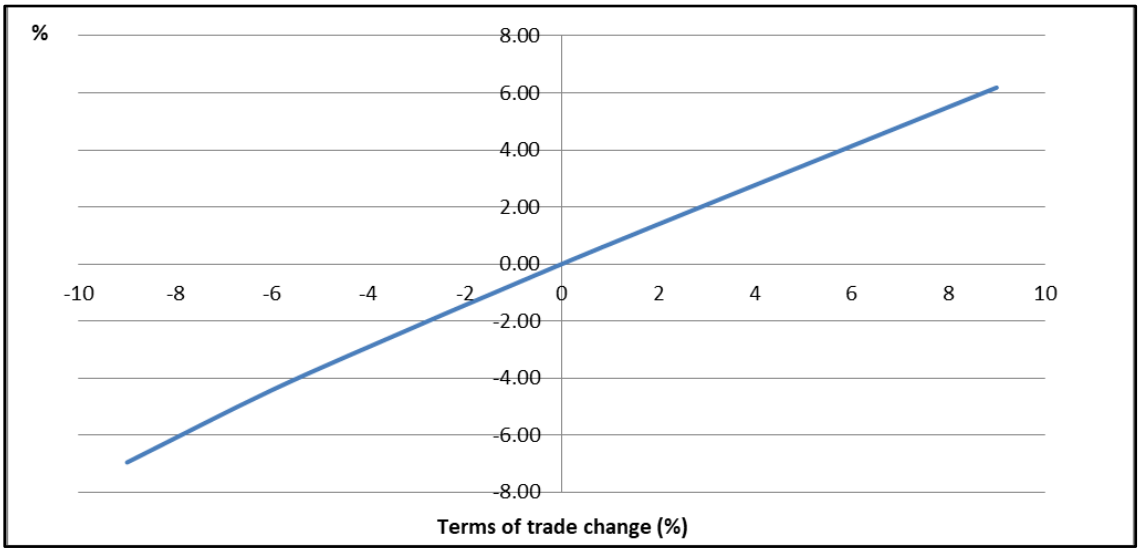


Figure 3-c. Real exchange rate

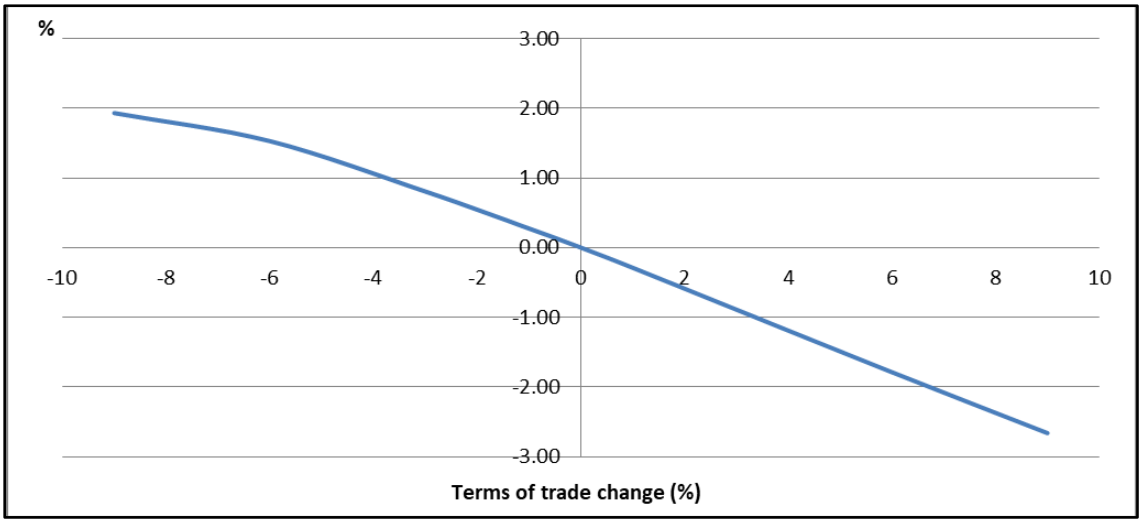


Figure 3-d. Welfare

Source: Model simulations.

Table 3 compares aggregate effects of lowering the terms of trade by 10 per cent and raising them by the same margin, in both the short and long runs.

Table 3: Aggregate effects of terms of trade shocks (resulting from oil price volatility)

Variable / Oil prices change	Unregulated oligopoly		Unregulated oligopoly with free entry and exit	
	–10%	+10%	–10%	+10%
Short run results				
Real GDP	**–1.5**	**–0.2**		
Real GNP	**–2.8**	**2.4**		
Real exchange rate	**–7.7**	**6.9**		
Real rate of return on capital, gross of tax	**–5.9**	**5.0**		
Investment/GDP	**–2.1**	**7.5**		
Fiscal deficit/GDP	**–4.5**	**4.8**		
Current account/GDP	**1.5**	**–2.0**		
Welfare (real disposable income, CPI deflated)	**2.1**	**–2.9**		
Long run results				
Real GDP	**–10.5**	**10.7**	**–16.6**	**16.2**
Real GNP	**–13.3**	**13.6**	**–19.5**	**19.3**
Real exchange rate	**–5.9**	**5.9**	**–5.8**	**5.7**
Real rate of return on capital, gross of tax	**–13.6**	**13.8**	**–21.5**	**21.6**
Investment/GDP	**0.5**	**–0.6**	**5.2**	**–7.5**
Fiscal deficit/GDP	**–14.7**	**15.0**	**–20.4**	**20.6**
Current account/GDP	**–15.7**	**16.1**	**–26.1**	**28.4**
Welfare (real disposable income, CPI deflated)	**3.5**	**–3.5**	**4.1**	**–4.4**

Source: Simulation results.

These results capture second-best effects of oil price shocks, a major contribution of this analysis. They are particularly important because:

- First, they reinforce the intuitive conclusion that the Kuwaiti economy is very sensitive to changes in oil prices, even though this conclusion appears at odds with the findings of Mehrara and Oskoui (2007) that oil price shocks do not explain GDP fluctuations in Kuwait.[18]
- Second, the asymmetry in the response of real GDP suggests that the impact of positive terms of trade shocks on domestic economic activity is miniscule and slightly negative in the short run. This decline in real GDP emerges because of the countercyclical Dutch disease effects and because oil windfalls are invested in KIA savings (rather than domestically), with deindustrialization being coupled with an absence of capital movement in the short run. This result is contrary to the conclusions of Berument, Ceylan, and Dogan (2010) that oil price shocks have a positive and significant impact on the output in Kuwait. Yet, consistent with their

[18] Further empirical analysis is required on this point, to verify the modelling results, but this is beyond the scope of this thesis.

findings, these results do show some asymmetry, even if it is smaller than that observed by them and others in advanced oil exporting economies.

In Kuwait's case, the principal reason for a relatively modest asymmetry is explained by the structure of the economy coupled with the adjustment mechanisms. Kuwait has a more highly specialized economy than other petrostates (especially the advanced ones) which have diversified economic activities. Further, the structure of the database lacks the factor endowment patterns and the intersectoral interdependencies that facilitate secondary services booms (Corden, 2012; Tyers & Walker, 2016).

In particular, during booms two additional factors contribute to the relatively modest asymmetry. First, the economy is highly distorted by subsidies, so that the artificially low energy purchase prices are comparatively stable and remain below the equivalent export oil price even after negative external price shocks. The weight of energy products in the local bundle does not decline and the relative price of the bundle remains lower than that abroad.

Second, countercyclical Dutch disease effects are limited because non-energy exporting sectors are small, so that the rise in non-energy exports during booms is washed out by the overall contraction caused by the decline in the oil sector. Further, booms increase the domestic price of nontradables relative to tradables, therefore increasing the movement of factors of production away from the already limited import-competing sectors to nontradables.

The high economic specialization also explains the movement in the real exchange rate, which follows that in real GNP.[19] As negative shocks reach 10 per cent, the depreciating real exchange rate (in line with standard Dutch disease literature) starts to taper off, suggesting that a potentially more visible asymmetry would appear with higher shocks. The rise in real GNP is significantly larger than that in real GDP in response to a given positive terms of trade shock. This discrepancy confirms that increased oil windfalls owing to higher prices are channelled to savings abroad in the KIA rather than into domestic economic activity or new physical capital, which further contributes to limited Dutch disease effects. Under the current economic structure, the KIA serves as a substitute industry to oil and therefore an alternative to economic diversification, confirming arguments in Shehabi (2020) about the structure reflecting deliberate policies that favour KIA at the expense of diversification. The supply of labour is only marginally restricted, due to firms' ability to employ expatriate labour quickly from outside the country as needed during booms, further reducing the asymmetry.

Oil export price declines, however, maintain the mandatory inflows into the FGF, but reduce inflows into the GRF and also cause domestic economic activity to decline. Further, as capital is immobile in the short run, the performance of non-petroleum industries improves only slightly, limiting inter-sectoral adjustment that could potentially lead to the expansion of the exporting non-petroleum industries. Varying trade elasticities would reduce the size of firms' markups and expand the size of the welfare and real economic activity impacts. Moreover, oil price declines cause the aggregate output and the aggregate household income to decline, lowering demand for labour in the impacted industries. The adjustment mechanism of expatriate labour further reduces the asymmetry relative to economies that do not have high dependence on expatriate labour and flexible employment contracts.

In addition, the depreciating real exchange rate renders imported products for final and intermediate consumption relatively more expensive. Yet demand in the non-oil exporting and services industries shifts from intermediate demand (with the lowest elasticity) to exports (with the highest elasticity), causing the overall elasticity of demand to increase. Oligopoly markups therefore decrease in return, smoothing the negative impact of negative terms of trade shocks. Nonetheless, these impacts remain relatively limited in comparison with the magnitude of the terms of trade shocks; this is due in particular to the limited expansion capacity of the non-energy sectors and the high concentration of oligopolies,

[19] If deflated by CPI, real GNP can be used as a measure of welfare. In this analysis, however, the measure of welfare used in household income is deflated by CPI.

including state-owned ones. The impact of oil booms and busts on the non-energy sectors is another a major contribution of this analysis.

The movement of aggregate welfare—defined as the real disposable income, CPI deflated—in a direction opposite to that of the terms of trade may appear counterintuitive, yet reflects the structure of the Kuwaiti economy and the composition of demand. With the exception of the energy industries, most demand is met by imports, which become relatively more expensive during booms with the appreciating real exchange rate. The pricing of energy products locally is fixed at artificially low subsidized levels, so an appreciating exchange rate does not raise the cost of the energy product bundle relative to those abroad. Yet inflationary pressures exist as increased demand for services and other nontradable goods raises the local prices of these products, reflecting the standard Dutch disease spending effect. The ensuing effect of these two factors is significant inflation, reducing welfare in the proposed measure. This result suggests that the government's monetary target of stable inflation cannot be maintained in real terms due to oil price volatility. Welfare further deteriorates due to increased oligopoly rents and markups following terms of trade improvements and the increased elasticity of overall demand. The opposite occurs following negative terms of trade shocks.

5.2 Long-run analysis

As Table 3 depicts, model results show that in the long run, as expected, positive terms of trade shocks cause substantial gains in the Kuwaiti economy at the aggregate level, with almost symmetrical results in the response of real GNP, real GDP, the real exchange rate, and welfare (measured as the real disposable income, CPI deflated). There is asymmetry in the response of investment as a share of GDP, largely due to the mobility of capital in the long run and the behaviour of the KIA. Under the standard oligopoly closure, the welfare response is symmetrical. Meanwhile, on the other aggregate variables excluding welfare, the magnitude of impact on them from a positive shock is insubstantially higher than that of an equal negative shock. The opposite occurs under an unregulated free entry and exit oligopoly closure, except for welfare gains resulting from a given negative shock—which are lower than welfare losses caused by an equal positive shock. As in the short run, positive terms of trade shocks are inflationary, causing the aggregate welfare to decline along with the appreciating real exchange rate. These results confirm the economic reality in Kuwait, where negative terms of trade shocks cause unusually large domestic economic stress.

It is striking that the change in oligopolistic behaviour (with free entry and exit) makes no real difference to the asymmetry in the responses of the aggregate or sectoral effects, except that the amplitude is higher. The larger magnitude under the free entry and exit closure reaches as high as 6 per cent for real GDP and real GNP for terms of trade shocks between –10 per cent and +10 per cent. When firms can enter and exit, the overall aggregate economic performance is better during positive terms of trade shocks, but also significantly worse during booms. Figure 4 (parts a–d) shows results under the two oligopoly closures.

Figure 4: Long-run effects of terms of trade shocks under current economic policies and free entry and exit oligopoly

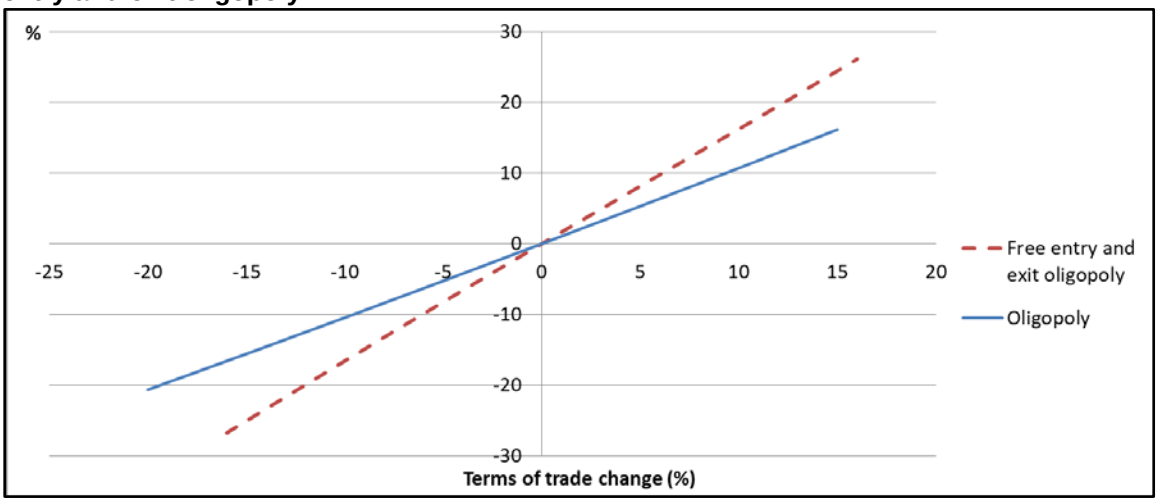


Figure 4-a. Real GDP

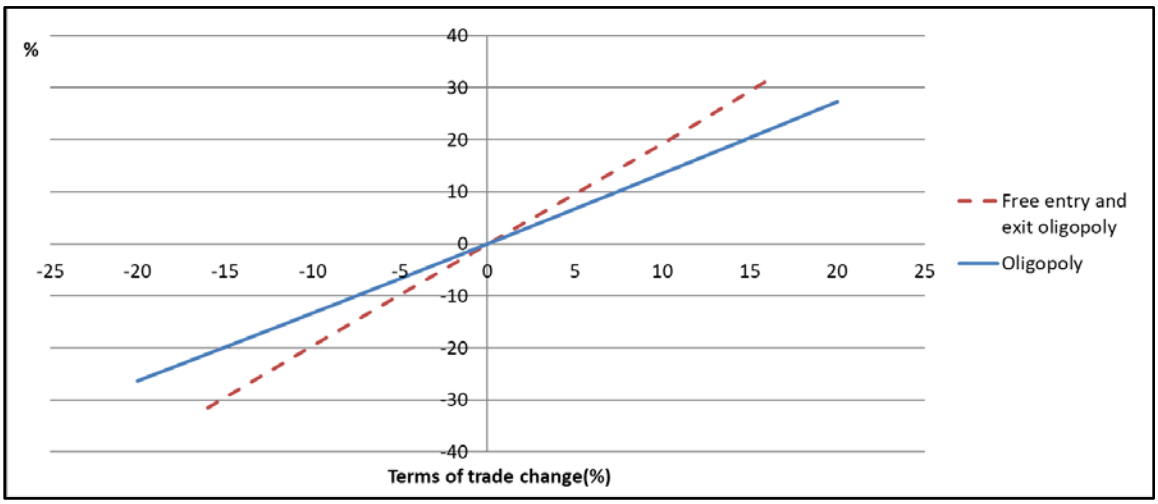


Figure 4-b. Real GNP

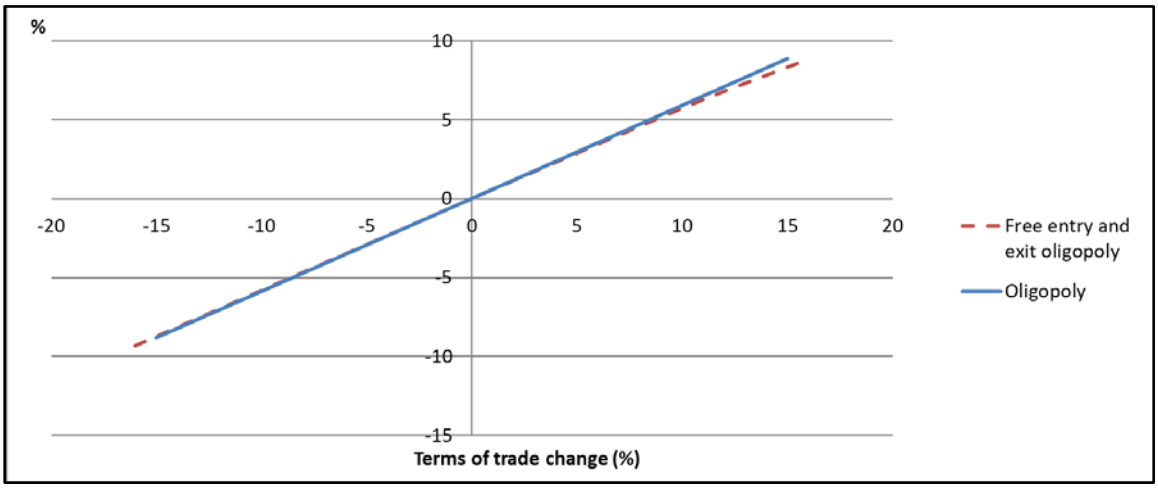


Figure 4-c. Real exchange rate

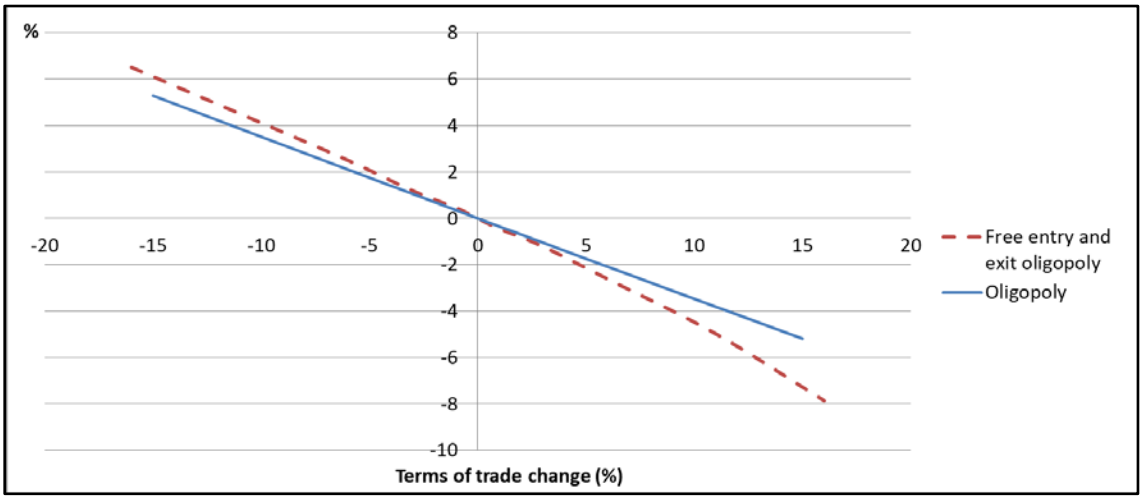


Figure 4-d. Welfare

Source: Model simulations.

The reason for the difference in magnitude of effects under the two oligopoly closures lies mainly in the structure of the economy and the database, but is also due to entry and exit of firms in the long run. Firms' entry tends to reduce scale, but it also entails that during busts firms carry more pure losses and so exit, increasing the overall markup and rent. By contrast, the standard non-entry oligopoly closure raises costs only slightly during booms, and increases demand for capital, thereby entailing that the gains in pure profits are captured by a small number of firms, with the primary winner being the oil industry. Non-entry also offers adjustments during busts by allowing firms to carry pure profits (losses), thus lowering the overall improvement during positive terms of trade shocks and smoothing out the effects of the negative ones.

With the exception of the impact on the real exchange rate, the magnitudes of the aggregate impacts of oil price volatility in Kuwait are larger in the short run (in contrast with the results of Devarajan and Offerdal (1989) for Cameroon, and Tyers (2015) for Australia). The principal reason for the difference between the two simulations is capital mobility in the long run, which enables sectoral adjustments, smoothing out the impact of the positive (and negative) terms of trade shocks. The difference is also attributable to the high level of specialization of the Kuwaiti economy and its idiosyncratic adjustment mechanisms, especially its segregated labour force. In this case, the Kuwaiti labour market closure does not vary by the length of run, enabling flexible expatriate labour use in booms, busts, and in the long and short runs.

Booms raise the overall oligopoly markup and rent—more so under the free entry and exit closure than with non-entry. Results are in Table 4.

Table 4: Key long-run sectoral effects of terms of trade shocks under both closures

Variable / Percentage change (departure from baseline)	Unregulated oligopoly		Unregulated free entry and exit oligopoly	
	–10%	+10%	–10%	+10%
Expatriate employment				
1 Agriculture	18.3	–12.3	60.6	–28.5
6 Chemical	16.0	–14.2	15.0	–23.1
7 Light manufacturing	20.0	–17.2	23.8	–20.9
8 Heavy manufacturing	55.2	–43.7	60.7	–43.7
10 Other network services	5.1	–4.7	7.8	–9.5
11 Construction	7.8	–10.2	31.7	–59.4
12 Transport	17.0	–15.2	23.6	–22.6
13 Financial services	8.5	–7.7	9.6	–12.1
14 Other services	7.5	–7.0	7.9	–8.2
Total	8.7	–8.0	10.4	–11.8
Gross output				
1 Agriculture	19.2	–12.1	70.9	–29.2
2 Mining	16.7	–13.0	38.7	–20.6
3 Crude oil	–23.2	24.4	–38.9	37.2
4 Gas and petro-services	4.0	–3.6	5.6	–5.7
5 Oil refining	–19.0	20.3	–44.0	37.0
6 Chemical	17.6	–15.6	9.3	–15.7
7 Light manufacturing	16.4	–14.3	18.6	–15.9
8 Heavy manufacturing	56.8	–45.9	55.0	–36.6
9 Electricity	4.9	–4.3	3.3	–4.6
10 Other network services	8.4	–8.1	8.6	–12.0
11 Construction	4.6	–7.7	25.8	–51.9
12 Transport	16.2	–14.7	21.2	–20.8
13 Financial services	5.9	–5.6	7.5	–9.8
14 Other services	6.0	–5.7	6.8	–7.0
Markup ratios				
1 Agriculture	–5.5	3.4	–21.5	10.5
6 Chemical	–0.1	0.0	0.4	–0.7
7 Light manufacturing	–0.5	0.4	–0.5	0.2
8 Heavy manufacturing	–1.6	2.1	–1.0	–0.7
10 Other network services	–0.7	0.8	–2.1	3.0
11 Construction	0.0	–0.1	0.5	–1.3
12 Transport	–0.4	0.4	–1.4	1.6

Variable / Percentage change (departure from baseline)	Unregulated oligopoly		Unregulated free entry and exit oligopoly	
	–10%	+10%	–10%	+10%
13 Financial services	0.0	0.0	–0.4	0.7
14 Other services	–0.1	0.1	–0.1	0.0
Average	–0.9	0.7	–2.7	1.4
Pure profits/GDP				
1 Agriculture	0.01	–0.01	–0.01	0.00
6 Chemical	–0.11	0.00	0.4	–0.72
7 Light manufacturing	–0.5	0.4	–0.5	0.2
8 Heavy manufacturing	–1.6	2.1	–1.0	–0.7
10 Other network services	–0.7	0.8	–2.1	3.0
11 Construction	0.0	–0.1	0.5	–1.3
12 Transport	–0.4	0.4	–1.4	1.6
13 Financial services	0.0	0.0	–0.4	0.7
14 Other services	–0.1	0.1	–0.1	0.0
Total	0.1	0.01	0.2	–0.02
Scale				
1 Agriculture	19.2	–12.1	47.4	–9.2
6 Chemical	17.6	–15.6	–19.8	46.2
11 Construction	4.6	–7.7	–20.3	60.9
12 Transport	16.2	–14.7	–0.1	–0.2
13 Financial services	5.9	–5.6	–14.1	34.7
14 Other services	6.0	–5.7	1.4	0.1
Total	19.2	–12.1	85.6	–9.2
*Change in firm entries/ Initial firms **				
1 Agriculture	0	0	31.9	–219.7
6 Chemical	0	0	19.8	–76.8
11 Construction	0	0	12.4	–43.0
12 Transport	0	0	29.2	–215.5
13 Financial services	0	0	27.3	–105.0
14 Other services	0	0	115.5	–626.7
Fixed costs/GDP				
3 Crude oil	0.0	0.0	–0.1	0.3
5 Oil refining	–0.01	0.01	–0.4	0.6
6 Chemical	0.0	0.0	0.05	–0.09
8 Heavy manufacturing	0.0	0.0	0.1	–0.1
11 Construction	–0.02	0.02	0.3	–0.7

Variable / Percentage change (departure from baseline)	Unregulated oligopoly		Unregulated free entry and exit oligopoly	
	–10%	+10%	–10%	+10%
12 Transport	–0.02	0.03	0.2	–0.2
14 Other services	–0.09	0.09	0.1	–0.2
Net exports				
2 Mining	0.6	–0.5	1.3	–0.8
3 Crude oil	–8.3	8.6	–10.4	11.5
5 Oil refining	–7.8	8.2	–16.4	14.7
6 Chemical	0.5	–0.4	0.2	–0.3
8 Heavy manufacturing	1.1	–0.8	0.9	–0.3
10 Other network services	0.5	–0.5	0.5	–0.6
14 Other services	1.0	–0.9	1.24	–1.2

* The model assumes assume no government interference to bail out or protect firms from exiting, hence the larger than realistic long-run results of the 10 per cent shock under a free entry and exit oligopoly closure.
Source: Simulation results.

Non-energy exporting industries (like 'Other network services' and 'Transport') and some nontradable services (namely 'Agriculture' and 'Financial services') face more intermediate demand, which lowers their overall demand elasticity and raises their markup and rents. Markups and pure profits decrease for the industries that become more directed at exports (such as 'Heavy manufacturing') and final demand (such as 'Construction'). The reverse occurs during busts. Yet these changes in markups and pure profits are washed out across the economy during booms, because (a) the changes in the economy remain dominated by changes in the hydrocarbon industry; and (b) the domestic transition of terms of trade shocks is limited by very large consumption subsidies, which enable firms to carry high markups and maintain prices higher than average costs. The same is true for scale: scale increases for advantaged industries and declines for harmed ones, but the overall effect on the economy is a decline in scale during booms, partly due to the impact of the shocks on the non-energy sectors.

The long-run sectoral effects reveal some striking realities of the dynamics of the Kuwaiti economy and the pervasiveness of oil dependence and structure. The Dutch disease literature would suggest that the rise in the resource export price causes expansion in the booming sector as well as in the sectors that support it and also in nontradable services, implying that more firms would be expected to enter during booms and more firms would exit during busts. Nevertheless, the model's results show that oil price increases expand only the Kuwaiti oil sector and raise rent distribution payments to the public, but are contractionary in output and expatriate employment for all non-energy sectors under both closures, as shown in Table 4. Further, when firms can enter and exit, terms of trade improvements cause firms to exit from all non-energy industries, even those for which pure profits are increasing. Gains are captured by only a small number of firms in a few oligopolistic industries, especially those with high concentration, namely tradable 'Other network services' and nontradable 'Other services.' It also implies that the resource movement effect of the Dutch disease is particularly high in Kuwait, where labour and capital are drawn out of non-energy industries to support the booming energy sector. The reason for this is that the wage effects of these shocks are minimal because guest workers enter and exit the market at the same wage.

The oil industry is capital intensive, while most of the other industries are labour intensive, enlarging the impact of factor movement. This result also confirms that oil windfalls do not increase capital use or investment in the domestic economy, but do support investments abroad in the KIA. In other words, the

sterilization of oil revenues through the KIA payments reduces government and overall investment spending, thus reducing capital accumulation and private consumption domestically. Thus, if the KIA is treated as a quasi-industry, a boom in Kuwait is thus expansionary in the energy sector and KIA only.

It is important to note that these results are potentially exaggerated (that is, in relation to what occurs in Kuwait in reality), especially as pertains to the employment of expatriate labour, which increases during booms.[20] Nevertheless, due to the identified factors and dynamics, the results do imply that reverse Dutch disease dynamics in domestic (non-KIA) industries are very limited under the current economic structure and policies because booms translate into increased rent transfers but not to overall economic structural transformation or higher domestic savings and capital. Reverse Dutch disease opportunities are also limited because oligopolistic industries, buoyed by the pervasiveness of consumption subsidies, adjust little. Further, the wage effects common in other countries are limited here because adjustment takes place via the entry and exit of expatriate workers. Nonetheless, this does suggest considerable scope for fiscal, industrial, and competition reform in the economy.

6. Simulation 2: Regulated oligopoly effects on response to terms of trade shocks

The purpose of this simulation is to quantify the impact of hypothetical anti-monopoly and anti-oligopoly regulation (the kind of policy that could be implemented by the Kuwaiti Competition Protection Authority to reduce the distortionary effects of imperfect competition) on managing terms of trade shocks caused by oil price volatility. Therefore, the model is simulated with equi-proportional terms of trade shocks ranging between –10 per cent and +10 per cent in combination with regulated oligopoly, in which the Kuwaiti Competition Protection Authority forces oligopoly pricing at average total cost, without any change in the country's policy instruments.[21] In this simulation, oligopoly markups as an adjustment channel require a policy intervention, as they would in the real world. Since this regulatory intervention conflicts with pure-profit-motivated free entry and exit, the simulations apply only to the short run, in which the number of firms in each industry is held fixed. Importantly, the terms of trade shocks are administered in an economy in which oligopoly rents are limited to covering average costs in all cases. The economy is, therefore, more open and efficient at both high and low oil prices, while both positive and negative terms of trade shocks are now advantageous to the economy even though the economy remains oil-dependent.

Figure 5 (parts a–d) depicts the aggregate short-run effects of terms of trade shocks ranging between –10 per cent and +10 per cent under regulation and, for purposes of comparison, the standard oligopoly closure (Section 4.3) in which all current economic policies remain in effect. Importantly, the graph depicts the Kuwaiti economy's response to terms of trade shocks in its current policy environment (no oligopoly regulation), compared with its response to these shocks if they were to occur in an environment where oligopoly regulation (average cost pricing) is imposed.

[20] In an examination of Kuwaitization dynamics, Shehabi (2018) discusses the movements of expatriate labour and shows their increase during booms.
[21] Costs of regulation are not simulated.

Figure 5: Short run effects of terms of trade shocks under current economic policies and regulated oligopoly

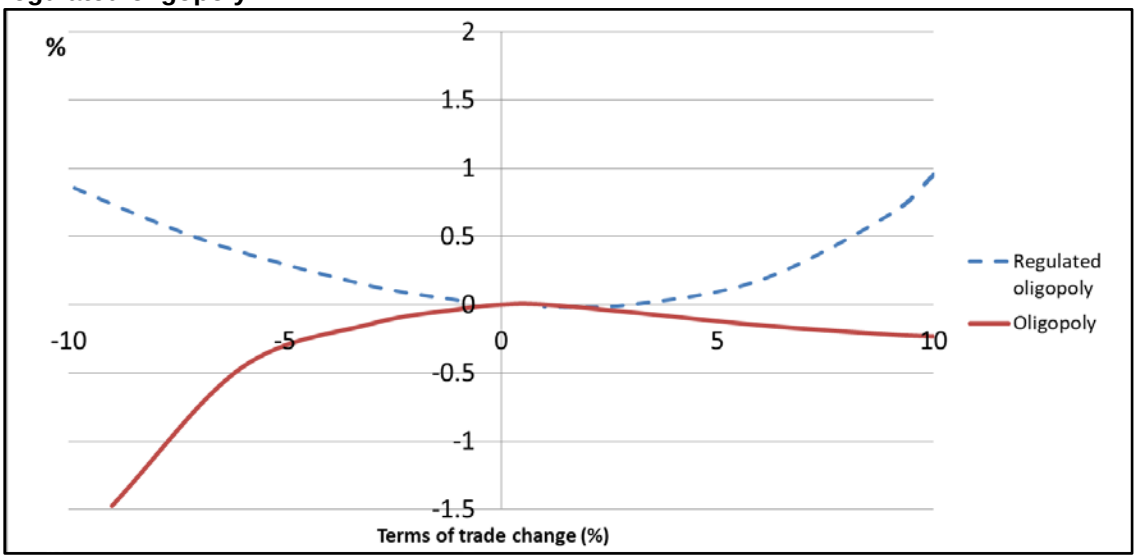


Figure 5-a. Real GDP

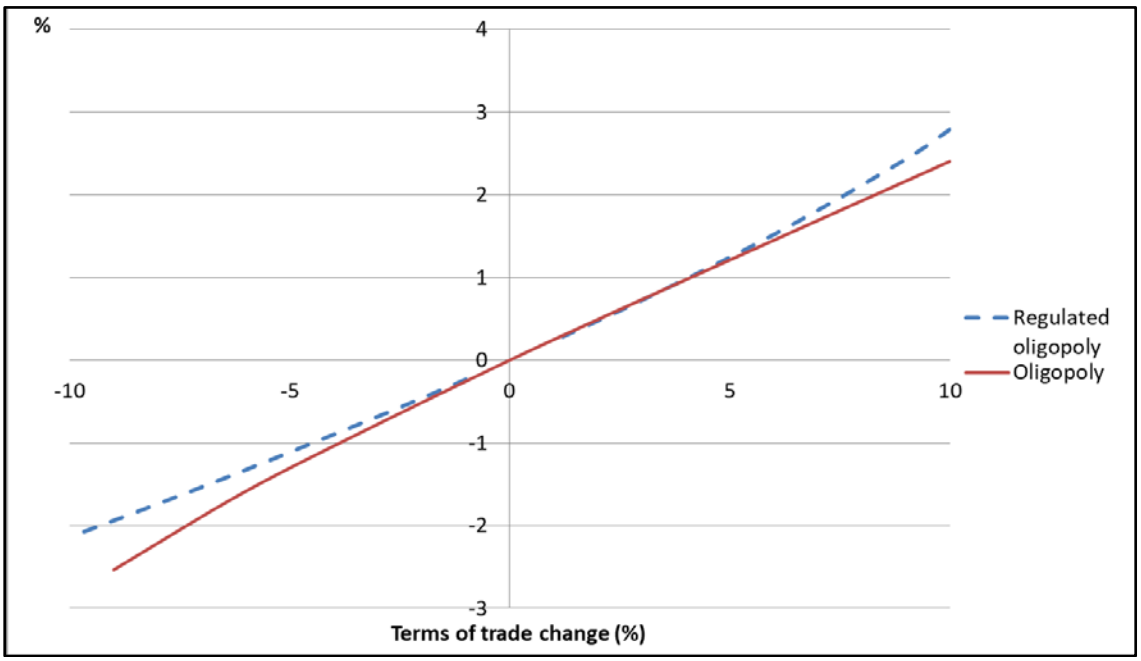


Figure 5-b. Real GNP

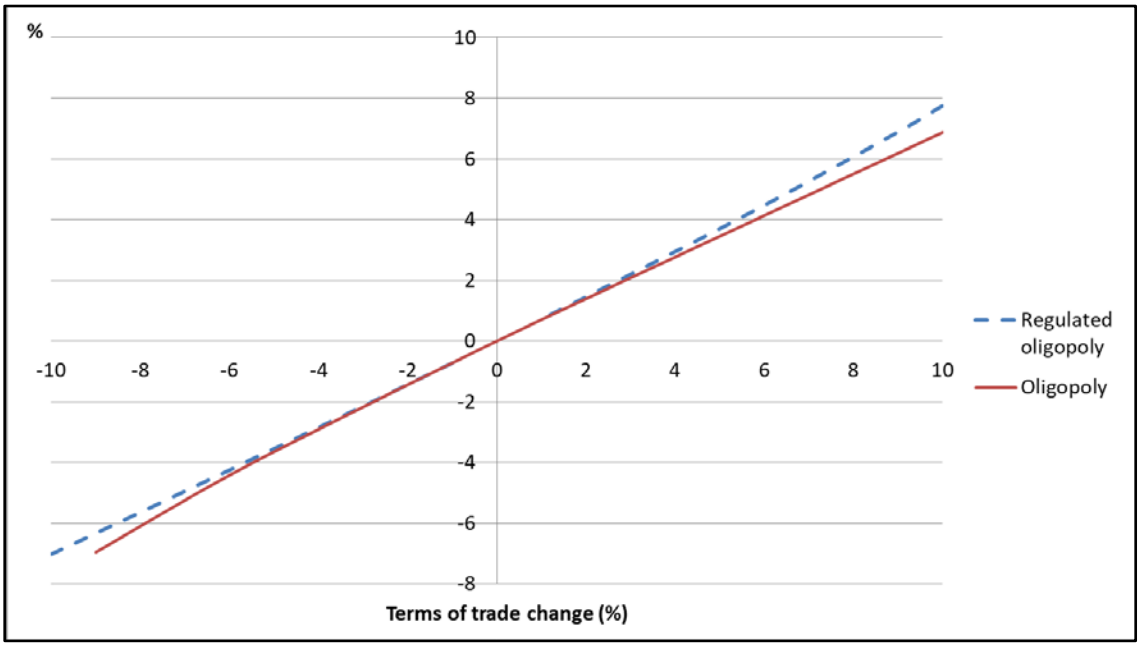


Figure 5-c. Real exchange rate

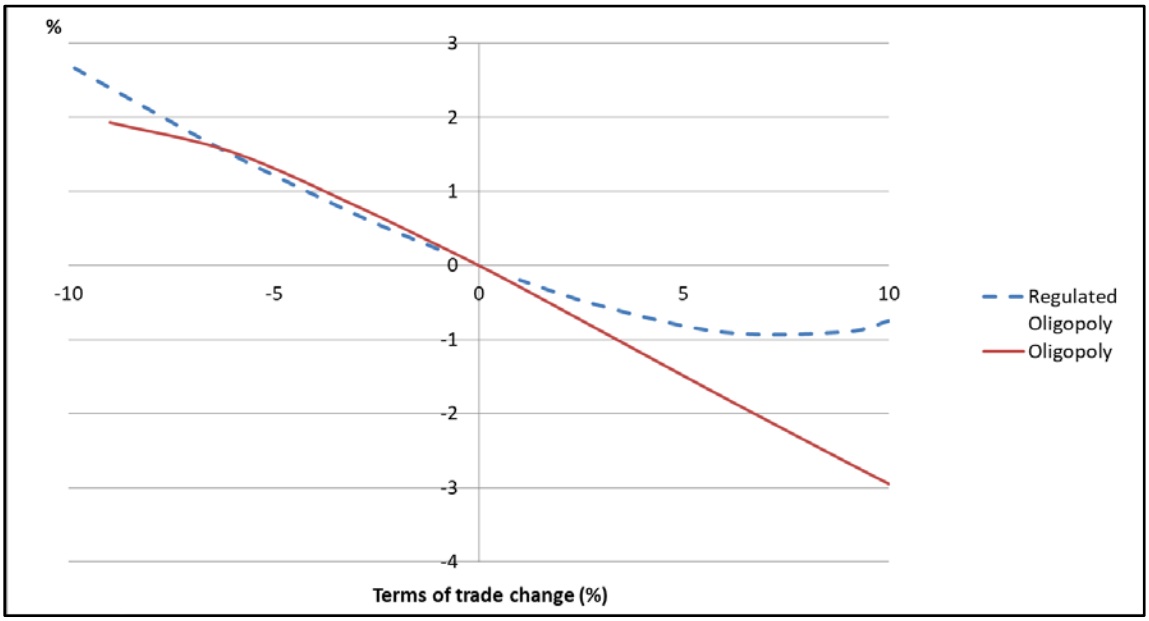


Figure 5-d. Welfare (real disposable income, CPI deflated)

Source: Model simulations.

The figure confirms that the impact on real GDP and welfare is asymmetrical and depends critically on the behaviour of oligopolies. In the case that regulation is imposed, real GDP (Figure *5*-a) improves in response to both positive and negative terms of trade shocks, with the improvement being naturally higher in response to positive than negative terms of trade shocks given the economy's overdependence on the oil industry. With regulated (average cost pricing) oligopolies that do not extract rents from the terms of trade changes, the non-petroleum sectors assume greater responsiveness and overall economic significance. Output from these sectors increases considerably when their terms of

trade improve, which is when Kuwait's net oil exporting terms of trade deteriorate. As modelled, this responsiveness is considerable when the other sectors behave in this way. The ensuing increase in non-petroleum exports reflects larger reverse Dutch disease effects than under unregulated oligopoly, and is also facilitated by continuous access to government subsidies and, more importantly, to the efficiency gains of ready access to expatriate labour with flexible contracts at competitive costs and wages. As a result, the subsequent increase in non-petroleum exports is large enough to offset some of the contractionary effects of declining oil prices, leading to improvements in real GDP. This result occurs because regulation ensures that pricing covers all the costs incurred by the fixed number of firms that exist in a given industry. Regulation (alone) generates declines in markups and efficiency improvements, so that when terms of trade shocks hit an economy with regulation, their impact is less. In a regulated economy, the relative expansion in the non-oil sectors following negative terms of trade shocks amplifies the efficiency gains caused by regulation alone. Negative terms of trade shocks cause considerable losses in oligopolistic industries, and (unlike the 'no regulation' simulation) with regulation (average cost pricing), the industries must adjust so that these losses do not occur. As such, these industries' contraction following a decline in terms of trade shock is significantly smaller than the situation where firms can carry pure losses. By contrast, in a regulated economy, positive terms of trade shocks generate added demand in the economy, amplifying the efficiency gains caused by regulation alone.

As for welfare (Figure *5*-d), its improvement in response to the negative terms of trade shocks is initially the same as that under no regulation, but improves for shocks exceeding 5 per cent. In a regulated environment, welfare continues to decline following positive terms of trade shocks for the same reason as under no regulation, but the more efficient oligopoly response ensures that the amplitude of the decline is lower than that without regulation, due to the welfare improvement resulting from regulation. So, the net effect is negative but small, initially declining at lower and lower rates and then reversing towards improvement. These results confirm, however, that with or without regulation, the Kuwaiti economy would continue to be sensitive to oil price changes.

In an economy with oligopoly regulation, there is a near symmetry in responses of real GNP and the real exchange rate to the shocks. These responses are also parallel to those under the unregulated oligopoly closure, but with slightly larger magnitudes for a given terms of trade shock. The larger magnitude under regulated oligopoly (being the difference between the values of real GNP under the two different closures) reaches only 0.5 per cent for real GNP for terms of trade shocks between –10 per cent and +10 per cent.

The minimal improvements to real GNP (Figure *5*-b) emerge because regulation impacts *domestic* industry and not payments into or from the KIA abroad, which dominate the external flows by which GNP differs from GDP. The link between the terms of trade and the real exchange rate (Figure *5*-c) is as expected whether industries are average cost pricing or not, with negative shocks yielding real depreciations that are marginally lower than the appreciation yielded by equi-proportional positive shocks. The larger magnitude under regulation reaches only 0.5 per cent for terms of trade shocks of –10 per cent and 1 per cent for shocks of +10 per cent. This effect occurs because regulation of oligopoly impacts the domestic market, while the movements of the real exchange rate are largely determined by movements in the international price of oil, the dominant export and industry in the Kuwaiti economy. Aggregate results are in Table 5.

Table 5: Aggregate effects of terms of trade shocks under regulated oligopoly

Variable	Regulated oligopoly	
	–10%	+10%
Short run results		
Real GDP	**0.87**	**0.95**
Real GNP	**–2.1**	**2.8**
Real exchange rate	**–7.0**	**7.8**
Real rate of return on capital, gross of tax	**–5.5**	**6.5**
Investment /GDP	**–11.1**	**23.4**
Fiscal deficit/GDP	**–5.1**	**4.6**
Current account/GDP	**5.3**	**-16.8**
Welfare (real disposable income, CPI deflated)	**2.7**	**-0.8**

Source: Simulation results.

In a regulated economy, the effect of terms of trade shocks on real GDP and welfare is to offset a considerable portion of the negative impacts of declines in the oil industry. The response to fiscal deficit as a share of GDP shows minimal asymmetry, for the same reason as the symmetry in the real exchange rate.

Regulating oligopoly improves the overall economic performance in two ways. First, regulation ensures that pricing covers all the costs of the fixed number of firms that exist in a given industry, as mentioned above. Second, for industries having very high rents (such as the tradable 'Transport', 'Other network services', 'Light manufacturing', and 'Chemicals', and the nontradable 'Agriculture', 'Construction', and 'Other services' sectors), regulation forces prices to drop, reducing markups and rents and raising scale. Consequently, the overall inefficiency in the economy decreases substantially (second-best effects), an effect that is amplified by both a negative and a positive shock.

Although short-term sectoral results are not indicative of the overall economic response due to limitation on capital movement, they provide insights, albeit limited, on the extent to which regulating oligopoly can have impacts on the management of oil price volatility. Table 6 shows these results for indicative purposes only.

Table 6: Short-run sectoral effects of oligopoly regulation following a 10% decline in the terms of trade

Variable	Percentage change (departure from new equilibrium post regulation)				
	Expatriate employment	Gross output	Markup ratios	Scale	Exports/GDP
1 Agriculture	109	3.1	–1.6	3.1	0.0
2 Mining	103	1.9	–0.8	1.9	0.2
6 Chemical	112	11.5	–1.4	11.5	0.7
7 Light manufacturing	112	5.5	–0.5	5.5	0.1
8 Heavy manufacturing	110	4.5	–2.4	4.5	0.5
10 Other network services	106	6.8	–0.3	6.8	0.7
11 Construction	78	–26.9	–0.7	–26.9	0.0
12 Transport	120	16.8	–0.4	16.8	1.8
13 Financial services	107	2.4	–0.1	2.4	0.1
14 Other services	108	26.7	26.7	4.9	0.2

Source: Simulation results.

Although indicative only, the results show that the decline of oil export prices is expansionary in all non-energy tradable and nontradable industries, which is supported by reduced scale and an increase in expatriate labour. Non-energy exports as a share of GDP expand slightly, partially mitigating the decline in oil exports. This result supports the conclusion of Simulation 1 that there is a large scope for reverse Dutch disease dynamics to mitigate the negative impacts of oil price declines in Kuwait. Markups decline for the oligopolistic industries with high concentration, of 'Heavy manufacturing', 'Agriculture', and 'Chemical', and only marginally for 'Light manufacturing', 'Construction', 'Transport', and 'Other network services'. Yet, markup increases for the nontradable 'Other services'. Overall, economy-wide markups decline across the economy.

Undoubtedly, the results of this simulation might be optimistic, in the sense that regulating oligopolies to the examined extent is farfetched, given the limited effectiveness of the Kuwaiti Competition Protection Authority to date and the power of the merchant class (which owns a large portion of non-public firms in the economy) in executive decision-making milieus and the parliament. Nevertheless, observations showing the substantial improvements in aggregate and sectoral economic performance resulting from regulating oligopoly pricing do shed light on important realities in the current Kuwaiti economy. Specifically, oligopolistic firms price their products at levels significantly higher than average costs, causing a large part of the current economic efficiency to be captured by their rents. Regulating oligopoly, therefore, enables significant efficiency gains and reduction in markup and pure profits—effects that are amplified by both a negative and a positive shock—which can be subsequently transferred as real gains for the various agents in the economy as a whole.

7. Discussion and policy implications

The analyses above reinforce the intuitive conclusion that the Kuwaiti economy, and by inference every GCC economy, is very sensitive to changes in oil prices and that the economy is not sustainable even if oil prices recover, with its existing policy regimes. This conclusion is consistent with those of studies that assess oil price declines in the area. Also, contrary to existing literature, the analyses suggest that oil price shocks explain GDP fluctuations in Kuwait. Sustainability requires changes in its economic, labour, energy, regulatory, and oligopolistic structures.

In this paper, terms of trade shocks are simulated in the model to quantify the asymmetry, if any, in the response of Kuwait's economy to these shocks. Notably, the outcomes are obscured to some extent by the generalizations of the basic theory embodied in the model (differentiated products, savings, investment, fixed costs, and oligopolistic industries). Nevertheless, the results enable important insights into the mechanisms of the impacts of oil price volatility in the larger GCC, which are synthesized below.

The first insight concerns the asymmetric nature. Consistent with expectations in the literature, a potential asymmetric response exists between equi-proportional terms of trade shocks. Nonetheless, contrary to expectations in the literature, in the current economic policy environment, this asymmetry is either non-existent or very limited. Although this symmetry of economic responses is driven by the dominance of the oil industry in both GDP and exports, it is significantly smaller than the asymmetry shown to exist in other resource-dependent economies (such as Australia) and in highly specialized petrostates (such as Nigeria). This is partly due to the pervasiveness of oligopolies which extract rents from the terms of trade changes. Even with firms' entry and exit, gains from terms of trade improvements are captured by only a small number of firms in a few oligopolistic industries, especially those with high concentration. These dynamics promote rent-seeking behaviour, and oligopolies' sustained rents detract from growth-enhancing innovation, hampering economic efficiency, competitiveness, and growth. The potential asymmetry can be mitigated by idiosyncratic adjustment mechanisms, namely the SWFs and expatriate labour movement, especially when oligopolies are regulated.[22]

A second and rather important insight is that, contrary to the standard Dutch disease and Kuwait-specific literature (such as Looney (1991)), Kuwait could avoid Dutch disease effects. The simulations show a strong resource movement effect of the Dutch disease in Kuwait, but an almost non-existent de-industrialization effect. This result is driven by the following three factors.

1. A high concentration of oligopolies (and possibly the concentration of government ownership in them, which is not modelled).
2. The presence of very strong SWFs (KIA in Kuwait) which sterilize oil revenue and reduce government and overall investment spending, thus diverting away from domestic capital increases. This is a rational diversion in that, in the long run, outflows only occur if home rates of return fall below foreign rates offered by the SWFs. Yet in the current economic structure, GCC SWFs serve as a quasi-industry that acts as an 'alternative' source of revenue to oil and to diversification efforts. Thus, oil windfalls (booms) are contractionary to all industries except for the energy sector and the SWFs distanced from the local economy.[23] Oil windfalls also translate to a fiscal expansion (and an ensuing increase in the distribution of welfare payments), which evidence a procyclical fiscal policy that is not conducive to economic sustainability. This cushions the economy during low oil prices, but it also diverts resources away from economic diversification efforts.
3. Analysing sector data leads to the important conclusion that the almost non-existent de-industrialization effect is driven by dynamics of high dependence on guest workers and their wages, which are lower than those of Kuwaiti labour. Guest workers can enter and exit the labour market quickly with very few costs and no repercussions to their unemployment.

Collectively, these results suggest that the Dutch disease during high oil price episodes is not inevitable, but is rather a result of policy choice, confirming conclusions of Alsabah (1985) and Shehabi (2020). The downside of that policy is that reverse Dutch disease effects, which are potentially adjusting forces, are weak during episodes of low oil prices aiding forces of the depreciating exchange rate.[24]

[22] The role of SWFs and expatriate labour as adjustment mechanisms is demonstrated in Shehabi (2017).
[23] There are parallels between investments in the KIA and those in the Norwegian SWF, which also invests in non-oil, oil-consuming industries. As such, when the Norwegian GDP declines following a decline in oil prices, the Norwegian government's income from its SWF increases, mitigating the former effects.
[24] This is consistent with results of Shehabi (2017, 2020).

Third, in a unique examination of a policy environment with regulated oligopolies (average cost pricing), an asymmetry is evident in the response of the real GDP and welfare to terms of trade shocks in the short run. This occurs because regulation limits distortions of oligopolies whose high markups and rents capture a substantial part of the economic efficiency. Oligopoly regulation (alone) enables significant efficiency gains and reduction in markup and pure profits (second-best effects), which can be subsequently transferred to the economy as a whole. These effects are amplified by both a positive and a negative oil price shock. Following a negative shock, relative increases in the non-petroleum sectors and declines in markups amplify the efficiency gains of regulation. In the case of a positive shock, the efficiency gains are amplified, partially by the added demand in the economy. Regulating oligopoly, therefore, renders the economy more open and efficient at both high and low oil prices.

Finally, various policy implications emerge from the aforementioned analyses, pertinent to managing both COVID-19 induced oil price shocks and the GCC states' Visions of economic transformation. There is procyclical fiscal policy, but it has shortcomings in managing oil rents and their volatility. The current policy regime (even if oil prices recover) is unsustainable; it, along with relatively limited investments in the non-energy exporting sectors, despite commitments under the Visions, causes non-energy industries to remain insufficiently competitive to gain a significant international market share. Therefore, their expansion is insufficient to lead to compensatory structural change which could achieve the desired (or planned) economic diversification. Thus, there is large scope for substantial microeconomic reforms, especially those concerning the management of oil windfalls and SWF savings, the fiscal structure, labour policy, and competition. Importantly, industrial regulation offers a potential policy option in the Visions for raising economic efficiency, managing oil and non-oil rents, expanding non-energy sectors, and enhancing economic resiliency to manage continuous oil price volatility. These overall effects of regulation, if applied, allow expansion in the economy along with the continuation of contributions to the SWFs, but not at the expense of domestic industry. Nonetheless, the existing economic structure, the ineffective regulatory agency, and the influence of the merchant classes could in reality limit the success of implementing such regulation.

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Appendix A: Key database elements and model specifications

A.1. Database overview

The following table represents key elements of the database described in Section 4.1 above.

Table A.1.1: Key economic structural elements 2013

Industry/ Percentage	Share of GDP^{FC}*	Share of total exports	Share of total imports	Export share of output	Net exports over output
1 Agriculture	0.3	0.0	0.4	1.3	–63.3
2 Mining	1.4	0.0	0.3	0.0	0.0
3 Crude oil	48.9	42.1	3.5	50.5	50.3
4 Gas and petro- services	0.9	1.3	0.2	50.5	50.3
5 Oil refining	5.4	38.6	7.3	72.6	72.2
6 Chemical	1.1	3.4	2.6	37.4	–1.7
7 Light manufacturing	0.8	0.4	6.5	4.1	–56.0
8 Heavy manufacturing	0.8	1.9	5.2	8.1	–72.0
9 Electricity	0.6	0.0	0.4	0.0	0.0
10 Other network services	4.6	4.6	3.6	32.3	31.4
11 Construction	2.2	0.0	19.7	0.0	0.0
12 Transport	3.4	5.7	14.2	38.9	14.1
13 Financial services	7.8	0.7	7.6	4.1	–1.3
14 Other services	21.7	1.2	28.5	1.8	–15.6

* GDP^{FC} is GDP at factor cost, which is the sum of value added in each industry.
Source: Author's CGE model database (SAM) constructed for 2013.

Factors shares of value added in each industry are shown in Table A.1.2.

Table A.1.2: Factor intensity in value added per industry 2013

Industry/ Percentage	Physical capital	Kuwaiti unskilled labour	Kuwaiti skilled labour	Expatriate unskilled labour	Expatriate skilled labour	Arable land	Natural resources
1 Agriculture	35.1	0.5	0.4	5.7	2.4	41.4	14.5
2 Mining	9.3	12.8	29.8	2.8	1.9	1.1	42.3
3 Crude oil	13.1	4.2	9.9	0.4	0.3	0.1	72.0
4 Gas and petro-services	25.7	15.1	18.4	1.1	0.7	0.1	39.0
5 Oil refining	86.6	5.4	6.6	0.8	0.5	0.0	0.0
6 Chemical	76.8	4.1	4.1	9.5	5.6	0.0	0.0
7 Light manufacturing	55.4	10.0	10.0	18.4	6.1	0.0	0.0
8 Heavy manufacturing	52.6	10.7	10.7	19.6	6.5	0.0	0.0
9 Electricity	86.1	7.6	4.9	0.8	0.5	0.0	0.0
10 Other network services	65.4	6.9	4.2	4.4	3.0	16.1	0.0
11 Construction	32.2	9.5	4.1	38.0	16.3	0.0	0.0
12 Transport	52.9	10.6	3.5	28.0	4.9	0.0	0.0
13 Financial services	31.2	8.3	19.3	14.5	26.8	0.0	0.0
14 Other services	17.0	1.7	14.9	41.8	24.6	0.0	0.0

Source: Author's CGE model database (SAM) constructed for 2013.

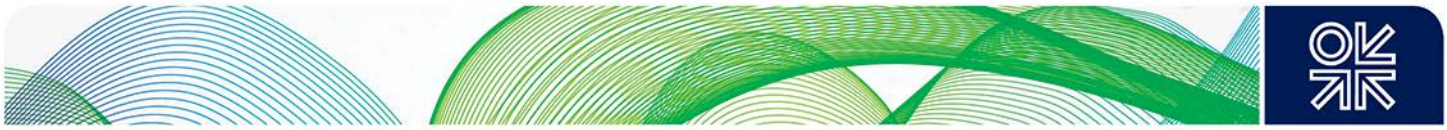

Table A.1.3 depicts demand shares per industry drawing upon the SAM data.

Table A.1.3: Demand shares per industry 2013

Industry/ Percentage	Final	Government	Investment	Intermediate	Export
1 Agriculture	87.1	3.2	0.0	0.2	9.5
2 Mining	8.5	56.2	0.0	1.0	34.2
3 Crude oil	1.7	49.3	0.0	0.9	48.2
4 Gas and petro- services	7.6	0.0	0.0	0.7	91.8
5 Oil refining	8.1	71.7	0.0	3.6	16.7
6 Chemical	8.3	55.8	0.0	15.8	20.1
7 Light manufacturing	48.4	9.5	0.0	4.0	38.1
8 Heavy manufacturing	12.6	35.6	0.0	27.9	23.9
9 Electricity	96.5	0.0	0.0	0.0	3.5
10 Other network services	41.9	33.8	0.0	0.0	24.4
11 Construction	0.0	0.0	0.0	96.1	3.9
12 Transport	44.0	36.3	0.0	0.0	19.7
13 Financial services	19.6	4.3	0.0	0.0	76.2
14 Other services	45.5	2.3	47.4	0.9	3.9

Source: Author's CGE model database (SAM) constructed for 2013.

A.2. Initial conjectural variation parameters and number of firms

The conjectural variation relationship (μ_i) allows firms to collude on price, so the overall oligopoly pricing choice is determined by the influence of pricing choices made by any individual firm *k* on the price set by firm *j*, as follows: $\mu_i = \frac{\partial p_{ij}}{\partial p_{ik}}$.

In calibrating these parametrized values, information on oligopolistic industries is used to determine rough estimates of the number of 'effective' (strategically interacting) firms in each industry and the corresponding parameters governing competitive behaviour. This determination of the number of 'effective' firms is informed by analysis of the levels of industrial concentration (by examining capital and revenue data in each industry) and the ownership structure of firms (private versus public). The following table includes the number of effective firms per industry and initial conjectural variation parameters.

Table A.2.1: Number of effective firms and initial conjectural variation parameters

Industry/ Percentage	Effective number of firms [a]	Conjectural variation parameter
1 Agriculture	2	0.87
2 Mining	1	0.7
3 Crude oil	1	0.99
4 Gas and petro- services	2	0.99
5 Oil refining	2	0.55
6 Chemical	8	0.6
7 Light manufacturing	30	0.3
8 Heavy manufacturing	27	0.5
9 Electricity	3	0.9
10 Other network services	1	0.78
11 Construction	3	0.7
12 Transport	3	0.61
13 Financial services	6	0.5
14 Other services	87	0.2

[a]: This index represents the 'effective' number of strategically interacting firms in each sector.
Source: Author's CGE model database (SAM) constructed for 2013.