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Modeling long-term impacts of the COVID-19 pandemic and oil price declines on Gulf oil economies

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ABSTRACT

The COVID-19 pandemic has been detrimental on hydrocarbon-overdependent Gulf states. The effects of the unprecedented oil price declines and substantial COVID-relief packages on Gulf economies are critical, as they can become enduring and foundational if the energy transitions accelerate to meet the Paris Agreement targets. Thus, this study assesses the impacts of the pandemic on the long-term economic sustainability of Gulf economies, using illustrations from Kuwait using the economy-wide WAFRA Applied General Equilibrium (WAFRAGE) Model applied to Kuwait (WAFRAGE-KWT Model). The simulation results indicate that post-pandemic, the economic resiliency of these states has significantly waned, primarily because the pandemic hit during a state of weakened economic resilience following the 2014 oil price collapse and subsequent government response. Although COVID-relief packages appeared in the form of counter-cyclical fiscal policy, Gulf states are unable to realize this policy’s full potential benefits. They are incapable of being truly counter-cyclical under their current economic structure and the consumption-based nature of the COVID-relief packages, which protect oligopolistic firms’ profits and reduce production, non-oil exports, and economic efficiency. The eroded fiscal and economic resiliency also threatens Gulf states’ ability to weather energy transitions. The implication of the findings is that long-term sustainability requires immediate phased implementation of economic and energy reforms.

1. Introduction

While the COVID-19 pandemic has been deleterious for the global economy, it has had particularly negative effects on economies that export commodities with volatile prices. These effects have been due to the pandemic-triggered price shocks of unprecedented magnitude for commodities, especially hydrocarbons (Deutsche Bank, 2020; World Bank, 2020; IEA, 2020b). They have also been evident in the relatively wealthy hydrocarbon-overdependent Gulf Cooperation Council (GCC) states, namely, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates (UAE). Despite their ongoing plans for economic diversification, they remain hydrocarbon-overdependent (as Table 1 depicts): hydrocarbons contribute at least half of gross domestic product (GDP), between 78% (in the UAE) and 91% (in Kuwait) of exports, and between 60% (in the UAE) and 90% (in Qatar and Kuwait) of government budgets. Notwithstanding their differences, GCC states share similar economic features, namely, oil-dependent economic structures, dependence on hydrocarbons in domestic energy consumption, large public wage bills, dependence on foreign guest workers, high oligopolistic private sectors, and slow energy transitions. As such, when the pandemic occurred, GCC states have simultaneously experienced both a significant drop in oil export revenues and government budgets, as well as a rise in expenditures from adopting large COVID-relief packages. These dynamics raise two key questions: 1) What are the long-term impacts of oil price declines and COVID-19 associated shocks on Gulf economies?; and 2) What lessons can be drawn from the COVID-19 pandemic and domestic policy responses for managing the accelerating energy transitions and enhancing economic sustainability? Thus, using Kuwait as a case study, this research investigates these questions and focuses on the policy lessons applicable to GCC states as a whole.

The significance of this study is that the combination of the COVID-19 pandemic and oil price shocks has been problematic for Gulf states’ economies and global climate change mitigation. These shocks have also been problematic to the extent that, first, they have affected GCC states'
but it also caused overproduction and slow supply-side response, since this oil price shock was unprecedented, exacerbating the domestic economic development, and second, they can become enduring and foundational if the energy transitions accelerate to meet the Paris Agreement and the UN Framework Convention on Climate Change targets and the rising climate commitments. If these effects become enduring, then they will not only impact Gulf states’ economic sustainability, but also global climate sustainability. It should be noted that GCC states currently produce more than 25% of the world’s fossil fuels, and that the fiscal effects of the pandemic on their economies determine how and when they will respond and join the global climate change mitigation efforts. Their energy transitions are a must if the world is to meet the climate pledges of the 2021 United Nations Climate Change Conference (COP 26) in November 2021 and limit the global average temperature increase to no more than 1.5 °C above pre-industrial levels. Energy transitions are also a must if the UAE, Saudi Arabia, and Bahrain are to meet their net-zero emissions pledges by 2050 and 2060, respectively, which in turn require significant investments and fiscal sustainability.

Table 1

| Country | Share of energy sectors (%) |
|---------|-----------------------------|
|         | Value-added | Exports (includes re-exports) | Government revenue |
| Bahrain | 40          | 69                        | 83                  |
| Kuwait  | 61          | 91                        | 91                  |
| Oman    | 54          | 84                        | 79                  |
| Qatar   | 32          | 85                        | 90                  |
| Saudi   | 50          | 80                        | 88                  |
| UAE     | 45          | 78                        | 60                  |

Note: This table uses data prior to the collapse of the oil price in mid-2014 because this decline caused the share of energy sectors to artificially shrink without a matching structural change. Thus, using data from post-2014 would not only be misleading, but would also inflate the size of the non-oil sectors. Sources: Shehabi (2021); national accounts; United Nations value-added data (2018).

Like other oil exporters, GCC states have been affected by the pandemic, especially regarding oil price dynamics and their implications. Meanwhile, the unprecedented declines in the oil price markets have acted as a negative shock to the overall demand of goods and services, aggravating the short-term volatility in prices (Albulescu, 2020). Since oil is a traded commodity as well as an intermediate input in various other industries, oil price dynamics have created trade-related spillovers to the rest of the world, thus reducing global oil consumption and long-term pollution levels (Schumacher et al., 2020). The oil price changes have also had a direct impact on GCC states. Moreover, the energy market has been an important risk recipient of the various spillover effects of the pandemic, including risk of the stock market (Alqahtani et al., 2021; Zhang et al., 2021). Specifically, the stock markets in the G20 economies, which include Saudi Arabia as well as other petrostates like Russia and Mexico, have become more responsive to oil price changes during this period. However, the effect of oil price jumps on G20 stock markets depends on different volatility regimes (Alqahtani et al., 2021). Similar evidence has been found in the Chinese economy, where the stock price crash risk of energy firms has significantly decreased (Huang and Hezhe, 2021).

The novel issues that emerged among resource exporters during the pandemic have given rise to short-term economic challenges. In response, GCC states announced a rise in domestic expenses (especially, healthcare and unemployment benefits), plus simultaneous large fiscal (tax relief) and consumption-focused macroeconomic stimulus packages. The results placed unprecedented fiscal pressures, leading to record withdrawals from sovereign wealth fund (SWF) assets (Arabian Business, 2020; Holter and Bloomberg, 2020) and increased government debt. These policies were alarming as GCC states have already been grappling with the challenges from the 2014 oil price collapse, which caused real exchange rate volatility, comparatively high investment risks, price and production level changes, and real income declines, despite the GCC’s high income levels. These effects were further exacerbated by their unique economic features, which limited non-oil sectoral expansion (Shehabi, 2020b).

Some studies have estimated these short-term effects on oil economies. For example, the deteriorating external position and currency depreciation caused by capital flight and weakened exports have imposed “a double whammy” for oil-exporting economies in Asia and the Pacific (Huang and Zhao, 2020). Among the Middle East and North Africa (MENA) oil exporters, fiscal deficits have widened to 10.1% of GDP in 2020 (from 3.8% of GDP in 2019), but are expected to significantly improve, reflecting expected higher oil revenues in 2021 (IMF, 2021). Meanwhile, the Organization for Economic Co-operation and Development expects that most oil-exporting developing countries will be unable to weather the current crisis and are likely to increase reliance on short-term and expensive non-concessional private borrowing backed by oil collateral (OECD, 2020). In one qualitative assessment, Shehabi (in Schumacher et al., 2020) argued that for oil exporters, the pandemic has increased the opportunity cost of moving to “greener” alternatives and that (for some regions) stimulus packages may reallocate funds away from economic diversification plans and green investments. The present study also argues that short-term gains have been achieved at the expense of June 19, 2020. Since then, oil prices have further increased, reaching $67/bl in mid-March 2021 and trading at approximately 60% higher than the 2020 average and 5% above the 2019 average. Although crude oil prices hit a seven-year high in early October 2021 (IEA, 2021c), the recovery was short-lived. Uncertainty continued due to fears of additional waves, especially with the rise of new virus variants and varying economic recovery levels. Such volatility has been evident following the COVID-19 Omicron variant detected in November 2021 and the subsequent 14% drop in oil prices.

1 OPEC + includes members of the Organization of the Petroleum Exporting Countries (OPEC) as well as non-OPEC members, most notably Russia.

2 These effects extend to other oil exporters beyond the GCC, most notably SWF-rich Norway.
long-term sustainability, creating an urgent need for critical, quantitative, policy-focused research on resource exporters’ energy-policy nexus. To date, GCC-specific studies on the effects of oil price volatility have been limited. However, Ben Cheikh et al. (2021) investigated the presence of an asymmetric relationship between oil price movements and stock markets in GCC states, using non-linear vector smooth transition regression models. They found that, contrary to conventional wisdom, oil price changes have asymmetric effects on stock returns in some GCC countries, but not in others, and that GCC stock markets do not exhibit similar sensitivities to oil price changes. Additionally, Shehabi (2020c) examined the asymmetry in economic responses to oil price volatility and found that, consistent with the literature, there is potential asymmetry in Kuwaiti’s economic response to trade shocks. However, under the current economic policy environment, this asymmetry is non-existent for some economic variables. She also found that, contrary to standard Dutch disease theory and Kuwait-specific literature, reverse Dutch disease effects are alarmingly limited, thus limiting non-oil economic exports and diversification when oil prices decline. Overall, the results of these two studies are important, since they highlight economic reform policies, counter-cyclical fiscal policies, and economic stabilization, all of which can potentially temper the impact of oil price shocks on GCC states.

Beyond these studies, assessing the macroeconomic and sectoral impacts of outbreaks, such as COVID-19, is best performed using economy-wide models in a general equilibrium framework. Nevertheless, existing studies have mainly focused on short-term assessments and often excluded hydrocarbon exporters. Meanwhile, several studies have quantitatively estimated the pandemic’s short-run macroeconomic impact using a computable general equilibrium (CGE) approach. For instance, at the global level, Maliszewska, Matteo, and van der Mensbrugge (2020) predicted a GDP contraction of 2.5% and 4% for the short and long lockdown scenarios, respectively, while McKibbin and Fernando (2020) summarized the existing literature on the macroeconomic costs of outbreaks and provided GDP losses in 2020, compared to a baseline scenario for 24 countries (excluding GCC economies). Although other studies have applied single-country models to estimate country-specific impacts of the COVID-19 crisis, none have included an oil-dependent economy. In addition, among the single-country CGE models of Gulf economies (such as Shehabi, 2017, 2019, 2021; Soumane et al., 2019; Roos and Adams, 2020), none have examined the effects of COVID-19 or those of pandemic-type shocks. While the economy-wide studies of Shehabi (2017, 2019, 2020a, 2020c) included a social accounting matrix (SAM) for 2013, the SAM database only represented the economy prior to the collapse of oil export prices in 2014 and did not represent Kuwait’s economic structure in 2020 during the onset of the pandemic.

Therefore, the present study fills a significant gap in the literature by quantifying the potential long-term impacts of the pandemic-induced shocks (such as global and domestic economic declines), together with the associated global oil price declines and COVID-relief measures, on oil-dependent GCC economies. Kuwait is an interesting case because its data have exhausted or depleted Gulf states not survive future energy transitions. The simulation results indicate that, even in the rapid economic recovery scenario, the effects of the pandemic and associated policy responses are the most deleterious to the economy since the Gulf War of 1990–1991. Additionally, the cost of COVID-19 on economies is proportionate to the length of the pandemic and dependent on governments’ economic responses to it and oil market dynamics. Fiscal cushions and savings are also eroded, with all macroeconomic indicators in decline: real GDP by 8%–10%, from base levels; real GNP by 8%–12%; and fiscal balance as a share of GDP, by 8%–15%. Meanwhile, employed labor’s real wages significantly decline, with the greatest impact on unskilled Kuwaiti labor (as high as 9%) and the opposite effect on Kuwaiti versus non-Kuwaiti labor. As for other aspects, the effects on household welfare are counterintuitive: they show improvements because economic losses are offset by the government’s COVID-19 relief packages. Moreover, although economic stimuli packages appear counter-cyclical, they are consumption-based and they support oligopolistic large private sector players by protecting their markups. Thus, they do not contribute to expanding production, efficiency, or non-oil exports from pre-COVID levels. Overall, the results confirm that there has been a large trade-off between short-term economic recovery gains and long-term sustainability goals. Therefore, restoring long-term sustainability in Gulf states requires immediate but phased implementation of wide-scale fiscal, economic, and microeconomic policy reforms as well as energy transitions to expand the non-oil clean energy sectors for domestic consumption and export.

This study makes three important contributions to the literature on hydrocarbon exporting economies, especially in distorted, highly specialized, welfare-based, small open oil economies. First, it is the first known study to quantify economy-wide impacts of the COVID-19 pandemic, government policies, and oil price declines on an oil-dependent economy in the Gulf. Second, it sheds light on how the pandemic affects the preparedness of Gulf economies in both managing the accelerating global energy transition and advancing the energy transition domestically and in the export market. Third, it constructs the first SAM of Kuwait’s economy in a low-price environment.

Furthermore, there are three important takeaways from this study. First, due to the welfare-based economic structure and consumption-based nature of their COVID-relief packages, Gulf states are incapable of being truly counter-cyclical. Second, COVID-relief policies in the Gulf have exhausted or depleted Gulf states’ reserves (albeit to varying degrees), reducing the resilience of their already-weakened conditions from the 2014 oil price declines. Third, and consequently, given the absence of a diversified export base, there is a significant need to implement economic reforms and energy transitions, without which GCC states might not survive future energy transitions.

The remainder of this study is as follows. Section 2 summarizes Kuwait’s economy, with reference to the newly constructed SAM, whereas Section 3 discusses the COVID-19 shocks and key policy responses. Section 4 describes the model, after which the simulations and analyses in Section 5 quantify the potential long-term impacts of the pandemic-induced shocks.
scenarios are presented in Section 5. Section 6 analyzes the simulation results, while Section 7 presents the conclusion and policy implications.

2. Overview of a Gulf hydrocarbon economy

Notwithstanding their differences, hydrocarbon-dependent GCC states share many unique common economic structures. Since the 1960s, all of these states have adopted an economic development strategy that has positioned crude and refined oil products as their most important sources of exports and government revenue. A key feature of their economic structure is overdependence on hydrocarbon rents. To demonstrate, oil revenue contributes at least half of their GDP, while oil exports contribute between 78% (in the UAE) and 91% (in Kuwait) of exports, and between 60% (in the UAE) and 90% (in Qatar and Kuwait) of government budgets. Accordingly, the GCC states' economies are closely linked to their oil and gas production, and oil and gas prices. Consequently, they are subject to hydrocarbon price volatility. Meanwhile, the trade shocks following oil price volatility can cause real exchange rate volatility, comparatively high investment risks, price and production level changes, and real income declines, despite Gulf states' high income levels. The following table summarizes the share of hydrocarbons in key macroeconomic indicators among GCC states in 2013–2014.

GCC states also share similar economic structures in their reliance on expatriate labor, high subsidies, pervasive oligopolies with collusive pricing behaviors, and large public sectors. To demonstrate, the share of expatriate (non-national) labor in the employed population in GCC states is among the highest in the world, ranging from 56% to 93% and averaging 70.4% (ILO, 2020a).

Beyond these similarities, these states have faced similar COVID-19 shocks, especially those pertaining to their effects on the oil market. While their fiscal preparedness to weather these challenges has varied, the similarities and challenges among them offer a basis for examining Kuwait as a case study and drawing lessons for GCC states as a whole. As stated earlier, Kuwait was chosen as a case study due to the availability of data required for economy-wide models in the public domain. The following section examines Kuwait's economic features and performance in order to contextualize the subsequent analysis.

2.1. Kuwait's economic features and performance

Like the other five GCC economies, Kuwait has depended on abundant hydrocarbons (oil and gas) resources as its main engine of economic activities, exports, and government budgets. Such dependence, facilitated by low production costs relative to other regions, is due to its favorable geological circumstances, coupled with abundant resources. Meanwhile, hydrocarbon production is managed through the fully state-owned Kuwait Petroleum Company. Approximately half of the produced crude oil is used domestically by citizens and industries, including refining, petrochemicals, and power generation, for electricity and water desalination (Al-Abdullah et al., 2020). Meanwhile, domestic natural gas production is used domestically, primarily in power generation, and supplemented by imported natural gas. These are trends that continue, despite the renewable project targets for 2030 (Al-Abdullah et al., 2020).

Fiscal policy, the main instrument of macroeconomic stabilization, is supported by substantial foreign asset accumulation in SWFs (managed through the Kuwait Investment Authority (KIA)), which, in turn, stabilize the nominal exchange rate (which is pegged to a basket of currencies). Additionally, in the past key economic advantages have stemmed from the rapid accumulation of oil rents and liberal trade policies for goods and services, capital, and labor. These advantages not only support the distribution of generous welfare redistributive measures (such as energy and other subsidies) to citizens and local industries, but also guarantee employment to Kuwaiti citizens in the public sector (with generous salaries and benefits). Thus, the political economy of the welfare state has governed the relations between the government, political representatives (through the National Assembly), and a strong merchant class (Crystal, 1989; Herb, 2016), which is a highly oligopolistic private sector (Shehabi, 2017, 2020).

As for the negative effects of oil price shocks, they have been historically moderated by adjustment mechanisms that have acted as cushions for the economy. These mechanisms include the flexibility in the expatriate labor market and investments in (or fiscal commitments to) SWFs, which help stabilize oil revenue and offer savings during busts and fiscal deficits (Shehabi, 2017). Moreover, like other GCC states, Kuwait has historically followed a pro-cyclical policy regime in managing oil price shocks.

Despite concerns about the economic sustainability of dependence on finite resources, oil has continued to dominate Gulf economies. It was not until the unexpected collapse of the oil export price from mid-2014 to 2016 (from US$103/bl in January 2014 to US$30/bl in January 2016) that the sustainability of oil dependence became a pressing concern. In a fundamental policy shift, Kuwait adopted various reforms and policies, consistent with the New Kuwait Vision 2035 (and detailed in its Development Plan, 2010–2014 and 2015–2020), in order to advance the country's economic transformation policies and plans to transition from hydrocarbons. Its announced goals included: expanding renewable projects; improving the country's business environment to attract foreign direct investments; increasing productivity and growth of the non-energy sectors; enlarging the participation of the private sector (local and foreign) from its current low level of approximately 25%; increasing the participation of Kuwaiti labor in the private sector; and reducing carbon emissions in line with Kuwait's National Determined Commitments to the United Nations Framework Convention on Climate Change (UNFCCC).

Despite these plans, oil has continued to dominate the economy, exposing it to ongoing oil price volatility challenges. For example, in 2016, Kuwait experienced its first fiscal deficit in years, a trend that has since continued to deteriorate. Due to Kuwait's dominant pro-cyclical fiscal policy, economic busts from the deterioration in oil export revenue was matched by a reduction of non-committed expenditures on development and energy transition projects, but not in committed rigid expenditures and wages. Instead, these expenditures were expanded when oil prices increased and remained at the same level when oil prices collapsed and were funded by foreign financing and access to SWF assets invested for purposes of future generations and for fiscal rebalancing.

When examining the development of key economic policies, the key features of a highly distorted Kuwaiti economy emerge, which are taken into account in both the CGE model of Kuwait and the following SAM which serves as the model database. These features have also been shown to largely constrain Kuwait's economy and its non-oil pro-export diversification potential (Shehabi, 2017, 2020a). These rigidities, detailed in Shehabi (2019, 2020a, 2020c), are summarized as follows:

- **First**, large structural rigidities, caused by Kuwait's specialization in and dependence on hydrocarbons in the economy's output, trade, and budget, coupled with the dominance of the hydrocarbon sector. In this regard, crude oil and oil refining contributed to 84% of the country's exports in 2015, while the public sector generated approximately 70% of GDP in the same year.
- **Second**, fiscal rigidities, owing to negligible taxes and high subsidies (for energy and other purposes) that are committed expenditures to the public, irrespective of the economic conditions.
- **Third**, labor market rigidities, which have resulted from the existence of two separate labor markets based on nationality. Non-Kuwaitis comprise 83% of the labor force (Public Authority for Civil Information, 2018) and represent more than 90% of the private sector's labor, employed at lower wages and flexible labor contracts linked to local employers through a strict employer-sponsorship of expatriate labor system, named kafala. They have few protections against layoffs and many do not have coverage by the country's unemployment insurance program (ILO, 2020b). Meanwhile, 77% of Kuwaitis are employed by the bloated public sector, which prioritizes indigenous employment and offers salaries exceeding those in the private sector.
for similar levels of education and technical training. Kuwaiti labor are eligible for generous labor protection mechanisms, pensions, and insurance programs.

- Fourth, SWF savings, which represent an important institutional and financial feature of Kuwait's economy, also act as a financing alternative to oil revenue shortages and a means of smoothing out short-term governmental expenditures during deficits.

- Fifth, pervasive oligopolies exist across all sectors of the private sector, with collusive pricing behaviors and limited or no regulations, while state-owned industries operate as monopolies. This situation is problematic to the extent that oligopolies distort markets and prices, and their sustained rents engender strategic behaviors that detract from growth-enhancing innovation (Segerstrom et al., 1990; Aghion and Howitt, 1992; Grossman and Helpman, 2014). They also earn markups that capture a significant portion of oil rents in both booms and busts, and largely limit the expansion of non-oil exports in Kuwait (Shehabi, 2020a, 2020c). Oligopolies' increased rents during booms and losses (usually subsidized) during busts further impair Kuwaiti economic performance (Shehabi, 2020c).

Finally, the economy's performance has followed changes in oil prices. Meanwhile, drops in the oil price have caused large declines in the GDP and government budget. Most recently, the pandemic-triggered oil price decrease has caused a significant decline in government revenue (in which oil revenue is the majority), without a matched decline in rigid government expenditures (in which the public wage bill comprises more than half). Accordingly, the government fiscal position has deteriorated during the pandemic, with an estimated fiscal deficit of more than KWD 19 billion (US$ 65 billion) in 2021/2022 (see Fig. 1).

2.2. Model database: Broad representation of Kuwait's economic structure

Central to economy-wide modeling is the use of an appropriate database to which the models can be calibrated. In this study, this database takes the form of a SAM depicting all sectors of the Kuwaiti economy and the interactions between them within a given period. Specifically, the SAM displays all transactions as contributing to a circular flow of an economy's incomes and expenditures. It is a matrix of the combined national income and product accounts, government accounts, and balance of payments accounts, combined with the country's input–output table to capture inter-industry flows. Moreover, assessing the effects of COVID-triggered oil export revenues requires the use of a database that reflects the Kuwaiti economy and oil price environment at the advent of COVID-19. It should be noted that there is no official SAM for Kuwait and that the SAM in Shehabi (2017) represents the data from 2013. Thus, it does not represent Kuwait's economic structure in 2020.

In order to fill this gap and undertake COVID-related model simulations, the present study constructs a SAM, using official data from Kuwait's Central Statistical Bureau (CSB) and supplemented by other satellite accounts. The emerging features of Kuwait's economy are represented in a new 2015 SAM. Although the data for 2015 are the most recent complete set of data, this SAM is appropriate for this study. Specifically, this SAM represents Kuwait's economic structure in 2020 because it represents the economic structure following the decline of the oil price in 2014 (unlike the previous 2013 SAM, which represents Kuwait's economic structure at exceptionally high oil prices). More details on this database are in Appendix A. Table 2 presents the key structural elements of the Kuwaiti economy in 2015.

2.3. Economic snapshot at the advent of COVID-19

To contextualize COVID-19's effects on Kuwait, this study compares the country's economic structure in the higher oil price environment (2013) with that of the lower price environment (2015). The new SAM reveals the following important aspects:

- Limited advancements in energy transition projects in power generation.
- A higher share of domestic consumption of energy in 2015.
- Worsened non-oil diversification and refined petroleum exports relative to crude exports. This trend is evidenced by the rise in crude oil exports share of total exports by 17% (reaching 58%), the decline in refined to total exports share by 13% (reaching 25%), and the drop in the non-oil exports to total exports to 16%.
- Increased subsidies, despite policy goals to reduce total and energy subsidies, with total household and industry consumption subsidies increasing by 18% and total energy industries' consumption subsidies increasing by 74%.
- No significant change in the private sector structure, with continued oligopolistic private sector and limited regulations.
- Decreased productivity and participation by Kuwait labor, with the private sector continuing to mostly employ non-Kuwaitis, but paying larger salaries to Kuwaitis. For example, in the services sector, 12% of labor is Kuwaiti, but they earn 41% of the wages.

![Figure 1](image.png)

*Note: The 2021/2022 figures are from the draft budget of the Kuwaiti Ministry of Finance, based on an estimated average oil price of US$ 45/bl.*

*Fig. 1. Contributions to revenues, expenditures, and fiscal deficits in Kuwait (2018–2019). Source: Author's representation, based on data from the Kuwaiti Ministry of Finance.*
short of the goals of the Kuwait 2035 Vision. The results also indicate industries. These relative intensities determine the changes in factor rewards following

Note:

Source: Model database (SAM) constructed by the author for 2015. Note: Oil Refining, Electricity, Chemicals, and Network Services have the highest capital intensity, while the tradable manufacturing industries and the non-tradable Other Services and Construction have the highest labor intensity. These relative intensities determine the changes in factor rewards following commodity price shocks, thereby driving factor relocation and output across industries.

These results suggest that Kuwait’s economic performance has fallen short of the goals of the Kuwait 2035 Vision. The results also indicate that, in line with findings of Shehabi (2017, 2020a, 2020c), at the advent of COVID-19, the Kuwaiti economy became more dependent on oil exports, and its economic rigidities have been exacerbated by the oil price shocks during 2014–2021. Overall, these results present important lessons to some of the other GCC states experiencing similar conditions.

3. COVID-19 shocks and policy responses

Kuwait’s fiscal and economic challenges have been exacerbated by the COVID-19 pandemic, which has generated a double fiscal blow: a simultaneous sharp rise in domestic expenditures (and stimulus packages) and a sharp decline in oil export revenue. During the early days of the pandemic, Kuwait implemented drastic measures to contain the virus, including a country-wide lockdown on March 13, 2020, becoming the first country to do so after China and Italy. Persistent lockdowns, curfews, and social distancing measures reduced the demand for transportation, aviation, automobiles, and a wide range of goods and services. Meanwhile, the demand for some sectors; namely, medical services, medical supplies, telecommunications, digital content providers, and food, has soared. While the public sector and many private businesses were forced to cease operations, which reduced output and production, they initially continued to pay salaries and other operational costs without revenue.

At the same time, generous economic stimulus packages were passed. Specifically, they included expanded relief for citizens such as funding public sector salaries and supporting private sector firms. Appendix B includes a summary of the details of Kuwait’s economic and fiscal measures, as part of the COVID-relief package. I deduce these measures were also funded through the relocation of committed funds for long-term diversification, energy transitions, or other environmental projects. These funds were reallocated for three reasons: 1) Kuwait’s unique dependence on oil exports to cover rigid committed expenditures that could not be redirected; 2) the adoption of economic diversification with more flexible spending and long-term targets; and 3) its welfare-based political economy, which centers on welfare distributive measures with immediate effects.

| Sector/Percentage | Share of GDP\(^a\) | Share of total exports | Export share of output | Net exports over output |
|-------------------|---------------------|-----------------------|----------------------|-----------------------|
| 1. Agriculture    | 0.54                | 0.1                   | 3.2                  | -148.2                |
| 2. Mining         | 0.01                | 0.0                   | 43.1                 | -2944.7               |
| 3. Crude oil      | 40.97               | 58.9                  | 62.0                 | 62.0                  |
| 4. Gas and petro-services | 4.18 | 0.0                   | 0.0                  | 0.0                   |
| 5. Oil refining   | 2.62                | 24.7                  | 47.5                 | 47.0                  |
| 6. Chemical       | 1.60                | 4.5                   | 40.9                 | -18.0                 |
| 7. Light          | 0.85                | 1.0                   | 17.8                 | -208.5                |
| manufacturing     | 1.20                | 0.6                   | 6.1                  | -287.0                |
| 9. Electricity    | 0.76                | 0.0                   | 0.0                  | 0.0                   |
| 10. Other network services | 3.63 | 4.7                   | 24.8                 | 21.3                  |
| 11. Construction  | 3.30                | 0.0                   | 0.0                  | 0.0                   |
| 12. Transport     | 3.05                | 2.1                   | 14.5                 | -2.6                  |
| 13. Financial services | 8.52 | 1.0                   | 4.4                  | -1.3                  |
| 14. Other services | 28.77               | 2.5                   | 2.3                  | -24.3                 |

* GDP\(^a\) is GDP at factor cost, which is the sum of value-added in each industry.

As evidence of the size of the double fiscal blow, the Kuwaiti Ministry of Finance estimated a fiscal deficit of more than KWD 19 billion (US$ 65 billion) in 2021/2022 (see Fig. 1). The effects on businesses and labor have also been significant. For example, by mid-May 2020, an estimated 89 Kuwaiti private businesses released their employees, while another 350 reduced salaries by 30%–50%. Consequently, an estimated 48,000 citizens lost their jobs, while an estimated of 316,000 non-Kuwaiti labor lost their jobs and residency as a result of COVID-19 layoffs and parliamentary proposals to reduce expatriate labor (Al Sherbini, 2021; Al-Zo’bi, 2020a). In addition to these effects, such economic stimuli had other impacts on sustainability, since they expanded consumption and welfare redistributive measures. In turn, these effects also increased greenhouse gas (GHG) emissions (Helm, 2020) and exacerbated existing distortions, which have been shown to prevent economic and energy diversification (Shehabi, 2020a).

4. Modeling framework

4.1. Model description and key specifications

4.1.1. Theoretical underpinnings

This study uses an economy-wide model in a CGE framework. In general, CGE models are large-scale models that calibrate economic data (in the form of a SAM) and use a set of equations that represent an economy’s economic interactions, inter-industry interactions and the behaviors of its different agents. Since the equations are grounded in general equilibrium theory, the model simulations provide insights into the underlying mechanisms and the channels through which shocks or policies are transmitted to the economy. It should be noted that the traditional economic or health economics analysis is ill-equipped to estimate the full effects of COVID-19 and government interventions on an economy. The reason is that such an analysis includes an implicit assumption of partial equilibrium, which ignores the behavioral changes and policy effects on the economy that are either direct or second-best effects. In contrast, CGE models can assess both direct and second-best effects of economic shocks or policies, making them the ideal structure for evaluating policy options or large-scale shocks such as COVID-19.

This study also employs the economy-wide WAFRA Applied General Equilibrium (WAFRA) Model for Kuwait (WAFRA-GWT Model), developed by the author. Although this model’s name is presented in this study for the first time, it builds on the research by Shehabi (2019, 2020b, 2020c) and by Asano and Tyers (2015, 2019) which explicitly represent oligopoly behavior and its regulations. The WAFRA-GWT Model embodies key features of the Kuwaiti economy (see Section 2.1). Specifically, this model is a single-country, two-region (namely Kuwait and the Rest of the World) CGE model incorporated in a comparative static framework, employing different closures to mimic the economy’s long-run responses to external or policy shocks. It also compares the economic outcomes of exogenous variables (such as real prices and fiscal deficits or wages at different equilibrium states) resulting from changes in exogenous variables (such as external economic conditions following COVID-19 and oil prices) or policy instruments that can be shocked in model simulations.

Moreover, this model incorporates various core features. The Kuwaiti economy is characterized as an “almost small” open economy (following Harris, 1984), a feature common in economy-wide national modeling. This characterization entails that the economy is open to trade and exhibits a price-taking behavior for imports along with constant elasticity, downward-sloping foreign demand curves for exports, which are differentiated from competing products (Harris, 1984). These assumptions are essential in the case of Kuwait, which is a small economy that is highly dependent on trade and international financial flows. Meanwhile, openness extends to financial markets via endogenous savings and investments, and open capital and current accounts. This model also makes conventional assumptions about the consumption of home products in each sector, whereby domestic products are differentiated by variety via...
constant elasticity of substitution (CES) nests. These local products are further differentiated from imported foreign varieties through the Armington (1969) assumption of national product differentiation, a standard feature in trade policy applications. This model, like that of Balistreri and Markusen (2009), includes the standard Armington. As for the CES nesting structures at the sub-national (firm) level, they imply product differentiation between home and foreign products. Similar differentiation applies between common home products supplied by oligopolistic firms, although elasticities of substitution are larger in this case. Interestingly, this model breaks away from traditional frameworks through its representation of oligopoly behavior, as detailed in Shehabi (2017, 2020c) and in line with Asano and Tyers (2015, 2019). While oligopolies generally reduce competition and innovation, in resource exporters, they play an additional role in affecting efficiency. Shehabi (2017) was the first study to consider the role of oligopoly and resulting efficiency in the context of economies in Kuwait and the MENA region.

Finally, important to modeling the long-term effects of COVID-19 and policy shocks, this model offers a full representation of government accounts and macroeconomic elements, including endogenous savings and investments, open capital and current accounts, and a complete system of expanded consumption subsidies and taxes (both direct on capital, labor income, land, and resource rents, and from indirect taxes on trade and consumption expenditures). In general, government transfers are not set as constant relative to the consumer price level. While ever the fiscal deficit is endogenous, the government saving varies, driving the current account deficit.

4.1.2. Demand and demand elasticities

On the demand side, firms in 14 industries rent capital and hire workers, supplying products and services to meet five demand sources: final, intermediate, investment, government, and foreign demands. Meanwhile, the elasticity of demand (ε) facing firms in a given industry I is a downward-sloping demand curve that depends on the weighted average of the elasticities of demand in the aforementioned five markets. Calculating this average depends on the initial shares $S_i^j$ of the demand facing each industry. Appendix C includes the demand shares per industry. In addition, the elasticity depends on component elasticities of substitution, firm numbers (which are assumed exogenous in this study), and the conjectural variation parameters in industry I ($\mu_i$), as described below.

The demand elasticities depend on the structure of the model and are essential for capturing oligopoly behavior. For example, the final demand elasticity is expressed as follows:

$$
\epsilon^F = -\frac{\eta^F}{n_i} \left\{ \left( \sigma_i^F - 1 \right) \delta^F \left( \frac{\bar{P}_{bi}}{\bar{P}_i} \right)^{1-\sigma^F} \right\} + \left( \gamma_i^F - \sigma_i^F \right) (1 + (n_i - 1) \mu_i),
$$

where $\eta^F$ is the elasticity of substitution of final demand across home varieties in sector I, $n_i$ is the number of firms in industry I, $\delta^F$ is the home share in final demand for product I, $\sigma^F$ is the elasticity of substitution of final demand for good I between domestic and foreign countries, $n_i$ is the number of domestic firms in industry I; $\bar{P}_{bi}$ is the CES composite price of all home varieties of product I; and $\bar{P}_i$ is the CES composite of home and foreign final product prices in the domestic market, weighted by domestic consumption shares.

Intermediate demands for home-produced varieties of the interme-

$$
T_i = \sum_{j=1}^{N} \Lambda_{ij} \bar{Q}_j, \quad \text{and} \quad T_i^* = \sum_{j=1}^{N} \Lambda_{ij}^* \bar{Q}_j \quad \forall j.
$$

(2)

The elasticity of intermediate demand is as follows:

$$
\epsilon^I = \sum_{j=1}^{N} S_i^j \left[ -\eta^I + \frac{1}{n_i} \left( \gamma_j^I + \sigma_j^I - 1 \right) \psi_j \left( \frac{\bar{P}_{b}^j}{\bar{P}_j} \right)^{1-\sigma^I} + \left( \gamma_j^I - \sigma_j^I \right) (1 + (n_i - 1) \mu_j) \right],
$$

(3)

where $S_i^j$ is the share of industry j in the total intermediate demand for input I, and $\bar{P}_j$ is the CES composite of home and foreign intermediate product prices in the domestic market, weighted by domestic intermediate consumption shares.

Government demand (subscript G) is formulated similarly to final demand. Government expenditure on goods and services G reflects its demand for both locally produced and imported goods and services. Demand for home-produced goods of variety j in industry I is as follows:

$$
G_{ij} = 1 - \delta^F \left[ \frac{G_i (\bar{P}_{b}^j)}{\bar{P}_i} \right]^{1-\sigma^G}.
$$

(5)

while government demand for imported goods in industry I is:

$$
\bar{P}_i^* = \frac{\delta^F (\gamma_i^G) \left[ 1 - \delta^F \left( \frac{\bar{P}_{b}^j}{\bar{P}_j} \right)^{1-\sigma^G} \right]}{\left[ 1 - \delta^F \left( \frac{\bar{P}_{b}^j}{\bar{P}_j} \right)^{1-\sigma^G} \right]^{1-\gamma^G}.
$$

(6)

In its expenditure on home and foreign products, the government pays no import duties or consumption taxes. Finally, the elasticity of government demand is obtained in a similar fashion to that of final demand, and is expressed as follows:

$$
\epsilon^G = -\frac{\eta^G}{n_i} \left\{ \left( \sigma_i^G - 1 \right) \delta^G \left( \frac{\bar{P}_{b}^j}{\bar{P}_j} \right)^{1-\sigma^G} \right\} + \left( \gamma_i^G - \sigma_i^G \right) (1 + (n_i - 1) \mu_i).
$$

(7)

4.1.3. Supply side and oligopolistic industries

On the supply side, the production technology is Cobb-Douglas in variable factors and intermediate inputs, the latter being composites (CES nests) of home and imported products and services. Intermediate inputs, in turn, are composites (CES nests) of home and imported products and services. In order to capture the pervasiveness of oligopolies in Kuwait, firms in all economic sectors (including private and state-owned firms) are modeled as oligopolistic (or monopolistic), and their price collusions and targeted regulatory surveillance are also modeled. The representation of oligopolistic behavior in this model is incorporated from Shehabi (2017, 2020a, 2020b, 2020c), and based on Asano and Tyers (2015, 2019), Tyers (2015), Tyers (2005), Gunasekera and Tyers (1990), Harris (1984), and Horridge (1987). This representation emphasizes oligopoly rents in the spirit of Blanchard and Giavazzi (2003) and is similar to that by Devarajan and Rodrik (1991).

As all Firms in all economic sectors are modeled as oligopolistic, they operate in differentiated product markets and adopt profit maximizing rules, each carrying fixed capital and labor costs that can increase the potential for unrealized economies of scale and the occurrence of pure
(economic) profits (or losses) at market levels. Pure (economic) profits are those earned for charging a price, plus a markup above the average cost. As such, each firm in industry $i$ exploits its monopoly over the supply of its own product variety by selecting the price $p_i$ relative to average variable cost $v_i$. Thus, its markup $m_i$ that maximizes its profit is as follows:

$$m_i = \frac{p_i}{v_i} = \frac{1}{1 + \tau_i} \quad \forall i$$

(8)

As oligopolist or monopolist, a firm’s optimal sale price depends on the varietal elasticity of demand. This elasticity of collective demand is then a weighted average of the elasticities of demand in the five markets it supplies.

4.1.4. Factors of production

This model includes seven primary factors of production: physical capital, Kuwaiti unskilled labor, Kuwaiti skilled labor, expatriate unskilled labor, expatriate skilled labor, arable land, and natural resources. In order to capture the labor market, this model expands industries’ production functions to include four labor types that are differentiated by nationality and skill. To reflect the Kuwaiti labor market’s segmentation, wage and mobility rigidities in this market are assumed, especially those pertaining to public sector employment and low-skill wages. Meanwhile, employment contracts are flexible for expatriates.

4.1.5. Household savings and investments

The household savings rate is fixed, and firms retain net earnings at corporate savings rates that are also fixed and industry specific. This model also represents financial agents who manage the portfolios of domestic and foreign assets impacting the inflow and outflow of financial investments. Additionally, it considers Kuwait’s external financial flows, primarily flows to and from the KIA. These also mimic, to a certain extent, the KIA’s role as a source of government funds following oil price shocks.

4.1.6. Long-run capital

The long-run version of this model is naturally Walrasian in that prices and interest rates adjust to ensure that products, factors, and financial markets all clear. External flows are constrained by the balance of payments (implied by domestic agents satisfying their budget constraints), which drives adjustments in the real exchange rate in response to shocks. As for other aspects, the total capital stock of the economy is endogenous (as is the level of capital use in each industry), and the open economy capital market has a market clearing identity that accounts for inward and outward financial flows. Such flows follow changes in interest rate parity, being the difference between the home and foreign real bond yields and expectations of the real exchange rate. In accordance with realistic changes in the long-run capital use within an economy, and consistent with Kuwait’s considerable external holdings, this model’s long-run closures allow changes through investment flows. Additional details are in Shehabi (2019, 2020b).

Finally, financial flows and real exchange rate changes are endogenous, while external economic conditions, such as yields on investments abroad and global oil market trends, are exogenous and can be shocked in model simulations. In addition, 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 modeled accordingly. Thus, it is sensitive to both the performance of the traded industries as well as the non-traded services sector. This model also adopts neoclassical features in characterizing consumption preferences and the variable costs of production, including optimizing representative agent behavior, full input substitutability, and flexible product and factor prices. Moreover, the aggregate household’s expenditure function is used to derive the consumer price index (CPI), which is a Cobb-Douglas-CES index of after-tax prices of both home products and imports. Since collective utility is defined as a Cobb-Douglas combination of consumption volumes by generic products, CPI-deflated GNP is a measure of overall economic welfare.

4.1.7. Government revenue

In this model, the government collects revenue from direct taxes on capital, labor income, land, and resource rents, and from indirect taxes on trade and consumption expenditures. The total government expenditure is $GT = G + GP$, where $G$ is the expenditure on goods and services described in equations (4) and (5), and $GP$ is the expenditure on transfers (pensions). To account for government interventions at the firm level, corporate taxes are separated from subsidies and charged through industry-specific rates. The government also makes direct transfers to the collective household, which can be set as exogenous in real terms and shocked, in which case another fiscal variable must be made endogenous: the fiscal deficit, one of the tax rates, or government expenditures on goods and services. Accordingly, the government transfer variable is exploited beyond the application by Asano and Tyers (2015) by not setting GP as constant relative to the consumer price level. In reality, Kuwait has limited taxation institutions, but this representation facilitates the examination of tradeoffs between welfare payments and between fiscal balance and cost of living stability following local or export price changes. It also enables the examination of possible fiscal policy changes in the future.

4.1.8. GNP and GDP

This model calculates national income, GNP, as the sum of payments made to domestically owned factors of production. It also accounts for the home share of any net profits (or losses), net income from indirect taxation, revenue from direct (income) taxation $T_y$, and net inflows from abroad, denoted as $B$. Thus, the formulation is as follows:

$$Y = rK_y + \sum_{i=1}^{N} w_i L_i + \left(\frac{K_p}{K_f}\right) \sum_{i=1}^{N} \pi_i + \left(T - T_y\right) + B$$

$$+ \left(1 - \frac{K_p}{K_f}\right) r_K \left(r(K_f - K_p) + \sum_{i=1}^{N} \gamma_i\right).$$

(9)

In effect, $B$ is the net income component of the current account and unrequited transfers.

In the following, GDP only measures income from production in the domestic economy. Therefore, in this model, the calculation excludes factor payments as well as other flows to and from abroad:

$$GDP = rK_y + \sum_{i=1}^{N} w_i L_i + \sum_{i=1}^{N} \pi_i + \left(T - T_y\right).$$

(10)

4.1.9. Real exchange rate

This model allows measuring variable economic variables in real terms. In this regard, the real exchange rate measures the home and foreign GDP price levels expressed in a common currency. Thus, in the following, this model 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 ($P^*$):

$$e_Y = \frac{P_y}{P^*} = E \frac{P_y}{P^*},$$

(11)

where $e_Y$ is the real exchange rate, $E$ is the nominal exchange rate, and both are expressed according to the financial convention.

4.2. A note on links to epidemiological demographic models

While it is common for pandemic and outbreak models to link economic data to a population-wide epidemiological demographic model, this study, in the context of Gulf states and Kuwait, does not necessitate such a linkage. In assessing the long-term macroeconomic and sectoral...
effects of the pandemic, such a linkage would be necessary to the extent that the COVID-19 crisis affects labor supply. Nonetheless, in Kuwait, it is reasonable to assume that the COVID-19 pandemic has had limited effects on future labor supply, for three main reasons. First, COVID-19’s mortality rate in Kuwait has been relatively low and much lower than the global average, i.e., 0.6% of those infected and 0.02% of the population, compared with the global average of 2.1% and 0.05%, respectively (ECDC, 2021). Second, vaccination efforts for the population have been underway in late 2020/early 2021, and the government has demonstrated the financial capability and willingness to continue securing vaccinations to achieve herd immunity. Third, and most importantly, under Kuwait’s current labor policies, the shortage of labor can be supplied via highly elastic expatriate labor from abroad, enabling access to ongoing labor supply. These reasons are also applicable to other GCC states. As such, for this study, the WAFRAGE-KWT Model is calibrated only with the new SAM 2015 for Kuwait and other relevant economic data for firms, as described in Section 2.2.

4.3. Model closures

Model closures dictate the length of run of the analysis and represent market clearance assumptions as well as other assumptions about which variables are free to change or can adjust in response to shocks. This study offers long-run analysis, for which the length 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 of any other shocks).

The closures critical to this study are as follows. The standard labor closure fixes the employment of Kuwaiti labor and enables endogenous movement of both skilled and unskilled expatriates. 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. In order to more realistically represent the changes in either the fiscal deficit and/or transfer payments, the adopted fiscal closure includes endogenous fiscal deficit and welfare payments, with exogenous government spending on goods and services, and exogenous consumption subsidy rates and corporate tax rates (both of which are shocked). The capital market closures are discussed above. In the long run, since the capital stock of the entire economy is mobile, 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. Meanwhile, payments to the KIA, and withdrawals from it, remain endogenous in this model. Finally, the oligopoly sub-closure in the long run allows free entry and exit of firms at a given profitability level. Appendix C further details these closures.

5. Model simulations

5.1. Channels through which COVID-19 has affected the economy

Like any health-related outbreak, COVID-19 is first and foremost a crisis that can affect any economy domestically, through both health/epidemiological shocks as well as economic shocks to supply, demand, production, equity, and policies. In Kuwait, the advent of COVID-19 has had the following effects on the economy:

- Oil and other products’ prices such as:
  - Decreased oil price export revenue for Kuwait.
  - Rising costs for consumers and producers.
- Disease effects such as:
  - Rise in infections and mortality.
  - Rise in pressures on the healthcare system.
  - Reduction in travel and demand for Kuwaiti oil, oil products, and other goods.
- Associated behaviors such as:
  - Decreased domestic demand for some industries, including travel.
  - Decreased international demand for Kuwait’s oil exports.
  - Increased consumption demand and government expenditures on healthcare and other services.
- Mitigation and policy responses such as:
  - Closures of businesses and schools, and quarantines.
  - Provision of wide-spread testing and health-related measures.
  - Expansion of welfare support payments and economic stimuli.

Importantly, the domestic effects of the pandemic in Kuwait largely depend on the government’s mitigation measures, such as lockdowns and closures, as well as the availability and spread of administering vaccines in a manner that enables the return of air transportation, movement, and the global economy to pre-pandemic levels.

Simulation design is important for investigating the potential long-run impacts of the COVID-19 pandemic on Kuwait’s economy. Since many of the aforementioned COVID-19 shocks are (or can be) short run in nature, model simulations can only have long-run effects (see Section 4.3) for the following reasons. Shocks of immediate or short-run nature are washed out over a brief period; thus, they are insufficient for moving an economy to a new equilibrium. Additionally, immediate and short-term effects of shocks tend to be more visible or tangible for economic agents and policymakers, rendering policy responses relatively easy. Conversely, policymaking tends to be more intricate and requires quantified assessments, especially in response to long-run shocks that have effects that are only visible after an economy has adjusted to long-run dynamics. The ongoing COVID-19 virus mutations and the different speeds of global vaccination efforts render the economic outlook uncertain until the end of 2021 and possibly into 2022 and 2023. In this regard, this study’s evidence-based assessments provide policy solutions to this challenge.

An economic closure of only a few months would be short run in nature and would not inform on the macroeconomic or sectoral effects in a general equilibrium setting. Similarly, in Kuwait, shocks to the Kuwaiti labor supply and mortality of the population are likely to have short-term effects, as explained in Section 4.2. As such, the simulations exclude epidemiological and economic shocks to the Kuwaiti labor supply and economic closures of businesses.

On the other hand, this study considers that oil price drops will have long-term effects. Indeed, oil prices increased from unprecedented sub-$20/bl levels in 2020 to $64/bl in early May 2021, trends that reflect the increased economic activity following the successful vaccine production in November/December 2020 as well as the positive market expectations for an expedited economic recovery. Nevertheless, the average oil price for 2020 remained relatively low at $41/bl. Additionally, optimism was subsequently countered by April 2021 (a year since the lockdown commenced in Kuwait and numerous other countries), due to new virus mutations (especially the Beta, Gamma, Delta variants), the catastrophic spread of the disease in India, and the advent of the highly-contagious Omicron variant in November 2021. Meanwhile, oil demand was threatened by accelerated efforts to achieve the European Green Deal of 2020 and by efforts of U.S. President Biden’s administration to advance efforts to combat climate change (including pledges to reduce U.S. greenhouse gas emissions by 50% by 2030). The average oil price for 2021 was $70/bl, entailing an average oil price for 2020 and 2021 of approximately $56/bl. Moreover, the analyses by the International Energy Agency (IEA), the U.S. Energy Agency, and various industry experts have predicted a lower average oil price in 2022, while future oil prices and demand are expected to decline even further in subsequent years (IEA, 2021a; 2021b). This decline is due to the acceleration of the energy
transitions to meet the rising climate commitments made at COP 26 in 2021 and the rise of various national commitments to achieve net-zero emissions and reduce the use of fossil fuels. Given these factors, there is ongoing uncertainty about the recovery of the global economy and oil demand.

As such, the channels through which COVID-19 has been transmitted to Kuwaiti’s economy over the long-run include:

a) Oil exports prices.
b) Oil export demand.
c) Domestic consumption demand.
d) Costs of businesses, production, and labor.
e) Government expenditures.

These channels also inform the selection of exogenous factors to shock in model simulations.

5.2. Scenarios and assumptions

To quantify the long-term effects of the COVID-19 crisis on Kuwait’s economy, the model simulations presented here include four simulations, all analyzed in the long term according to the nature of the shocks of the COVID-19 crisis and the ensuing policy responses. The first simulation focuses only on the effects of oil price declines, while the following three simulations combine oil prices and COVID-19 triggered shocks in three scenarios reflecting different assumptions of the speed of domestic and global economy recovery, and the length of domestic movement restrictions and government relief/stimuli packages. These assumptions inform the choice and values of the shocks in each scenario. Table 3 details the various assumptions underlying each scenario.

The first scenario (Scenario A) concerns the rapid recovery of the domestic and global economies, and oil prices. This outlook is reflected through shocks reflecting a conservative 4% decrease in global crude oil export prices and a 6% decline in oil and oil refining demand. This is in addition to the supply shocks to private sector industries (construction, transportation, finance, light and heavy manufacturing), a rise in the services sector (driven by increasing demand for health, information technology, and related services), and an increase in government expenditures. This scenario is plausible because it is consistent with the expected average oil prices of 2020 and 2021 of $49/bl, the relaxed pandemic-related government restrictions (including vaccine rollouts), and a fast global economic and travel recovery.

The second scenario (Scenario B) reflects a moderate recovery of domestic and global economies, by combining industry supply and government expenditure shocks with larger declines in oil export prices of 6% and demand (for crude and refined products) of 8%, plus increases in government subsidies to all industries in order to compensate for longer business closures. This scenario is plausible because it is consistent with the average oil price recovery of 2020 of $41/bl, the trends of pandemic-related government policies in Kuwait (including fast vaccine rollouts and extension of welfare support), and a moderate global economic and travel recovery.

The third scenario (Scenario C) concerns a protracted COVID-19 pandemic outlook whereby both the domestic and global economies’ recovery are significantly slower than those in Scenarios A and B, and whereby the pandemic effects extend to the local industries. This outlook is reflected through industry supply and government expenditure shocks of higher magnitudes than those in Scenarios A and B, combined with larger declines in oil export prices of 7% and demand (for crude and refined products) of 10%. Included in this scenario is the forced release of expatriate labor (double for unskilled than skilled labor) and larger increases in government support to businesses in the affected sectors (funded by withdrawals from savings abroad). This scenario is plausible because it is consistent with lower oil prices in 2021 and reasonable expectations of future price declines absent another shock to the oil market, as well as prolonged government policies that took effect during the pandemic (including fast vaccine rollouts and prolonged industry and household support) and a slow global economic and travel recovery.

In all three scenarios, the adopted fiscal closure includes an endogenous fiscal deficit, with exogenous government spending on goods and services, and exogenous consumption subsidy rates and corporate tax rates. Meanwhile, capital is mobile across sectors, with prices and interest rates adjusting to ensure that product, factor, and financial markets all clear. Moreover, non-Kuwaiti labor are mobile and have flexible labor contracts.

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In all three scenarios, the adopted fiscal closure includes an endogenous fiscal deficit, with exogenous government spending on goods and services, and exogenous consumption subsidy rates and corporate tax rates. Meanwhile, capital is mobile across sectors, with prices and interest rates adjusting to ensure that product, factor, and financial markets all clear. Moreover, non-Kuwaiti labor are mobile and have flexible labor contracts.

Table 4 depicts the shocks implemented in each scenario. Notably, in determining the value of oil price shocks and given ongoing oil price volatility and uncertainty in predictions, the simulations use: 1) $41/bl as the average oil price in 2020; and 2) $45/bl as the estimate of the Kuwaiti Ministry of Finance's (2021) budget for 2021/2022. Although lower than the rebound in oil prices by May 2021, such a low average oil price is consistent with future uncertainty facing oil markets and forecasts of low oil prices in the immediate to near future (IEA, 2021a; 2021b). Such forecasts are reasonable in the absence of another future major shock to the international energy market (such as natural disasters or international conflict).

Table 3

| Scenario/Shock | Assumptions | Oil prices remain low | Vaccines roll out domestically | Domestic restrictions on movement and business | Vaccines roll out globally | Global restrictions on travel and movement, and demand for refined products | Kuwaiti government’s support |
|----------------|-------------|-----------------------|---------------------------------|-----------------------------------------------|----------------------------|------------------------------------------------------------------|-------------------------------|
| **Scenario A: Rapid recovery** | | | | | | | |
| Quick recovery of domestic and global economies, and oil prices | Average recovery $45–50/bl | In 2021 to most of the population | Eased in the first half of 2021 | | | Healthcare services |
| **Scenario B: Moderate recovery** | | | | | | | |
| Quick recovery of the domestic economy; partial recovery of the global economy, and oil prices | Average recovery $40–45/bl | In 2021 to most of the population | Eased in the first half of 2021 | | | Partially lifted in 2021, ongoing in 2022 |
| **Scenario C: Prolonged COVID-19 pandemic** | | | | | | | |
| Slow recovery of the domestic and global economies, and oil prices | Average recovery below $40/bl | In 2021 to most of the population | Strict in 2021, as in 2020 | Limited in 2021; largely in 2022 | Restricted in 2021, lifted in 2022 | Healthcare services; extensive household and business support |

Source: Model simulations.
the post-2014 oil price declines. Accordingly, these results confirm the lower in an economy that operates in a low oil price environment, as in economic structure, the prospects for economic diversification following the oil price declines in 2014), and in the economic structure prior to this decline (as in Shehabi, 2017, 2020). In the lower oil price environment, the effect of an equi-proportionate decline in the oil price is 50% worse than that in the high oil price environment (2013). This result is driven by four aspects:

a) The lower price environment (post-2015), which had already reduced the fiscal cushion.

b) The economic structure and weakening economic role of the private sector.

c) The widening economic constraints, with higher subsidies.

d) The increasing reliance on the oil sector.

Furthermore, the low oil price shock alone (pre-pandemic) yield welfare declines by a large magnitude and is contractionary for the overall economy and macroeconomic indicators. Pertaining to economic diversification, the shock yields limited industrial expansion of non-oil exports, since it caused a decline in overall industrial oligopolistic markups, rather than an increase in non-oil exports. These limited reverse Dutch disease effects are larger than those in Shehabi (2020), where the economy was operating at a higher oil price environment (2013). These results also suggest that, in the existing policy regime and economic structure, the prospects for economic diversification are much lower in an economy that operates in a low oil price environment, as in the post-2014 oil price declines. Accordingly, these results confirm that the pandemic hit the economy at a state of weakened resiliency following the 2014 oil price declines. Since the economy faced these novel pandemic shocks at a lower resilience level, the effects of these shocks (as shown in the following scenarios) are potentially larger and longer lasting.

6.2. Combined scenarios: macroeconomic results

The negative effects on the oil industry and other industries by the COVID-19 closures are contractionary throughout the economy. Simulating the previous shocks in the three scenarios and assuming no other changes in the economy show that the real GDP is expected to contract by 8%-10%, mediated by the government's economic support (see Fig. 2 and Table 5). Meanwhile, depreciation in the real exchange rate occurs in all three scenarios, which increases with the severity of each scenario. Such depreciation renders imported final goods relatively more expensive, raising the cost of domestically sold products. Table 5 depicts the long-run impacts of the shocks implemented in each scenario on selected key economic variables, while Figure 2 depicts key macroeconomic results per scenario.

Since the majority of intermediate demand is generally met by imports, a depreciating exchange rate also raises the prices of imported intermediates, raising the overall cost of domestic production and, consequently, their price in the domestic market. At the same time, the rise of domestically produced intermediates (due to COVID-19) appreciates the real exchange rate, which by itself renders imported goods relatively less expensive. However, the appreciation is not large enough to offset the depreciation caused by the decline in oil export prices. The net effect is depreciation and net rising costs of products and initial inflationary responses.

Yet, these increases in prices do not translate to inflation, due to the government's policy of maintaining fixed prices of goods and services in the market. This policy, together with increased government support to Kuwaiti families during the pandemic, yields welfare improvements that are counterintuitively larger with the severity of the COVID-19 shocks.

Regarding trade, the overall Kuwaiti exports decrease between 12% and 20%, primarily due to decreases in the exports of the oil industry and refined products. Moreover, the reduction in exports is larger when domestic restrictions are longer and the global economic recovery is slower. In the three scenarios, domestic output of all sectors largely decreases. Yet the largest impact occurs in the private sector, which can mediate the hit by releasing labor, mostly expatriates. This effect triggers further declines in economic output, mediated by government support to businesses.

Finally, non-oil exports' share of GDP is basically non-affected in all three scenarios (see Table 5), since it is the net effect of different factors in opposite directions. Although the depreciating real exchange rate

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9 For details on the results of this shock, please contact the author.

10 This result holds even when the economy is shocked with a hypothetical oil price increase of 5%. Under the existing policy regimes and in an economy post-2014 oil price declines, simulating oil price increases yields an improvement in overall economic performance and GDP levels as well as an expansion of both the oil and gas sectors and the non-tradable sectors. Meanwhile, non-oil exports diminish and oligopolistic mark-ups increase, suggesting that the oligopolistic private sector benefits from oil price increases at the expense of economic diversification.

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6. Simulation results

6.1. Oil price declines alone

To assess the state of the Kuwaiti economy's resiliency and structure at the advent of the COVID-19 pandemic, a 5% decline in the oil export price was simulated in the current model and SAM (an economic structure following the oil price declines in 2014), and in the economic structure prior to this decline (as in Shehabi, 2017, 2020). In the lower oil price environment, the effect of an equi-proportionate decline in the oil price is 50% worse than that in the high oil price environment (2013). This result is driven by four aspects:

- The lower price environment (post-2015), which had already reduced the fiscal cushion.
- The economic structure and weakening economic role of the private sector.
- The widening economic constraints, with higher subsidies.
- The increasing reliance on the oil sector.

Furthermore, the low oil price shock alone (pre-pandemic) yield welfare declines by a large magnitude and is contractionary for the overall economy and macroeconomic indicators. Pertaining to economic diversification, the shock yields limited industrial expansion of non-oil exports, since it caused a decline in overall industrial oligopolistic markups, rather than an increase in non-oil exports. These limited reverse Dutch disease effects are larger than those in Shehabi (2020), where the economy was operating at a higher oil price environment (2013). These results also suggest that, in the existing policy regime and economic structure, the prospects for economic diversification are much lower in an economy that operates in a low oil price environment, as in the post-2014 oil price declines. Accordingly, these results confirm that the pandemic hit the economy at a state of weakened resiliency following the 2014 oil price declines. Since the economy faced these novel pandemic shocks at a lower resilience level, the effects of these shocks (as shown in the following scenarios) are potentially larger and longer lasting.

6.2. Combined scenarios: macroeconomic results

The negative effects on the oil industry and other industries by the COVID-19 closures are contractionary throughout the economy. Simulating the previous shocks in the three scenarios and assuming no other changes in the economy show that the real GDP is expected to contract by 8%-10%, mediated by the government's economic support (see Fig. 2 and Table 5). Meanwhile, depreciation in the real exchange rate occurs in all three scenarios, which increases with the severity of each scenario. Such depreciation renders imported final goods relatively more expensive, raising the cost of domestically sold products. Table 5 depicts the long-run impacts of the shocks implemented in each scenario on selected key economic variables, while Figure 2 depicts key macroeconomic results per scenario.

Since the majority of intermediate demand is generally met by imports, a depreciating exchange rate also raises the prices of imported intermediates, raising the overall cost of domestic production and, consequently, their price in the domestic market. At the same time, the rise of domestically produced intermediates (due to COVID-19) appreciates the real exchange rate, which by itself renders imported goods relatively less expensive. However, the appreciation is not large enough to offset the depreciation caused by the decline in oil export prices. The net effect is depreciation and net rising costs of products and initial inflationary responses.

Yet, these increases in prices do not translate to inflation, due to the government's policy of maintaining fixed prices of goods and services in the market. This policy, together with increased government support to Kuwaiti families during the pandemic, yields welfare improvements that are counterintuitively larger with the severity of the COVID-19 shocks.

Regarding trade, the overall Kuwaiti exports decrease between 12% and 20%, primarily due to decreases in the exports of the oil industry and refined products. Moreover, the reduction in exports is larger when domestic restrictions are longer and the global economic recovery is slower. In the three scenarios, domestic output of all sectors largely decreases. Yet the largest impact occurs in the private sector, which can mediate the hit by releasing labor, mostly expatriates. This effect triggers further declines in economic output, mediated by government support to businesses.

Finally, non-oil exports' share of GDP is basically non-affected in all three scenarios (see Table 5), since it is the net effect of different factors in opposite directions. Although the depreciating real exchange rate

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9 For details on the results of this shock, please contact the author.

10 This result holds even when the economy is shocked with a hypothetical oil price increase of 5%. Under the existing policy regimes and in an economy post-2014 oil price declines, simulating oil price increases yields an improvement in overall economic performance and GDP levels as well as an expansion of both the oil and gas sectors and the non-tradable sectors. Meanwhile, non-oil exports diminish and oligopolistic mark-ups increase, suggesting that the oligopolistic private sector benefits from oil price increases at the expense of economic diversification.
makes non-oil exports relatively more affordable internationally, at the global level, any potential expansion is counteracted by global economic recession (post-pandemic), coupled with reduced output and oligopolistic markups (see Section 6.4). In all three scenarios, the declines in the oil export price cause substantial increases in the fiscal deficit, exacerbated by public economic stimuli and support. Overall, fiscal deficit as a share of GDP, declines by 8%–15%.

6.3. Combined scenarios: wages, household welfare, and consumption

An important part of evaluating the effects of the COVID-19 pandemic on households is the impact on welfare and consumption. The negative effects on most industries directly transmit to households through labor (wages) and output prices. The results of this model also reveal important lessons on the effects of the pandemic on both households and Kuwaiti and non-Kuwaiti labor (Table 5).11

While employed labor continue to earn wages, their real wages significantly decline, but with opposite effects on Kuwaiti versus non-Kuwaiti labor. Among the Kuwaitis, unskilled labor, who earn lower wages than skilled labor and are employed in the affected private sector firms, take the largest hit in their real wages, by as much as triple that of skilled Kuwaiti labor in Scenario A and double that in Scenarios B and C. As the economic conditions worsen in Scenarios B and C, the increased government support of businesses improves the employment conditions for Kuwaiti unskilled labor, thereby reducing the decline of real wages of such labor. Meanwhile, the decline in real wages for skilled Kuwaiti labor is almost consistent across the three scenarios. However, for non-Kuwaiti labor, the effects on real wages are similar across skill levels and are significantly less than those of Kuwaiti labor in Scenario A because of the exit of expatriate labor.

Regarding expatriate labor, they are all of working age and are mostly employed by the private sector, with flexible labor contracts. As such, since the affected industries adjust the employment levels of non-Kuwaiti labor in response to the shocks, the exit of expatriate labor absorbs large parts of the shocks.12 Across all three scenarios, the concentration of unskilled non-Kuwaiti labor in low-wage jobs in industries negatively affected by the pandemic (such as construction) entails that the largest loss in employment occurs among unskilled expatriate labor. As economic conditions worsen (as in Scenarios B and C), the real wages of non-Kuwaiti labor decline (opposite to that of Kuwaiti labor), since the government’s support for businesses is disproportionately allocated to Kuwaiti labor.

The effects of these dynamics on welfare are counterintuitive. Contrary to the expected negative welfare effects of oil price shocks (such as those in Shehabi, 2017, 2020c), the aggregate welfare measure drops by only negligible levels in Scenarios A and B. This is because declines in real disposable income are minimal (while savings remains constant), and households are, therefore, not required to adjust their consumption of energy and other products. In Scenario C, as the government increases

11 Ideally, the effects are assessed on different groups across workers (or households) separated by working age, employment type, health, and other digital vulnerabilities. However, given the limitations in the available data, this model does not include such household details or health vulnerabilities.

12 The exit of foreign labor has been occurring since the advent of the COVID-19 pandemic.

### Table 5
Long-run impacts of COVID-19 and associated shocks on selected economic variables.

| Variable | Percentage change (departure from baseline) |
|----------|-------------------------------------------|
|          | Scenario A: Rapid recovery | Scenario B: Moderate recovery | Scenario C: Prolonged pandemic |
| Macroeconomic indicators | | | |
| Real GDP | –7.80 | –7.30 | –10.00 |
| Real GNP | –8.80 | –10.80 | –12.00 |
| Non-petroleum exports/GDP | –0.16 | 0.17 | 0.25 |
| Government | | | |
| Fiscal deficit/GDP | –7.93 | –9.43 | –15.00 |
| Investment expenditure/GDP | –3.60 | –3.45 | –5.99 |
| Welfare | | | |
| Welfare (Real disposable income, CPI-deflated) | –0.4 | –0.3 | 0.5 |
| Labor | | | |
| Real Kuwaiti unskilled wage, PC-deflated | –9.13 | –6.58 | –6.94 |
| Real Kuwaiti skilled wage, PC-deflated | –3.99 | –3.54 | –3.68 |
| Real expatriate unskilled wage, PC-deflated | –1.82 | –2.81 | –3.37 |
| Real expatriate skilled wage, PC-deflated | –1.82 | –2.81 | –3.37 |
| Industry/oligopoly | | | |
| Average markup, non-oil tradables | –0.80 | –0.53 | –0.40 |
| Average markup, non-oil tradables | 0.78 | 1.56 | 1.59 |
| Average markup, non-tradable services | 0.66 | 0.49 | 0.47 |
| Average industry scale | 37.70 | 35.92 | 35.61 |

Source: Simulation results.
welfare payments to Kuwaiti citizens in an attempt to ease the economic effects of a protracted economic recovery, the aggregate response measures improve. Importantly, however, while these welfare payments offset household welfare declines, they require additional resources from the already-strained fiscal balance, necessitating large withdrawals from the KIA (SWF) funds to finance committed government expenditures and the increase in welfare payments.

In terms of income and consumption, normally households adjust their demand in response to rising costs, and consequently household welfare, measured by real disposable income deflated by the CPI, drops. Yet, this decline in household welfare is offset by the large expansion of government support (through COVID-19 relief measures and welfare payments) and its policy to maintain inflation stable. As the majority of government support goes to Kuwaiti labor and citizens, welfare losses are mitigated by expanding payments, but more so for Kuwaiti than non-Kuwaiti labor.

In terms of consumption (see Fig. 3), overall final demand for home-produced goods increases for non-traded services (healthcare, education, other), with larger increases in the moderate recovery and prolonged COVID-19 pandemic scenarios. Demand also increases for agricultural goods by approximately 5%, substituting for imported agricultural goods, which have become relatively more expensive. Similarly, demand for electricity and network services (water and gas) remains stable and unaffected by the severity of the economic conditions, whereas demand for other construction and financial services declines by 5%–8%. Finally, demand for the transport sector takes a greater hit, declining by 10%–15%, which is largely driven by the length of economic closures and curfews, rather than the income effects.

6.4. Combined scenarios: sectoral effects

In model results, the rising costs of both domestic and imported intermediates (through real exchange rate effects) increase costs for industries domestically. Across all industries, with the exception of the sectors increasingly in demand during the pandemic, output decreases, with limited effects on pro-export trade. This result occurs largely because of the depreciating real exchange rate, coupled with the elasticity of substitution between imports and locally produced goods. In general, these dynamics are important to sectoral effects and output.

In all three scenarios, the decline in oil prices depreciates the real exchange rate. At the same time, the increasing cost of domestic prices has the opposite effect on the real exchange rate, but only to a limited and insufficient levels, resulting in a net depreciation in the real exchange rate. However, the demand for intermediate goods is inelastic, and the low real exchange rate renders imported intermediates relatively more expensive. Consequently, it raises production costs for sectors with imported intermediates. Accordingly, the contracting industries (especially in the private sector) are forced to adjust production and reduce costs, with labor costs the first to be cut from unskilled and unskilled expatriate labor. Yet, given the flexibility of their labor contracts, non-Kuwaiti workers are the first to be let go. As their stay in Kuwait is linked to their employment contracts, non-Kuwaiti workers exit the labor market, which, in all three scenarios, provides a minimal cushion to the economy. Then, the rise of production costs leads to lower output, which, in turn, raises the relative price of produced goods for the same demand level. Under these economic conditions, the elasticity of demand shifts from the least inelastic to the most elastic, with the share of final demand increasing relative to intermediate demand. As such, sectors expand output to satisfy final demand as well as meet the increasing government demand for goods and services during the pandemic.

Overall, the sectoral results of the implemented shocks show clear winners and losers of the pandemic (see Fig. 4). Across all three scenarios, the hydrocarbon industry has the largest declines in terms of percentage. The industries affected the most are those with some (albeit minimal to date) exporting capacity (such as manufacturing) as well as both non-tradable sectors for non-urgent services (such as construction and transport) and financial services. In addition to the real exchange rate dynamics, the decline in these industries’ output is driven by demand pulls and longer restrictions. The contraction of these industries entails losses of employment for private sector employees, some Kuwaitis, and mostly non-Kuwaitis. Moreover, the rising costs further decreases industrial outputs, causing changes equal to or larger than that in the oil sector (Scenario A).

However, in the more realistic and pessimistic scenarios where the COVID-19 recovery is prolonged slow economic recovery, as in Scenario B, the government’s support to the affected industries mediates the large negative impacts on them, as in Scenario A. The additional domestic demand in Scenario C (due to larger financial government support to households and industries) is met by a rise in production levels, thereby either stabilizing or reducing the output cuts on the affected industries. On the other hand, some industries emerge as less affected or even “winners.” For example, in Scenario A, output of some services largely
increases due to rising domestic demand in COVID-19-related services (primarily health). The two primary non-crude oil sectors with export capacity; namely, Oil Refining and Chemicals, also show improvement, driven mostly by the depreciating exchange rate.

The effects on Electricity and Other Network Services (gas and water) are generally limited, since these sectors are highly subsidized and thus shielded from the negative effects of COVID-19. Additionally, household and industrial demand for these sectors is rather inelastic and robust in the face of economic downturns, thus requiring ongoing production to meet the demand. Meanwhile, as domestic closures persist and the global economy slowly recovers, production increases to meet increasing demand. As for other aspects, the longer the domestic closures, the larger the magnitude of negative effects on the affected sectors. Nevertheless, in Scenarios B and C, the expanding government support mitigate some of the losses from the shocks, therefore reducing the overall negative effects on the sectors in these scenarios.

While COVID-19 shocks generally transmit to an economy through various supply and demand shocks, in Kuwait, the demand shocks have been mitigated through the distribution of welfare payments that ease consumption. Yet, the rise in consumption, along with government expenditures, has been insufficient for improving the GDP, indicating that business closures and the decline in production in most industries are detrimental to the economy and its capacity to increase non-oil exports.

The markups of private sector oligopolies offer another important and potentially counterintuitive insight on the industrial effects of the pandemic. Normally, busts reduce oligopolies’ markups and pure profits, creating large efficiencies and economic improvements that transmit economy-wide. In the model results, however, oligopolists’ markups decline, but only minimally (by less than 1%), with the magnitude of declines decreasing with the severity of the scenario. These results are due to the increase in government support for businesses. While small firms hit by the pandemic are forced to shut down, large oligopolies weather the crisis by, first, letting go of expatriate labor and, to a much lesser extent, unskilled Kuwaiti labor; and second, by accessing (the expanding) government support. Rather than using the relief package to expand output, oligopolies restore their pre-pandemic profits and markups. As such, despite expanding measures to businesses, oligopolists maintain their markups, and consequently, there are no improvements in economic efficiency that could expand economy-wide and cushion the adverse effects of the pandemic and oil price shocks.

Importantly, the expansion of output toward the export market is significantly lower than that expected in a normal bust following oil price declines, such as the relatively low pro-export expansion in Shehabi (2020a, 2020b). In addition to the real exchange rate and weakening global economy effects, the limit in pro-export output is due to the ability of industries to support their markups in the domestic market. These markups do not change post-pandemic from base levels, and most of the increases in output are met in the domestic market only where prices can be significantly higher than competitive pricing at the international level.

Finally, although the support of ongoing wages and expansion of government (welfare) support to households and businesses appear to be a counter-cyclical fiscal policy, they are consumption-based and therefore do not enable the full realization of the benefits of such a policy. These measures also ease consumption shocks without an increase in supply throughout the economy. Moreover, the expansion in welfare is met with neither an expansion in production and efficiency nor a reduction in oligopolies’ markups.

7. Conclusion and policy implications

Hydrocarbon exporting economies have been negatively impacted by three novel shock-producing events; namely, COVID-19 (which triggered supply and demand shocks), oil export price declines, and the government’s policy responses to the pandemic. Thus, this study examines the long-term effects of the combination of these shocks on Gulf hydrocarbon economies, using simulations from Kuwait in the WAFRAGE-KWT Model. According to model simulations, the combination of COVID-19 shocks, its mitigation measures, and oil price declines significantly harms the economy’s GDP and causes a fiscal deficit. Increased government responses to these shocks, in the form of household support and economic stimulus packages, help relieve some of the effects on households and industries, but they do not expand productive capacity and further exacerbate the fiscal deficit. While managing the spread of the virus was definitely important, this study’s analysis clearly suggests that the longer that business closures and movement restrictions continue, the greater the impact on economic activities, output, and fiscal effects, even
if household welfare effects are moderated. Longer closures of the economy also entail larger government stimulus packages, which help private companies stay in business, but support their oligopolistic profits (rather than increase their production) and cause a significant drain on fiscal balance and savings. They also cause delays in launching non-government funds that could support development projects in line with Kuwait’s Vision 2035. In sum, the economy faces larger long-term impairments caused by the combination of these shocks during the pandemic.

An important contribution in this study is the examination of the effectiveness of a change in Kuwait’s government fiscal policies during the pandemic (in 2020–2021) toward a seemingly counter-cyclical fiscal policy. As in other hydrocarbon exporters, this policy has been offered as a solution to the government’s pro-cyclical fiscal policy in Kuwait, which has been shown to be ineffective in expanding economic diversification and reducing economic rigidities (Shehabi, 2020c). Nevertheless, during the COVID-19 pandemic, the expansion of the government’s relief payments appeared in the form of a counter-cyclical fiscal policy, but in reality, it was not. As the model results depict, the relief packages were consumption-based and unable to achieve the counter-cyclical policy’s potential pro-export expansion and economic stabilization benefits. The continued expansion of welfare support payments and support of rigid expenditures (such as the public wage bill) offset the large declines in households’ income and stabilized some of the negative effects on industries and large firms. Nevertheless, they supported consumption and oligopolist private sector markups, and did not increase productive capacity, output (partly due to the ongoing closures and reduced working hours), non-oil exports, or economic efficiency. As such, they resulted in a negative net effect on exports and the GDP as well as an unsustainably increasing fiscal deficit with depleted SWF resources.

This study also offers an important contribution to understanding the effects of the pandemic on the long-term economic sustainability of Gulf economies and Kuwait. The model simulations indicate that the resilience of the Kuwaiti economy has significantly weakened, primarily because the pandemic hit during a state of weakened economic resilience following the 2014 oil price declines. Meanwhile, the COVID-19 shocks (such as closures and expansion of large government relief) exacerbated existing rigidities and challenges, further harming economic resilience and threatening long-term economic sustainability. As the economy faced these novel pandemic-related shocks at a lower resilience level, the effects of the shocks were larger and more long lasting, further impeding progress towards Vision 2035 and long-term economic sustainability. These results suggest that, in the existing economic structure, policy regime, and foreseeable oil market dynamics, Kuwait will be unable to weather the effects of a future pandemic or the accelerated energy transitions.

Although alarming, this conclusion confirms that there is a critical window of opportunity to undertake both urgent reforms and energy transition projects, both of which can be strategically and incrementally implemented. While the results highlight the urgent need for structural and fiscal reforms, such reforms have been politically contentious and difficult in Kuwait. As such, during and after the pandemic, there is an opportunity to implement other targeted policy reforms that can reduce economic distortions and rigidities and achieve large economic efficiency and productivity gains, even in the current economic and fiscal structures. These reforms are necessary in key areas, particularly the private sector, industrial policy and regulation, public sector labor policy, energy efficiency, decarbonization, and human capital development. Thus, in time, these policies will help improve economic efficiency and productivity, even in the face of lower hydrocarbon export price and demand. This environment will, in turn, render the implementation of necessary fiscal (tax and subsidies) reform easier.

Another opportunity for necessary policy reform is energy diversification. Energy transition projects in Kuwait (and in other Gulf states) are extremely important for two reasons. First, expanding renewable and clean energy projects enables these states to reduce reliance on highly subsidized fossil fuels in the domestic market, thereby decreasing domestic emissions and fiscal costs as well as freeing up resources for use in profitable exportable applications. Second, energy transition projects can help restore economic sustainability by enabling Gulf states to adapt to the decline in conventional oil and gas demand, due to global climate change mitigation measures and the accelerating global energy transitions. Such adaptation can be achieved by transforming their hydrocarbon sectors into clean (low-carbon) energy sectors that produce low-carbon fossil fuels using carbon capture, utilization, and storage (CCUS) technology and other clean energy fuels, such as clean hydrogen and its derivatives. Such a transformation will not only provide new sources of much-needed export revenue, but it will also reduce the risk of hydrocarbon resources and infrastructure becoming potentially stranded. Nevertheless, energy transition projects require commitments from policymakers as well as fiscal reforms that redirect existing financial sources away from rigid public wages and other expenditures that limit productive capacity.

Overall, there are three important takeaways of this study. First, due to their welfare-based economic structure and consumption-based relief policies, Gulf states are incapable of being truly counter-cyclical. Second, COVID-relief policies in the Gulf states have largely constrained or exhausted their reserves. Third, there is a significant need to implement economic and regulatory reforms if these states are to survive future energy transitions and declines in oil export revenue.

Finally, these conclusions offer a strong reminder of the importance of implementing real economic reforms in increasing economic resilience and achieving long-term economic sustainability. Absent government reforms on fiscal, private sector, productivity, competition, and energy strategies, the current long-standing rigidities and economic over-dependence on hydrocarbons will continue to impede a sustainable economic recovery and harm economic and energy diversification. In the absence of a diversified export base, this effect, together with the pandemic-triggered erosion of fiscal cushions and savings, will jeopardize Kuwait’s ability (and possibly that of other GCC states) to survive future shocks of declining oil prices and demand following accelerated energy transitions or other global crises.

Declaration of competing interest

I hereby declare there is NO conflict of interest of which I am aware concerning the submission of this paper to Economic Modelling Journal.

I confirm this manuscript is an original manuscript that has not been submitted for publication to another journal.

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Appendix A. Representation of Broad Economic Structure and Data Sources

This appendix offers information on the construction of the SAM database for 2015, with which the WAFRAGE-KWT Model is calibrated in this study.

Primary data for the SAM were obtained from the Central Statistical Bureau (CSB, 2019), including:

- 2015 Input–Output table by commodity.
- 2015 Imports matrix by commodity.
- 2015 Supply–Use table.
- 2015 Producer's Matrix.
- National accounts for 2015.

Other satellite accounts were used for the SAM and model calibration, including:

- Trade and import information 2015 (CSB, 2015).
- Labor concentration information from the Public Authority for Civil Information (PACI).
- Firm capital level data from firm surveys from the CSB.
- Firm capital and concentration level from the Kuwait Stock Exchange (KSE).
- Energy information from Kuwait's Ministry of Electricity and Water.
- Trade and production data for the Rest of the World region (the second region in the model) from the Global Trade Analysis Project (GTAP) database.

The constructed SAM aggregates official CSB data from 57 economic sectors to 14, of which 6 are energy or energy-intensive industries. It also disaggregates factor rewards to seven primary factors: physical capital, skilled Kuwaiti labor, skilled non-Kuwaiti labor, unskilled Kuwaiti labor, unskilled non-Kuwaiti labor, arable land, and energy resources (petroleum in the ground). The factor shares and input–output coefficients from these 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. A top-down approach is used to aggregate the data to 14 economic sectors, which are then matched to those in the GTAP database for trade data with the rest of the world.

Due to data limitations, the SAM database cannot directly address the public-private contrast; however, it offers some representation of this contrast in the analysis. The database and the model represent the dominance of the public sector in the Kuwaiti economy through representing the energy sectors (petroleum, electricity, and water) as large and nominally independent corporations, acting as separate monopoly firms with their own factor demand and output. For publicly owned firms, the government is treated as the residual owner of additional rent payments (profits), after payments to fixed and variable capital and labor. In completing the SAM, direct tax components from workers and labor are identified. Fiscal rigidities are also included in the model through a full representation of government accounts and expanded consumption subsidies and taxes (both direct and indirect). Deriving the database's rows and columns associated with household and government incomes and expenditures rely on data from the balance of payments, transfers between government and households, direct taxes, and household savings. These data also enable the completion of the column entries for savings.

Finally, the pervasiveness of oligopolistic industries is explicitly represented in the model. There is no complete dataset available in the public domain on the structure and conduct of Kuwaiti energy and non-energy (especially services) industries. As such, constructing the SAM relies on various surveys, primarily the Stock Exchange and the CSB Annual Establishment Surveys, to gather data for individual sectors and industries, and to extrapolate the patterns of undocumented industries (as needed). Specifically, pre-tax capital payments are reduced by tax liabilities to arrive at after-tax corporate profits. Profits (after tax and depreciation) are subsequently allocated between retained earnings and dividends. In addition, these information sources are used to determine rough estimates of the number of "effective" (strategically interacting) firms in each industry and corresponding parameters governing competitive behavior. The determination of these parameters depends on firm concentration, as measured by revenue and market capitalization.

Appendix B. Summary of Kuwait's COVID-relief Package

This appendix summarizes Kuwait's COVID-relief package. A Higher Steering Committee for Economic Stimulus was formed on April 1, 2020, in order to implement the stimulus for the local economy through a set of measures approved in the cabinet resolution on March 31, 2020, and approved by the Council of Ministers on the same day. They included various monetary and liquidity measurements for citizens and industries such as:

- Expanding relief for citizens, including funding public sector salaries.\textsuperscript{13}
- Creating a mechanism for securing a minimum income that covers the cost of living for workers affected by the current crisis.
- Increasing the budget for ministries and government departments by KD 500 million for fiscal year 2020/2021.
- Reducing the Central Bank of Kuwait's discount rate to a historic low of 1.5%.
- The Kuwait Banking Association announced a moratorium period up to 6 months on bank loans, including waiving interest and charges (if any for postponement) for retail clients (citizens and expatriates) and small- and medium-sized enterprises (SMEs).
- Increasing the limit of financing from 90% to 100% and providing loans on concessional and long-term bases to SMEs through joint financing from local banks and the Kuwait National Fund for SMEs.
- Lowering various banking standards, such as the capital adequacy ratio from 13% to 10.5%, and the risk weight for SMEs from 75% to 25%.
- Establishing a temporary fund to receive financial contributions from locals, in support of the government's efforts related to the outbreak.
- Government exemptions from some fees and dues offered to affected economic entities and institutions in the manufacturing sectors and cooperative societies (if these exemptions are passed through to their clients).

\textsuperscript{13} Including the salaries of those registered under Chapter Five of Social Security in the affected sectors.
• Controlling inflation by maintaining stability in the price levels of food and medical commodities in local markets.

The Central Bank of Kuwait introduced COVID-19 relief packages in which they extended liquidity and regulatory flexibility until June 2021 (Arabian Business, 2021). Following the parliamentary elections in December 2020 and the creation of a new government in March 2021, Kuwait’s National Assembly extended the COVID-relief bill by approving laws that guaranteed bank loans for businesses affected by the pandemic (Hegagy, 2021).

Although Kuwait’s fiscal stimulus packages were initially considered smaller than some packages by its GCC neighboring states (MacDonald, 2020), the ensuing fiscal deficit was the largest for Kuwait since the Gulf War in 1990–1991. The fiscal effects have been so enormous that Kuwait expected the depletion of its fiscal stabilization of SWFs and was considering halting legally mandated contributions to the Future Generations Fund (one of its two SWFs) to ease the strain (Al-Zo’bi, 2020b). The government also aimed to extend the debt laws that could enable the country to tap into the international markets and cover its fiscal deficit (Hegagy, 2021).

Appendix C. Demand Elasticities and Model Closures

This appendix complements the brief description of the model in the main text of this study. It emphasizes important parts relevant to the overall analysis, primarily the final, intermediate, and government demand built into the model as well as government revenue and the real exchange rate.

C.1. Demand and Demand Elasticities

Table C.1 calculates the shares per industry, drawing on the SAM data.

Table C.1
Demand shares per industry in 2015.

| Industry/Percentage | Final | Government | Investment * | Intermediate | Export |
|---------------------|-------|------------|--------------|--------------|--------|
| 1. Agriculture      | 36.4  | 0.0        | 19.6         | 40.8         | 3.2    |
| 2. Mining           | 0.0   | 0.0        | –10.8        | 67.7         | 43.1   |
| 3. Grade oil        | 0.0   | 0.0        | 9.2          | 28.8         | 62.0   |
| 4. Gas and petro-services | 0.0 | 0.0 | 65.9 | 34.1 | 0.0 |
| 5. Oil refining     | 6.5   | 0.0        | 2.0          | 44.1         | 47.5   |
| 6. Chemical         | 2.0   | 0.0        | 1.6          | 55.6         | 40.9   |
| 7. Light manufacturing | 51.6 | 0.0 | –5.4 | 36.0 | 17.8 |
| 8. Heavy manufacturing | 3.2  | 0.0 | 45.8 | 45.0 | 6.1 |
| 9. Electricity      | 66.4  | 0.0        | 18.8         | 14.8         | 0.0    |
| 10. Other network services | 38.4 | 0.0 | 6.5 | 30.3 | 24.8 |
| 11. Construction    | 0.0   | 0.0        | 91.4         | 8.6          | 0.0    |
| 12. Transport       | 17.7  | 0.0        | 0.3          | 67.6         | 14.5   |
| 13. Financial services | 13.9 | 0.0 | –1.0 | 82.7 | 4.4 |
| 14. Other services  | 33.5  | 44.6       | 4.0          | 15.5         | 2.3    |

Source: Author’s WAFRAGE-KWT Model database (SAM) constructed for 2015.

* Investment demand combine investment and stock change accounts, which can have negative sums.

C.2. Model Closures

The closures critical to this study are as follows:

The labor market closures\[14\] 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, but are sectorally mobile. As such, expatriate employment of skilled and unskilled labor is endogenous in both the short- and long-run analyses, while Kuwaiti employment is

Notably, assuming rigidity in the national worker supply is important, but may constrain the model’s solutions.

Fiscal closures determine the elements of government revenue or expenditures that are held constant and the ones that adjust. Specifically, the adopted closure allows the government deficit and welfare payments to adjust, while government spending on goods and services is held constant. Meanwhile, government savings vary, driving the current account deficit. There are also 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 it 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. Thus, 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.\[15\] Meanwhile, payments to the KIA and withdrawals from it are endogenous.

\[14\] Labor 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-term flexibility of expatriate worker contracts, given that the stock of such workers can fall with a decline in labor demand in both the short and long runs. Notably, assuming that such rigidity in the Kuwaiti worker supply is important (although in reality, national workers’ mobility can be achieved through labor policy changes), it reflects actual labor market rigidities caused by the dynamics of the Kuwaitization and public sector employment policies (see Shehabi, 2018).

\[15\] The total stock of physical capital varies in the long run, while its home-owned share depends on corresponding long-term changes in domestic real income and the share of wealth abroad. The home-owned share of domestic capital is important because it affects the level of factor income outflow associated with profit repatriation.
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