

# **2 Macroeconomic and framework conditions and innovation performance in Kuwait**

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This chapter first discusses Kuwait's macroeconomic performance, and in particular, the benefits and long-term risks caused by Kuwait's exceptional resource endowment, the diversification challenge, and its labour market and social contract. The second section discusses Kuwait's framework conditions, especially those related to the business environment and entrepreneurship. The last section reviews Kuwait's aggregate innovation performance. It starts by examining input indicators: R&D expenditure across sectors, education input and outcomes, and the availability of human resources for innovation. It then reviews indicators of innovation output to highlight qualitative and quantitative characteristics of Kuwait's innovation system, in particular the quantity and quality of research outcomes, the number of patents, and the share of high R&D-intensive activities in its total exports.

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This chapter analyses Kuwait's macroeconomic environment and the framework conditions of its innovation system, as well as its research and innovation inputs and performance output as a backdrop to the assessment of the public research, business innovation and public governance systems that will be developed in the remainder of this review.

## 2.1. Macroeconomic environment

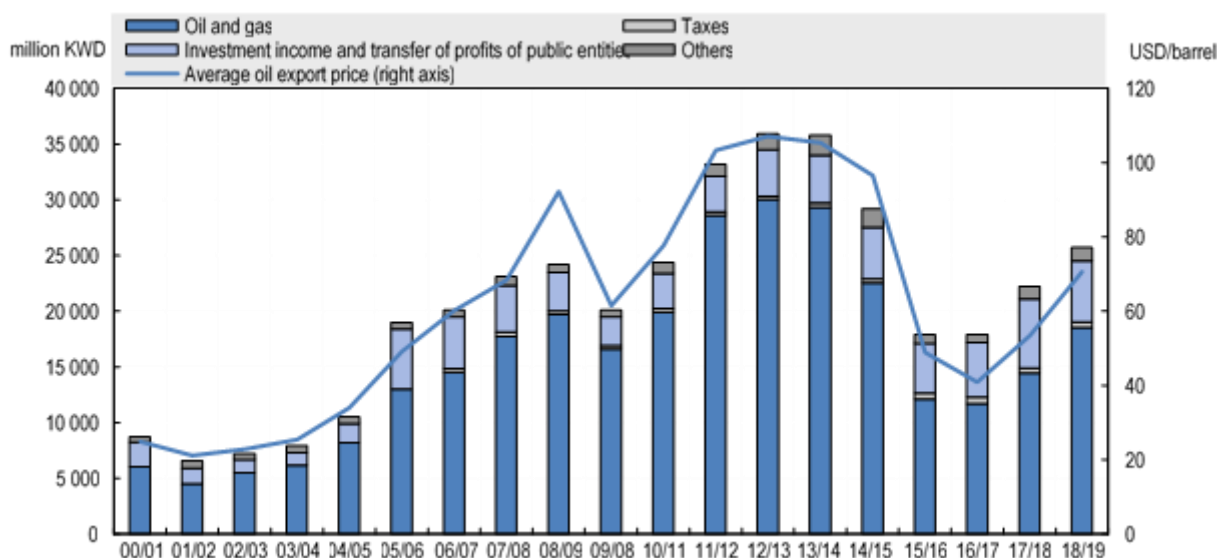
Macroeconomic conditions are critical for a country's innovation system, as a sound and stable macroeconomic environment is a precondition for research, development and innovation and facilitates knowledge diffusion throughout the economy. Innovation performance is, in turn, a key driver of competitiveness, long-term productivity growth and gross domestic product (GDP) per capita growth.

### 2.1.1. An exceptional resource endowment drives the economy, but bears long-term risks

For the past 80 years, Kuwait's high hydrocarbon endowment has provided the basis for its socio-economic development. Originally a merchant economy at the tip of the Arabian Gulf, since 1938 and the discovery of oil, Kuwait has seen its economic and social development become increasingly dependent on the extraction and exports of this commodity. Thanks to the oil rent, Kuwait has been able to ensure a high level of wealth and well-being for its population. This has also helped Kuwait recover relatively quickly from the Iraqi invasion in 1991 and continue its economic and demographic expansion.

With 101 500 million barrels in 2018, Kuwait holds 6.8% of the world's proven crude oil reserves and ranks fifth – far behind Saudi Arabia which holds 18% of the world's reserves, but ahead of the United Arab Emirates (OPEC, 2019). Kuwait's revenues from oil exports accounted for more than half of its GDP and 64% of government revenues in 2017/18 (Figure 2.1) (IMF, 2019). With a current production-to-reserves ratio of about 1% (i.e. at current production rates, proven reserves are expected to last for 100 years), Kuwait is likely to remain one of the world's leading oil producers in the decades to come (KISR, UNDP and GSSCPD, 2019).

Figure 2.1. Fiscal revenues, Kuwait, 2000-19

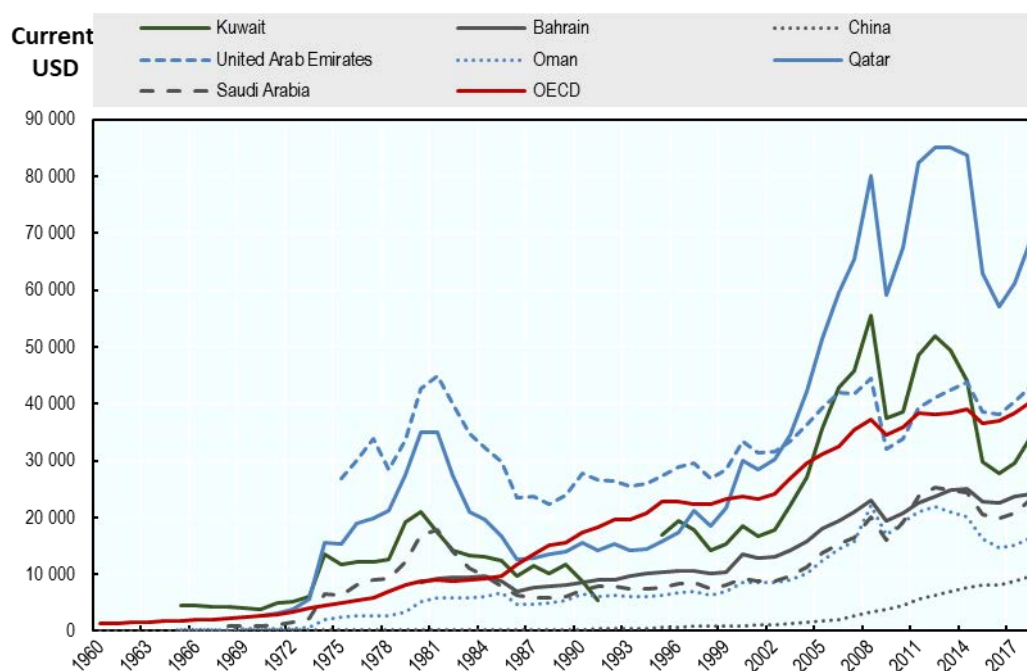


Source: OECD based on IMF *Invalid source specified.*, Kuwait's Article IV Consultation reports.

Like its Gulf Cooperation Council (GCC) neighbours, Kuwait has been able to uphold a social contract whereby regimes promise citizens prosperity, order and freedom to pursue a socially and economically satisfying life. Living standards have improved over time. The Human Development Index scores has improved, from 0.71 in 1990 to 0.81 in 2018 and Kuwait is ranked in the category of countries with “very high human development” (UNDP, 2019). However, it still ranks below all the other GCC countries, which together have a Human Development Index average of 0.85, and is well below the OECD average of 0.90. Other indicators have also improved: infant mortality has fallen steadily, from 15 per 1 000 live births in 1990 to less than 7 in 2018; expected years of schooling have increased by three years, from 10.6 years in 1990 to 13.6 in 2017; mean years of schooling for people aged 25 and older have increased, from 5.3 in 1990 to 7.2 in 2018; and life expectancy at birth rose by almost three years between 1990 and 2017, from 72.1 to 74.8 (UNDP, 2018b). However, Kuwait performs below most other GCC countries on all of these indicators.

Kuwait has one of the highest levels of GDP per capita in purchasing power parity in the world, with almost USD 74 000 per capita in 2018 according to World Bank data. However, while its nominal GDP per capita was three times higher that of the OECD in the early 1970s, it now stands at 0.85 of OECD nominal GDP per capita (Figure 2.2).

**Figure 2.2. GDP per capita, Kuwait, 1960-2018**



Source: World Bank Data Bank, World Development Indicators, <https://databank.worldbank.org>.

The unemployment rate in Kuwait is low, at 2.2% of the labour force in 2015. Although it has increased slightly in the past decade or so (from 3.9% in 2003 to 4.7% in 2015), the unemployment rate of Kuwaiti nationals has consistently been below 5% of the labour force (KCSB, 2015). However, this low rate of unemployment hides large differences between age groups, with young people being much more likely to be unemployed than older people. In 2015, 22.1% of Kuwaiti nationals aged 15-24 were unemployed, with women being the most affected (31.5% of Kuwaiti women aged 15-24 were unemployed in 2015) (KCSB, 2015).

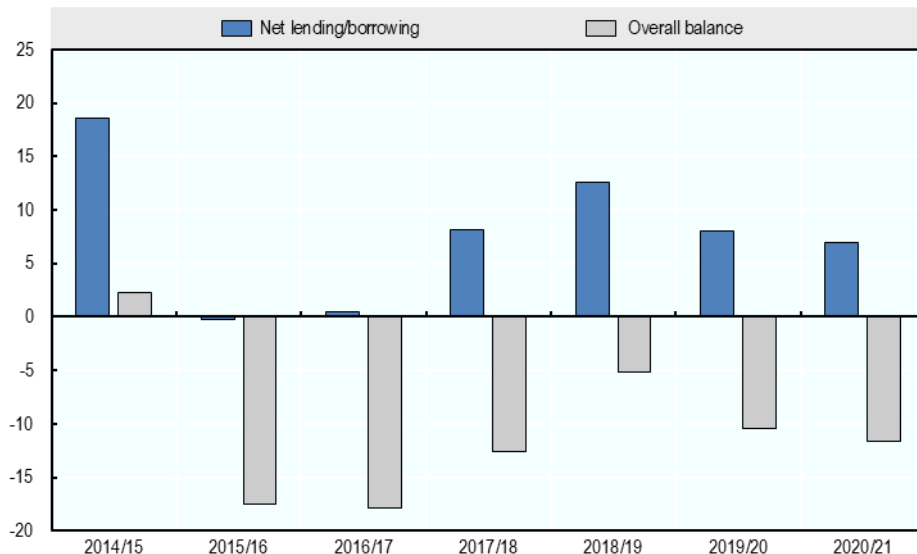
Furthermore, inflation is low (1.5% in October 2019) and the national currency is stable. The budget balance has generally been in surplus since the early 1980s, with only a few exceptions (e.g. in the aftermath of the first Gulf war and following slumps in oil prices in 2014-16) (IMF, 2018). Kuwait has invested the surplus from oil revenues in its sovereign wealth fund established in 1953, the Kuwait Investment Authority (KIA). In 2017, the KIA had around USD 530 billion of assets under management, making it the world's fourth largest sovereign wealth fund, behind Norway's Government Pension Fund Global, the China Investment Corporation and the Abu Dhabi Investment Authority (SWFI, 2019).

However, strong dependence on a single export commodity which drives most of government revenues can also create economic vulnerability due to exposure to price shocks. Furthermore, other factors such as slowing global demand amid global concerns about carbon emissions and the development of renewable energy and sustainable mobility are likely to cause a stagnating, or even decreasing, demand for oil.

Oil price volatility and the persistence of oil price shocks create a high degree of uncertainty in government revenues and have produced large (and sustained) swings in fiscal balances: spending levels have generally followed the movements of oil prices, but not necessarily with the same magnitude (Beidas-Strom, Rasmussen and Robinson, 2011). This also exacerbates volatility in the whole economy, as a decline in fiscal revenues due to falling oil prices often requires cuts in public spending, which may then affect employment in the public sector, as well as growth in the non-oil sector (IMF, 2016). For example, the fall in oil prices led to an overall public deficit of about 18% of GDP (after transfers to the Future Generations Fund and excluding investment income) in the fiscal years 2015/16 and 2016/17 after 16 straight years of surpluses, leading the government to start borrowing to preserve liquid buffers (IMF, 2018). In spite of the rebound of oil prices in 2018/19, this deficit situation is expected to persist, according to the Ministry of Finance's projections (Figure 2.3).

**Figure 2.3. Kuwait's fiscal balance, 2014-20**

% of GDP



Note: The overall balance is the fiscal balance after transfers to the Future Generations Fund and excluding investment income.

Source: IMF (2019), *Kuwait: Staff Report for the 2019 Article IV Consultation*, <https://www.imf.org/~media/Files/Publications/CR/2019/1KWTEA2019001.ashx>.

The wealth in natural resources in Kuwait has also led to a situation of a so-called “resource curse” – a paradoxical situation whereby a country with an abundance of natural resources tends to have less economic growth than countries with fewer natural resources. One particular phenomenon of the resource curse can be Dutch disease (Box 2.1), which leads to the appreciation of the domestic currency and a loss of competitiveness in the non-resource sectors. The KIA invests part of the surplus from oil revenues in various assets – in foreign countries – to ensure stable revenues for future generations, while avoiding asset price inflation in Kuwait.

### Box 2.1. Dutch disease: Definition

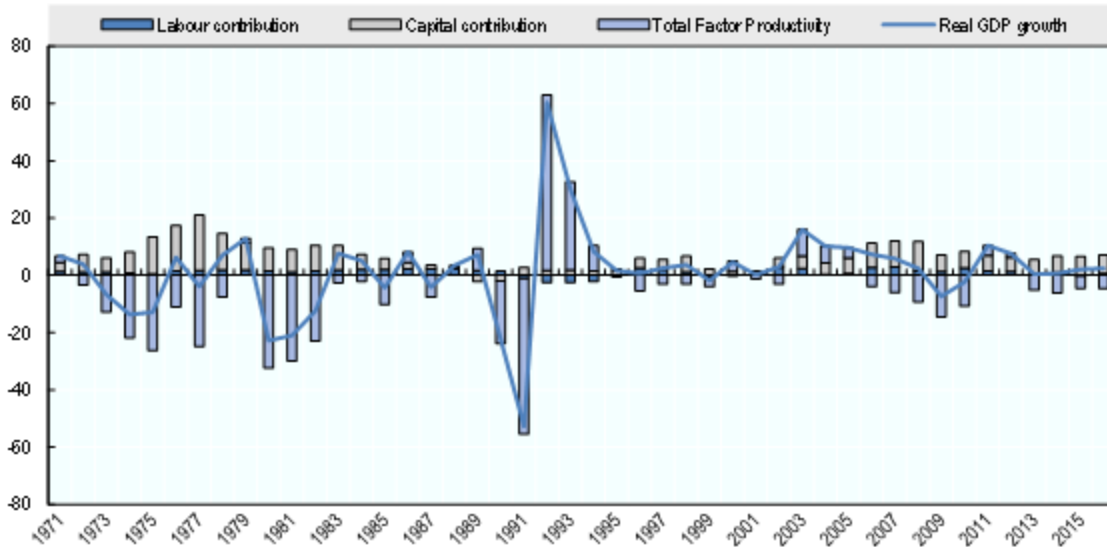
The Dutch disease theory describes how the increase in a country’s revenues from one specific sector (natural resources, for example) can cause an appreciation of the national currency, resulting in the nation’s other exports becoming less competitive.

The term was first mentioned in *The Economist* in 1977 to describe the decline in the manufacturing sector in the Netherlands following the discovery of the Groningen natural gas field in 1959 (2.8 trillion cubic metres of natural gas). Gas exports had led to large inflows of foreign currency, thereby increasing demand for the national currency (the guilder) and making it stronger, hitting the competitiveness of Dutch manufacturing and services (*The Economist*, 1977).

Nevertheless, Kuwait has not managed to escape the “resource curse” and has experienced a drastic fall in productivity over the past half century. While its GDP per worker exceeded five times that of the United States in the 1970s, they were at a par in 2010 (Cherif and Hasanov, 2014a). Furthermore, real GDP growth in Kuwait has been driven by rapid factor accumulation, especially by capital which has been growing faster than GDP itself. As a result, total factor productivity<sup>1</sup> (TFP) has strongly contracted (Figure 2.4). Growth in TFP is measured as a residual of the production function, i.e. the part of GDP growth that cannot be explained by growth in capital and labour inputs, and is thus generally considered as indicative of innovation and technological progress. TFP growth is therefore key to drive long-term economic growth. Worryingly, while TFP has dropped in all other GCC countries, Kuwait is the country for which TFP growth has dropped the most since 1970 (Figure 2.5).

**Figure 2.4. Decomposition of real GDP growth, Kuwait, 1971-2015**

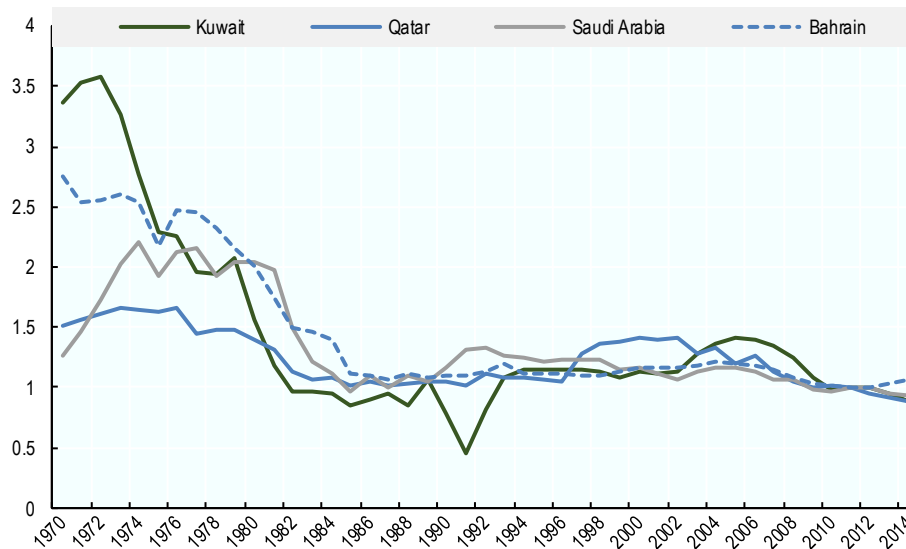
Annual percentage point contribution to real GDP growth



Source: The Conference Board (n.d.), *Total Economy Database™*, <https://www.conference-board.org/data/economydatabase/index.cfm?id=27762>.

**Figure 2.5. Evolution of total factor productivity in Kuwait and other Gulf Cooperation Council countries, 1970-2014**

Total factor productivity at constant national prices, index 2011=1

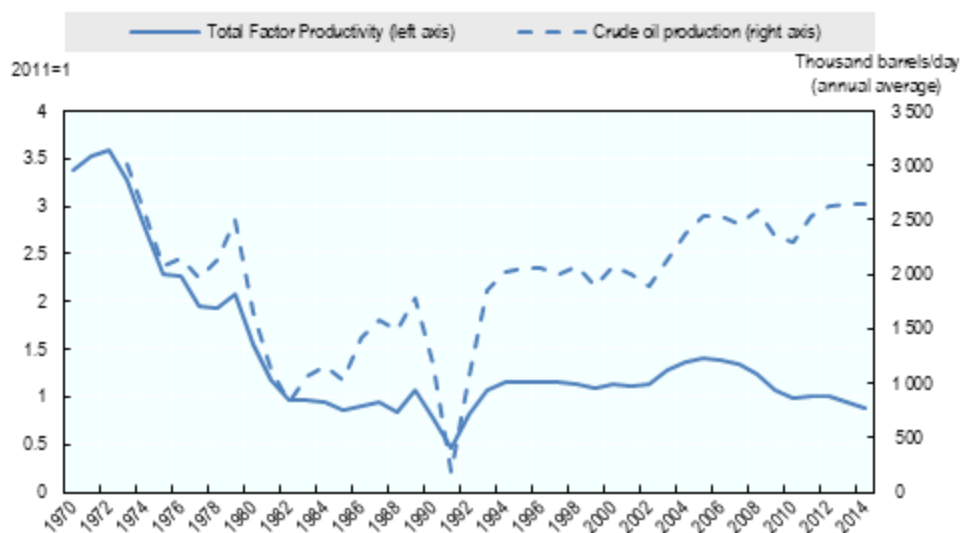


Source: University of Groningen and University of California, Davis, retrieved from FRED, Federal Reserve Bank of St. Louis.

However, in a resource-driven economy such as Kuwait, this figure has to be interpreted with caution. Initially, the productivity curve closely follows the oil production, but starting from the 1980s, the TFP does not fully reflect increases in oil production (Figure 2.6). This is symptomatic of large increases in labour

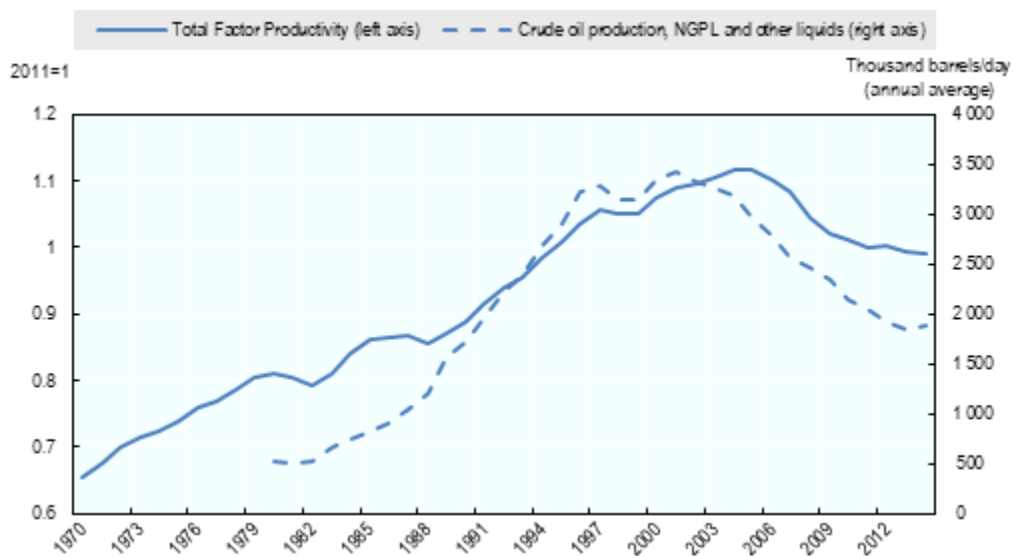
and capital, which have not driven GDP growth productively. In order to increase the TFP, Kuwait would need to reinvest capital and transfer labour into high value-added activities, typically knowledge-intensive industries. In the case of Norway, the TFP is also strongly correlated to hydrocarbon production. However, the TFP curve managed to hold in a falling production environment, as shown in Figure 2.7.

**Figure 2.6. Evolution of total factor productivity and oil production in Kuwait, 1970-2014**



Source: University of Groningen and University of California, Davis, retrieved from FRED, Federal Reserve Bank of St. Louis.

**Figure 2.7. Evolution of total factor productivity and oil production in Norway, 1970-2012**



Source: University of Groningen and University of California, Davis, retrieved from FRED, Federal Reserve Bank of St. Louis.

### 2.1.2. The diversification challenge

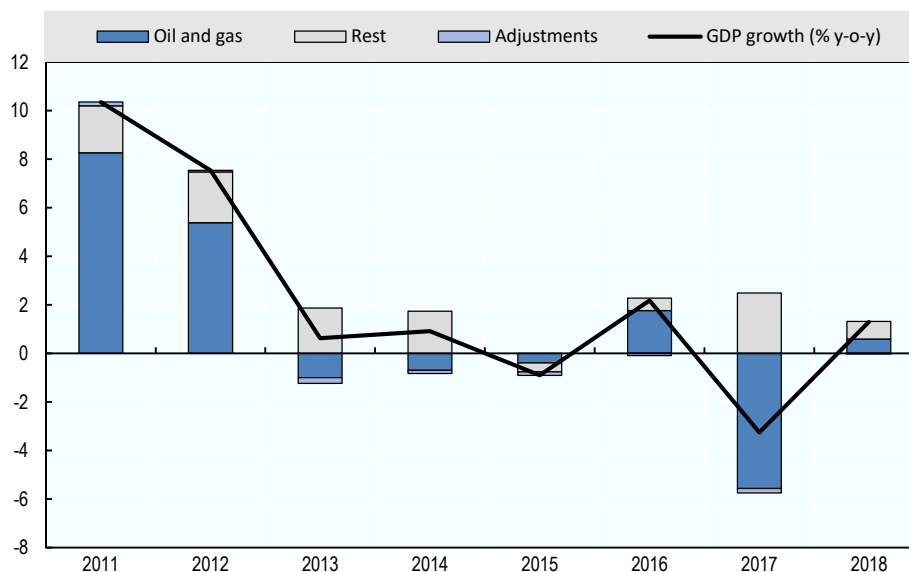
A sustainable economy enhances a nation's standards of living by creating wealth and jobs, encouraging the development of new knowledge and technology, and helping to ensure a stable political climate. Having a diverse economy, i.e. one based on a wide range of profitable sectors rather than only a few, has long been thought to play a key role in fostering sustainable economic growth. Most importantly, diversified economies perform better over the long term.

Diversification is needed to hedge against market risk and mitigate the exposure of Kuwait's economy to oil price fluctuation. Diversification can also provide productive jobs for the Kuwaiti population, especially since the oil-producing sector is structurally capital-intensive, not labour-intensive, and cannot provide enough productive jobs for all Kuwaitis. Not only is diversification needed to mitigate the effects of oil price variations, it is also essential to prepare for when oil export revenues will not be able to sustain future generations' standard of living.

Decomposition of GDP growth in the past few years shows that GDP growth in Kuwait has strongly been driven by variations in the output of the oil sector (Figure 2.8). This is especially an issue as the oil sector accounts for about half of total GDP. The challenge is therefore to expand non-oil sectors that can provide a sustainable source of growth and employment.

**Figure 2.8. Contribution of oil and non-oil sectors to GDP growth in Kuwait, 2011-18**

Annual percentage point contribution to real GDP growth



Notes: GDP in constant prices. The contribution of one sector to GDP growth is measured as the growth in this sector's output multiplied by the share of this sector in total GDP.

Source: OECD calculations based on Kuwait Central Statistical Bureau.

The issue has been raised for a long time in Kuwait. In 2010, the Kuwait Vision 2035 (General Secretariat of the Supreme Council for Planning and Development, n.d.) was formulated with the aim to:

*(...) transform Kuwait into a financial and trade hub, attractive to investors, where the private sector leads the economy, creating competition and promoting production efficiency, under the umbrella of enabling government institutions, which accentuates values, safeguards social identity, and achieves human resource development as well as balanced development, providing adequate infrastructure, advanced legislation and inspiring business environment.*



However, little impact of this diversification policy has so far been observed. The share of oil and gas has decreased slightly in the past few years, from 49% of GDP (before adjustments) in 2010 to 47% in 2018. However, the priority sectors identified in the Kuwait Vision 2035 – financial intermediation and insurance and wholesale and retail trade – grew at an average annual rate of 0.6% and 0.4% respectively between 2010 and 2018, and their share in total GDP decreased. The share of financial intermediation and insurance in total GDP fell from 9.3% in 2010 to 8.2% in 2018, while the share of retail and wholesale trade decreased from 4.0% in 2010 to 3.5% in 2018 (Table 2.1).

The non-oil sector grew by about 2.7% annually between 2010 and 2018 and its share in the total GDP (before adjustments) rose slightly, from 50.8% in 2010 to 52.6% in 2018. The largest non-oil sector is the public administration and defence sector, which represents 10.9% of the total GDP (and 18.2% of the non-oil economy) and grew by about 5.6% per year. However, as government revenues are in majority driven by oil, this sector also depends heavily on oil and oil prices.

The non-oil manufacturing sector has also grown strongly, by about 4.0% per year between 2010 and 2018, but accounts for only 6.9% of total GDP. Other fast-growing sectors include electricity, gas and water (9.2% per year), and health and social work (5.0%).

**Table 2.1. Breakdown of real GDP by economic activity, Kuwait, 2010-18**

In constant prices

Economic activity	2010		2018		2010-18
	Million KWD	%	Million KWD	%	CAGR
<b>Oil and oil product sectors</b>	<b>18 483.9</b>	<b>49.2<sup>1</sup></b>	<b>21 253.7</b>	<b>47.4<sup>1</sup></b>	<b>1.8</b>
<b>Non-oil sectors</b>	<b>19 079.9</b>	<b>50.8<sup>1</sup></b>	<b>23 586.4</b>	<b>52.6<sup>1</sup></b>	<b>2.7</b>
Agriculture and fishing	149.4	0.5	178.6	0.5	2.3
Extraction of crude oil petroleum and natural gas and service activities incidental to oil and gas	18 483.9	55.9	21 253.7	54.1	1.8
Manufacturing	1 977.4	6.0	2 718.8	6.9	4.0
Electricity, gas and water	662.3	2.0	1 337.2	3.4	9.2
Construction	730.3	2.2	838.9	2.1	1.7
Wholesale and retail trade	1 338.2	4.0	1 378.4	3.5	0.4
Hotel and restaurant	272.4	0.8	317.3	0.8	1.9
Transport	1 152.5	3.5	1 094.0	2.8	-0.6
Telecommunications	1 229.8	3.7	1 305.5	3.3	0.7
Financial intermediation	3 092.2	9.3	3 230.9	8.2	0.6
Other services	3 253.2	9.8	3 682.2	9.4	1.6
Public administration and defence	2 780.3	8.4	4 285.8	10.9	5.6
Education	1 329.4	4.0	1 733.3	4.4	3.4
Health and social work	764.1	2.3	1 127.1	2.9	5.0
Household with employed persons	348.6	1.1	358.4	0.9	0.3
<b>Sub-total</b>	<b>37 563.9</b>		<b>44 840.1</b>		<b>2.2</b>
Adjustments: FISIM, taxes, subsidies	-4 484.7	-13.6	-5 577.2	-14.2	2.8
<b>Gross domestic product at market value</b>	<b>33 079.2</b>	<b>100</b>	<b>39 262.8</b>	<b>100</b>	<b>2.2</b>

1. The oil and non-oil sectors' shares are the shares of the GDP sub-total (i.e. before adjustments of FISIM, taxes and subsidies).

Note: CAGR: compound annual growth rate; FISIM: financial intermediation services indirectly measured.

Source: OECD calculations based on Kuwait Central Statistical Bureau.

Sustainable growth is importantly driven by export diversification and sophistication of countries (Cherif and Hasanov, 2014<sub>b</sub>). Kuwait's goods exports reveal limited diversification. According to the revealed comparative advantage (RCA), which measures a product's share in a country's export in relation to its share in world trade,<sup>2</sup> fuels is the only sector where Kuwait has a comparative advantage, while the other

sectors experienced very limited or no competitiveness improvement in the period 2010-17. The RCA in fuels rose from 6 to almost 8, while the RCA in chemicals (the second highest) increased from 0.43 to 0.53 during the period and the RCA in plastic and rubber slightly decreased, from 0.41 to 0.38 between 2010 and 2017 (Table 2.2).

**Table 2.2. Top five sectors ranked by revealed comparative advantage in Kuwait, 2010 and 2017**

No.	Sector	2010	2017
1	Fuels	5.98	7.89
2	Chemicals	0.43	0.53
3	Plastic or rubber	0.41	0.38
4	Metals	0.07	0.07
5	Stone and glass	0.15	0.06

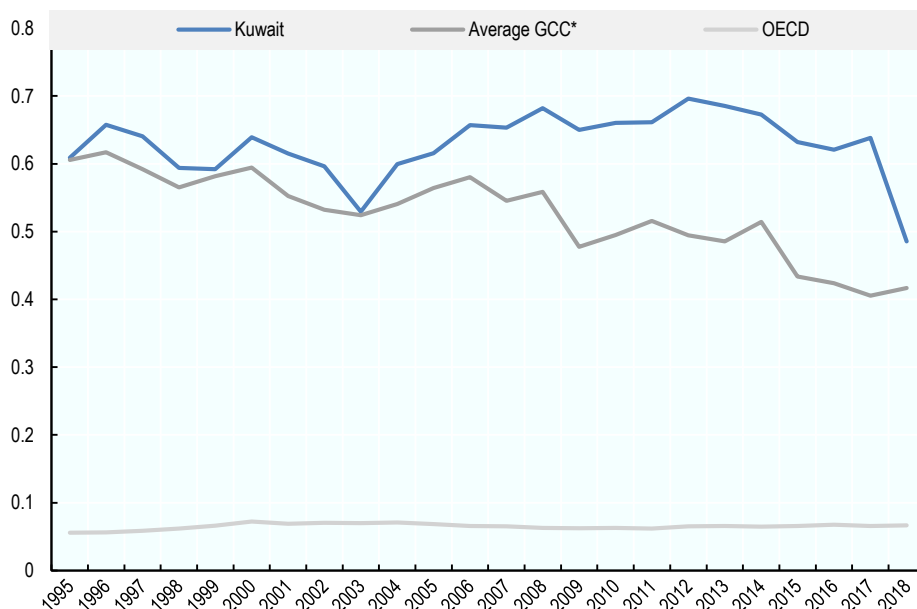
Source: *World Integrated Trade Solutions (WITS) database*, <https://wits.worldbank.org>.

According to UNCTAD data, Kuwait's exports in services grew strongly in the years leading to 2008, soaring by 77% in 2006 and 20% in 2007 (in current prices), with ICT services – a sector critical for innovation due to its high knowledge content – accounting for about half of all services exports. However, exports in services suffered a sharp drop between 2009 and 2017, decreasing by 55% over the period.<sup>3</sup>

Another indicator of diversification is the level of export concentration. The more exports are concentrated on a few products, the less diversified an economy is. According to UNCTAD's concentration index,<sup>4</sup> Kuwaiti exports had remained as concentrated on oil as they were two decades ago, with an export concentration level of between 0.59 and 0.70 until 2018, when the index dropped to 0.49 from the previous years' level of 0.64. Other GCC countries have been able to diversify away from oil more than Kuwait. For example, Oman's export concentration index fell from 0.75 in 1995 to 0.45 in 2018, Saudi Arabia's concentration decreased from 0.69 to 0.56 in the same period, and the United Arab Emirates' dropped from 0.57 to 0.23 (Figure 2.9), as these countries' exports diversified into downstream oil chemicals, plastics, as well as metals and metal products.

**Figure 2.9. Export concentration index, Kuwait, 1995-2018**

Export concentration as measured by the Herfindahl-Hirschmann Index



Note: The Herfindahl-Hirschmann Index (HHI) is normalised to 1 for an economy which would export one single commodity. A diversified economy has a value of HHI that tends towards zero. Average GCC is the unweighted average of the indexes for Bahrain, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Source: UNCTAD (2019), Beyond 20/20 WDS - Documentation.

Kuwait is not the only resource-rich country having trouble diversifying its economy. International experience has shown that diversifying away from oil is often very difficult, with only a few successful examples (Callen et al., 2014). Dubai is one example of successful diversification and has diversified its economy into logistics, transportation, tourism and real estate thanks notably to its business-friendly and favourable regulatory environment and its modern infrastructure (Callen et al., 2014).

These successful experiences of diversification, and in particular those of Indonesia, Malaysia and Mexico, suggest that it requires several decades of preparatory work to develop a non-oil tradable sector (typically 20-30 years to achieve high export sophistication). In the case of Malaysia, for example, an export-oriented strategy started in the early 1970s and encountered rapid growth in export sophistication in the 1980s-1990s (Callen et al., 2014). Successful diversification has also been achieved through a policy mix of promoting vertical diversification in oil and gas and petrochemicals, as well as horizontal diversification in other sectors, through an emphasis on technological upgrade and competition in international markets (Cherif and Hasanov, 2014). In the case of Kuwait, achieving horizontal diversification through an export orientation of the non-oil economy is even more important given that the relatively small size of the domestic market might not be able to generate sufficient demand by itself to drive the development of the non-oil private sector (Alsharif, Bhattacharyya and Intartaglia, 2017).

Furthermore, diversification requires strong political will. Kuwait might be tempted to continue relying on oil primarily and launch diversification policies in reaction to shocks and consider the necessity of economic reform and structural adjustment only when oil prices are down and the government faces budgetary pressure. This is also why, in general, economic diversification truly starts when oil reserves and/or revenues start to diminish (Callen et al., 2014). In Kuwait, this will not happen through reserves depletion since reserves are sufficient for another 100 years of production at current levels. However, diversification

might well be driven by the demand side, since the gradual global transition away from fossil fuels will affect world demand for oil and foster economic diversification.

### **2.1.3. Kuwait's labour market and the social contract**

Oil dependence and the structure of the labour market in Kuwait are closely intertwined, as a large share of jobs is provided by the government and is financed through oil revenue. Kuwait's large oil endowment, combined with the relatively small proportion of Kuwaiti citizens in the total population (about one-third of the total population in 2015, according to data from the Kuwait Central Statistical Bureau [KCSB]) has led Kuwait to be in a position of very strong rentierism. This is also what constitutes the basis for the social contract between the “rulers” and the “ruled”, as seen also in other GCC countries (Hertog, 2013), whereby rulers provide citizens with oil revenues mainly through highly paid jobs in the public sector (government, administration and state-owned enterprises), scholarships, subsidies for energy, utilities and basic needs, and more generally high living standards, while citizens offer loyalty and support to the regime in exchange.

This rentierism has resulted in a dual job market, one for Kuwaiti citizens and another for foreigners, with Kuwaiti citizens mostly working in the public sector (92.0% of Kuwaitis worked for the government or government-owned establishments in 2015) and foreigners in the private sector (74.8% of foreigners worked for the private sector and 17.0% for the household sector in 2015). In 2018, 75% of employees in the government sector were Kuwaitis and 25% non-Kuwaitis, according to KCSB's statistics of the government sector. Of these non-Kuwaiti government employees, 47% work in the Ministry of Public Health and 38% in the Ministry of Education.

Government jobs for nationals are subject to very little competition and can be considered largely as a redistribution of the oil rent. Private sector companies, on the other hand, mostly hire expatriates and wages are much lower and aligned to be attractive enough for workers from the low-wage countries it seeks to attract (mostly Asian and Arab countries). Jobs in the private sector are subject to performance requirements and competition and are typically unattractive to Kuwaiti nationals, especially as the public sector jobs set a “reservation wage” below which Kuwaiti citizens would rarely work (Herb, 2009). The government offers a specific stipend, called “workforce support” (*daam amala* in Arabic) to Kuwaiti nationals who accept to work in the private sector, in order to compensate for the wage gap between the two markets. However, as long as they have the possibility to do so, most Kuwaitis prefer to work in the public sector, especially as they think working conditions in the public sector are much better than in the private sector (Salih, 2010).

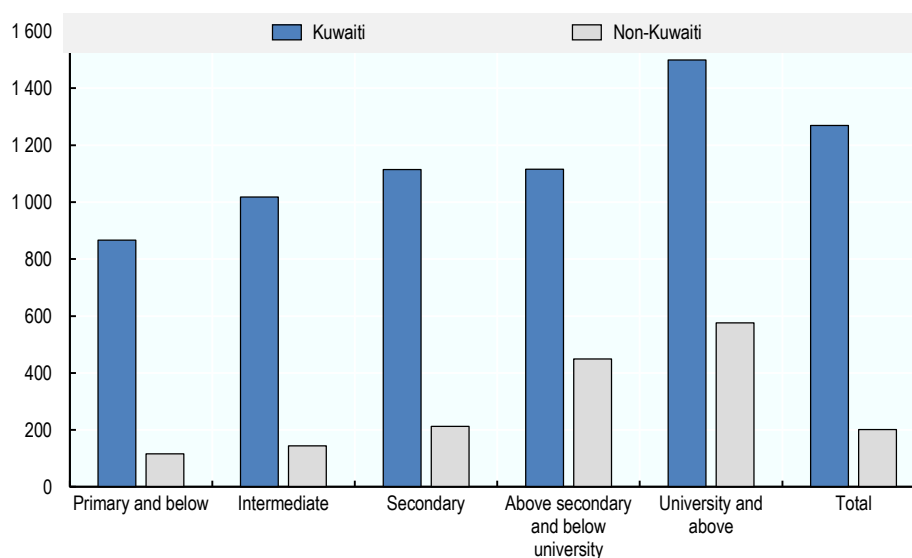
The duality of the labour market does not come only from the supply side (workers), it also comes from the demand side (employers). Companies in the private sector tend to rely on a cheaper and easier-to-adjust expatriate workforce, rather than nationals with a higher reservation wage and stronger social protection expectations. It is also much easier for private companies to hire trained expatriates and dismiss them when other skills are needed. “Kuwaitisation” has thus sought to replace expatriates with nationals in certain categories of jobs. In the private sector, this is mainly achieved through quotas of Kuwaiti workers (depending on the economic activity of the company), with penalty fees for not complying. In government-related enterprises and systems, the approach is to give priority to Kuwaitis for the jobs available. Conversely, expatriates are also offered public sector employment in areas where domestic labour supply is insufficient – typically high-skilled occupations in education and health services.

The job market duality is also illustrated by the difference in monthly wages, with the median monthly earnings (including basic salary and various allowances) nine times higher for Kuwaitis than for non-Kuwaitis (KWD 1 113 vs. KWD 120 per month). The wage gap decreases when the level of education increases, but is still 2.8 times more for workers with a university education. A Kuwaiti with a university or more education level earns KWD 1 350, while a non-Kuwaiti earns an average of KWD 490, 1.7 times less than what an uneducated Kuwaiti is earning (Figure 2.10). Within the government sector, this gap is somewhat reduced, but Kuwaitis still make more than twice the earnings of non-Kuwaitis.

These wage gaps deter entrepreneurship and innovation, as it would make no economic sense for a Kuwaiti national to create a company, forego lucrative employment in the public sector and subsist only on a small stipend until the company can generate revenue and sustain the entrepreneur. Furthermore, the National Fund can provide a loan to an entrepreneur only if the entrepreneur does not plan on bringing a non-Kuwaiti on board. For non-Kuwaitis, incentives to start a new company are even more off-putting: non-Kuwaitis need to partner with a Kuwaiti to be able to register a company and have an equity stake limit of 49%.

**Figure 2.10. Median monthly wages, Kuwaiti and non-Kuwaiti, by education level, 2015**

In KWD



Source: KCSB, Labour Force Survey.

The duality of the Kuwaiti labour market has also been reinforced by the social contract between the government and the citizens. Kuwait has developed a unique model of democracy with free elections for parliament. It is a hybrid system divided between a government appointment by the Amir and a national elected assembly with near universal adult suffrage for citizens. The Kuwaiti parliament is the strongest among GCC countries and one of the strongest in the Arab world and it plays a critical role in Kuwait's policy making: it has the power to interpellate government members and to have votes of no-confidence in individual ministers (Herb, 2009). With few citizens employed in the private sector and almost no taxes from private businesses financing public services, interests of Kuwaiti citizens and the private sector have been diverging, leading parliament to pursue populist public employment and subsidy policies, while undermining attempts to support diversification driven by the private sector (Hertog, 2013).

The Kuwaiti government has been able until now to direct its budgets towards the creation of public sector jobs for its citizens. However, with 32% of its population under 25 years old (United Nations, 2019), it will become increasingly difficult to create enough public sector jobs for all the workers entering the labour market without creating a high, potentially unbearable, fiscal cost. As already seen above, in 2015, the unemployment rate was 4.7% for Kuwaiti nationals and 1.8% for non-Kuwaitis according to the KCSB Labour Force Survey. Increasing private sector job creation for nationals is therefore all the more necessary.

Various measures have been implemented to decrease the labour market divide, in particular addressing the wage distortions and reducing the wage gap, but the labour market in Kuwait remains divided. Privatisation can also drive the reduction in the labour market divide and has become one of the priorities of the government as described in the New Kuwait Plan. But more needs to be done, especially on the education and skills front in order to increase the employability of Kuwaiti nationals, especially as Kuwait performs poorly in terms of education outcomes (see Section 2.3).

## 2.2. Framework conditions in Kuwait

### 2.2.1. The role of framework conditions

The 2010 Innovation Strategy (OECD, 2010b) stressed the importance of sound framework conditions to foster innovation. The importance of these framework conditions has increased in recent years, especially as businesses and capital have become more mobile and seek the most favourable operating environments internationally. The OECD Innovation Imperative (OECD, 2015b) has identified several new issues relevant for framework conditions which need to be tackled to create a good basis for the innovation ecosystem.

The framework conditions for innovation include:

- Sound macroeconomic conditions: in particular, fiscal and monetary stability and low and stable inflation help reduce uncertainty and enhance the efficiency of resource allocation.
- Open and competitive markets: elimination of anti-competitive product market regulations as well as proactive competition policies in line with international best practices are powerful ways to stimulate investment in innovation. Indeed, if markets are insufficiently competitive, companies will enjoy rent situations in domestic markets, which are not conducive to innovation and competitiveness in international markets.
- Sound regulatory framework: to facilitate the generation of new technologies and foster their rapid diffusion.
- Innovation-friendly tax systems which create the right incentives for innovation: tax policies related to investment in knowledge-based assets, in particular, have important impacts on the decision of firms to invest in innovative activity.
- Openness to international trade and integration into international value chains: greater openness can lead to increased knowledge diffusion and absorption via various channels, including imports of goods and services, investment flows, mobility of workers, and collaborative research and innovation. Furthermore, the growing importance of global value chains and their implications for framework conditions that affect innovation, notably concerning trade, investment and regulatory policies, underscores the importance of openness.
- Well-developed financial markets and easy access to finance for new and innovative small firms: econometric analysis suggests that the scale of financial development, stock market capitalisation and the share of corporate profits in GDP have significant positive effects on R&D expenditure (Jaumotte and Pain, 2005). Innovation activity also requires medium- to long-term investment and planning in order to decide on the relatively long innovation cycle from product inception to market launch and return on investment. A stable financial system is therefore crucial to ensure investment in innovation. Furthermore, bank credit is typically not well-suited for financing innovation, and equity instruments, such as venture capital, are needed, especially for young, technology-based firms with high growth potential.
- Favourable business environment conditions, with, in particular, high ease of starting and doing business.

- Right skills and culture: an appropriate education system is crucial to provide the adequate skills which enable the workforce to be innovative. Importantly, innovation requires enhancing human capital, by encouraging both technological prowess and a culture of experimenting and risk-taking in order to create new business models using technology.
- Framework conditions to benefit from investment in knowledge-based capital: in several OECD countries, investment in knowledge-based capital – software; data; intellectual property; and economic competencies such as brand equity, new organisational methods and firm-specific skills – is now larger as a proportion of GDP than investment in tangible capital. A sound international framework for intellectual property rights, together with the effective enforcement of these rights, is key to foster innovation.

### **2.2.2. Room for improvement for innovation framework conditions in Kuwait**

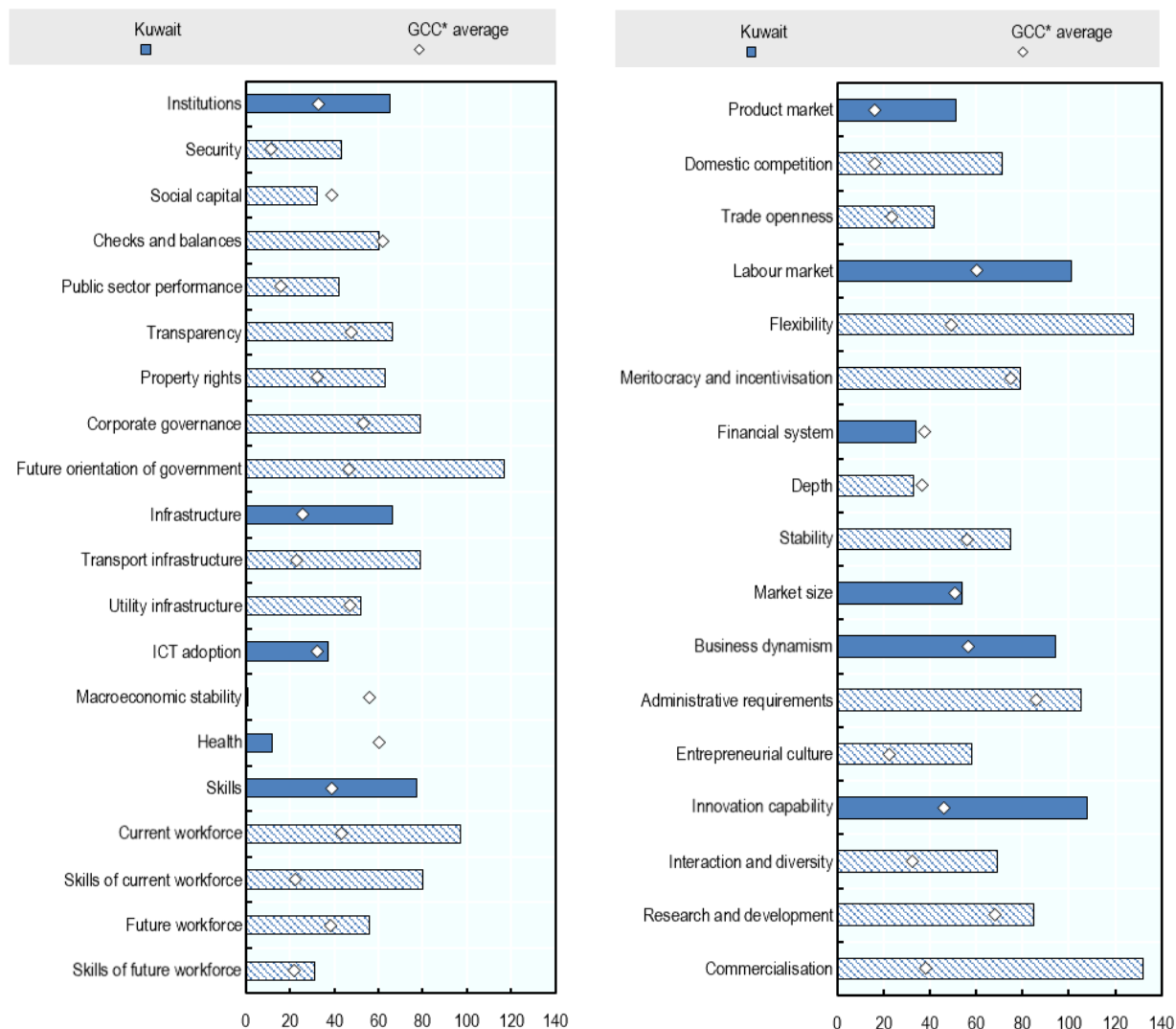
Business environment reform is seen as a top governmental priority. It is being overseen by the Permanent Committee for Streamlining Business Environment and Enhancing Competitiveness in the State of Kuwait, a platform that brings together the private sector, civil society and 15 governmental entities, co-ordinated by the Kuwait Development and Investment Promotion Agency (KDIPA).<sup>5</sup>

Kuwait has recently improved its position in global rankings of its innovation system and framework conditions, but there is still room for improvement. In its latest *Doing Business 2020 Report*, the World Bank ranks Kuwait 83<sup>rd</sup> out of 190 countries, a significant improvement from its rank of 97<sup>th</sup> the year before, but still below all other GCC countries (the United Arab Emirates ranks 16<sup>th</sup>, Bahrain 43<sup>rd</sup>, Saudi Arabia 62<sup>nd</sup>, Oman 68<sup>th</sup> and Qatar 77<sup>th</sup>). Most significant improvement is needed in starting a business (82<sup>nd</sup>), getting credit (119<sup>th</sup>) and trading across borders (162<sup>nd</sup>) (World Bank, 2019).

Small and medium-sized enterprises (SMEs) and new businesses are fundamental to any national innovation system, as they bring new ideas into the market and play a central role in creative destruction, knowledge spill over, and breakthrough and incremental innovation (OECD, 2010a). In Kuwait, the number of procedures and days to start a business are particularly high (5.5 and 19.5 respectively – a significant improvement compared with previous years, especially in terms of days to start a business, which was 35.5 only one year before, but still higher than 2.5 procedures and 4 days on average to start a business in the United Arab Emirates) (World Bank, 2019). In order to make the process of starting a business easier, Kuwait has recently implemented a number of reforms, in particular: it eliminated the paid-in minimum capital requirement (World Bank, 2018), merged procedures to obtain a commercial license and streamlined online company registration (World Bank, 2019).

Likewise, in the World Economic Forum's *Global Competitiveness Report 2019* (Schwab, 2019), Kuwait performs significantly below its GCC peers in almost all dimensions of the index except for 3 of the 12 pillars (macroeconomic stability for which Kuwait ranks 1<sup>st</sup>, and health and the financial system). The pillars for which Kuwait performs the less than the GCC average are: innovation capability, labour market, infrastructure and product market (Figure 2.11). The New Kuwait Plan has set ambitious objectives in that regard: from the 108<sup>th</sup> rank in 2020, Kuwait should reach the 49<sup>th</sup> position in 2035 in terms of innovation capabilities.<sup>6</sup>

**Figure 2.11. Kuwait's ranking in the World Economic Forum's Global 2019 Competitiveness Index compared to the average of other Gulf Cooperation Council (GCC) countries**



Notes: A lower score is better. The blue bars are the 12 pillars of the World Economic Forum's Global Competitiveness Index. The dashed bars are the sub-components of these pillars. GCC average is the unweighted average of the rankings of Bahrain, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Source: Schwab, K. (ed.) (2019), *The Global Competitiveness Report 2019*, [www3.weforum.org/docs/WEF\\_TheGlobalCompetitivenessReport2019.pdf](http://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf).

### 2.3. Innovation performance

The assessment of the innovation performance of a country takes into account a wide range of indicators, including input indicators such as research and development (R&D) expenditure, and educational and skills characteristics across the population, as well as output indicators such as scientific publications and patents.



### 2.3.1. Innovation inputs

The ability to mobilise resources for innovation differs markedly across countries. Innovation-intensive countries devote considerable financial resources to invest in R&D, skills for innovation, and science and technology.

#### *R&D expenditure and intensity*

The amount of money spent on research and experimental development (R&D expenditure) is of considerable interest to policy makers. In particular, such statistics are used to measure who conducts and who funds R&D and where it takes place, the level and purpose of such activities, and the interactions and collaborations between institutions and sectors. R&D comprises creative and systematic work undertaken in order to increase the stock of knowledge – including knowledge of humankind, culture and society – and to devise new applications of available knowledge (OECD, 2015a).

Intramural R&D expenditures are all current expenditures (including labour and other costs) plus gross fixed capital expenditures (such as for land, buildings, machinery and equipment) for R&D performed within a statistical unit during a specific reference period (OECD, 2015a). The main aggregate used to describe a country's R&D activities is gross expenditure on R&D (GERD), which covers all expenditures for R&D performed in the national territory during a specific reference period.

GERD is usually constructed by summing the intramural R&D expenditure totals for the following four main performing sectors: 1) business enterprise; 2) government (government laboratories and various types of research institutes with public missions); 3) higher education; and 4) private non-profit (OECD, 2015a).

Little comprehensive information is available on science, technology and innovation funding in Kuwait, and especially on research and experimental development expenditure. Information is fragmented and partial, due in part to the absence of a centralised or aggregated budget dedicated to science, technology and innovation (STI). According to the available evidence, there is no budget dedicated *ex ante* to STI activities in the different line ministries. Neither are there robust *ex post* consolidated expenditure statistics in line with international norms.

At the outset of this project, different sources estimated Kuwait's R&D intensity, i.e. total R&D expenditure divided by GDP, to lie between 0.1% and 0.5%, i.e. between KWD 34 million and 170 million (between USD 112 million and 560 million). In particular, the Kuwait Foundation for the Advancement of Sciences (KFAS) recently estimated that R&D intensity in 2017 was below 0.3%, with a breakdown of 0.19% funded by government, under 0.1% by the private sector and less than 0.01% by other sectors. However, these numbers for Kuwait are likely to not have taken all data into account, especially the expenditure in R&D performed and funded by businesses.

This study used primary data provided by Kuwaiti research actors, including firms involved in the dedicated innovation and R&D survey, in order to provide an estimate of overall R&D expenditures in Kuwait. However, this consolidation of data from various Kuwaiti sources should be taken with caution as it depends on hypotheses (including notably on the time spent by faculty members on research activities) and on the results of the first R&D survey in Kuwait. Providing a robust measure of GERD would necessitate a stronger endeavour to collect, process and publish data according to recognised international standards with regards to statistics on research and experimental development [R&D (OECD, 2015a)] and innovation (OECD/Eurostat, 2019).

In order to understand the innovation performance of the Kuwaiti business sector, a dedicated innovation and R&D survey was conducted in Kuwait: the first phase of the survey was conducted in 2018 and the second in 2019, where the sample was complemented by a set of younger enterprises which were not well represented in the sample used in the first phase. The survey was conducted by the KCSB, with strong support from KFAS and external help by the consulting company GOPA. This survey provides information

for a sample of businesses classified by Kuwait's Central Bureau of Statistics and for a sample of young enterprises (less than ten years old) made available by the company Cedar Rose. Valid responses were received from 2 326 businesses.

Among these companies, 21% reported some expenditure in R&D. The total spend in R&D by these companies amounts to KWD 16.4 million (i.e. USD 54.0 million). This number is likely to be an estimate of the minimum total business expenditure for R&D, especially as major economic players from the business sector, such as Kuwait Petroleum Corporation, did not take part in the survey. However, it is the best estimate that can be given at this stage, given some uncertainties around the quality of the data received and the statistical biases likely to be inherent to this survey. In particular, the results are not statistically representative of the overall population of enterprises in Kuwait, as it is likely that the enterprises which responded to the survey are more prompt to innovate than the ones which did not, thereby creating a self-selection bias. Furthermore, a tentative extrapolation to the whole economy, which is methodologically questionable due to the issues mentioned above, would result in about a doubling of this figure, from around 0.04% of GDP to 0.07%, which would not change the total GERD significantly.

Other channels of R&D funding in Kuwait exist, but are fairly limited. Kuwait University, for example, received about KWD 105 000 of funds from a joint contribution from KFAS and Massachusetts Institute of Technology in 2017/18. The Kuwait Institute for Scientific Research also receives external funding in addition to institutional funding. It amounted to KWD 5.5 million in 2017/18 and to KWD 8.2 million in 2018/19.

Taking all of this into account, the bottom-up recollection of the expenditure components of R&D points to an overall number for domestic R&D expenditure of between KWD 120 million and KWD 135 million, i.e. 0.33-0.37%<sup>7</sup> of GDP. This is lower than estimates for Saudi Arabia (0.8% of GDP according to UNESCO data) and the United Arab Emirates (0.7% of GDP), and much lower than the OECD average, which spent 2.4% of GDP on R&D in 2017.

Table 2.3 summarises the elements of R&D funding in Kuwait obtained from data gathered from various sources and described above.

**Table 2.3. Rough estimate of R&D expenditures in Kuwait, 2017**

Main channels	Funding estimates of R&D
Kuwait University (KU)	KWD 24.4 million including: – KWD 4.0 million (research budget 2017/18, including externally funded projects) – KWD 20.4 million (human resource cost estimate, see notes)
Public Authority for Applied Education and Training (PAAET)	KWD 12.2 million in 2017: – KWD 0.3 million (research budget based on value of internally and externally funded projects) – KWD 11.9 million (human resource cost estimate, see notes)
Kuwait Institute for Scientific Research (KISR)	KWD 53.3 million in 2017/18 (research budget, excluding construction)
Dasman Diabetes Institute	KWD 4.1 million
Jaber Al Ahmed Centre for Molecular Imaging and Nuclear Medicine	KWD 0.9 million
Other public institutions	KWD 5 million (estimate based on Kuwait Foundation for the Advancement of Science grants data, excluding KISR, KU and PAAET)
Business expenditure for R&D	KWD 25-40 million, including: – KWD 15-30 million (R&D survey estimate)
<b>Total</b>	<b>KWD 120-135 million</b>

Notes: KU research budgets include costs of equipment, consumables and wages of the few temporary and permanent researchers. The human resource cost is estimated on the basis of 30% of the faculty payroll (the 1 591 faculty members are expected to devote 30% of their time to research, according to KU rules) and a rate of overheads of 30% (in line with average international practices).

The PAAET's research budget is calculated based on the hypothesis that 1 527 faculty (professors and assistant professors and other teaching staff) devote 20% of their time to research. Using an average annual wage of KWD 30 000 and a 30% overhead rate, the staff cost of research is thus estimated at KWD 11.9 million = 1 527\*30 000\*0.2\*1.3.

Business expenditure for R&D is based on the R&D survey conducted by the Kuwait Central Statistical Bureau and the Kuwait Foundation for the Advancement of Science in 2018/19. The lowest value corresponds to the survey data collected from the sample of surveyed companies, non-extrapolated.

Sources: Kuwait University, Kuwait Institute for Scientific Research, Kuwait Foundation for the Advancement of Science, Kuwait Central Statistical Bureau, and the Supreme Council for Planning and Development.

### *Education and training*

Investment in human capital is key for innovation, technological development and long-term growth. Such investment can notably take the form of expenditure on education, especially tertiary and vocational training (OECD, 2017).

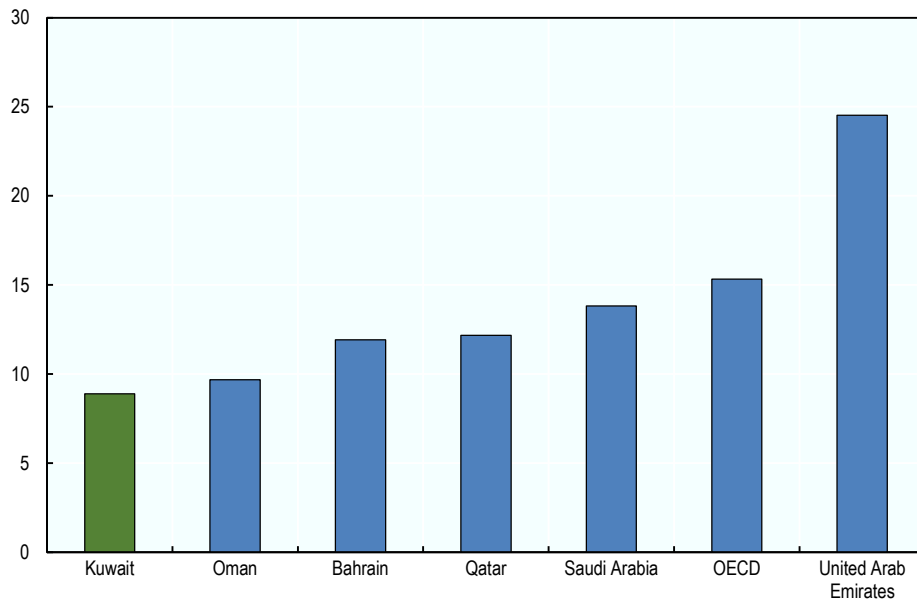
Government spending on education is relatively high in Kuwait. In the fiscal year 2015/16, Kuwait spent around KWD 2.4 billion on education (USD 7.9 billion), or around 5.5% of its GDP (KCSB, 2017). This is more than Bahrain and Qatar, where the government spent 2.3% and 2.9% respectively of their total GDP on education, according to UNESCO data. This is also more than the OECD, average which spent 4.4% of its GDP on education in 2016. In Kuwait, education affairs and services is the second-largest destination for government expenditures, just after general public services and defence (18.9% of total expenditures), and before social security and welfare affairs and services (15.6% of total expenditures).

Tertiary education is the largest item of education expenditures, with about a third of all education expenditure minus expenditure for general educational affairs. Primary education comes second (25% of all education expenditure minus general educational affairs), while secondary education lags behind with only 13% of all education expenditure (KCSB, 2017).

The pupil/teacher ratio (i.e. the number of pupils per teacher) is very low in Kuwait compared to other countries, both in primary and secondary schools, reflecting a high level of inputs in the Kuwaiti education system (Figure 2.12 and Figure 2.13). In primary schools, there is one teacher for every 8.9 pupils. This is almost half the OECD average, and three times lower than in the United Arab Emirates. The picture is similar for secondary schools, with 7.6 pupils on average per teacher in Kuwait – the lowest ratio of the

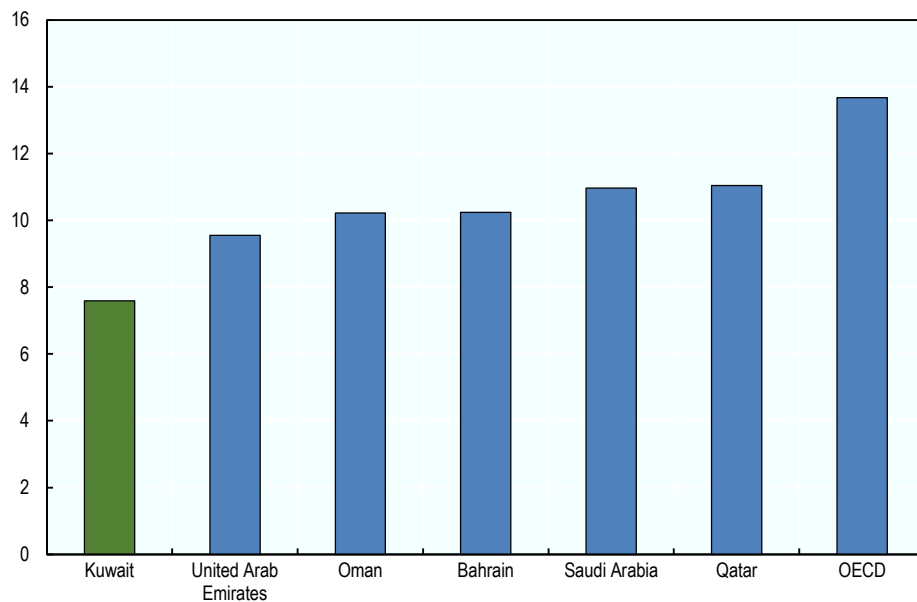
Gulf countries and almost half of the average ratio of OECD countries. In the World Economic Forum's latest *Global Competitiveness Report*, Kuwait ranks 2<sup>nd</sup> out of 141 countries in terms of average number of pupils per teacher in primary education, with only Luxembourg ranking better (Schwab, 2019).

**Figure 2.12. Pupil-teacher ratio, primary education, Gulf Cooperation Council countries, 2018**



Note: A low number is better, since it means fewer children per teacher.  
Source: UNESCO data.

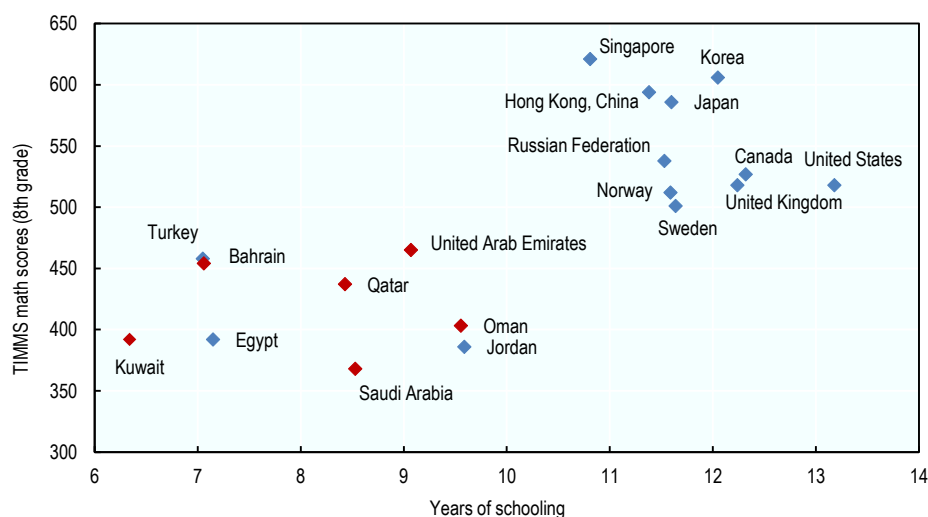
**Figure 2.13. Pupil-teacher ratio, secondary education, Gulf Cooperation Council countries, 2018**



Note: A low number is better, since it means fewer children per teacher.  
Source: UNESCO data.

While education inputs (government expenditures, number of teachers, etc.) in Kuwait are relatively high, Kuwait does not perform as well on education outputs. Kuwait's literacy rate for people aged 15 years and older was 96.1% in 2018, according to World Bank data, which is comparable with other GCC countries, but below literacy rates in the most developed countries (99% or more). However, at around 7.2 years, the average length of schooling for people aged 25 and over is lower than in most other countries, including other Gulf countries, likely because non-Kuwaitis do not have access to the free public schools (Burney and Mohammed, 2002). Furthermore, Kuwait is one of the lowest performers in grade 8 in the Trends in International Mathematics and Science Study (TIMSS) organised by the International Association for the Evaluation of Educational Achievement (IEA) (Figure 2.14). The quality of math and science education was also assessed very poorly by Kuwait's citizens themselves according to the World Economic Forum, as Kuwait ranked 106th out of 141 countries surveyed in the *Global Competitiveness Report 2017/18* (Schwab, 2018).

**Figure 2.14. Years of schooling and TIMSS math scores, eighth grade, 2015**



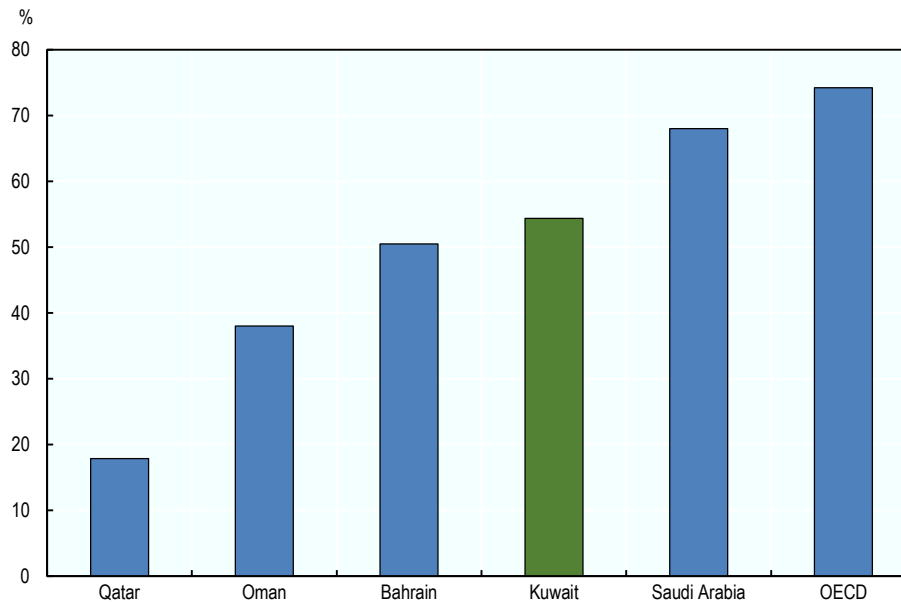
Note: Years of schooling are the average years of education completed among people aged over 15 using the Barro-Lee data set retrieved from the World Bank database, except for Oman, for which years of schooling are taken from the UNESCO Institute for Statistics database.

Sources: UNESCO; World Bank; IEA (2015), *IEA TIMSS 2015*, <https://www.iea.nl/studies/iea/timss/2015/results>.

Enrolment in tertiary education in Kuwait could be further improved. While enrolment rates in primary and secondary schools in Kuwait are high due to mandatory enrolment for children between the ages of 6 and 14 (in 2018, 92.4% of children were enrolled in primary education and in 2015 97.8% were enrolled in secondary education), this contrasts with enrolment in tertiary education, as only 54.4% of students were enrolled domestically in tertiary education in 2018, according to UNESCO data. This is generally higher than in other Gulf countries, but lower than in Saudi Arabia, where the gross enrolment rate in tertiary education reached 68% in 2018 (Figure 2.15), and in the OECD, where the gross average enrolment rate reached 74%.

Kuwait has one state university (Kuwait University), four higher education colleges run by the Public Authority for Applied Education and Training (PAAET) and a number of smaller private universities. In 2018, around 116 000 students were enrolled in tertiary education in Kuwait, an increase from 105 000 in 2014. Two-thirds are female students. The proportions of Kuwaiti and non-Kuwaiti students have remained stable over the years, with about 80-85% of students in Kuwait being of Kuwaiti nationality (KCSB, 2018).

Figure 2.15. Tertiary enrolment, 2018



Notes: Gross enrolment ratio is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of tertiary education. Tertiary education, whether or not to an advanced research qualification, normally requires, as a minimum condition of admission, the successful completion of education at the secondary level.

Source: (World Bank, n.d.).

Tertiary education in Kuwait produces low numbers of scientists and engineers. At Kuwait University, for example, in 2017/18, only a low share of students graduated in sciences and life sciences (4.9%) and engineering and petroleum (12.8); the highest share of graduates was in education (24.0% of all graduates) followed by Sharia' and Islamic studies (14.9%, included in Table 2.4 under "Business, administration and law"). These shares are quite similar in magnitude and relative importance to the breakdown of graduates by field of study in other Gulf countries (Table 2.4). The supply of scientists, engineers and ICT experts is a key innovation factor because of their direct involvement in a country's technical change.

**Table 2.4. Shares of graduates at Kuwait University by field of study, 2017/18**

	Share (%) in Kuwait	Share (%) in other Gulf countries
Education	24.0	6.7
Arts and humanities	11.2	11.5
Social sciences, journalism and information	10.4	8.1
Business, administration and law	30.4	37.7
Natural sciences, mathematics and statistics	4.9	3.6
Information and communication technologies	..	7.3
Engineering, manufacturing and construction	12.8	15.8
Agriculture, forestry, fisheries and veterinary	..	0.2
Health and welfare	6.4	7.2
Services	..	1.3

Note: The shares of graduates by field of study in other Gulf countries are the unweighted averages of these shares for Bahrain, Oman, Qatar, Saudi Arabia and the United Arab Emirates.

Sources: KCSB (2018), *Annual Bulletin of Education Statistics 2017/2018*, [https://csb.gov.kw/Pages/Statistics\\_en?ID=58&ParentCatID=70](https://csb.gov.kw/Pages/Statistics_en?ID=58&ParentCatID=70); UNESCO Institute for Statistics.

Around 3 100 Kuwaitis had scholarships (registered, admitted and ongoing) to study abroad in 2017/18, according to KCSB (scholarships to study abroad are only open to Kuwaiti students), which is about 3.2% of all Kuwaiti students and about 14% of all students studying outside of Kuwait (around 22 900 in 2017 according to UNESCO Institute for Statistics). This is a decrease from previous years (there were around 3 500 students with scholarships abroad in 2016/17 and 3 900 in 2013/14). Contrary to statistics on general student enrolment in Kuwaiti universities which are dominated by female students, male students are much more likely to have a scholarship to study abroad. In 2017/18, 2 301 male students had scholarships to study abroad (around 75% of Kuwaiti students with scholarships), while only 811 female students did (25%). United States and United Kingdom universities are the two top destinations for Kuwaiti students, welcoming respectively 50% and 35% of Kuwaiti students abroad.

Kuwait's universities rank very poorly in international rankings. In particular, none of its universities rank among the top 1 000 universities of the Shanghai ranking (ShanghaiRanking Consultancy, 2019), and the only Kuwaiti university which appears in the Times Higher Education (THE) 2020 ranking is Kuwait University, which ranks 801-1 000. Universities in other Gulf countries perform better than Kuwaiti universities. For example, Saudi Arabia's King Abdulaziz University ranks 101-150 in the Shanghai ranking and 201-250 in THE, while Alfaisal University ranks 251-300 in THE. In the United Arab Emirates, the United Arab Emirates University ranks 301-350 and Khalifa University 351-400 in THE, while Qatar University ranks 401-500 (Times Higher Education, 2020).

The country's long-term development plan, described in Kuwait Vision 2035, places a strong emphasis on education as a catalyst to economic diversification, sustainable growth and social progress. Human capital is one of the seven pillars of the Kuwait National Development Plan, which aims to reform the education system to better prepare youth to become competitive and productive members of the workforce. The human capital pillar consists of several projects, including the Integrated Education Reform Program project which aims to align curriculum with international best standards (for a total budget of around KWD 182 million, or USD 600 million).

### *R&D personnel*

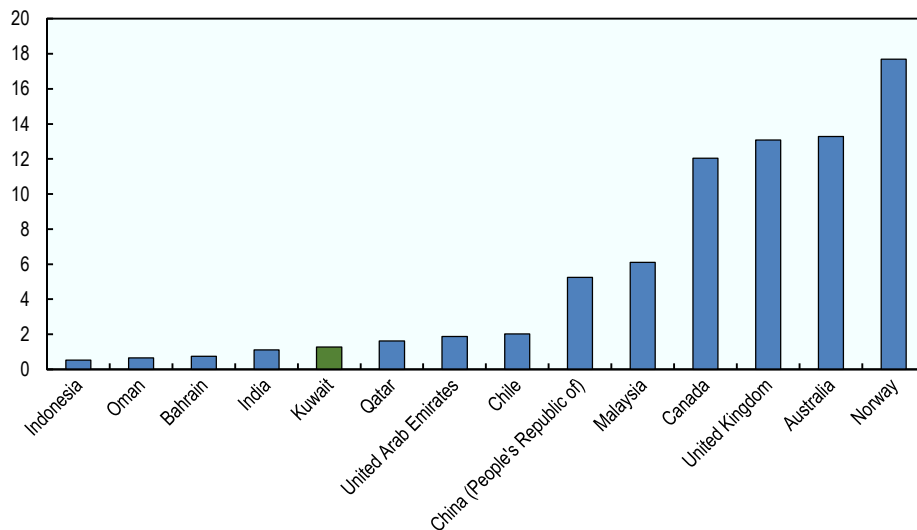
Researchers and other R&D personnel are a crucial input for innovation and R&D performance in a country and include researchers, technicians with high levels of technical experience and training, and other supporting staff who contribute directly to carrying out R&D projects and activities in R&D-performing statistical units (OECD, 2015a). According to UNESCO data, the labour force involved in research activities

has grown strongly in Kuwait over the past 10-15 years, with around 3 000 full-time equivalent (FTE) R&D workers in Kuwait. This number increased from around 300 or less FTE R&D workers per million inhabitants between 2008 and 2012 to about 700 in 2017 and from around 0.5 FTE R&D workers per 1 000 workers before 2010 to 1.3 in 2017. Shares of R&D personnel by function have remained rather constant over the past few years, with researchers accounting for about two-thirds of total R&D personnel (in FTE), technicians for less than 10% and other supporting staff for about 25%. Compared with other countries for which data are available, Kuwait is among the countries with the lowest number of FTE R&D personnel per thousand employees. According to UNESCO data, only a few countries, like Indonesia, Oman and Bahrain, have fewer R&D personnel than Kuwait. But Kuwait lies well below others like Qatar and the United Arab Emirates and has ten times fewer R&D personnel than the likes of Australia, Canada and the United Kingdom (Figure 2.16).

However, these numbers for R&D personnel need to be taken with caution as they do not systematically take into account R&D personnel in the private sector. This is the case in particular for Kuwait. However, businesses in Kuwait which took part in the business survey mentioned above reported a total of just under 1 100 FTE R&D workers. This adds to the 3 000 FTE R&D workers in government and higher education taken from the UNESCO Institute of Statistics database, making a total of around 4 100 FTE R&D workers overall in Kuwait.

**Figure 2.16. Total R&D personnel per thousand total employment, 2017 or latest available year**

Full-time equivalent



Source: UNESCO Institute for Statistics.

### 2.3.2. Innovation outputs

#### *Outcomes from public research*

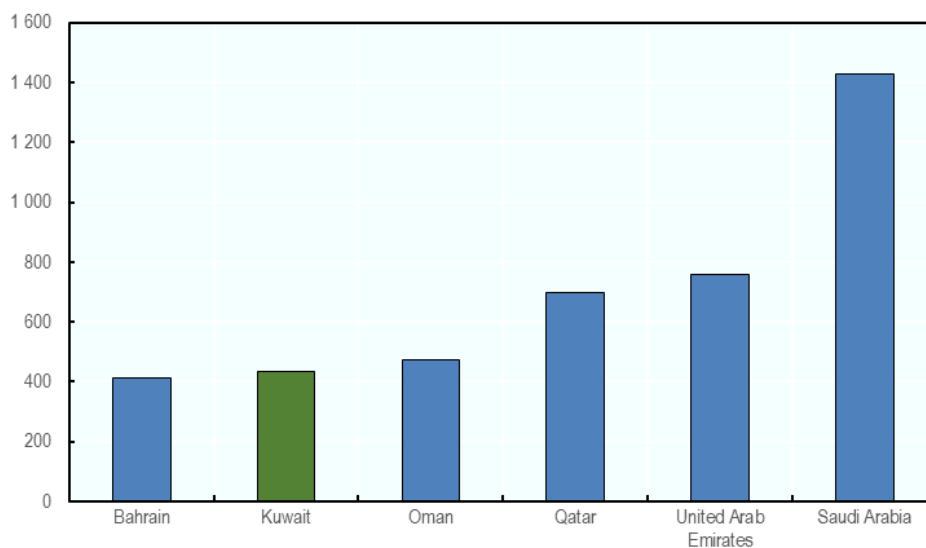
Although the number of publications published by Kuwaiti universities or research institutes has steadily increased over the past two decades, as in almost all countries worldwide, from 633 publications in 2000 to 1 953 in 2018, Kuwait's publication output is growing at a much slower rate than the average rate of the Gulf countries, leading to a decrease in its world ranking in terms of number of publications, from 64th in 2000 to 81st in 2018. Furthermore, in terms of number of total publications per million inhabitants, Kuwait



is underperformed only by Bahrain, with Saudi Arabia publishing as much as three times more documents per million inhabitants than Kuwait (Figure 2.17).

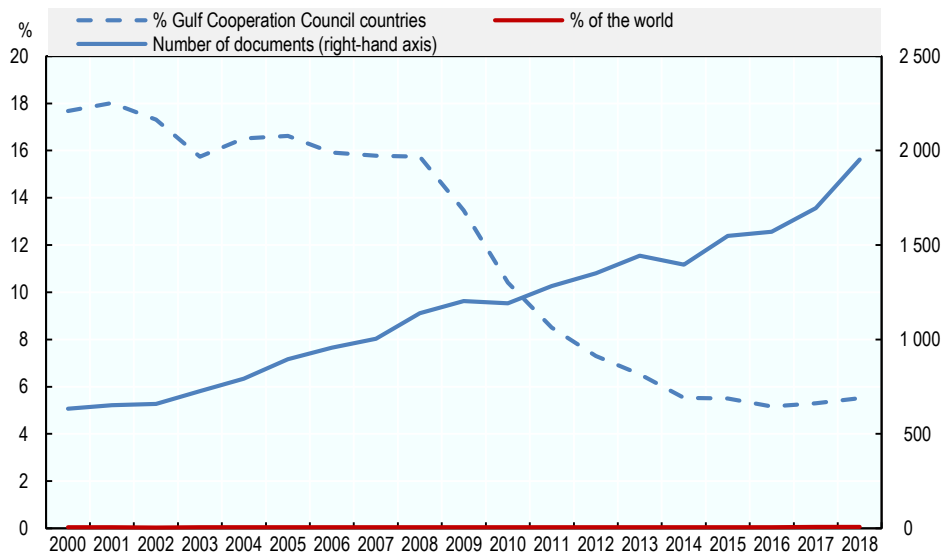
While the share of Kuwaiti publications has remained constant at around 0.05% of world publications since 1996, its share of publications in all Gulf countries has fallen sharply, from around 18% in 2000 to less than 6% in 2018, with many of its neighbours catching up and overtaking Kuwait's position in the region, and in particular Qatar, whose share increased from less than 2% to 10%, and the United Arab Emirates, whose share increased from 14% in 2000 to close to 19% in 2018 (Figure 2.18). However, these numbers need to be taken cautiously given the potential biases that such data entail. It is indeed possible that jumps in the share of publications of one country is due to a national journal entering the selection of journals of the Scopus database and in which national publications may be favoured, thereby leading to an increase in the share of this country and a drop in the share of other countries. Additionally, at least in some cases, adjunct professorships were offered to non-resident foreign researchers provided they add affiliation to the corresponding institution when publishing.

**Figure 2.17. Number of total publications per million inhabitants, Gulf Cooperation Council countries, 2018**



Source: OECD calculations based on Scopus data.

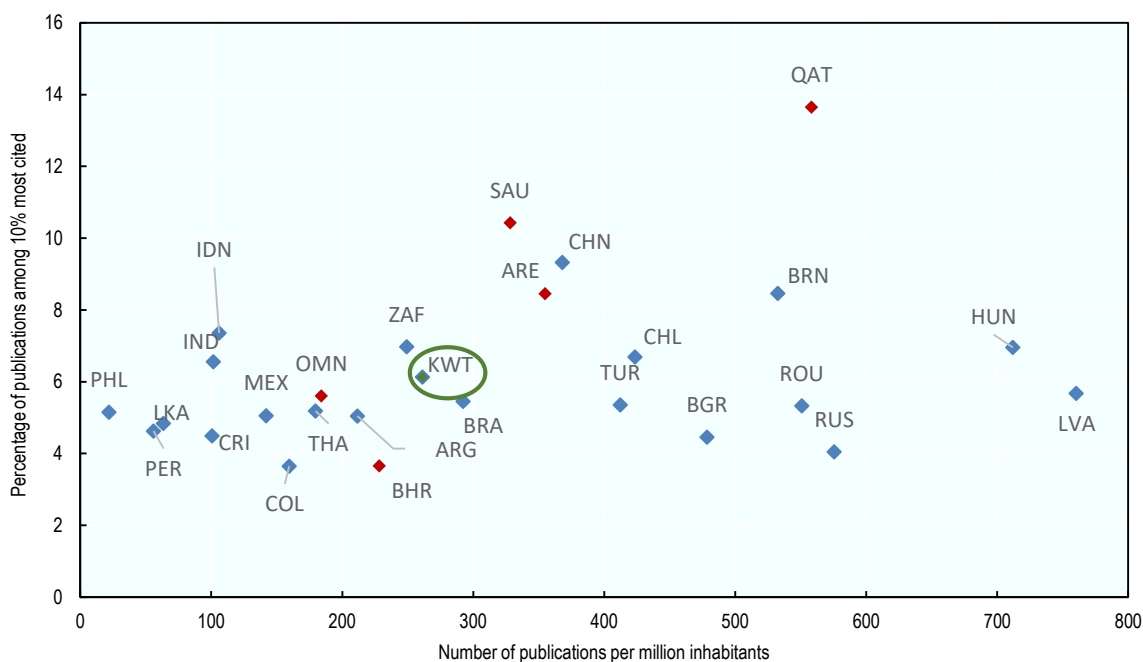
Figure 2.18. Number of Kuwaiti publications and share of Gulf Co-operation Countries, 2000-18



Source: Scimago, *Scimago Journal & Country Rank*, <https://www.scimagojr.com>.

Not only does Kuwait perform poorly in terms of the number of publications, but the quality of its publications is also low in a global comparison. While Kuwait performs better than Thailand, the Philippines, all Latin American countries except Chile, Bahrain and Oman, the percentage of Kuwaiti publications among the 10% most cited is lower than in all other countries. Figure 2.19 shows the number of publications per million inhabitants on the horizontal axis and the percentage of publications among the 10% most cited on the vertical axis, for a sample of countries with comparable levels of publications. It shows that Kuwait is lagging behind countries such as Saudi Arabia, Qatar or Argentina with regards to this “quality” measure of research output and research excellence

Figure 2.19. Quantity vs. quality of publications – select countries

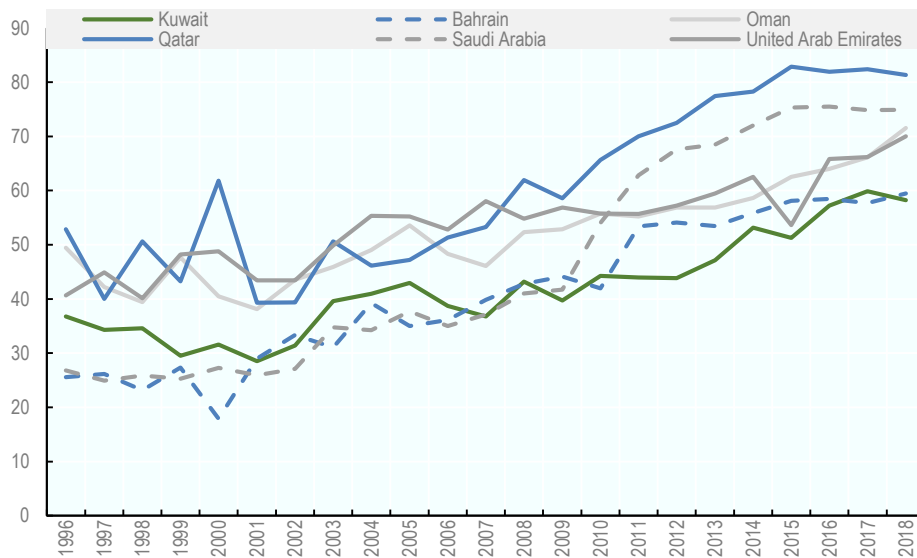


Notes: Number of documents and percentage among the world's 10% most-cited publications, based on fractional counts of documents by authors affiliated to institutions in each economy. "Top-cited publications" are the 10% most-cited papers normalised by scientific field and type of document (articles, reviews and conference proceedings). Kuwait symbol in green, Gulf Co-operation countries in red.

Sources: OECD calculations based on Scopus Custom Data, Elsevier, Version 5.2019; 2019 Scimago Journal Rank from the Scopus journal title list (accessed June 2019).

There is room for improvement for Kuwait in terms of international collaboration on scientific research compared with other Gulf countries, where GCC neighbours have been significantly ahead since 2007, while Kuwait was above the GCC average in the late 1990s (Figure 2.20). International collaboration is defined as the document ratio whose affiliation includes more than one country address and is positively correlated with citation impact (a quality measure of scientific publishing), especially for countries with lower levels of scientific production. Encouraging international collaboration on scientific research is a means for smaller countries like Kuwait to overcome their limited scale by participating more intensively in global networks (OECD, 2017).

**Figure 2.20. International collaboration on scientific research, Gulf Cooperation Council countries, 1996-2018**

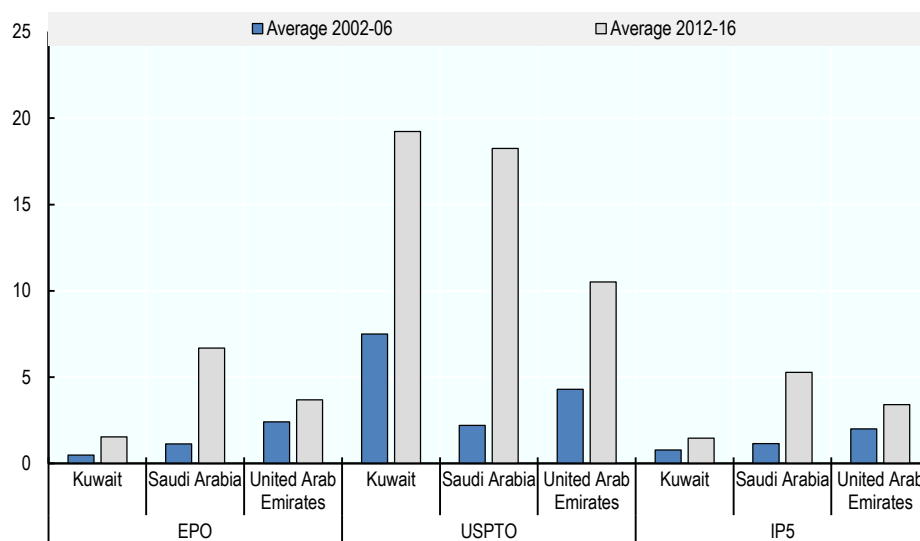


Source: Scimago.

### *Patents and intellectual property rights*

International patenting data are used as an indicator of economically valuable technological invention and as a proxy to innovation output. Patents protect novel inventions and technologies and patent data shed light on the extent to which investment in R&D translates into innovative output. Kuwait's patent applications increased quite dramatically between 2002 and 2016, as in Saudi Arabia and the United Arab Emirates for which the OECD has data regarding patent applications. Kuwait has also filed more patent applications per million inhabitants to the US Patent and Trademark Office than Saudi Arabia and the United Arab Emirates. However, its number of applications to the European Patent Office and the number of patents filed to at least two IP offices worldwide (IP5<sup>8</sup> patent families) are much lower than in Saudi Arabia and the United Arab Emirates (Figure 2.21).

**Figure 2.21. Patent applications filed to the EPO and USPTO and number of IP5 patent families per million inhabitants**



Notes: Patent applications filed to the EPO and USPTO are by priority year and inventor country. IP5 patent families refer to patents that have been filed in at least two IP offices worldwide, one of which among the Five IP offices (namely the European Patent Office, the Japan Patent Office, the Korean Intellectual Property Office, the US Patent and Trademark Office, and the State Intellectual Property Office of the People's Republic of China). The numbers of IP5 patent families are by earliest filing date and inventor country, using fractional counts.

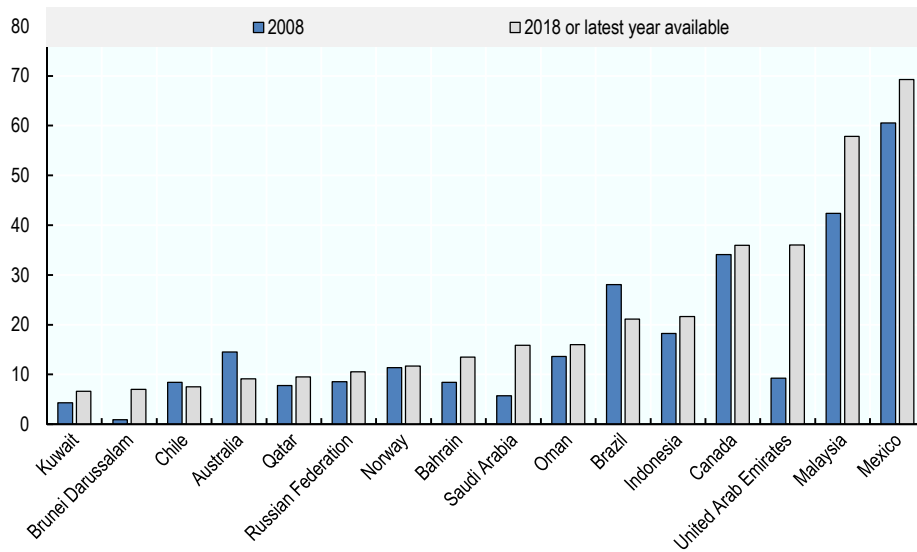
Source: OECD, STI Micro-data Lab: Intellectual Property Database.

### *High R&D-intensive exports*

Most developed countries have been shifting towards higher technology-intensive manufacturing industries and knowledge-intensive market services. This shift is also observed within lower technology industries, as shown in the increasing R&D intensity within these industries. The evolution towards a more knowledge-intensive economy has also been reflected in trade flows (OECD, 2007). Indicators of trade performance in R&D-intensive industries can be used as proxy measures of the industrial and economic impact of scientific and technological activity (OECD, 2019).

Kuwait performs particularly poorly in terms of share of high and medium-high R&D-intensive activities (manufacturing and non-manufacturing) in total exports and had the lowest share of all GCC countries and a sample of countries for which mining and quarrying account for at least 20% of all exports (Figure 2.22).

**Figure 2.22. Share of high and medium-high R&D-intensive activities in total exports, 2008 and 2018**



Notes: High R&D intensity activities are, in manufacturing: air, spacecraft and related machinery, pharmaceuticals and computer, electronic and optical products; and in non-manufacturing: scientific research and development, and software publishing. Medium-high R&D-intensive activities are, in manufacturing: weapons and ammunition, motor vehicles, trailers and semi-trailers, medical and dental instruments, machinery and equipment, chemicals and chemical products, electrical equipment, railroad, military vehicles and transport; and in non-manufacturing: IT and other information services.

Source: Calculations based on *OECD STAN database*.

## 2.4. Conclusion

Since 1938 and the discovery of oil, Kuwait has seen its economic and social development become increasingly dependent on the extraction and exports of this commodity. Thanks to the oil rent, Kuwait has been able to ensure a high level of wealth and well-being for its population.

However, strong dependence on a single export commodity which drives most of government revenues can also create economic vulnerability due to exposure to price shocks. The recent fall in oil prices caused a fiscal deficit in 2015/16 – the first in 16 years. Other factors such as slowing global demand amid global concerns about carbon emissions and the development of renewable energy and sustainable mobility are likely to cause a stagnating, or even decreasing, demand for oil.

These prospects require Kuwait's leadership to accelerate the transition from a resource-based economy towards a knowledge-based one, where value creation, societal challenges and the well-being of society at large will be based on the production, diffusion and implementation of knowledge.

Diversification of the economy has long been on the government's political agenda and "New Kuwait" aims at transforming the country into a finance and trading hub, transitioning towards a knowledge-based economy by 2035. Nevertheless, little has so far been achieved towards the objective of reducing dependence on oil; Kuwait's exports are as concentrated today as they were in 1995.

Oil dependence and the prevailing social contract in Kuwait are closely intertwined, as the government not only provides security, infrastructure, education and health care, but also offers well-paid jobs to its citizens financed through oil revenues. This gives Kuwaiti nationals very few incentives to engage in risky activities such as innovation and entrepreneurship or even to work in the private sector at all.

The New Kuwait Development Plan foresees a significant shift towards the private sector, mainly because the rising public wage bill is not sustainable in the long term. However, as long as the oil rent continues flowing, it will be difficult to cut back on what Kuwaitis see as their acquired rights.

One way out of this bind would be the separation of the “entitlement to the rent” from employment in a government entity (public administration or state-owned enterprise). To some extent, this is already in place with the “workforce support” supplement to Kuwaitis working in the private sector, but such support seems to be insufficient to incentivise widespread applications to private sector jobs. For entrepreneurs, the situation is even less favourable, and there is little incentive to forego risk-free employment in the government sector in order to start a business.

In parallel, a strong signal is needed from Kuwaiti leadership which could be interpreted as a moral encouragement in favour of entrepreneurship. The recent initiative of the Amiri Diwan<sup>9</sup> to establish a National Innovation Centre could play a decisive role in this sense, since it may be an indication to the population that innovation is a priority, and will be valued by the supreme leadership of the country.

Unleashing the innovative spirit of non-Kuwaitis by providing equal opportunities is also key. Non-Kuwaitis represent about three-quarters of the resident population, and many of them are second- or third-generation residents, yet they do not have the same rights and opportunities as Kuwaitis. Entrepreneurship rules should put non-Kuwaitis on equal footing with Kuwaitis. A non-Kuwaiti entrepreneur should be given the possibility to start a company without a Kuwaiti sponsor and to access financial support on equal terms with Kuwaitis (e.g. from the National Fund).

The importance of framework conditions for innovation has increased in recent years, especially as businesses and capital have become more mobile and seek the most favourable operating environments internationally. In particular, a business environment favourable to starting and doing business is an important pre-condition for boosting innovation. A stable financial system is also crucial to ensure investment in innovation. A sound regulatory framework fosters the generation of new technologies and helps their rapid diffusion. An appropriate education system also is necessary to provide the skills required by an innovative workforce. And importantly, innovation requires technological prowess and a culture of experimentation and risk-taking.

Kuwait has recently improved its position in global rankings of its innovation system and framework conditions, but there is still room for improvement. In its latest Doing Business Report, the World Bank ranks Kuwait 83rd out of 190 countries, a significant improvement from 97th the year before, but still below all other GCC countries. Likewise, in the World Economic Forum’s Global Competitiveness Report 2019, Kuwait performs significantly below its GCC peers in almost all dimensions of the index.

It is particularly difficult in Kuwait to start a business – and more so than in other GCC countries. While Kuwait has recently implemented a number of reforms – in particular, it eliminated the paid-in minimum capital requirement, merged procedures to obtain a commercial license and streamlined online company registration – more needs to be done to make the process of starting a business easier, by tackling, in particular, inefficient government bureaucracy, restrictive labour regulations, corruption and poor work ethic in the national labour force.

Innovation performance has been modest, as suggested by the falling trend in total factor productivity growth over the past 40 years. Publication statistics, as well as numbers of patent applications and the share of high and medium-high R&D-intensive products in total Kuwaiti exports also reveal poor innovation performance.

Research and development expenditures in Kuwait amount to around 0.33-0.37%<sup>10</sup> of GDP – a fifth of the 2% target set in the Blue Ribbon report 12 years ago and only half of the spending in neighbouring United Arab Emirates and Saudi Arabia. A gradual increase in R&D funding can be achieved pending appropriate governance arrangements proposed in other recommendations (regarding notably the overall STI strategy, an increase of competitive research grants, performance-based contracts). In line with Kuwait’s aspiration

for a knowledge-based development path and practices of other resource-rich countries (Norway, Kazakhstan), a mechanism could be set to dedicate some of the resources from oil directly to a central “Knowledge Fund” dedicated to finance higher education institutes’ and research institutions’ research performance contracts, as well as other channels supporting research and innovation



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## Notes

<sup>1</sup> Total factor productivity is defined as the ratio of aggregate output (e.g. GDP) to aggregate inputs. Since economic output is a function of inputs such as labour and capital, an increase in TFP can be interpreted as the contribution of knowledge to economic output.

<sup>2</sup> The RCA index of country *i* for product *j* is:  $RCA_{ij} = (x_{ij}/X_{it}) / (x_{wj}/X_{wt})$ , where  $x_{ij}$  and  $x_{wj}$  are the values of country *i*'s exports and of world exports to country *j* and where  $X_{it}$  and  $X_{wt}$  are country *i*'s total export and total world exports respectively. An index of less than unity implies that the country has a revealed comparative disadvantage in the product. If the index is more than 1, the country is said to have a revealed comparative advantage in the product (World Bank, n.d. b).

<sup>3</sup> This coincides with the sale of Zain African operations in 2010 and it would appear that at least part of this drop can be attributed to this event, since Zain used to provide maintenance services to its African operations from Kuwait.

<sup>4</sup> The concentration index, also named the Herfindahl-Hirschmann Index (Product HHI), is a measure of the degree of product concentration. The normalised HHI is used in order to obtain values between 0 and

1:  $H_j = \frac{\sqrt{\sum_{i=1}^n (\frac{x_{ij}}{X_j})^2} - \sqrt{\frac{1}{n}}}{1 - \sqrt{\frac{1}{n}}}$  where  $H_j$  = country or country group index,  $x_{ij}$  = value of export for country *j* and product *i*,  $X_j = \sum_{i=1}^n x_{ij}$  and *n* = number of products (SITC Revision 3 at 3-digit group level). An index value closer to 1 indicates a country's exports are highly concentrated on a few products. On the contrary, values closer to 0 reflect exports that are homogeneously distributed among a series of products.

<sup>5</sup> <https://tahseen.kdipa.gov.kw/>.

<sup>6</sup> Information included in the MRDP 2020-25 provided by the SCPD.

<sup>7</sup> Official statistics for R&D expenditure do not exist. Preliminary figure obtained by consolidation of data from Kuwaiti sources. Includes a very preliminary figure from KNPC, which is awaiting confirmation/revision

<sup>8</sup> IP5 designates the five major IP offices, including the European Patent Office, Japan Patent Office, Korean Intellectual Property office, the National Intellectual Property Administration of the People's Republic of China and the United States Patent and Trademark Office

<sup>9</sup> Court of the Amir.

<sup>10</sup> Official statistics for R&D expenditure do not exist. Preliminary figure obtained by consolidation of data from Kuwaiti sources. Includes a very preliminary figure from KNPC, which is awaiting confirmation/revision.



**From:**  
**OECD Reviews of Innovation Policy: Kuwait 2021**

**Access the complete publication at:**

<https://doi.org/10.1787/49ed2679-en>

**Please cite this chapter as:**

OECD (2021), "Macroeconomic and framework conditions and innovation performance in Kuwait", in *OECD Reviews of Innovation Policy: Kuwait 2021*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/3bb007bd-en>

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