

3 – The impact of lower oil prices on the UK economy

Key points

- The significant fall in oil prices since mid-2014 should increase overall UK economic activity as the cost of production decreases for businesses, especially for those that are heavily dependent on oil inputs. This will boost both investment and employment.
- Although the oil and gas extraction sector is negatively affected by the reduction in the oil price, sectors such as agriculture, air transport, coke and refined petroleum manufacturing and oil-intensive manufacturing sectors will benefit as the price of their key input falls.
- Water transport and other services sectors will enjoy a small positive impact. However, oil-intensive sectors are likely to benefit from the reallocation of capital and resources at the expense of less oil-intensive sectors.
- We use a model of the UK economy to quantify these effects in three alternative scenarios. In a case where the reduction in the oil price is permanent, settling at around \$50 per barrel, the size of the UK economy (GDP) increases by around 1% on average relative to the baseline between 2015 and 2020. Employment also increases by around 90,000 by 2020, with a peak boost to employment of around 120,000 in 2016.

- In contrast, the impacts are smaller where the fall in the oil price is temporary: depending on how far and fast oil prices rebound, the boost to GDP could vary from 0.2-0.5% and the increase in employment by 2020 could vary from 3,000 to 37,000.
- Real household incomes also rise as oil prices fall, which increases consumer spending. This is due to two factors: overall consumer prices fall as cost savings are passed on to households and real wages increase as demand for labour rises in fast-expanding sectors.
- As a result of growing economic activity, government tax revenues also rise as the tax take from corporate and personal income taxes increase, more than offsetting declining revenues from the oil and gas sector. The fall in the oil price should also have a small impact in narrowing the UK trade deficit.

The significant fall in oil prices since mid-2014 should increase UK economic activity.

Introduction

The dramatic decline in oil prices since mid-2014 is having a significant impact on the world economy. How does such a large and unexpected decline in oil prices affect the UK economy specifically, and which industry sectors are likely to emerge as winners or losers? How does a change in the oil price affect UK government revenues and the trade balance?

In order to answer these questions, we used our dynamic computable general equilibrium (CGE) model to assess the impact of future changes in the oil price on the UK economy. We used three projected oil price scenarios that differ in the magnitude and persistence of the oil price shock, against a baseline where oil prices remain at mid-2014 peak levels.

The rest of the article is structured as follows:

- Section 3.1 discusses past trends in oil prices and the UK's trade position in crude oil and oil products.
- Section 3.2 sets out our oil price scenarios and modelling approach.
- Section 3.3 discusses the results from the analysis.
- Section 3.4 summarises and draws conclusions from the analysis.

3.1 Trends in oil prices and the UK's position

Trends in oil prices

Oil prices mostly traded above the US\$100/barrel mark over the four years to mid-2014. However, by mid-January 2015, oil prices had fallen dramatically to around a third of their peak level in June 2014 and, despite some recovery since mid-January, remain well below those levels. The recent fall in oil prices was one of the biggest in history, with the only comparable declines in recent decades being the oil price collapse in the 1980s and in the 2008-9 global financial crisis. The latter was reversed relatively quickly, but the former proved to be long-lasting, so we need to explore how different scenarios for future oil price movements will influence the economic impact of the recent decline.

A combination of supply- and demand-side factors led to this sharp decline. On the supply-side, strong growth in production by non-OPEC producers and growing US shale oil production have contributed to an overall increase in output. Added to this is the apparent strategy of OPEC producers led by Saudi Arabia (who have lower production

costs) to maintain production levels in order to defend and grow market share by forcing more expensive unconventional sources out of the market. On the demand-side, the decelerating pace of growth in China and the slow economic recovery in the EU have contributed to weakening demand for oil.

These factors combined have exerted downward pressure on prices. In addition, oil consumers are taking advantage of the opportunity to stockpile cheap oil, which could further dampen demand for oil in the short-term.

In the longer term, technological advancements will continue to drive down the costs of extracting unconventional shale gas and tight oil reserves (including hydraulic fracturing or “fracking” methods), which will bolster non-OPEC oil supply. Furthermore, the rebalancing of the Chinese economy away from manufacturing to services could have a negative impact on oil consumption.¹ Growth in other developing countries, increasing energy efficiency and the shift towards renewable energy in developed countries could mean that

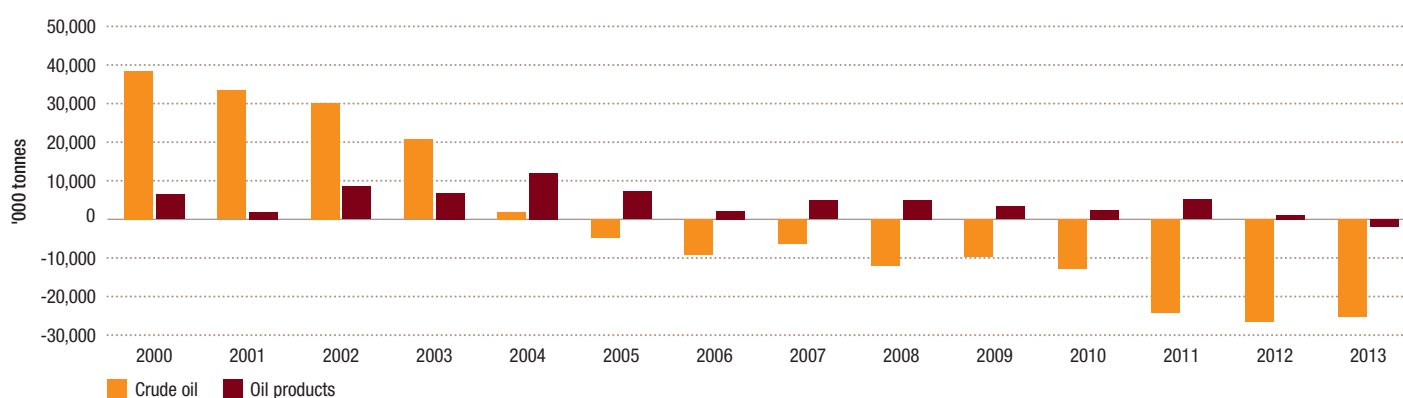
demand for oil is increasingly driven by developing countries rather than developed countries.

The net impact of these factors is unclear, but could imply a return in the longer term to a level of oil prices in line with marginal supply costs, which at current and projected levels of global demand might be around \$70-100 per barrel. The path by which prices return to this kind of level is, however, highly uncertain, as is the pace of any such adjustment.

The UK's position

The UK is the largest producer of oil and second-largest producer of natural gas in the European Union. Production from UK oil and natural gas fields in the North Sea peaked around the late 1990s and has declined steadily since as the discovery of new reserves and new production has failed to keep up with the maturity of existing sites. Figure 3.1 shows the UK's position in terms of net exports of crude oil and oil products.¹ Following years of being a net exporter of petroleum and natural gas, the UK became a net importer of crude oil from 2005, and oil products from 2013.

Figure 3.1: UK net exports of crude oil and oil products²



Source: DECC

¹ IMF (2013) “Commodity Market Review”, October 2013.

² Crude oil includes the production of crude oil and natural gas liquids, petroleum products are refined crude oil. A negative value signifies that in that particular year imports were greater than exports.

Figure 3.2 compares the historic real growth in GVA for the UK oil and gas sector and for the rest of the economy. The oil and gas sector – which consists of the extraction of crude petroleum and natural gas and the manufacture of refined petroleum products – has shrunk to around a third of its size since its peak in the late 1990s. The sector now accounts for less than 2% of total UK GVA, as compared to 6% in 1999.

3.2 Modelling the impact of oil price shocks on the UK economy

Our modelling approach

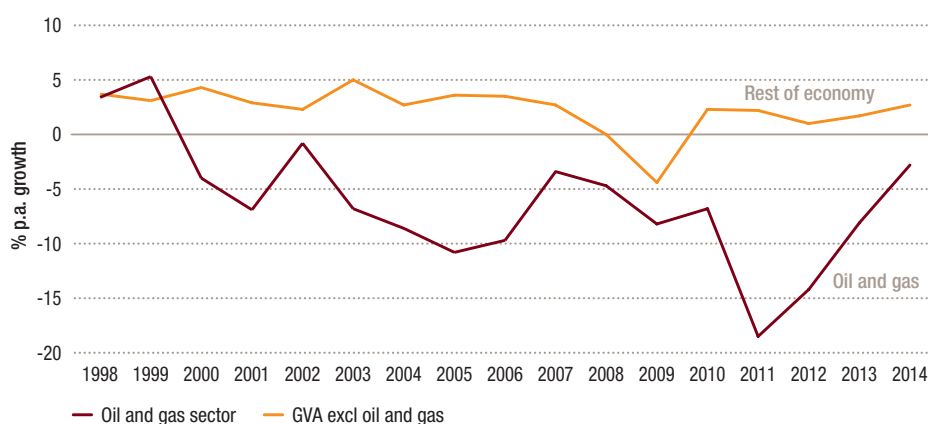
We used a computable general equilibrium (CGE) model to assess the impact of future changes in the oil price on the UK economy in three alternative scenarios. The model estimates how the UK economy would react to changes in policy, technology and other external factors by looking at the interactions between different industrial sectors, households, the government and the rest of the world. These models are a standard tool of empirical economic analysis, and are widely recognised and used by international organisations such as the IMF, OECD and the World Bank, as well as the European Commission, national governments and central banks.

We simulate an oil price shock in this model by reducing the output price of the oil and gas extraction sector and the input price of other sectors in the economy, which takes into account the relative oil intensity of the different sectors.

Oil price scenarios

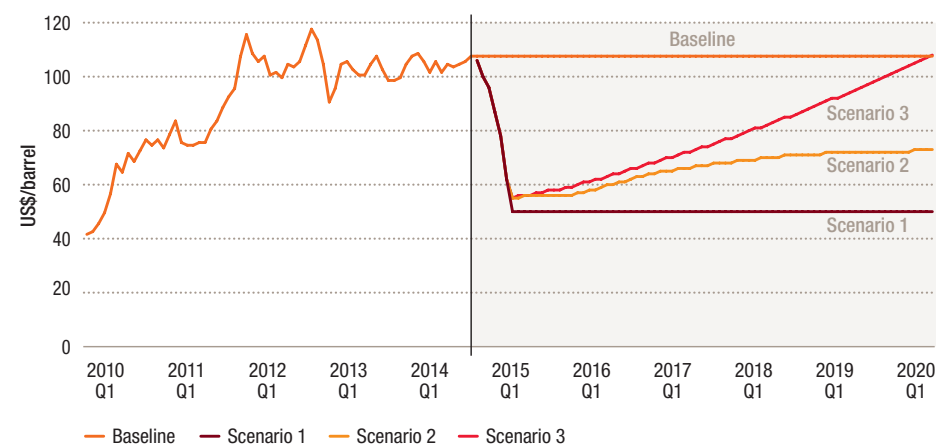
We assess the following three scenarios for the period to 2020 (shown in Figure 3.3):

Figure 3.2: Real GVA growth for oil and gas sector vs rest of UK economy



Source: ONS

Figure 3.3: Alternative oil price scenarios



Source: PwC analysis, IMF

- **Scenario 1:** Oil price remains at a low level of US\$50/barrel.
- **Scenario 2:** Oil price gradually increases to US\$73/barrel in 2020.³
- **Scenario 3:** Oil price gradually returns to US\$108/barrel in 2020.

The CGE model measures the impact of each scenario relative to a baseline

3 The forecasts for Scenario 2 were drawn from the IMF's projections published in January 2015. This scenario is also broadly consistent with our main scenario for the UK economy in Section 2 above.

where the oil price remains at its mid-2014 peak of around \$108 per barrel. This baseline is also consistent with our growth projections for the UK economy published in the July 2014 issue of the UK Economic Outlook. The model also assumes longer-term UK economic growth to be in line with historical trend growth rates.

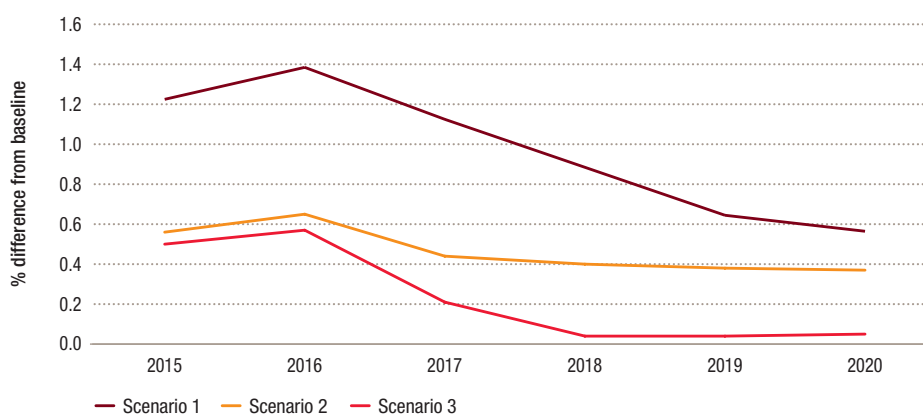
3.3 Results from our analysis

The results from the modelling show that the UK economy will be significantly affected by a reduction in oil prices. Although North Sea oil producers and refiners will experience a reduction in output, the UK economy benefits as a whole. Generally, the fall in oil prices increases overall economic activity as the cost of production decreases and investment increases. Consumers also benefit from lower energy costs and cheaper goods and services, which boosts real incomes and translates into an increase in consumption. Below we present and discuss these results in more detail.

Impact on overall UK GDP

Figure 3.4 shows the impact of the change in oil price on the level of UK real GDP.⁴ As shown in Figure 3.4, in Scenario 1, where the oil price remains persistently low at US\$50 per barrel between 2015 and 2020, the initial impact will raise the level of real UK GDP by around 1.2% in the first year relative to the baseline where oil prices remained at \$108 per barrel. The effect peaks in 2016 when the level of GDP increases by around 1.4% of the baseline level as the full impact of the oil price shock filters through the economy. The impact then tails off to around 0.6% of the baseline as the UK is exposed to stronger competition by cheaper imports

Figure 3.4: Impact on the level of real GDP, 2015-2020



Source: PwC analysis

from other countries that also benefit from the oil price shocks, thus diminishing the benefit to the UK.

In Scenario 2 where the oil price recovers gradually to \$73 by 2020 in line with latest IMF projections, UK GDP is estimated to be around 0.5% higher on average over the 2015-20 period relative to the baseline.

In Scenario 3, where the oil price recovers to mid-2014 levels by 2020, the impact on the economy is much smaller at 0.2% on average over the 2015-20 period, with minimal effects on the level of GDP by 2020 given this is a purely temporary shock in this scenario.

The model assumes adaptive expectations, which means that economic agents revise their expectations of future oil prices during each period based on current oil prices. The implication of this assumption is that there is a lag between the initial oil price shock and the subsequent economic impact. The stickiness of downward price adjustments also means

that the impact of the oil price shock takes time to filter through the economy.

In the following sub-sections, we set out the rest of the findings from our analysis, particularly with regard to sectoral GVA and employment, inflation, household consumption, UK government revenues and the trade balance.

Impact on output by industry sector

Figure 3.5 maps the transmission of a fall in the oil price at the industry sector level. We distinguish between the oil and gas extraction sector, sectors with oil-intensive production processes, and sectors that use oil and gas less intensively in their production processes. Our analysis focuses on the impact of the fall in the oil price on the UK as a whole, rather than focusing on specific regions within the UK. However, there are likely to be regional differences, depending on the distribution of oil-intensive industries across the regions.⁵

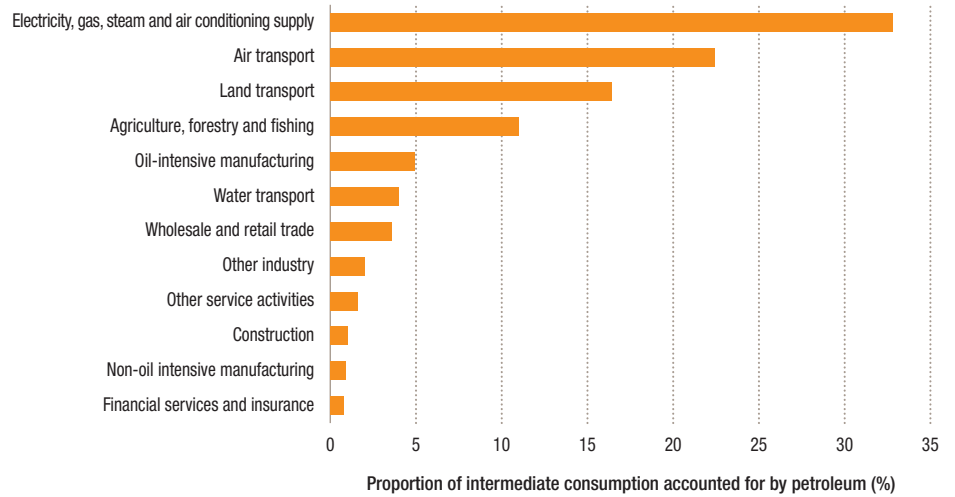
The CGE model takes into account the “reorganisation effect”, where firms automatically adjust their production

⁴ See the technical appendix for comparisons of the results of our study with existing academic literature.

⁵ In particular, the area around Aberdeen may be a loser given the concentration of onshore oil and gas activity there. Some parts of the North and Midlands may also benefit more from impacts on oil-intensive heavy industry, but our model does not allow quantification of these regional variations.

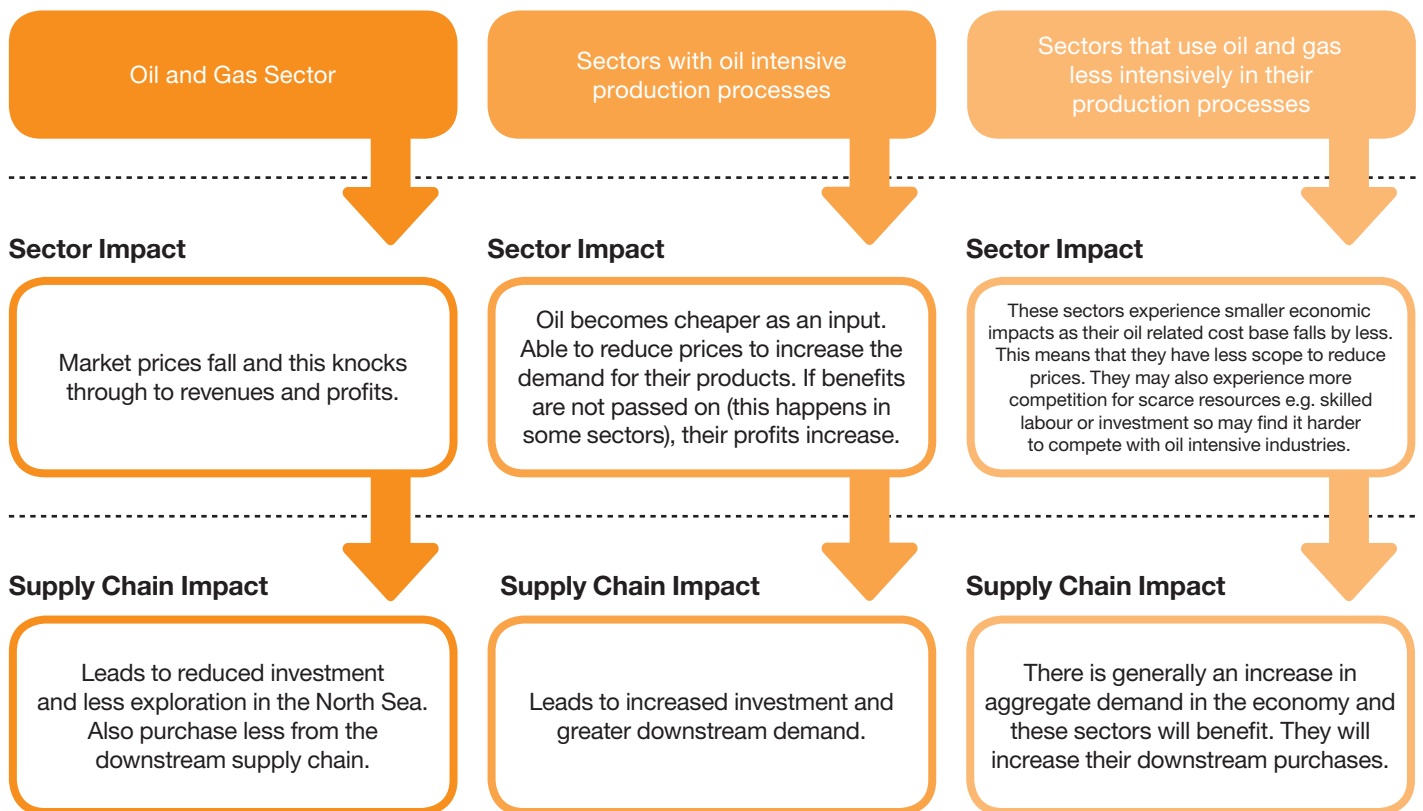
processes in response to changes in input prices, such as wage costs and the cost of intermediate inputs. As the prices of intermediate inputs, such as oil, fall, firms reorganise their activities to make efficient use of cheaper inputs, enabling them to increase output. Oil-intensive sectors such as the utilities, transportation, agriculture and oil-intensive manufacturing sectors (see Figure 3.6) are likely to benefit most. Within the oil-intensive manufacturing sector, oil and gas-related inputs and energy consumption account for at least 10% of total intermediate consumption for the following sectors: the manufacture of refined petroleum, industrial gases and chemicals, cement and metals.

Figure 3.6: Oil intensity by sector, 2014



Source: ONS

Figure 3.5: Transmission mechanism of a fall in the oil price



The model also assumes that workers can move between sectors as these expand or contract. If wages rise in a sector that benefits from the fall in the oil price, then we can expect workers to move into this sector to gain from the wage rise. The model also assumes a temporary loss in productivity to take into account the fact that people need to be retrained when moving between sectors, and consequently, their wages fall during this period.

Table 3.1 shows the average estimated impact of the fall in the oil price on the level of real GVA by sector between the years 2015 and 2020. Average impacts are smaller in Scenarios 2 and 3 than in Scenario 1 as in these scenarios the scale of the oil price decline is defined to be smaller.

As we might expect, the modelling results suggest that sectors with oil- and energy-intensive production benefit most from a reduction in the oil price. These sectors will benefit from lower production costs, and these cost reductions are assumed to be largely passed through to consumers over time which in turn creates increased demand for their products. Higher levels of demand lead to increased investment and improved productivity. There will also be greater demand for exports and increased import competition. The increase in overall output also generates more demand for supplier inputs, which positively affects the downstream supply chain via the multiplier effect.⁶ This is combined with a further knock-on impact on aggregate demand as workers employed will spend more on goods and services in the UK economy.

In **Scenario 1** with persistently low oil prices, the agriculture, air transport,

Table 3.1: Impact on level of real GVA by sector, average for the years 2015-2020

Average % difference from baseline	Scenario 1	Scenario 2	Scenario 3
Agriculture, forestry and fishing	2.3%	1.1%	0.3%
Air transport	2.1%	1.0%	0.3%
Manufacture of coke and refined petroleum products	1.6%	0.7%	0.6%
Oil-intensive manufacturing	1.4%	0.6%	0.4%
Other industry	1.4%	0.6%	0.3%
Construction	1.2%	0.6%	0.1%
Non-oil intensive manufacturing	0.9%	0.5%	0.4%
Financial services and insurance	0.7%	0.3%	0.2%
Electricity, gas, steam and air conditioning supply	0.7%	0.3%	0.1%
Wholesale and retail trade	0.3%	0.1%	0.0%
Water transport	0.3%	0.1%	0.0%
Land transport	0.2%	0.1%	0.0%
Other service activities	0.0%	0.0%	-0.1%
Government	-0.1%	-0.1%	0.0%
Extraction of crude petroleum and natural gas	-7.9%	-4.0%	-2.2%

Source: PwC analysis

oil-intensive manufacturing and construction sectors all experience an expansion in output of around 1-2% of sector GVA. The coke and refined petroleum manufacturing sector also expands by around 1.6% in Scenario 1. Although the oil intensity of this sector is relatively high, the impact of the oil price fall is dampened due to its close linkages with the oil and gas extraction sector, which is negatively affected. Manufacturing sectors that are relatively oil-intensive and energy-intensive, such as the manufacturing of cement, industrial gases and chemical

products, metals, machinery and equipment and wood products, also experience an increase in output due to the fall in the oil price.

The benefits to manufacturers would not be uniformly positive and a reduction in oil prices could generate winners and losers. For instance, sectors that use large volumes of imported materials could benefit as transportation costs fall and overseas suppliers pass on the benefits they obtain from lower oil prices. However, sectors that operate in export markets may experience

⁶ The increase in demand for supplier inputs also leads to an increase in input prices.

increased competition from businesses who can now compete on price in these markets due to lower production and transportation costs.

The role of the transport sector, whether it be by land, sea or air, will be critical in determining the scale of any economic impacts from oil price reductions. Transport services are critical in facilitating trade within the UK and internationally. More specifically, although land transport is fairly oil-intensive, it is also a highly competitive sector. This means that although overall output volumes have increased, the reduction in oil prices could increase the number of new entrants to the sector, or force incumbents to expand the services they offer, thereby squeezing overall industry margins.

Our modelling also suggests that the construction sector could also gain significantly from a reduction in the oil price. As business investment rises following the rise in intermediate demand and consumer spending, we would expect the construction sector to be the key beneficiary. In order to expand, businesses will need to move to new premises, enlarge existing premises or engage in refurbishment, and the construction sector will be the primary provider of these services.

The financial services sector will experience a small positive impact on output as it facilitates the reallocation of capital and other resources to the sectors that want to invest in response to rising levels of demand. In general, oil-intensive sectors are likely to benefit from the reallocation of capital and resources at the expense of less oil-intensive sectors that deliver relatively lower returns to investors.

More generally the impact on the “other services” sector will be largely neutral. These sectors will benefit through increased demand for their products from other sectors of the economy that are expanding as well as increased consumer spending. However, the businesses in this sector may find increased competition for scarce resources, e.g. skilled labour and investment, which may limit their capacity to respond to this increased demand. A similar effect occurs in the public sector – growth in the sector is constrained by government spending plans, and the sector finds it difficult to retain skilled workers who leave for higher wages in the expanding sectors.

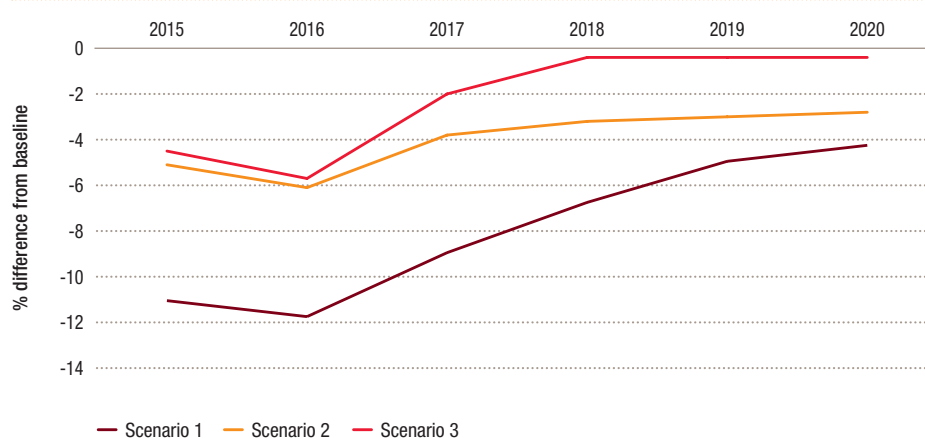
Although the fall in the oil price is associated with an increase in household spending, the wholesale and retail trade sector does not reflect all of the increase in spending as this sector only captures the value associated with activities related to the distribution, not the production, of manufactured goods.

Therefore, most of the value generated from increased household spending is reflected in the manufacturing and agriculture sectors. The primary product produced by the agriculture sector is food and raw material for clothing, so agriculture is therefore expected to experience a rise in demand associated with increased consumer spending. Similarly the manufacturing sector benefits because it produces consumer durables and clothing.

However, while these sectors may benefit from lower fuel costs, we have not taken into account any adverse corresponding economic effects that might dampen economic performance in these sectors and reduce their ability to pass on lower oil prices to their customers, e.g. a weaker outlook in the Eurozone may restrict their ability to invest.

The oil and gas extraction sector is most heavily impacted by the fall in oil prices (see Figure 3.7) and is the one sector

Figure 3.7: Oil and gas extraction sector - impact on level of real GVA, 2015-2020



Source: PwC analysis

that loses out significantly in terms of GVA. The industry is likely to face further cost pressures as highlighted in the recent Activity Survey published by Oil & Gas UK, which shows the costs of operating in the UK Continental Shelf rising by 8% in 2014, and production costs increasing from £17/barrel to £18.50/barrel.⁷

In Scenario 1, the oil and gas extraction sector suffers a severe contraction in output and employment during the first two years following a reduction in the oil price, with higher cost producers exiting the industry or scaling back their operations. A permanent reduction in the oil price could reduce the level of GVA in this sector by around 8% on average between 2015 and 2020, with a peak output loss of around 12% in 2016.

In Scenarios 2 and 3, where the oil price returns to a higher level, the oil and gas extraction sector could suffer a smaller contraction in output, which might moderate over time. The oil price will also have a negative effect on investment and exploration activity by the sector. There is some risk that a significant downturn could affect the ability of the industry to invest in major infrastructure (such as hub platforms and pipelines), causing the exploration of smaller and more technically difficult fields to become uneconomic.

Although the fall in the oil price is permanent, it triggers an increase in demand for oil as it is now a cheaper input. The fall in the oil price also narrows the growing spread between oil and gas prices, which slows the rate of switching from oil to gas, or to renewable sources of energy in the longer-term as

the cost saving incentives to do so are lessened. The increase in economic activity in other sectors also leads to a subsequent increase in the demand for oil. This rebound effect means that the contraction in output experienced by the oil and gas sector slows over time.

Table 3.2: Increase in total UK employment relative to baseline, 2016 vs 2020

Oil price scenario	2016	2020
Scenario 1 (staying at \$50)	121,000	91,000
Scenario 2 (rising to \$73 by 2020)	53,000	37,000
Scenario 3 (rising to \$108 by 2020)	11,000	3,000

Source: PwC analysis

Table 3.3: Impact on level of employment by sector, 2020, in thousands of full time equivalents

In thousands	Scenario 1	Scenario 2	Scenario 3
Construction	20.2	8.0	0.7
Wholesale and retail trade	18.9	7.8	0.7
Agriculture, forestry and fishing	13.4	5.3	0.5
Oil-intensive manufacturing	12.8	5.0	0.5
Land transport	10.9	4.5	0.4
Financial services and insurance	6.9	2.7	0.3
Non-oil intensive manufacturing	5.9	2.4	0.2
Other industry	4.4	1.8	0.2
Other service activities	2.1	0.9	0.1
Air transport	1.8	0.8	0.1
Electricity, gas, steam and air conditioning supply	1.2	0.5	0.0
Manufacture of coke and refined petroleum products	0.2	0.0	0.0
Water transport	0.0	0.0	0.0
Government	-4.2	-1.8	-0.1
Extraction of crude petroleum and natural gas	-2.9	-1.2	-0.1

Source: PwC analysis

7 Oil & Gas UK "Activity Survey 2015"

Impact on employment

The fall in the oil price will have a positive impact on employment, which is associated with increased levels of economic activity. The increased productivity and profitability among UK businesses that benefit from the fall in the oil price will increase demand for labour and capital, which, in turn increases wages and investment returns. Higher wages attract more workers into employment in these sectors, and unemployment falls.

Table 3.2 shows the increase in employment relative to the baseline for the UK economy in our three scenarios. The employment impacts peak in 2016 and moderate over time as the effects of lower oil prices filter through the economy. If there is a permanent reduction in the oil price, the economy will see an increase in employment of around 90,000 by 2020. The employment effects are smaller where the fall in the oil price is temporary: in Scenarios 2 and 3, the total number of jobs increases by around 37,000 and 3,000 respectively by 2020.

Table 3.3 shows the employment impacts by sector in thousands of jobs. The construction sector will see the largest increase in employment in absolute terms, followed by the wholesale and retail trade sector, and agriculture. The oil-intensive manufacturing sectors will also see an additional 13,000 jobs if the fall in the oil price is permanent. In percentage terms however (see Table 3.4), the agriculture, air and land transport sectors will experience the largest percentage increases in employment. As outlined above these sectors benefit from a rise in consumer spending. Both the agriculture and retail sectors

provide an entry point into the labour market for part-time or lower skilled workers, which make it relatively easier for these sectors to attract new workers and meet the predicted demand increase. The lower input costs for the manufacture of coke and refined petroleum also means that the sector will see an increase in employment of around 1.6% where the fall in the oil price is permanent. As described in the preceding section, the public sector experiences a fall in employment as public sector employees move to the faster-growing private sectors where wages are now higher.

The fall in the oil price will have a positive impact on employment.

Table 3.4: Impact on level of employment by sector, 2020, in % difference from 2013

% difference from 2013	Scenario 1	Scenario 2	Scenario 3
Agriculture, forestry and fishing	2.9%	1.2%	0.1%
Air transport	2.6%	1.1%	0.1%
Land transport	2.3%	0.9%	0.1%
Manufacture of coke and refined petroleum products	1.6%	0.6%	0.1%
Construction	1.6%	0.6%	0.1%
Other industry	1.5%	0.5%	0.1%
Oil-intensive manufacturing	1.4%	0.5%	0.0%
Electricity, gas, steam and air conditioning supply	0.8%	0.3%	0.0%
Financial services and insurance	0.7%	0.3%	0.0%
Non-oil intensive manufacturing	0.5%	0.2%	0.0%
Wholesale and retail trade	0.4%	0.2%	0.0%
Other service activities	0.0%	0.1%	0.0%
Government	-0.1%	0.0%	0.0%
Water transport	-0.1%	0.0%	0.0%
Extraction of crude petroleum and natural gas	-7.9%	-3.1%	-0.3%

Source: PwC analysis

Impact on inflation

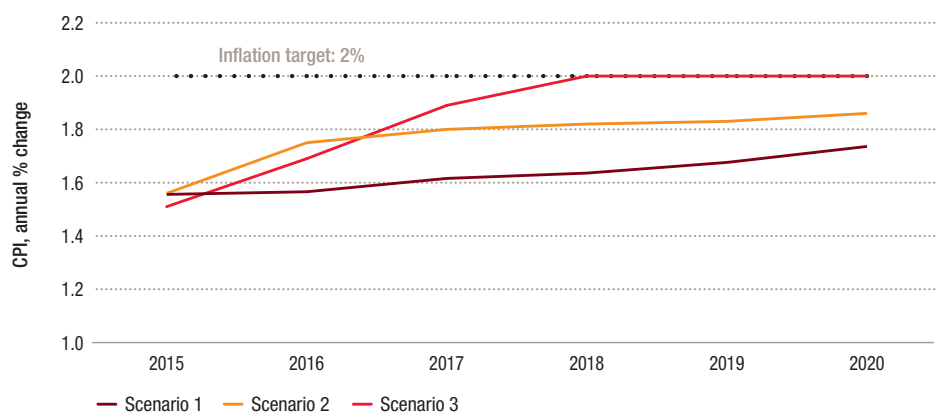
The lower cost of production from the fall in oil price across a range of energy-intensive goods will be passed on to consumers to varying degrees, and so reduce inflation directly as is already apparent in the latest CPI figures. Although the increase in real GDP and aggregate demand will exert upward pressure on prices, this is offset by the cost savings that translate into lower consumer prices. Figure 3.8 shows the modelled impact of negative oil price shocks on consumer price inflation in our three scenarios, relative to a baseline where inflation remained on target at 2%. Note that this ignores other factors that may affect inflation, so it is illustrative of how oil price changes alone affect inflation, rather than being forecasts of what we think inflation will actually be (for which readers should refer to Section 2 above).

Impact on household spending

Figure 3.9 shows average household expenditure per week on various goods and services. Expenditure on power and fuel (including for personal vehicles) account for around 11% of total weekly spend, or £50 per week.

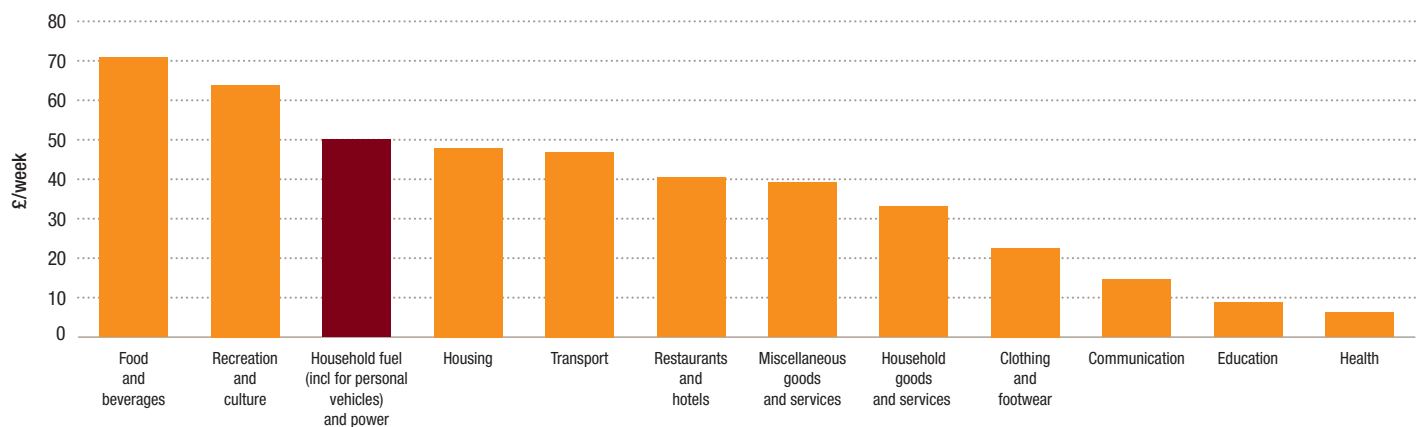
Our modelling suggests that consumers benefit overall from the reduction in oil prices as businesses pass on cost savings to consumers in the form of cheaper goods and services. However, less than 1% of electricity in the UK is generated from petroleum, so the fall in the oil

Figure 3.8: Impact on CPI inflation relative to baseline target level, 2015-2020



Source: PwC analysis

Figure 3.9: Household expenditure, average per week, 2013



Source: ONS

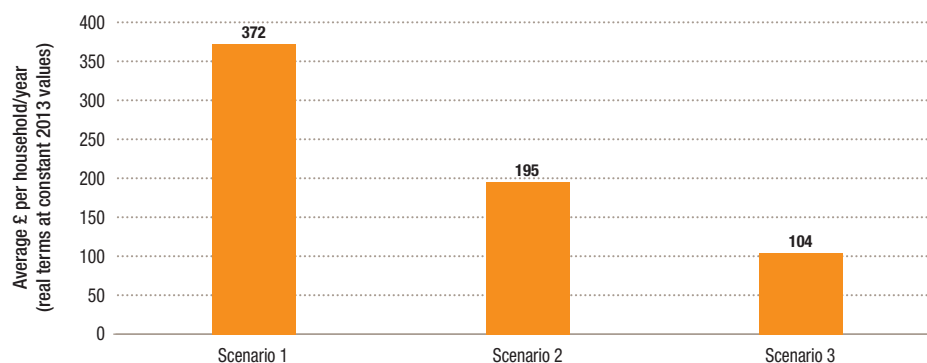
price will only have a minimal impact on the household electricity bills. Households should also benefit as the increase in demand for labour in fast-expanding sectors should increase the overall level of wages in the economy, thus increasing their spending power. This is offset slightly by the subsequent increase in prices due to the increase in demand for consumer goods and services, but the overall net impact is an increase in real household spending.

Figure 3.10 shows the impact on household spending in real terms as a result of the fall in the oil price. In Scenario 1, the persistently low oil price will enable household consumption to rise by an additional £372 a year in real terms on average between 2015 and 2020. Where the fall in the oil price is temporary, the impact on real household spending is smaller, increasing by £195 and just over £100 a year on average in Scenarios 2 and 3 respectively.

Impact on the trade deficit

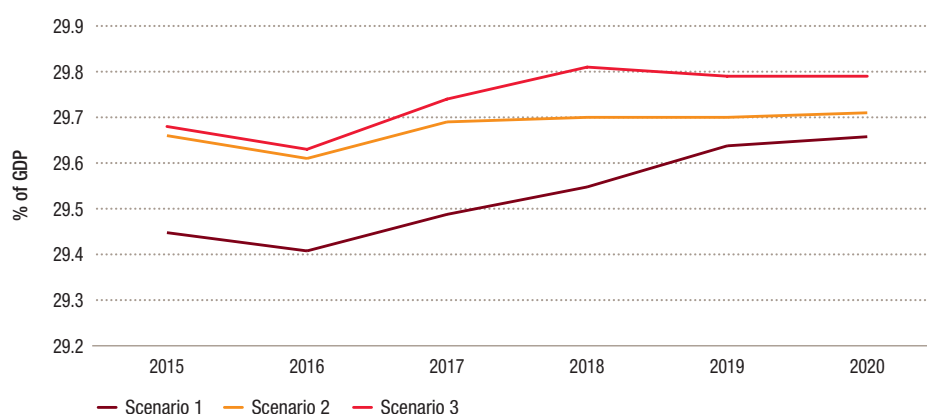
Figure 3.11 shows the impact on UK exports as a percentage of GDP, as a result of the fall in oil prices. As a net importer of crude oil and oil products, the fall in the oil price will provide a small benefit to the UK by narrowing the trade deficit. In Scenario 1, the expansion in other sectors also leads to an increase in exports. However, the value of exports decreases in the short-run as the wealth effect from the fall in the oil price means that more goods and services are being consumed domestically. This effect also explains why the impact on UK exports is less apparent in Scenario 1 in comparison to Scenarios 2 and 3.

Figure 3.10: Impact on real household spending average over 2015-2020



Source: PwC analysis

Figure 3.11: UK exports in different oil price scenarios, 2015-2020



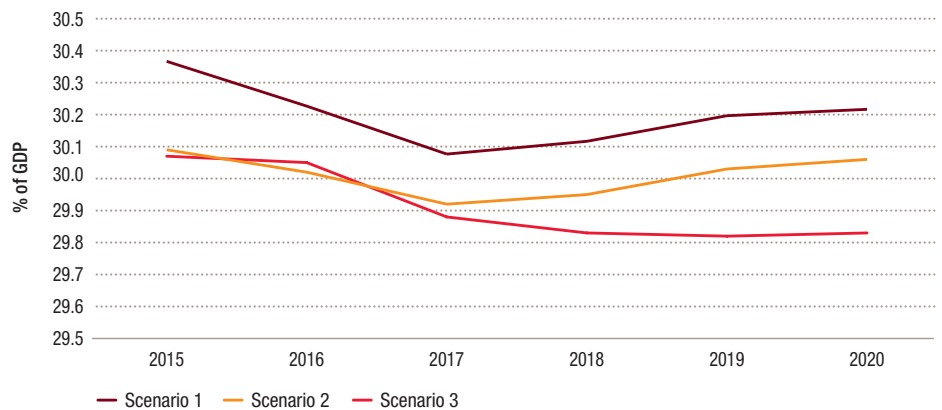
Source: PwC analysis

Figure 3.12 shows the impact on UK imports. Imports decline initially as the cost of oil imports fall. In the longer-term, although UK firms experience an improvement in international competitiveness and exports increase, this also generates wealth, part of which will be spent by households on increasing their consumption, including imported goods. This means that the impact on net exports is dampened as overall economic growth in the UK also drives up imports. On balance, our results suggest that the UK will enjoy a small narrowing of the trade deficit as a result of the fall in the oil price.

Impact on UK government revenues

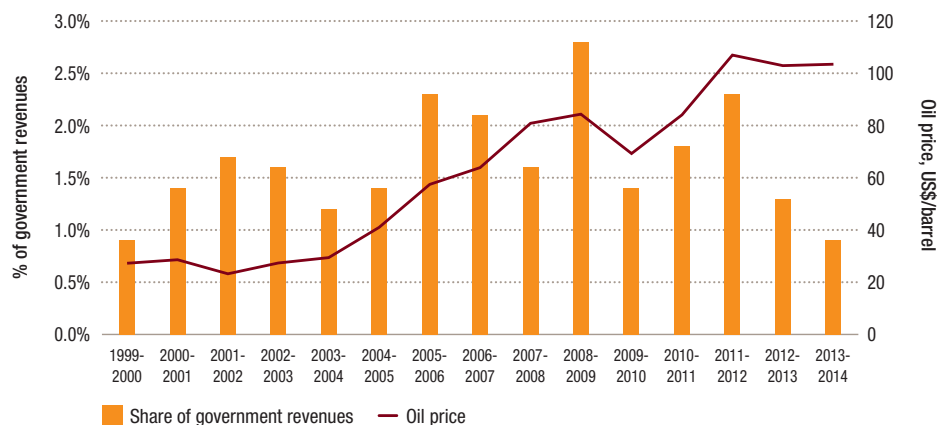
The UK oil and gas fiscal regime applies to exploration for, and production of, oil in the UK and on the UK Continental Shelf. This currently consists of corporation tax, the supplementary charge and the petroleum revenue tax. Figure 3.13 shows the trends in government tax receipts from the oil and gas sector compared to trends in oil prices. Up until fiscal year 2011-12, the share of government revenues from the UK oil and gas sector broadly followed trends in oil prices. However, this relationship began to decouple in recent years as significant declines in oil production and increasing costs led to a reduction in tax revenues from the sector. In 2012-13, tax revenues fell by around 45% to £6.1 billion, and then fell again in the following year by around 25% to £4.7 billion due to lower production levels and higher expenditure. These trends are linked to the increasing maturity of the North Sea fields as oil and gas from marginal sites become more expensive and difficult to extract.

Figure 3.12: UK imports in different oil price scenarios, 2015-2020



Source: PwC analysis

Figure 3.13: Revenues from the UK oil and gas sector



Source: ONS, Thomson Reuters

Our analysis suggests that the reduction in oil price will have a small positive impact on overall government tax revenues (see Figure 3.14). Although tax revenues from the oil and gas sector are likely to decline, rising tax contributions from other sectors of the economy will more than offset this loss as they expand. In Scenario 1, the UK government receives £6.7 billion on average in additional tax revenues between 2015 and 2020, which is around 1.4% of total tax revenues. The additional tax impacts from a temporary fall in the oil price are smaller – at around £3.2 billion and £1.3 billion in Scenarios 2 and 3 respectively.

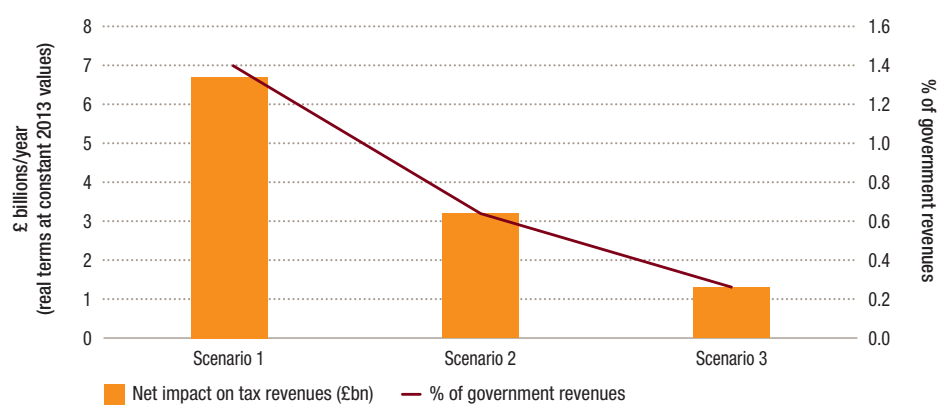
In our model we assume that the overall increase in government tax receipts is transferred back to consumers via lump-sum transfers, which provide a further boost to consumer spending and economic output.

3.4 – Summary and conclusions

The fall in the oil price should have a significant positive impact on the UK economy by increasing overall economic activity as the cost of production decreases for businesses, especially for those that are dependent on oil inputs. Although the oil and gas extraction sector is negatively affected by the reduction in the oil price, sectors such as agriculture, air transport, coke and refined petroleum manufacturing and oil-intensive manufacturing sectors will benefit as the price of a key input falls.

Water transport and other services sectors will enjoy a small positive impact. However, oil-intensive sectors are likely to benefit from the reallocation of capital and resources at the expense of less oil-intensive sectors.

Figure 3.14: Net impact on government tax revenues per annum, average over 2015-20



Source: PwC analysis

Future oil price trends remain highly uncertain, so we have looked at three alternative scenarios. In a case where the reduction in the oil price is persistent, the size of the UK economy increases by around 1% on average relative to the baseline between 2015 and 2020. Employment also increases by around 90,000 by 2020.

In contrast, the impacts are much smaller where the fall in the oil price is wholly or partially temporary: in these scenarios the average impact on the level of GDP is 0.2-0.5%, with employment effects in 2020 of between 3,000 and 37,000 depending on how far and fast oil prices rebound.

Real household incomes also rise, which increases consumer spending. As a result of growing economic activity, government tax revenues increase as the tax take from corporate and personal income taxes increase by more than the loss of North Sea oil and gas revenues.

In summary, lower oil prices should be positive for most sectors of the UK economy, households and the government. But the scale of these benefits remains highly uncertain depending on how oil prices evolve from here.

Technical Appendix:

Modelling oil price changes

Table 3.5 sets out the oil price projections for each scenario in our analysis.

As part of our modelling exercise, we also undertook a literature review of studies on the impact of an oil price shock on oil importing countries. Cournede (2010) found that an increase in the real oil price of 65% reduces US potential output by 1.3%, implying an elasticity of output to the oil price of around -0.02. The author found similar estimates for the EU where a 59% increase in the real oil price reduces EU potential output by 0.7%, which implies an elasticity of around -0.01. A more recent study by the Bank of England (2013) shows that an increase in oil price of around 10% leads to a reduction in output of around 0.2% in UK.

These estimates vary widely, depending on the oil intensity of the economy, dependence on energy imports and methodology. We compared the estimates of elasticities from the academic literature with our analysis, and found that our results were in line with most other estimates. These are summarised in Table 3.6.

Table 3.5: Oil price scenarios, US\$/barrel

Scenario	2015	2016	2017	2018	2019	2020
Baseline	108	108	108	108	108	108
Scenario 1	50	50	50	50	50	50
Scenario 2	57	64	68	71	72	73
Scenario 3	60	68	76	85	96	108

Note: Oil prices calculated as an average of Brent crude, WTI and Dubai.

Table 3.6: Estimates from academic literature compared to PwC estimates

Reference	Impact of a 1% increase in oil prices on GDP, %	Time period
PwC study	Scenario 1: -0.024% Scenario 2: -0.015% Scenario 3: -0.010%	5 years (projected)
Bank of England (2013) ⁸	UK: -0.02	36 years (1975-2011)
Peersman and Van Robays (2012) ⁹	US: -0.04 Euro area: -0.04	22 years (1986-2008)
Cournede (2010) ¹⁰	US: -0.02% EU: -0.01%	3 years (2007-2009)
Duval and Vogel (2008) ¹¹	OECD: -0.03%	10 years (projected)
Barrell and Kirby (2008) ¹²	UK: -0.04%	2 years (2008-2009)
Blanchard and Gali (2007) ¹³	UK (1970-1983): -0.1% UK (1984-2007): -0.02%	37 years (1970-2007)

⁸ Millard, S. and Shakir, T. (2013) "Oil shocks and the UK economy: the changing nature of shocks and impact over time", Bank of England Working Paper No. 476, August 2013.

⁹ Peersman, G. and Van Robays, I. (2012) "Cross-country differences in the effects of oil shocks", Energy Economics, Volume 34, Issue 5, September 2012, Pages 1532-1547

¹⁰ Cournede, B. (2010) "Gauging the impact of higher capital and oil costs on potential output", OECD Economics Department Working Papers No. 789, July 2010.

¹¹ Duval, R. and Vogel, L. (2008) "Oil price shocks, rigidities and the conduct of monetary policy", OECD Economics Department Working Papers No. 603, April 2008.

¹² Barrell, R. and Kirby, S. (2008) "The budgetary implications of global shocks to cycles and trends in output: impacts of housing, financial and oil shocks", October 2008.

¹³ Blanchard, O. and Gali, J. "The macroeconomic effects of oil price shocks: why are the 2000s so different from the 1970s?", NBER working papers No. 13368, 2007.

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