

China and the United Kingdom: Economic Relationships

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The NIESR Landscape Series will examine key economic and financial relationships between the UK and the rest of the world. In light of changing relations with the EU, the need to rebuild following the Covid-19 crisis but also the increasingly important impact on the world economy from emerging economies, as well as the challenges of climate change, we need to understand more fully the external influences on domestic economic outcomes. This occasional series will document the extent of national linkages but also present results synthesised from a variety of primary and secondary sources. We wish to stimulate debate on our findings and encourage better economic policy making that will support firm planning and ultimately benefit UK households.

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Executive summary

- China's remarkable growth has transformed the global pattern of **world production, trade and investment**, and has caused large changes in the industrial structures of North America, Europe (including the UK) and Japan. China and its neighbours have become the 'workshop of the world' (sections 3, 4 and 8).
- China's growth has been accompanied by high savings and the accumulation of massive foreign exchange reserves invested in low-risk financial assets. China has acted as a powerful force in **depressing interest rates** worldwide (section 3).
- China is more than a massive source of cheap labour. Huawei is a leading producer of **5G network equipment**. There is no US producer. Huawei is involved in building the UK's 5G network, but its share is capped at 35%, and Huawei is banned from certain sites. The US is pressing the UK to impose a complete ban, as in the US itself, Australia and New Zealand (section 5).
- The number of Chinese students at **UK universities** has more than trebled since 2006, and is now about 115,000, more than from the entire EU. Their fees are at least £1.7 billion a year. There are 13 Higher Education institutions where more than 10% of the students are Chinese and which would therefore be particularly vulnerable to any loss of Chinese students. Some 16,000 pupils at **UK independent schools** are from China and Hong Kong, 28% of the non-UK total (section 6). Chinese tourists to the UK spent £1.7 billion in 2019 (section 8).
- China General Nuclear Power Group has taken a 33.5% stake in the £20 billion **nuclear power station at Hinkley Point C**, and is participating in planning for the replacement of nuclear power stations that are nearing the end of their useful lives (section 7).

- Mainland China's **financial structure** is substantially leveraged and widely regarded as unsustainable. Foreign exposures to China are relatively modest. China's attempts to establish the **RMB as a global currency** have included the setting up of an extensive network of swap lines. The objective has not as yet been achieved. London is the main trading centre in the west (sections 9 and 10).
- Our simulations of a '**China shock**' – a sustained 6% fall in demand in China – suggest that the impact on the UK might be about 1% of GDP, perhaps lasting for several years. Simulation of a **trade war between the USA and China** suggest that the effect on UK GDP would be modest. **Restrictions on trade between the UK and China** – a possible outcome of the Huawei debate – would depress GDP and put upward pressure on inflation, so that interest rates would increase (section 12).

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Table of Contents

| | |
|---|----|
| Executive summary | 2 |
| 1. Introduction | 5 |
| 2. Population, employment and use of the English language..... | 5 |
| 3. The economic effects of China’s emergence on the United Kingdom..... | 7 |
| 4. International trade..... | 10 |
| 5. Information and communication technologies..... | 20 |
| 6. Education | 23 |
| 7. Electricity generation and nuclear power in the UK..... | 29 |
| 8. Tourism | 31 |
| 9. Direct investment | 32 |
| 10. Finance..... | 33 |
| 11. Chinese participation in the international monetary system..... | 38 |
| 12. Economic dependence of the UK on China | 39 |

1. Introduction

This paper sets out salient aspects of the economic relationships between China and the UK, and describes some model simulations. Virtually all of the available facts are pre-Covid-19. It is impossible at this stage to assess the economic consequences of Covid-19; but it appears that the United Kingdom has been much worse affected than China: 628 deaths per million of population, compared to only 3.¹ Even in Hubei province, deaths per million of population have been no more than 77.²

2. Population, employment and use of the English language

Populations and age structures are shown in table 1

Table 1 China and United Kingdom: population in 2019 (millions; percentages of totals in brackets)

| | Total | Up to 14 (1) | 15 – 64 (1) | 65 and over |
|----------------|-------|--------------|-------------|-------------|
| Mainland China | 1,400 | 235 (16.8) | 989 (70.7) | 176 (12.6) |
| UK | 67 | 13 (19.0) | 42 (62.5) | 12 (18.5) |

(1) The UK data include 15-year olds in column 3, not column 4

Sources:

China, National Bureau of Statistics -

<http://data.stats.gov.cn/easyquery.htm?cn=C01&zb=A0301&sj=2019>.

UK -

<https://www.ons.gov.uk/peoplepopulationandcommunity/populationandmigration/populationestimates/bulletins/annualmidyearpopulationestimates/mid2019#main-points>

The UK economy (like that of Hong Kong) is much more service-oriented than that of China (Table 2).

¹ Source: worldometers.info, 23rd June 2020.

² As at 13th May. Source: Wikipedia, 23rd June 2020.

Table 2. Employment by industry, UK and China (thousands).

| | UK (2019) | | Mainland China (2019) | |
|---------------|-----------|------------|-----------------------|------------|
| | Numbers | Percentage | Numbers | Percentage |
| Total | 32,603 | | 774,710 | |
| Agriculture | 342 | 1.05% | 194,452 | 25.10% |
| Manufacturing | 2,994 | 9.18% | 213,045 | 27.50% |
| Service | 29,267 | 89.77% | 367,213 | 47.40% |

| | HK (2018) | | Taiwan (2019) | |
|---------------|-----------|------------|---------------|------------|
| | Numbers | Percentage | Numbers | Percentage |
| Total | 3,900 | | 11,500 | |
| Agriculture | - | - | 559 | 4.9% |
| Manufacturing | 86 | 2.2% | 3,066 | 26.6% |
| Service | 3,814 | 97.8% | 7,875 | 68.5% |

Notes: Agriculture (SIC, A). Manufacturing (SIC, C). Others belong to Service industry.

Sources:

UK -

<https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/datasets/employmentbyindustryemp13>

Mainland China, National Bureau of Statistics - <http://data.stats.gov.cn/easyquery.htm?cn=C01>

HK - <https://www.gov.hk/en/about/abouthk/factsheets/docs/employment.pdf>

Taiwan - <https://eng.stat.gov.tw/ct.asp?xItem=12683&ctNode=1609>

Surveys in China, some of them dating back to 2000, suggest that a third of the population have studied at least one foreign language, and that of those, 95% – about 390 million - have studied English. However, in a survey conducted in 2006, only 7.3% of those who had studied English said they used it ‘often’, and 23.3% ‘sometimes’.³

In the 2011 UK Census, there were 393,141 people from the Chinese ethnic group in England and Wales, making up 0.7% of the total population.⁴

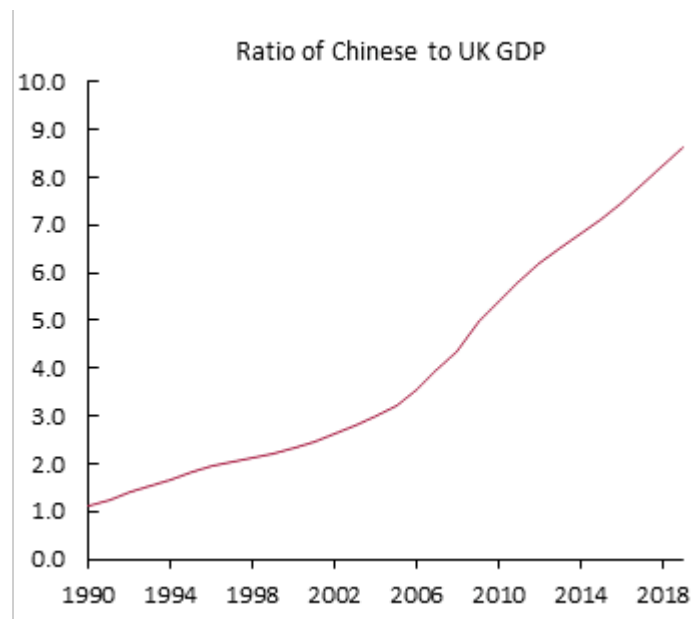
³ Wei and Su (2012).

⁴ <https://www.ethnicity-facts-figures.service.gov.uk/summaries/chinese-ethnic-group>

3. The economic effects of China's emergence on the United Kingdom

After the end of the Cold War, China emerged as the world's second economic powerhouse. And by 2011, it had become the second largest economy in the world. Figure 1 illustrates its importance by showing the ratio of Chinese to UK GDP from 1990 to 2020. Whereas the UK has broadly kept its position in the world pecking order at around in the top half dozen or so economies, China has become an economic and political superpower.

Figure 1



Source: IMF, World Economic Outlook Database, April 2020; NIESR. Ratio is calculated at PPP exchange rates.

The main driver of this growth, based on the development of substantive enabling infrastructure and planned regional development, has been the extensive construction of manufacturing and assembly plants as China, along with the Emerging Far East, has become 'the workshop of the world'. As far as the UK is concerned, there are three main economic consequences from this rapid growth.

First, the development of so much finished good manufacturing and much of the global supply chain in China has meant a re-orientation of activity for the UK. Many consumer and intermediate goods now have a large proportion of their value added created in China. Even

accounting for transport costs, this has placed downward pressure on the prices of traded goods both in the retail sector and the producer sector where costs have been contained. While this has been a benefit for consumers of goods and the control of unit labour costs and inflation, it has had some other implications. Table 3 shows the huge increase in trade with China compared to trade with the rest of the world and the reduction in manufactured employment.

Table 3. Import values and manufacturing shares of employment in five countries

| | 2000 | 2003 | 2006 | 2009 | 2012 | 2015 |
|--|-------|-------|-------|-------|-------|-------|
| <i>Goods imports from China (2000=100)</i> | | | | | | |
| UK | 100 | 151 | 278 | 326 | 423 | 473 |
| US | 100 | 152 | 284 | 287 | 412 | 468 |
| Germany | 100 | 167 | 371 | 457 | 606 | 611 |
| France | 100 | 156 | 312 | 428 | 554 | 538 |
| Italy | 100 | 167 | 348 | 417 | 498 | 485 |
| <i>Goods imports from the A8 (2000=100)</i> | | | | | | |
| UK | 100 | 185 | 407 | 313 | 564 | 604 |
| US | 100 | 122 | 162 | 123 | 238 | 315 |
| Germany | 100 | 165 | 212 | 234 | 322 | 348 |
| France | 100 | 154 | 306 | 379 | 464 | 430 |
| Italy | 100 | 148 | 287 | 339 | 361 | 375 |
| <i>Goods imports from the World (2000=100)</i> | | | | | | |
| UK | 100 | 114 | 173 | 144 | 204 | 187 |
| US | 100 | 101 | 149 | 125 | 182 | 180 |
| Germany | 100 | 119 | 182 | 186 | 230 | 209 |
| France | 100 | 117 | 171 | 174 | 215 | 182 |
| Italy | 100 | 125 | 186 | 174 | 205 | 173 |
| <i>Manufacturing share of employment</i> | | | | | | |
| UK | 0.137 | 0.114 | 0.099 | 0.087 | 0.084 | 0.080 |
| US | 0.141 | 0.121 | 0.112 | 0.100 | 0.101 | 0.102 |
| Germany | 0.196 | 0.191 | 0.181 | 0.178 | 0.176 | 0.174 |
| France | 0.136 | 0.129 | 0.118 | 0.109 | 0.101 | 0.097 |
| Italy | 0.199 | 0.191 | 0.183 | 0.174 | 0.164 | 0.157 |

Source: OECD Structural Analysis Database and COMTRADE.

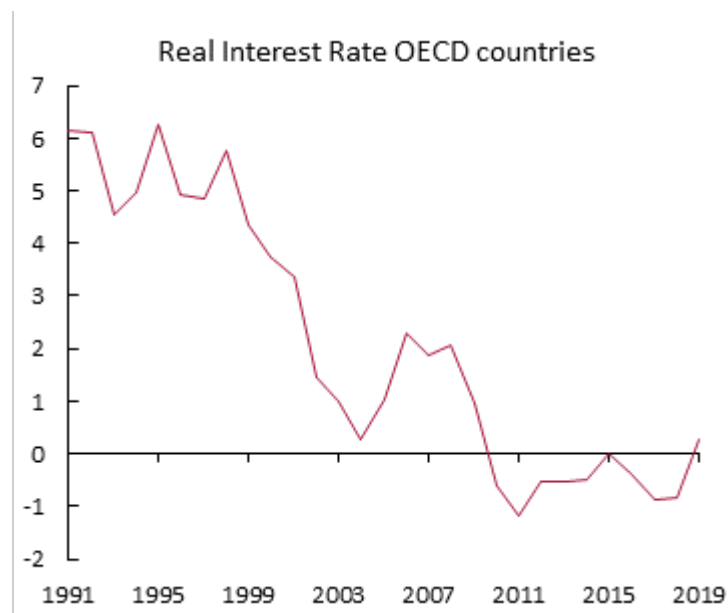
Note: Import values measured in dollars relative to 2000. Values in 2000 differ across countries. The absolute level of imports differs across countries. For example, in 2000, German goods imports from the A8 were 38.2bn USD and UK goods imports from the A8 were 4.8bn USD.

Secondly, the process of trade specialisation has augmented welfare globally with the Chinese economy a particular beneficiary. But increases in trade in the manufactured sector have accelerated the loss of jobs in the UK in that sector. The manufacturing sector now accounts for some 11-12% of UK GDP, down from some 25% in the 1970s and directly for some 9% of employment. This process has had two direct consequences for the UK. Most obviously with so many manufacturing jobs lost there has been a need to develop a national and regional strategy for regeneration in many areas. This should involve some re-training and the designation of development zones with long run financial support. It has also focussed our attention on those industries and sectors that are able to compete internationally, such as

pharmaceuticals and finance. These industries also depend on sustained levels of global demand to support their activities.

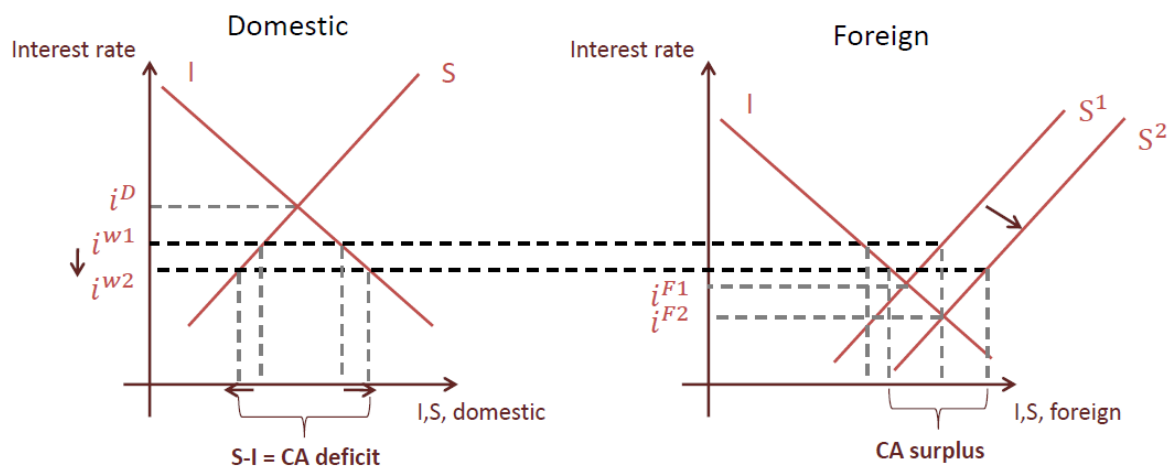
Thirdly, world real interest rates have been pushed down along a secular trend led to a large degree by China (Figure 2). Countries in fast growing economies with a high propensity to save will generate export surpluses and re-cycle those savings abroad. The resulting rise in global savings has depressed real interest rates (Figure 3). This development has contributed to the chronic UK current account deficit. But it also provided a considerable fillip to global asset prices, including in particular UK housing, where supply is constrained but demand has sharply increased alongside a reduction in borrowing costs. This has contributed to high levels of household and firm-level indebtedness that both stand at around 80% of GDP.

Figure 2



Source: NiGEM database.

Figure 3 The effect of increasing global saving on real interest rates



In effect China, in a world of a shortage of risk-free assets, behaves in a risk averse manner, lending large volumes of funds to advanced economies, such as the UK. The UK has a positive net position in overseas equities and direct investment assets, and a negative net position in debt; it is thus absorbing risk from the rest of the world. In effect, the UK has been borrowing from countries such as China, which are risk averse, and using the proceeds to buy overseas equity.

4. International trade

Trade between mainland China and the UK has grown consistently fast since the 1990s. Total Sino-UK exports and imports increased from £6 billion in 1999 to £80 billion in 2019.⁵ It is important to note that the statistics of trade in goods record goods transported between China and the UK via a third country – e.g. a port in the EU – as UK trade with the third country, not with China. The statistics therefore seriously understate China’s importance as a trade partner. Subject to that proviso, direct trade with mainland China accounts 5.6% of total UK trade, and China is now the fifth largest trading partner of the UK and the second largest non-EU partner after US (Table 4). Mainland China is the third largest market for UK exports of goods and services, and one of the fastest growing (Figure 4 and Table 5). The UK still has a

⁵ Source: ONS.

bilateral trade deficit with mainland China, but it has been narrowed by about one fourth since 2016 (Figure 4).

Table 4

Top 10 UK trading partners in 2019 (exports plus imports of goods and services¹), not seasonally adjusted

| Rank | Partner country | £ billion | % of total trade |
|------|----------------------------|-----------|------------------|
| 1 | United States ² | 230.3 | 16.2% |
| 2 | Germany | 136.6 | 9.6% |
| 3 | Netherlands | 93.9 | 6.6% |
| 4 | France | 90.3 | 6.3% |
| 5 | China | 80.4 | 5.6% |
| 6 | Ireland | 62.8 | 4.4% |
| 7 | Spain | 53.4 | 3.8% |
| 8 | Italy | 47.9 | 3.4% |
| 9 | Belgium | 47.1 | 3.3% |
| 10 | Switzerland | 39.1 | 2.7% |
| | EU ¹ | 672.5 | 47.3% |
| | Non-EU ¹ | 750.6 | 52.7% |
| | World ¹ | 1,423.1 | 100.0% |

Source: [ONS UK trade, experimental quarterly trade in goods and services tables: October to December 2019](#), next release: [ONS UK trade, experimental quarterly trade in goods and services tables: January to March 2020](#).

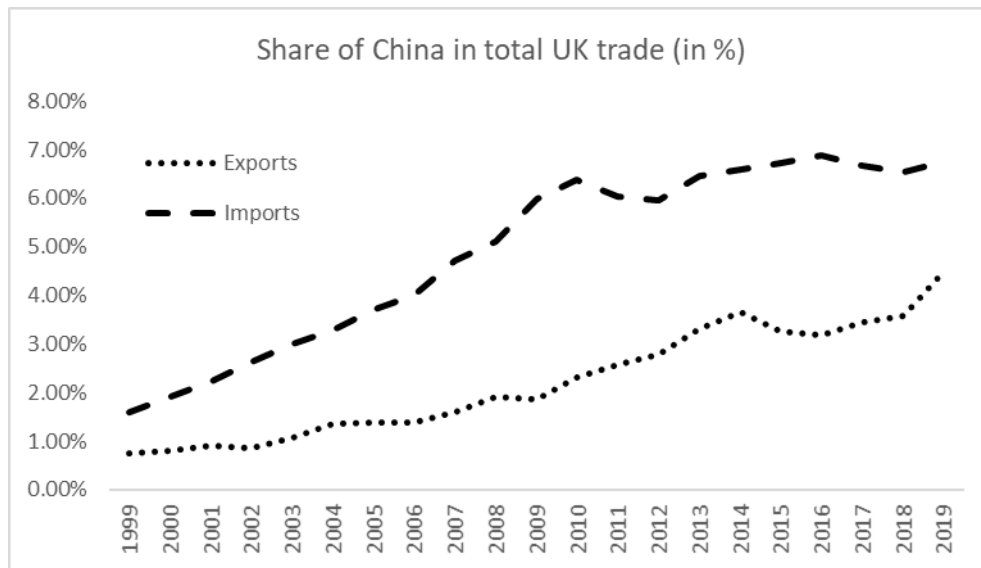
Table 5

Fastest-growing⁵ markets for UK exports of goods and services⁴ between 2010 and 2019

| Rank | Export market | Value in 2019 ⁵ £ billion | Growth 2010-19 ⁵ (%) |
|------|-----------------|---|------------------------------------|
| 1 | North Macedonia | 1.6 | 487.9% |
| 2 | Malta | 1.9 | 222.9% |
| 3 | China | 31.4 | 199.0% |
| 4 | Qatar | 4.5 | 177.4% |
| 5 | Philippines | 1.1 | 147.1% |
| 6 | Kazakhstan | 1.9 | 132.5% |
| 7 | Gibraltar | 2.0 | 124.0% |
| 8 | South Korea | 6.7 | 123.9% |
| 9 | Hong Kong | 13.5 | 118.1% |
| 10 | Kuwait | 2.6 | 117.3% |

Source: [ONS UK trade, experimental quarterly trade in goods and services tables: October to December 2019](#), next release: [ONS UK trade, experimental quarterly trade in goods and services tables: January to March 2020](#).

Figure 4 Shares of mainland China in the UK total trade, 1999-2019.



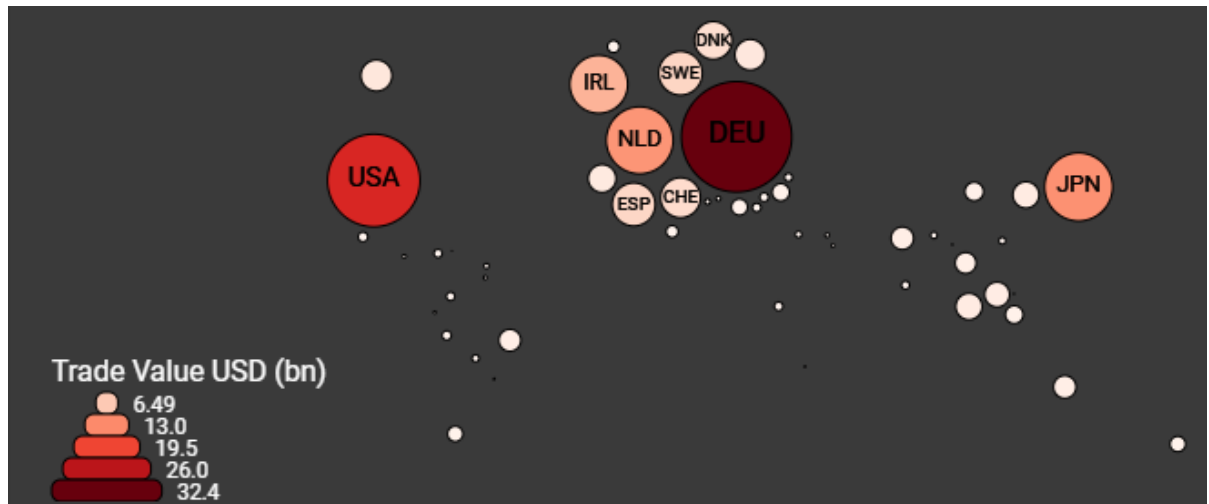
Source: NIESR calculations based on ONS data. Data in current prices.

a. Trade in goods

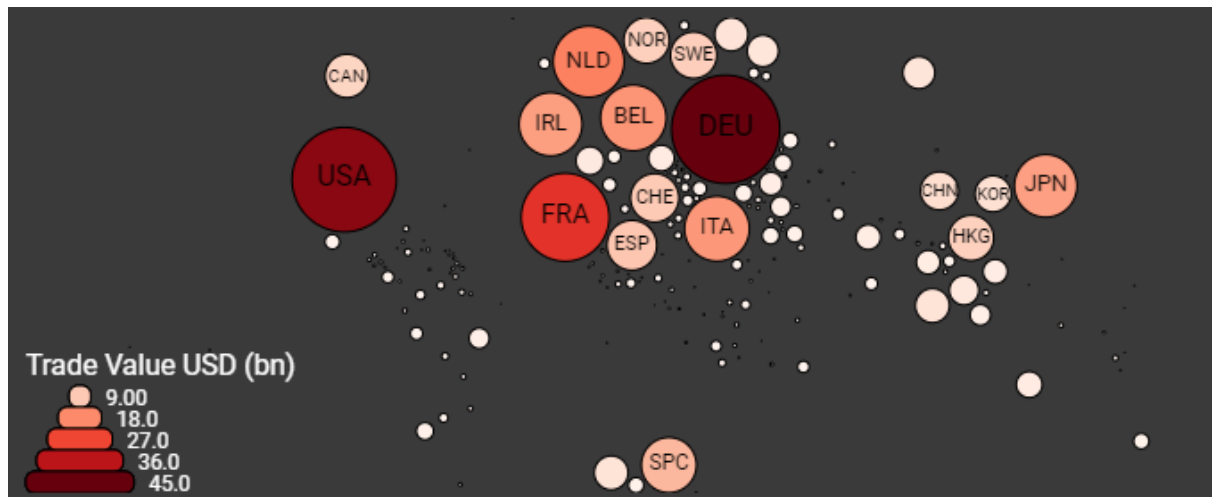
The changing pattern of UK trade in goods since the 1990s is illustrated by a series of world bubble maps (Figure 5). Mainland China (CHN) has emerged from nowhere in 1992 to become a medium-sized partner (though still smaller than Hong Kong) in 1999 and a major partner from 2009 onwards. Hong Kong's former role as springboard in Sino-UK goods trade has been largely eclipsed.

Figure 5 UK World Trade Bubble Map 1992, 1999, 2009, 2019

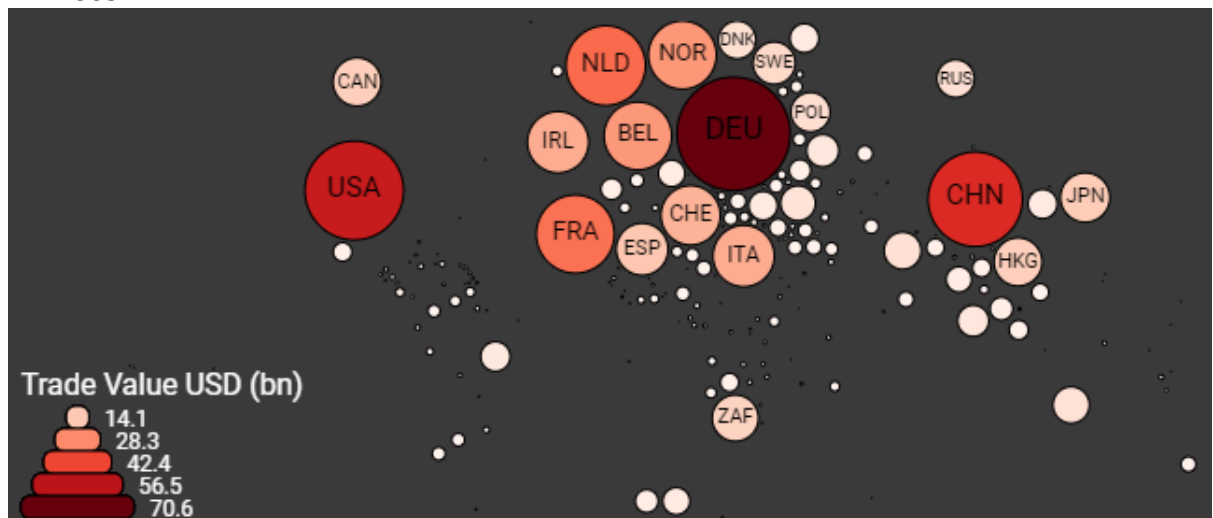
i. 1992



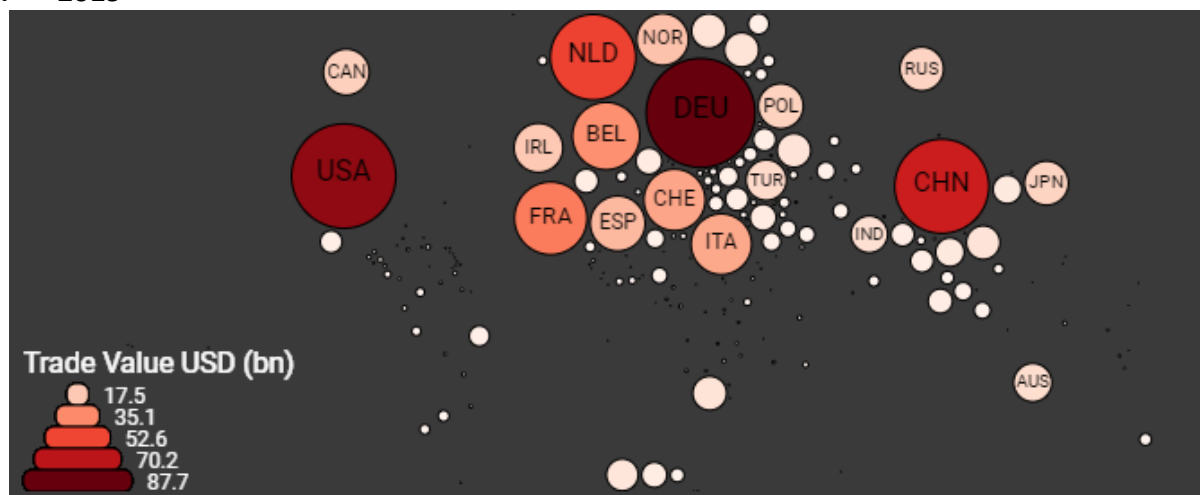
ii. 1999



iii. 2009



iv. 2019



Source: NIESR, Coriolis Ltd

Table 6 shows changes in UK goods trade directly with China between 1999 and 2019. Between 2016 and 2019, UK exports to China almost doubled, while imports from China increased by 19%.

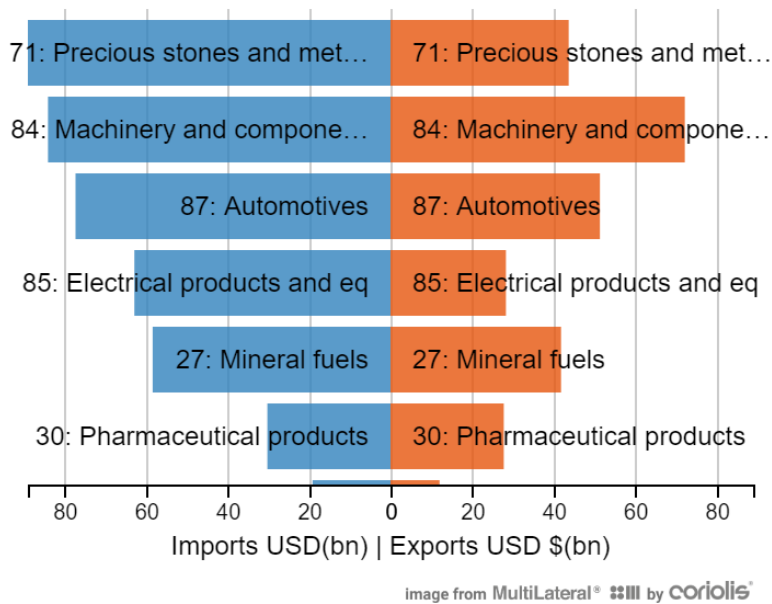
Table 6 UK direct goods trade with China, 1999 and 2019 (£ bns)

| | UK imports from China | UK exports to China |
|------|-----------------------|---------------------|
| 1999 | 4.0 | 1.4 |
| 2019 | 46.9 | 25.8 |

Source: ONS

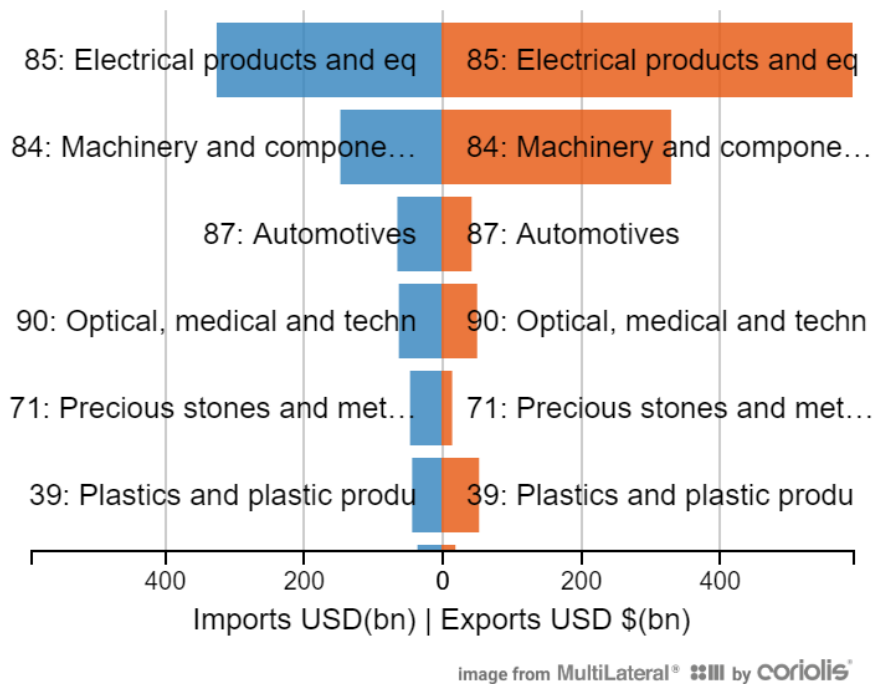
Figure 6 shows the industries which were most prominent in UK international trade in goods in 2019. They include machinery, electrical products, automotive, aircraft and precious metals and pharmaceuticals, as well as oil. And Figure 7 shows that machinery and electrical products were China’s leading export industries in 2019.

Figure 6 Main industries in UK international trade, 2019



Source: Coriolis Ltd

Figure 7 Main industries in Chinese international trade, 2019



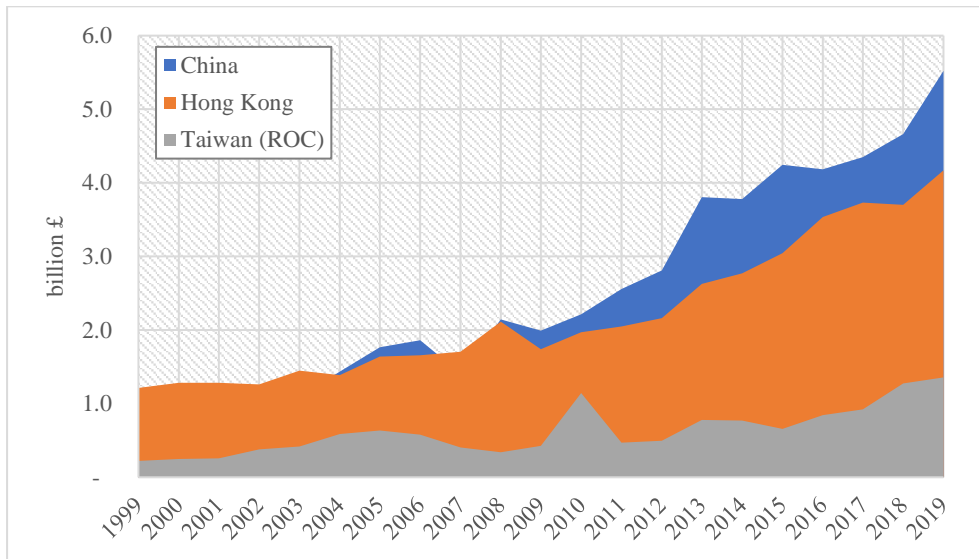
Source: Coriolis Ltd

b. Trade in services

Trade in services between the UK and China has been growing steadily over the past two decades (Figures 8 and 9). While China’s accession to the WTO in 2001 only had moderate

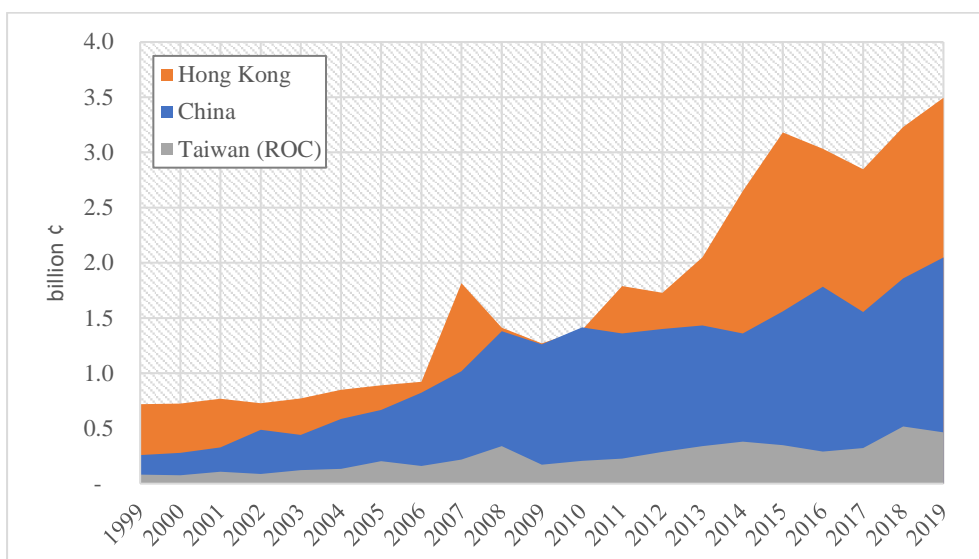
effects on services trade, trade picked up particularly after 2012. This coincided with the adoption of the *EU-China 2020 Strategic Agenda for Cooperation* in 2013, and the first currency swap deal between the Bank of England and the People’s Bank of China in the same year (section 10).

Figure 8 UK exports to China, Hong Kong and Taiwan (ROC), in billion £, 1999-2019.



Source: NIESR calculations based on ONS data. Data in current prices.

Figure 9 UK imports from China, Hong Kong and Taiwan (ROC), in billion £, 1999-2019.



Source: NIESR calculations based on ONS data. Data in current prices.

Bilateral trade in services was higher than ever before in 2019. Service exports from the UK to China, Hong Kong and Taiwan reached £5.5 billion, £4.2 billion and £1.4 billion, respectively – in all cases the highest amounts on record (Table 7). Conversely, UK imports of services reached £2 billion from China, £3.5 billion from Hong Kong and £0.5 billion from Taiwan.

Table 7 UK services trade with China, Hong Kong and Taiwan (ROC), in billion £, in current prices, 1999-2019.

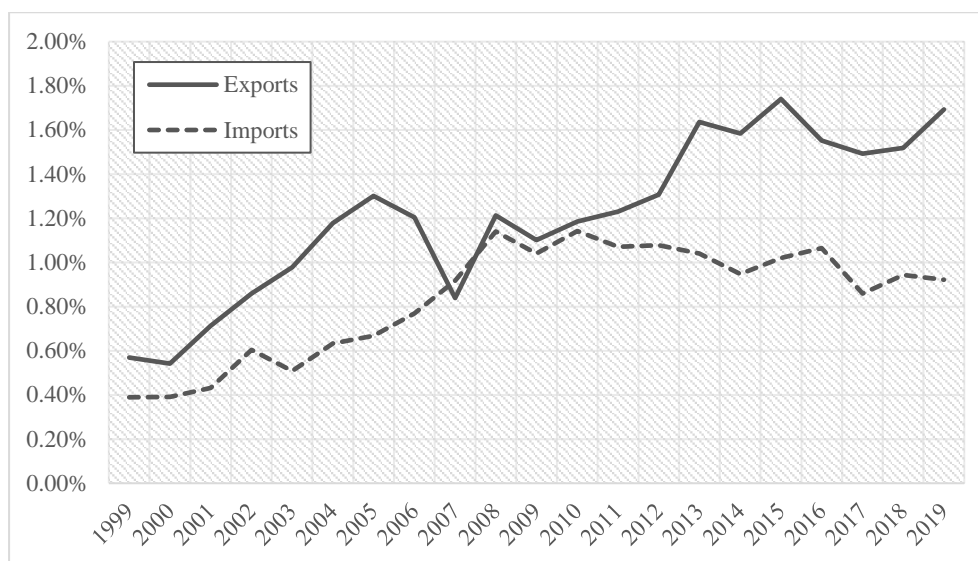
| | China | | Hong Kong | | Taiwan | |
|------|-------|-----|-----------|-----|--------|-----|
| | EX | IM | EX | IM | EX | IM |
| 1999 | 0.5 | 0.3 | 1.2 | 0.7 | 0.2 | 0.1 |
| 2000 | 0.5 | 0.3 | 1.3 | 0.7 | 0.2 | 0.1 |
| 2001 | 0.7 | 0.3 | 1.3 | 0.8 | 0.3 | 0.1 |
| 2002 | 0.9 | 0.5 | 1.3 | 0.7 | 0.4 | 0.1 |
| 2003 | 1.1 | 0.4 | 1.4 | 0.8 | 0.4 | 0.1 |
| 2004 | 1.4 | 0.6 | 1.4 | 0.9 | 0.6 | 0.1 |
| 2005 | 1.8 | 0.7 | 1.6 | 0.9 | 0.6 | 0.2 |
| 2006 | 1.9 | 0.8 | 1.7 | 0.9 | 0.6 | 0.2 |
| 2007 | 1.4 | 1.0 | 1.7 | 1.8 | 0.4 | 0.2 |
| 2008 | 2.1 | 1.4 | 2.1 | 1.4 | 0.3 | 0.3 |
| 2009 | 2.0 | 1.3 | 1.7 | 1.3 | 0.4 | 0.2 |
| 2010 | 2.2 | 1.4 | 2.0 | 1.4 | 1.1 | 0.2 |
| 2011 | 2.6 | 1.4 | 2.1 | 1.8 | 0.5 | 0.2 |
| 2012 | 2.8 | 1.4 | 2.2 | 1.7 | 0.5 | 0.3 |
| 2013 | 3.8 | 1.4 | 2.6 | 2.0 | 0.8 | 0.3 |
| 2014 | 3.8 | 1.4 | 2.8 | 2.7 | 0.8 | 0.4 |
| 2015 | 4.2 | 1.6 | 3.0 | 3.2 | 0.7 | 0.4 |
| 2016 | 4.2 | 1.8 | 3.5 | 3.0 | 0.8 | 0.3 |
| 2017 | 4.4 | 1.6 | 3.7 | 2.8 | 0.9 | 0.3 |
| 2018 | 4.7 | 1.9 | 3.7 | 3.2 | 1.3 | 0.5 |
| 2019 | 5.5 | 2.0 | 4.2 | 3.5 | 1.4 | 0.5 |

Notes: EX = exports, IM = imports

Source: ONS

China is also becoming a relatively more important export destination for UK services. China's share in total UK services exports increased from 0.6% in 1999 to 1.7% in 2019 (see Figure 10). China also grew in relative importance as a source of UK services imports up to 2008, when it accounted for 1.1% of the total, but the percentage has declined since then, to 0.9% in 2019.

Figure 10 Share of mainland China in total UK services trade, 1999-2019.



Source: NIESR calculations based on ONS data.

As shown in Table 8, in 2019, the main recorded service exports from the UK to China were other business services (£1.2 billion)⁶, intellectual property (£1.1 billion), personal travel, (£870 million), sea transportation (£450 million), financial services (£380 million), architectural, engineering, scientific and other technical services (£340 million), and information services (£330 million). The figure for personal travel seems implausibly low, bearing in mind that it includes education of students from China in UK schools and universities (section 6); it appears not to capture all the relevant expenditure.

On the import side the main categories included other business services (£960 million), sea transportation (£350 million), personal travel (£300 million), and professional and management consulting services (£200 million).

⁶ This includes Technical, trade-related and other business services, Professional and management consulting services, and R&D services.

Table 8 UK exports and imports from China by service category, in million £, in current prices, 2016-19.

| | | Service exports | | | | Service imports | | | |
|--------|--|-----------------|------|------|------|-----------------|------|------|------|
| | | 2016 | 2017 | 2018 | 2019 | 2016 | 2017 | 2018 | 2019 |
| 0 | Total Services | 4185 | 4351 | 4661 | 5522 | 1785 | 1555 | 1860 | 2049 |
| 1 | Manufacturing | 11 | 3 | .. | 0 | 100 | 152 | 90 | 16 |
| 2 | Maintenance and Repair | 27 | 33 | 55 | 81 | 8 | .. | 3 | 0 |
| 3 | Transportation | 983 | 915 | 905 | .. | 367 | 361 | 463 | 457 |
| 3.1 | Sea transportation | 489 | 446 | 415 | 448 | 265 | 256 | 352 | 346 |
| 3.2 | Air transportation | 214 | 216 | 218 | 222 | 86 | 89 | 98 | .. |
| 3.3 | Other modes of transportation | 4 | 4 | 4 | .. | 0 | 0 | 0 | 0 |
| 3.4 | Postal and courier services | 276 | 249 | 268 | .. | 16 | 16 | 13 | .. |
| 4 | Travel | 1316 | 891 | 950 | 1019 | 451 | 352 | 311 | 337 |
| 4.1 | Business travel | 253 | 143 | 136 | 151 | 54 | 39 | 35 | 35 |
| 4.2 | Personal travel | 1063 | 748 | 814 | 868 | 397 | 313 | 276 | 302 |
| 5 | Construction | 39 | 32 | .. | .. | 14 | 11 | 51 | 9 |
| 5.1 | Construction abroad | .. | 15 | .. | .. | 6 | 5 | 6 | .. |
| 5.2 | Construction in the reporting economy | .. | 17 | .. | .. | 8 | 6 | 45 | .. |
| 6 | Insurance and Pension | 109 | 107 | 105 | 105 | 0 | 1 | .. | 6 |
| 6.1 | Direct insurance | 96 | 87 | 91 | .. | 0 | 0 | 0 | 0 |
| 6.2 | Reinsurance | 4 | 4 | 4 | 4 | 0 | 0 | 0 | 0 |
| 6.3 | Auxiliary insurance services | 9 | 16 | 10 | .. | 0 | 1 | .. | 6 |
| 6.4 | Pension and standardised guarantee services | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7 | Financial | 348 | 399 | 362 | 380 | 52 | 49 | 57 | 78 |
| 7.1 | Explicitly charged and other financial services | 252 | 250 | 212 | 236 | 52 | 49 | 57 | 78 |
| 7.2 | Financial intermediation services indirectly measured (FISIM) | 96 | 149 | 150 | 144 | 0 | 0 | 0 | 0 |
| 8 | Intellectual property | 168 | 511 | 730 | 1134 | 4 | 12 | .. | 12 |
| 9 | Telecommunications, computer and information services | 233 | 232 | 281 | 331 | 60 | 53 | 64 | 118 |
| 9.1 | Telecommunications services | 88 | 111 | 140 | .. | 36 | 28 | 38 | .. |
| 9.2 | Computer services | 60 | 47 | 45 | .. | 4 | 7 | 12 | .. |
| 9.3 | Information services | 85 | 74 | 96 | 167 | 20 | 18 | 14 | .. |
| 10 | Other Business Services | 747 | 967 | 984 | 1183 | 679 | 503 | 751 | 959 |
| 10.1 | Research and development services | 83 | 227 | 121 | .. | 115 | 135 | 219 | .. |
| 10.1.1 | Work undertaken on a systematic basis to increase the stock of knowledge | 70 | 220 | 114 | .. | 115 | 126 | 206 | .. |
| 10.1.2 | Other research and development services | 13 | 7 | 7 | 0 | 0 | 9 | 13 | 0 |
| 10.2 | Professional and management consulting services | 186 | 195 | 248 | 296 | 164 | 135 | 177 | 200 |
| 10.2.1 | Legal, accounting, management consulting and public relations | 138 | 164 | 197 | 256 | 137 | 104 | 127 | 150 |
| 10.2.2 | Advertising, market research and public opinion polling | 48 | 31 | 51 | 40 | 27 | 31 | 50 | 50 |
| 10.3 | Technical, trade-related and other business services | 478 | 545 | 615 | .. | 400 | 233 | 355 | .. |
| 10.3.1 | Architectural, engineering, scientific and other technical services | 193 | 263 | 322 | 341 | 16 | 22 | 69 | .. |
| 10.3.2 | Waste treatment and de-pollution, agricultural and mining services | 4 | .. | 1 | .. | 0 | 1 | 3 | 0 |
| 10.3.3 | Operating leasing services | 0 | .. | 0 | 0 | 8 | 1 | 7 | 0 |
| 10.3.4 | Trade-related services | 8 | 33 | 23 | .. | 28 | 44 | 59 | .. |
| 10.3.5 | Other business services not included elsewhere | 273 | 236 | 269 | 346 | 348 | 165 | 217 | 255 |
| | (of which) Intragroup Fees and Cost Recharges | 18 | 28 | 21 | 40 | 85 | 36 | 55 | 76 |
| | (of which) Procurement Services | 0 | 4 | 0 | 0 | 4 | 4 | .. | .. |
| | (of which) Services between affiliated enterprises, n.i.e | 152 | 144 | .. | .. | 145 | 79 | .. | .. |
| 11 | Personal, Cultural and Recreational | 95 | 145 | 128 | 159 | 2 | .. | 9 | 9 |
| 11.1 | Audiovisual and related services | 17 | 26 | 21 | .. | 0 | .. | 4 | 3 |
| 11.2 | Other personal, cultural, and recreational services | 78 | 119 | 107 | .. | 2 | 0 | 5 | 6 |
| 12 | Government | 109 | 116 | 117 | 144 | 48 | 54 | 49 | 48 |

Source: ONS

5. Information and communication technologies

A modern economy is a digital and data-driven economy. Economic growth increasingly takes the form more of increasing product quality and less of increasing product quantities. The ongoing Covid-19 pandemic has demonstrated how much we were already relying on digital technologies, as well as how far we are from exploiting their full potential. While the previous wave of digitalisation was mainly driven by internet-based services focussed on consumers via websites, apps and smartphones (internet search, social networks, online shopping/platforms), there are indications that the next wave is likely to be driven by companies via internet-of-things (IoT), automation and data analytics – also termed the ‘Fourth Industrial Revolution’.⁷

5G, cloud computing and artificial intelligence are key technologies that enable a future competitive digital economy. It is only a question of when – not if – 5G will become the standard mobile technology around the globe. The new standard is not only vastly faster than previous technologies such as 4G, but also enables completely new use-cases, and hence new business models due to much higher available bandwidth, lower latency rates (delay in signal responses), higher potential density of devices in an area, and improved energy efficiency.⁸ These use-cases include autonomous driving, augmented- and virtual reality, communications, cloud gaming, and use of IoT sensors in factories, or ‘smart cities’, among others.⁹ As an enabling (or ‘general-purpose’) technology, 5G is likely to benefit a large number of sectors across the economy, including manufacturing, transportation & logistics, and healthcare.¹⁰ Considering the large number of potential use-cases across many different sectors also makes an assessment of the likely economic implications challenging. It is clear, however, that a delay in developing the latest digital infrastructure has clear negative implications for economic competitiveness.

⁷ Klaus Schwab, 12 Dec 2015: <https://www.foreignaffairs.com/articles/2015-12-12/fourth-industrial-revolution>

⁸ Reviewed in “Enabling 5G in the UK”, Ofcom, 9 March 2018:

<https://www.ofcom.org.uk/spectrum/information/innovation-licensing/enabling-5g-uk>

⁹ A full overview of value creation via 5G is provided by GSMA in “The 5G Guide”, April 2019:

https://www.gsma.com/wp-content/uploads/2019/04/The-5G-Guide_GSMA_2019_04_29_compressed.pdf

¹⁰ Reviewed by WEF in “Repository of use cases: The Impact of 5G: Creating New Value across Industries and Society”, November 2019: http://www3.weforum.org/docs/WEF_The_Impact_of_5G.pdf

A study by IHS Markit puts the contribution of 5G on global economic output at US\$13.2 trillion by 2035 (roughly 10% of global gross product in 2019), with its supply chain alone contributing \$3.6 trillion and supporting 22.3 million jobs.¹¹ The European Commission estimates that by 2025, 5G will contribute around €62.5 billion to automotive, healthcare, transport, and utilities sectors in the EU.¹² Additional benefits of €50 billion would arise for businesses, consumers and the environment via smart city benefits, smart homes, and IoT devices at the workplace.

With Huawei, China is home to one of the leading providers of network equipment necessary to build 5G networks. The other major providers are Nokia of Finland and Ericsson of Sweden, but there is no US vendor. The US government is pressuring the UK to adopt a full ban. This puts the UK in a difficult position as it wants to build a competitive digital infrastructure but not jeopardise its 'special relationship' with the US and 'five eyes' intelligence alliance.¹³

In January 2020 the UK government confirmed its designation of Huawei as a 'high risk vendor', arguing that under China's 2017 National Intelligence Law the company could be ordered to act in a way that is harmful to the UK.¹⁴ This means that Huawei's involvement in building the UK's 5G network is capped at 35% market share and banned from core sites of the network as well as sensitive sites including nuclear and military applications. Over the last decade, the UK's annual imports of communications equipment from China increased from around £1 billion in 2010 to £2.4 billion in 2019.¹⁵ Huawei has commercial contracts with all major operators in the UK,¹⁶ and currently supplies around a third of wireless antennas and

¹¹ IHR Markit, "The 5G Economy", November 2019: <https://www.qualcomm.com/media/documents/files/ihs-5g-economic-impact-study-2019.pdf>

¹² European Commission, "Identification and quantification of key socio-economic data to support strategic planning for the introduction of 5G in Europe", February 2017: <https://op.europa.eu/en/publication-detail/-/publication/2baf523f-edcc-11e6-ad7c-01aa75ed71a1/language-en>

¹³ FT, "Boris Johnson toughens stance on Huawei after Trump lobbying", 4 December 2019: <https://www.ft.com/content/b4bbd218-16a2-11ea-8d73-6303645ac406>

¹⁴ UK National Cyber Security Centre (NCSC), 28th January 2020: https://www.ncsc.gov.uk/guidance/ncsc-advice-on-the-use-of-equipment-from-high-risk-vendors-in-uk-telecoms-networks#section_5

¹⁵ Data from Comtrade. Based on HS code 851762 "Communication apparatus (excluding telephone sets or base stations); machines for the reception, conversion and transmission or regeneration of voice, images or other data, including switching and routing apparatus".

¹⁶ Huawei press release, 16th December 2019: <https://www.huawei.com/en/news/2019/12/huawei-5g-innovation-experience-centre-london>

around 40% of the equipment that is used for high-speed fibreoptic networks in the UK.¹⁷ According to BT alone, this cap already implies costs of £500 million since the company will have to remove Huawei equipment from its existing 4G network, which is the basis for the new 5G network.¹⁸

Fresh US sanctions on Huawei (imposed in May 2020) prevent the company from using microchips made with US technology. It is possible the UK's National Cyber Security Centre could change its advice to the government and recommend to exclude Huawei entirely from the country's 5G network. The sanctions could be used as a 'technical reason' by the UK government to argue that Huawei's equipment is no longer safe and reverse its January decision on Huawei.¹⁹

From an economic viewpoint, eliminating Huawei from the UK's 5G infrastructure market could be expected to lead to higher prices and delays in roll-out. A study commissioned by Huawei and conducted by Oxford Economics concludes that restricting Huawei from helping to build the UK's 5G infrastructure market would increase rollout costs by 9-29%.²⁰ Moreover, it estimates that by 2023 around 4-10 million people less would have access to 5G with the overall negative economic impact on UK GDP by 2035 of between \$1.8-11.8 billion. To date there are no other major studies publicly available on the economic impact of banning Huawei from building parts of the UK's 5G infrastructure, including from the UK government.

The cloud computing market in the UK is dominated by US providers, including Amazon Web Services, Microsoft, Google, and IBM. The increasing importance of cloud services, and the absence of competitive UK providers, means that they will mainly be traded. Alibaba – the

¹⁷ Bloomberg, "U.S. Escalation Against Huawei Could Wreck U.K.'s 5G Compromise", 26 May 2020, <https://www.bloomberg.com/news/articles/2020-05-26/u-s-escalation-against-huawei-could-wreck-u-k-s-5g-compromise>

¹⁸ Reuters, "BT warns of 500 million pounds hit from British limits on Huawei", 30 January 2020, <https://uk.reuters.com/article/uk-bt-outlook/bt-warns-of-500-million-pounds-hit-from-british-limits-on-huawei-idUKKBN1ZT0MJ>

¹⁹ FT, "The UK should bar Huawei from its 5G network", 5 July 2020, <https://www.ft.com/content/4fe3a612-f430-43dd-ad89-8f319ca80e8b>

²⁰ Oxford Economics, "The Economic Impact of Restricting Competition in the 5G Infrastructure Market", December 2019: <https://www.oxfordeconomics.com/recent-releases/Economic-Impact-of-Restricting-Competition-in-5G-Network-Equipment>.

leading Chinese cloud service provider – officially launched its UK cloud in November 2018 and operates two data centres in London. While Alibaba had a global market share of around 7.7% in the cloud infrastructure market in 2018, figures for the UK are not publicly available.²¹ It is safe to estimate that they will be significantly lower as Alibaba is a major competitor mainly in China and the Asia-Pacific region.²²

After the US, China is a global leader in Artificial Intelligence, particularly when it comes to adoption of AI in companies, access to data, and access to computing hardware.²³ The ambition of China to become the global leader in AI has been clear latest with the launch of China's "A Next Generation AI Development Plan" in June 2017.²⁴ Considering the UK's own ambitions in developing AI²⁵, there could be opportunities for bilateral trade with China in both directions.

6. Education

In 2015 the British Council spoke of a 'golden future for the UK and China', reflecting a boost in bilateral ties promoted by the Cameron government and building on a 2013 report about 'culture means business' (British Council 2013 and 2015). The argument centred on direct and indirect economic benefits of cultural cooperation: first of all, people from overseas who have experienced British culture are significantly more likely and more interested in doing business with the UK. Secondly, those people also rate the country more highly as a destination that offers business opportunities – including universities and schools (often for the children of Chinese businesspeople).

²¹ Gartner, July 2019: <https://www.gartner.com/en/newsroom/press-releases/2019-07-29-gartner-says-worldwide-iaas-public-cloud-services-market-grew-31point3-percent-in-2018>

²² However, much of the ICT equipment needed to equip datacenters (e.g. services, switches, routers) are made in China and imported to the UK.

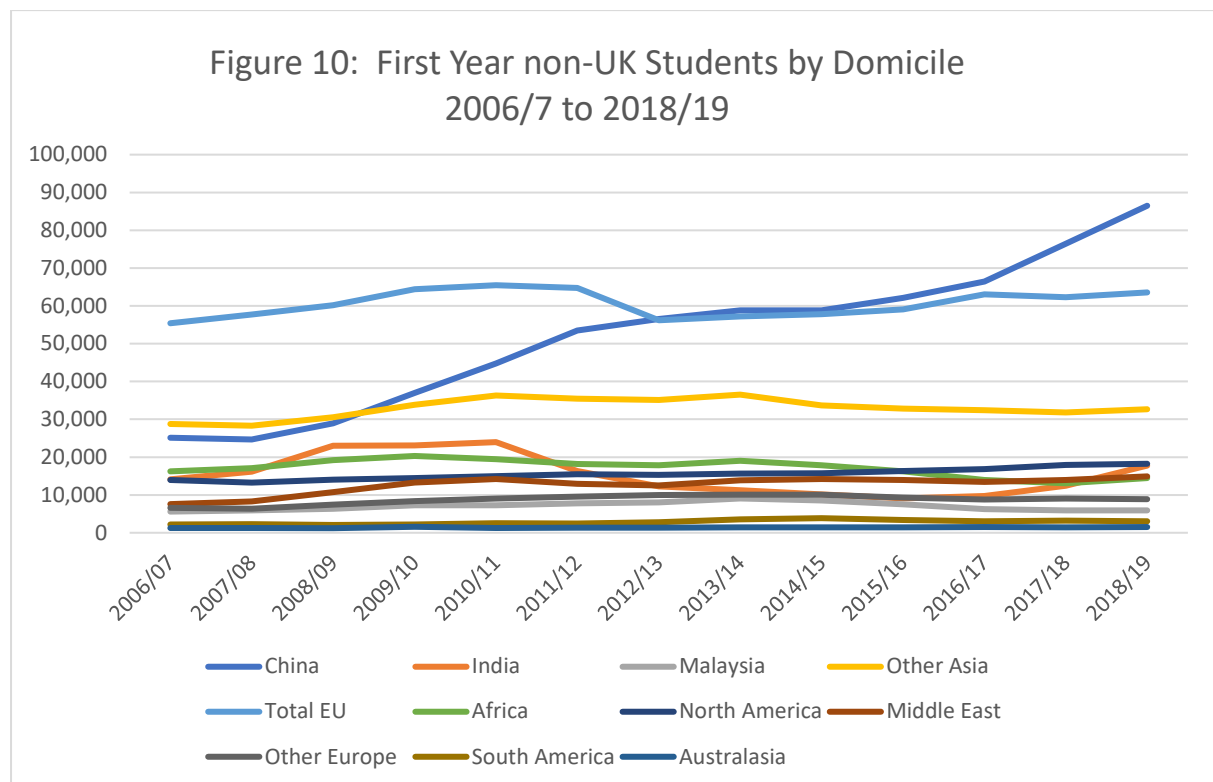
²³ Centre for Data Innovation, "Who is Winning the AI Race: China, the EU or the United States?", August 2019: <https://www.datainnovation.org/2019/08/who-is-winning-the-ai-race-china-the-eu-or-the-united-states/>.

²⁴ English translation available here: <https://flia.org/notice-state-council-issuing-new-generation-artificial-intelligence-development-plan/>.

²⁵ UK government, AI Sector Deal, May 2019: <https://www.gov.uk/government/publications/artificial-intelligence-sector-deal/ai-sector-deal>.

a. Chinese students at UK universities

Figure 10 shows the numbers of new university students arriving in the UK from 2006 to 2019. The numbers coming from nearly all countries other than China have remained broadly stable, but the numbers coming from China have risen significantly – from 25,000 in 2006 to nearly 90,000 by 2019 (House of Commons 2020). Some put the total number at about 115,000 – depending on how Higher Education (HE) institutions are counted and on whether foundation courses are included. According to the British Council (2020), China is the largest source of international students in the UK, with 115,014 study visas issued to Chinese students in 2019. This represents 45% of international student visas.



Source: HESA (quoted in Dolton 2020)

In 2017/18, Chinese students at UK HE institutions made up 23.2% of all international students (UUK 2019). More than 86,000 students from China started courses in the UK in 2018/19, a 13% increase on 2017/18 and a figure that is almost 50% higher than in 2014/15. In 2015/16 and 2016/17, one-third of all non-EU students came from China (UUK 2019). More than a third (35% in 2018/19) of all non-EU students at UK universities are now from China (Dolton 2020).

b. Dependence of UK universities on Chinese students

In 2018/19 there were nearly half a million overseas students studying at UK universities, out of a total student population of about 2½ million. China is the most important source of overseas students. At this time, the total income from overseas students' fees was around £7bn (cf. Bolton 2019). This constitutes about 17.3% of total university funding (Dolton 2020).

Fees paid by Chinese student are worth at least £1.7 billion to the UK HE sector, representing approximately 5% of all income of HE institutions, and more than 10% of revenue at certain universities. How reliant individual institutions are on this source of income varies enormously. There are 13 UK HE institutions where at least 10% of all students were from China, led by the University of Liverpool with 17%. The numbers were particularly concentrated on post-graduate study programmes: at five HE institutions, half of all full-time postgraduate students were from China.

There are no data on Chinese student expenditure on accommodation, or wider consumer spending in the UK.

With the number of students from China at UK universities now higher than the number from the whole of the EU combined, it is likely that the gap will widen in the coming 3-5 years following Brexit, as EU students will be less likely to come to the UK if they have to pay international fees (Dolton 2020).

This dependency on recruiting Chinese students means that UK HE institutions are vulnerable to any changes in government policy (China and UK) or world events (such as Covid-19) that reduce the attraction of UK universities. If the number of Chinese students were to drop, then universities would lose both tuition fee revenue and revenue from accommodation and other on-campus spend. Moreover, the evolution in China's demographic structure suggests that the population who might want to study abroad is likely to fall over the next 10 years (Dolton 2020).

c. Chinese pupils at UK independent schools

The available figures (Table 9) suggest that more than 28% of non-UK pupils at independent schools are from China, i.e. mainland China, Taiwan and Hong Kong. Non-UK pupils account for about 10% of the total.

Table 9 Chinese pupils at independent schools in the UK.

| Country of origin | Number of pupils |
|---------------------|------------------|
| Mainland China | 10,864 |
| Taiwan | 216 |
| Hong Kong | 5,404 |
| Total non-UK pupils | 58,650 |

Source: ISC (2020)

There are no data on the economic value of the Chinese pupils at independent schools in the UK. If one assumes that the average annual school tuition fees are £25,000 per pupil, then total fees might be about £400 million per annum.

d. UK independent schools in China

A growing number of independent schools around the world also operate overseas campuses. Currently 69 such campuses exist, and they educate a total of 46,407 pupils (ISC 2020). More pupils are being educated on overseas campuses than there are overseas pupils in ISC schools in the UK. This applies to Chinese pupils too:

Table 10 UK independent schools in China

| Location | Number of independent school campuses | Number of pupils |
|----------------|---------------------------------------|------------------|
| Mainland China | 29 | 18,792 |
| Hong Kong | 7 | 4,104 |

Source: ISC (2020)

Approximately 17 British independent schools currently operate these 36 campuses (ISC 2020). The oldest is Dulwich College Shanghai Pudong, which opened in 2003 and – like most of earlier established ones – was largely tailored towards the children of Britons working and living abroad. By contrast, the newly established schools seek to attract Chinese pupils (Venture 2019).

‘By 2022, the top four school groups operating campuses in mainland China are expected to be: Harrow School (10), Dulwich College (8), Wellington College (6), and Hurtwood House (4)’ (Venture 2019: 5). Going forward, 15 more schools seem to have plans to enter China’s lucrative market.

There are no data on the economic value of these pupils for UK independent schools operating in mainland China and Hong Kong.

e. UK university campuses in China

In 2017/18, 139 UK universities delivered some form of Transnational Education (TNE) to 693,695 students in 225 countries and territories worldwide (UUK 2019). The UK is a world leader in this field, and ‘there are 1.5 times as many students studying for a UK degree overseas than there are international students studying in the UK’ (UUK 2019: 20). The top five host countries for UK TNE are China, Hong Kong, Malaysia, Singapore and Sri Lanka. Between 2016/17 and 2017/18, the numbers of TNE students in China and Sri Lanka increased by 15.8% (UUK 2019).

In 2005, the UK had 43 HE institutions involved in delivering 115 degree programmes in China, occupying the top position in terms of market share of 31%. This represented a significant increase in market share from 2004 when the UK held only 5% of the market (Conlon, Litchfield, Sadlier 2011). Today China is the top location for TNE and with 75,925 students it accounts for 11% of total UK TNE activity (UUK 2019).

There are different types of collaboration between British and Chinese Universities: independent campus, independent department, and collaborative programmes. Those collaborative programmes could be hard to count them since some information is not publicly available. Hence, only independent campus and departments are mentioned here.

Independent campus:

The University of Liverpool and Xi'an Jiaotong University established the Xi'an Jiaotong-Liverpool University, which hosted around 13,000 students in 2018.

The University of Nottingham has an independent campus at Ningbo with a capacity for nearly 8,000 students. Around 84.3% students each will pursue a post-graduate degree.

Birmingham City University and Wuhan Textile University have established the Birmingham Institute of Fashion and Creative Art in Wuhan.

Joint programmes or Dual degree

University of Glasgow and University of Electronic Science and Technology of China (Glasgow College, UESTC).

The University of Cardiff and Beijing Normal University have established a joint-college and offer a dual degree. The courses include Chinese (BA), Modern Chinese (BA), and Modern Languages and Translation (BA). Students in Cardiff will spend years two and three in Beijing.

The University of Surrey and Dongbei University of Finance and Economics have also established a joint programme.

However, neither the number of students nor their economic value to UK universities is known.

7. Electricity generation and nuclear power in the UK

The sources of electricity generation in the UK have changed over the past two decades and are planned to change further. These changes reflect several factors, but the awareness of climate change has been of key importance. Following the Kyoto Protocol in 1997 and leading up to the Copenhagen Summit in 2009, the Climate Change Bill was published in November 2007. The Bill set out a framework to put Britain on the path to become a low-carbon economy with, in the Bill, legally binding targets to reduce carbon dioxide emissions by at least 60% by 2050, and by 26 to 32% by 2020, against 1990 levels. UK governments have since changed these targets, and the Government laid draft legislation in Parliament in early June 2019 to end the UK's contribution to climate change, by changing the UK's legally binding long-term emissions reduction target to net zero greenhouse gas emissions by 2050.

Electricity generation has been an important area in these plans. In 2000 34 per cent of electricity was generated by coal powered facilities, 37% by gas powered and 20% by nuclear power.²⁶ One objective of successive governments has been to reduce dependence on fossil fuels and increase the use of renewable energy. By the end of 2019 the coal-powered share had fallen to 3%, the share from gas-powered had changed little (38%), nuclear had reduced slightly to 16%, energy from wind and solar power had risen to 23%, and bioenergy accounted for 10%. Within this mix of sources one factor has been that some nuclear power plants reached the end of their effective lives in the past decade. With demand for electricity expected to grow, not least from the anticipated increase in electric cars, power generating capacity is projected to increase.²⁷ Government plans are to meet this in a variety of ways, one of which is increased nuclear power generation.

Building new nuclear power plants is a contentious issue in the UK (and other countries). In 1976, the Flowers Report recommended that there should be no further commitment to nuclear energy unless it could be demonstrated that long-lived highly radioactive wastes could be safely contained for the indefinite future. Since then, efforts to identify suitable sites

²⁶ Figures are for Great Britain in fourth quarter of the year from Ofgem. Source: <https://www.ofgem.gov.uk/data-portal/electricity-generation-mix-quarter-and-fuel-source-gb>

²⁷ See National Grid (2018), 'Future Energy Scenarios', July.

for a safe geological disposal facility have been rejected by affected communities. In addition to the issue of the disposal of spent nuclear waste, the range of issues around the safety of nuclear power mean that the process of securing planning permission to build a new plant is a lengthy and contentious one. Along with planning permission, issues of cost (both of building with long lead times and of the high upfront costs that have been a hurdle to new nuclear plants) and the uncertainty of the return on the subsequent electricity produced, have led to substantial delays or cancellation.²⁸

In September 2016, following a comprehensive review, the Government decided to proceed with the project to build a new power station at Hinkley Point C in Somerset. This is the first new nuclear power station in over 20 years. It has two French-designed nuclear reactors and is being built by EDF. The estimated cost is around £20 billion and China General Nuclear Power Group (CGN) has taken a 33.5% stake in order to underwrite the finances.

Several of the current UK nuclear power stations are expected to be decommissioned in the coming decade and so the issue of replacement is becoming more pressing.²⁹ EDF has submitted plans for a replacement plant at Sizewell C, which it will develop with CGN (which has a share estimated at around 20%) based on the same reactor design as Hinkley C. Plans are being drawn up for a nuclear reactor at Bradwell (Essex) but in this case EDF is in a supporting role to CGN. The reactor design for Bradwell, which will use a Chinese reactor technology, is being examined as part of the generic design approval process (GDA). While these two proposals are in England, the Scottish government's energy policy is opposed to new nuclear power stations under current technologies.³⁰ As a consequence, at this stage the plants at Hunterston and Torness are not expected to be replaced by new nuclear facilities at the end of their lives.

²⁸ A proposal to build a nuclear generator at Moorside in Cumbria was withdrawn in 2018 following financial considerations by NuGeneration (a subsidiary of Westinghouse / Toshiba).

²⁹ Currently operating nuclear power stations are: Dungeness, Kent (expected shutdown (ES) 2028); Hartlepool, Durham (ES 2024); Heysham, Lancashire (ES 2024 and 2030) Hinkley Point, Somerset (ES 2023); Hunterston, Scotland (ES 2023); Sizewell, Suffolk (ES 2035); and Torness, Scotland (ES 2030). Source: World Nuclear Association, <https://www.world-nuclear.org/information-library/country-profiles/countries-t-z/united-kingdom.aspx>

³⁰ <https://www.gov.scot/policies/nuclear-energy/>

The UK – China Joint Statement of 22 October 2015 stated that “Both sides attach importance to their cooperation on energy and transport in each other’s countries. The UK welcomes the progressive participation of Chinese companies in its civil nuclear energy projects, and both sides welcome the commercial agreement on Hinkley Point C.”³¹ However, not only is building new nuclear plants a hotly debated issue but overseas ownership of energy supply capability (e.g. the ownership by CGN) is also controversial. As government policy essentially requires new nuclear proposals to be ‘developer-led’, once approval to develop a site and funding are in place, the government can invoke only security grounds as a basis for revoking approval. As a consequence, the issue of security of energy supply, and in particular foreign ownership of generating capacity, is adding to the complexity of the process for building nuclear power plants in the UK.

8. Tourism

Tourism to the UK is a key service industry, and total revenue from 36 million incoming tourists in 2018 was £36 billion (1.7% of GDP). Average spend was therefore £1,000. Out of that total, revenue from 860,000 tourists from China was £1.5 billion (0.7% of total Chinese spending on foreign tourism), so that their average spend in the UK was £1,750, or 75% above the average spending of tourists visiting the UK.³² In 2019, the number of tourists from China was up to 883,000 and revenue up to £1.7 billion, so average spend was £1,940.³³

China is the source of 40% of ‘elite shoppers’, who account for 17% of tax-free spending and spend an average €55,000 a year. In Europe, France (36%), and the UK and Italy (31% each) are their preferred destinations.³⁴

Visits from the UK to China have grown from 575,000 in 2010 to 608,000 in 2018.³⁵

³¹ <https://www.gov.uk/government/news/uk-china-joint-statement-2015>

³² It was also more than the average spend of Chinese overseas tourists globally, which was \$1,850 (see <https://www.unwto.org/country-profile-outbound-tourism>).

³³ Sources: World Bank <http://wdi.worldbank.org/table/6.14#>, ONS, <https://www.visitbritain.org/markets/china> <https://www.visitbritain.org/markets/usa>

³⁴ Source: Global Blue, <https://www.globalblue.com/corporate/media/press/the-top-0.5-of-world-s-wealthiest-shoppers-account-for-17-of-global-tax-free-spend>, 12th December 2019.

³⁵ Source: National Bureau of Statistics, China.

The OECD estimated on 2nd June that COVID-19 will lead to a 60% decline in international tourism in 2020.³⁶

9. Direct investment

Estimates of direct investments held by the UK in China, and by China in the UK, are inconsistent and therefore unreliable; nevertheless, they give an idea of orders of magnitude (Table 11). For purposes of comparison, the GDP of mainland China is about US\$15,000 bn and that of the UK about US\$3,000 bn.

Table 11 Direct investments: China, Hong Kong and the UK (US\$bn)

| Investing country | Investee country | | | Total |
|-------------------|------------------|------------|----------|-------|
| | Mainland China | Hong Kong | UK | |
| Mainland China | | 959 467 | 17 5 | 1,982 |
| Hong Kong | 741 1,378 | | 34 28 | 1,636 |
| UK | 17 23 | 17 134 | | 1,749 |
| Total | 2,814 | 1,707 | 1,864 | |

Source: IMF CDIS Table 1

Notes: in each cell, the upper figure is as reported by the investing country, and the lower figure as reported by the investee country. The totals in the right hand column are as reported by the investing countries; those in the bottom row are as reported by the Investee countries.

Hong Kong is evidently a very large direct investor in mainland China. The natural interpretation is that much foreign direct investment in mainland China is routed via Hong Kong. Likewise, mainland China is a very large direct investor in Hong Kong, no doubt as a conduit for direct investments in the rest of the world. It is clear that the UK has far more inward direct investment relative to its GDP than mainland China.

³⁶ OECD Policy Responses to Coronavirus (COVID-19) Tourism Policy Responses to the coronavirus (COVID-19)

10. Finance

China's economy is substantially leveraged. Many of the debts are thought to be doubtful and the structure is therefore widely regarded as unsustainable. Debts of non-financial entities amounted to 256% of GDP at the end of 2018, or the equivalent of US\$33,161 billion. Most of the debt is corporate - the equivalent of US\$20,217 billion.³⁷ For the purposes of comparison, annual GDP is about US\$15,000 billion in China and about US\$21,000 billion in the United States. Foreign exposures to mainland China are small in relation to these enormous amounts.

On the assets side, China has foreign exchange reserves of US\$3,080 billion and Hong Kong has a further US\$438 billion (March 2020).³⁸ In addition, China's sovereign wealth funds are thought to be worth around US\$1,400 billion.³⁹ They include a £1 billion fund - part of China Investment Corporation – for equity investment in UK small and medium sized enterprises.

a. UK banks' exposures

Foreign-incorporated banks' exposures to China, net of risk transfers, were US\$802 billion at the end of 2019, of which the share of UK-based banks was US\$212 billion at the end of 2019.⁴⁰ In addition, foreign banks had US\$860 billion of exposure to Hong Kong, of which UK-based banks accounted for \$461 billion.⁴¹ No doubt a large part of the funds lent to Hong Kong were on-lent to mainland China; banks *located in* Hong Kong had US\$384 billion of asset exposure to China.

While UK banks' exposures to China are small relative to China's total debts, they are substantial relative to the banks' total assets. UK-based banks' exposures to China and Hong

³⁷ Source: IMF article 4 report, 2019, Table 6.

³⁸ Source: IMF International Financial Statistics.

³⁹ Source: SWF Institute.

⁴⁰ Source: BIS table B4 CN. 'UK-based banks' are banks whose parent company is incorporated in the UK.

⁴¹ Source: BIS table B4 HK.

Kong were 19% of their total cross-border exposures and 11% of their total global exposures (Table 12).⁴²

Table 12 UK-based banks' cross-border exposures, end of 2019 (USD bn)

| | |
|--------------------|-------|
| Exposure to | |
| Mainland China | 212 |
| Hong Kong | 461 |
| Total cross-border | 3,593 |
| Global total | 6,406 |

Source: BIS tables B1, B4-CN, B4-HK.

Of the asset exposures to China of banks located outside China, 69% are denominated in USD, and only 9% in RMB. Of Chinese banks' external liabilities, which amount to US\$1,331 billion, 39% are denominated in USD and 33% in RMB.⁴³

b. Debt securities issued by Chinese borrowers.

International debt securities comprise only a small fraction of total debt securities issued by Chinese borrowers. And only a small fraction of Chinese international debt securities are denominated in RMB (Table 13).

⁴² Source: BIS tables B4 CN and HK.

⁴³ Source: BIS table A5.

Table 13 Debt securities issued by Chinese and Hong Kong borrowers (USD bn)

| | China | Hong Kong |
|---|--------|-----------|
| Total debt securities outstanding | 15,883 | 734 |
| Total international debt securities outstanding | 1,375 | 542 |
| By currency | | |
| RMB | 17 | |
| HKD | | 23 |
| US dollar | 1,124 | 427 |
| Euro | 104 | 30 |
| Other foreign currencies | 105 | 58 |

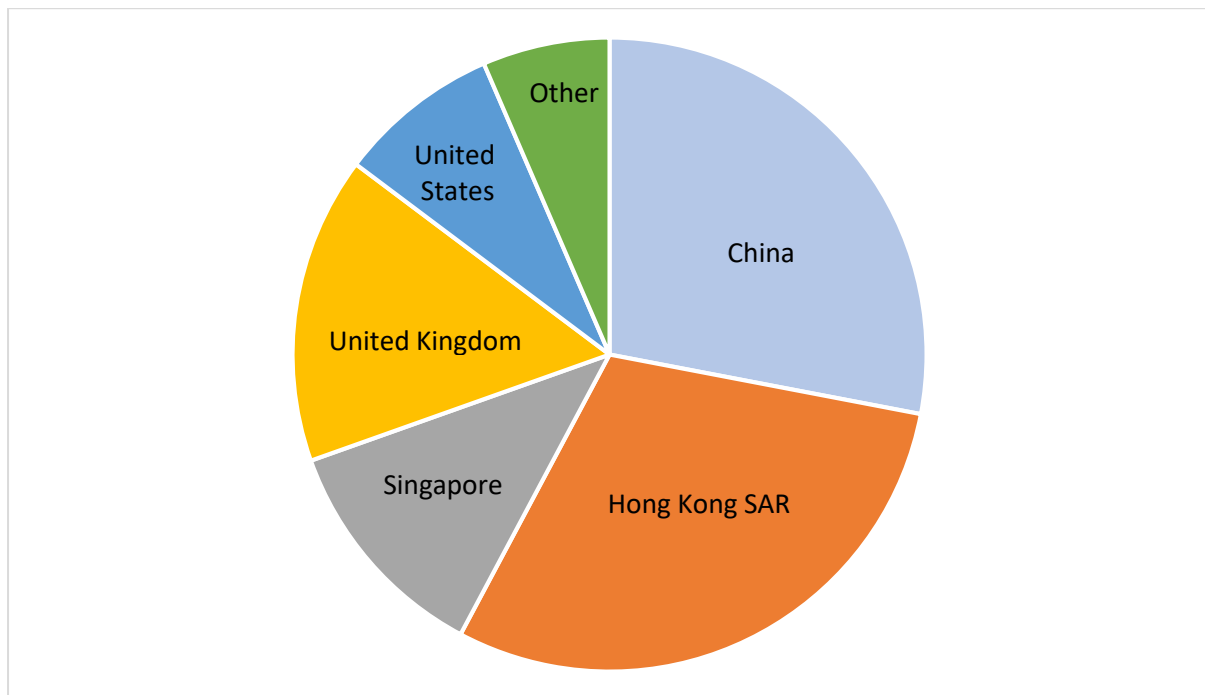
Source: BIS table C4.

c. Trading in foreign exchange

Trading in RMB has grown steadily since the beginning of the century, but even in 2019 it accounted for under 10% of global foreign exchange turnover.

Most trading takes place in Asia (figure 11). Outside Asia, the main trading location is London, where the five largest Chinese banks are represented. There are controls on transfers of RMB between mainland China and the rest of the world, but few controls outside China, so that there is a unified market for offshore RMB, centred in Hong Kong.

Figure 11 **Location of foreign exchange markets in RMB**



Source: BIS foreign exchange turnover survey, 2019, table 6.1.

d. Swap lines

China's central bank, the Peoples Bank of China, has set up a network of swap lines with other central banks. Their main purpose appears to be to facilitate the trading of RMB against foreign currencies outside China, by enabling foreign central banks to have access to RMB. In that way, trade transactions with China can be settled in RMB, for example by enabling foreign importers from China to acquire RMB more easily.

In particular, the PBOC has established swap lines with central banks in financial centres in Europe and Asia so as to enable those central banks to provide RMB liquidity in case of a threatened breakdown in offshore RMB financial markets. Table 14 provides a list of the PBOC's swap lines, and the amounts available under each. The prominence of Hong Kong is conspicuous, as is the absence of the United States.

Table 14 Swap lines established by the Peoples' Bank of China (amounts in RMB billions, except for Indonesia)⁴⁴

| | |
|-------------|----------|
| Hong Kong | 400 |
| ECB | 350 |
| UK | 350 |
| Singapore | 300 |
| Japan | 200 |
| Australia | 200 |
| Indonesia | 200 |
| Brazil | 190 |
| Korea | 180 |
| Switzerland | 150 |
| Russia | 150 |
| Malaysia | 80 |
| Thailand | 70 |
| Argentina | 70 |
| Qatar | 35 |
| UAE | 35 |
| Macao | 30 |
| Chile | 22 |
| Pakistan | 20 |
| Belarus | 20 |
| Ukraine | 15 |
| Nigeria | 15 |
| Sri Lanka | 10 |
| Hungary | 10 |
| Turkey | 10 |
| Kazakhstan | 7 |
| Mongolia | 5 |
| Iceland | 3.5 |
| Albania | 2 |
| Suriname | 1 |
| Indonesia | US\$4 bn |

The utilisation of the facilities is not generally disclosed. The swap line with Korea was opened on 12th December 2008, and the first drawing was proudly announced, but not until 30th May 2014.⁴⁵ Turkey's RMB swap line, established in 2019, was used for the first time on 18th June 2020.

⁴⁴ This is a list of all the swap lines that the PBOC has established and made public. Some of them have reached the end of the term specified at the time of the announcement, and may not have been renewed.

⁴⁵ Source: PBOC website, ShanghaiDaily.com, 31st May 2014.

China is also the leading member of the Chiang Mai Initiative – Multilateral and of the BRICS financing facility. It is not clear that these facilities have been much used. The Chiang Mai Initiative (pre-multilateralisation) was conspicuously unused during the financial crisis of 2008-09, when it was completely eclipsed by the swap lines set up *ad hoc* by the Federal Reserve.⁴⁶

The RMB accounts for only 2% of those global foreign exchange reserves whose currency denomination has been identified.⁴⁷ This is not surprising. The absence in China of any separation between the executive government and the judiciary is likely to deter official holders from making substantial placements in RMB.

e. Trading in interest rate derivatives

The RMB is not significant in derivatives markets. The notional principal of outstanding exchange-traded futures and options denominated in RMB was US\$21 million at the end of 2019, out of an all-currencies total of US\$95 billion.⁴⁸

Daily average trading in over-the-counter interest rate derivatives denominated in RMB amounted to US\$33 billion, or about 0.5% of the all-currencies total, at the end of 2019.⁴⁹ Of the total, 38% was transacted in mainland China, 32% in Hong Kong, 15% in Singapore and 11% in London.⁵⁰

11. Chinese participation in the international monetary system

China's objectives in international finance have to be inferred from its actions. The provision of RMB swap lines in particular suggests a desire to have China's external trade denominated in RMB – just as the United States wanted its external trade to be denominated in dollars

⁴⁶ Allen (2013).

⁴⁷ Source: IMF, Composition of Foreign Exchange Reserves, December 2019.

⁴⁸ Source: BIS table D2.

⁴⁹ Source: BIS table D12.1.

⁵⁰ Source: BIS derivatives survey 2019 table 3.2.

after 1918. It also seems clear that China wants to facilitate trading in RMB-denominated financial instruments in international financial centres.

The inclusion of the RMB in the basket of currencies used to value the SDR was regarded as an important achievement by China. Yet it has not increased the market use of the RMB, which has declined in the past 5 years.⁵¹ This is largely because of increased capital account controls.

China and other Asian countries have long been concerned about their lack of influence in the IMF. The attempt after the Asian financial crisis of the late 1990s to set up an Asian Monetary Fund was frustrated by the United States. Yet the monetary institutions that have been set up among Asian countries after the crisis – notably the Chiang Mai Initiative – have not been effective.

Against this background, China set up the Asia Infrastructure Investment Bank in 2015. The UK made big efforts to persuade countries to join — against strong US opposition. The *quid pro quo* was acceptance on China's part of high standards of transparency and governance. And China has also set up the BRICS Bank and the Belt and Road Initiative. These Chinese-led institutions are in competition to the World Bank, which borrowers thought was imposing excessive constraints on them.

12. Economic dependence of the UK on China

Using the NiGEM model, we have explored the economic and financial links between the UK and China through three scenarios: a 'China hard landing' scenario, which affects the UK directly; a 'trade war' scenario, in which the UK is caught in the cross fire in a trade war between the US and China; and a scenario in which China/UK trade is drastically impeded by

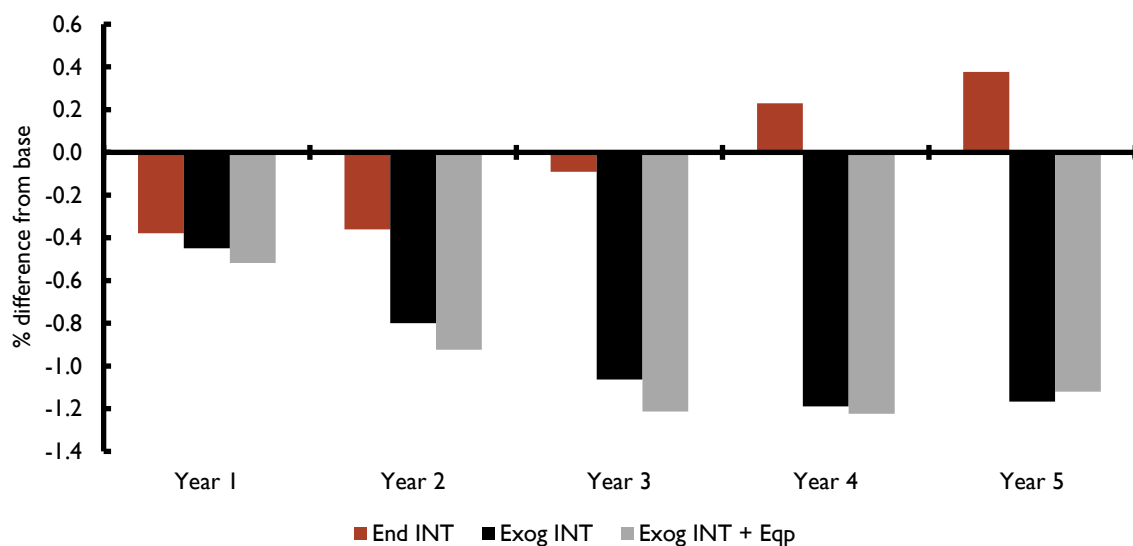
⁵¹ H. Lockett and E. Szalay, 'Why the renminbi's challenge to the dollar has faded' (*Financial Times*, 16 October 2019).

non-tariff barriers, as a possible outcome of the current impasse over Huawei’s access to the UK telecommunications market.

a. China hard landing

Our starting point is an exogenous shock to Chinese domestic demand that lowers the level of GDP by around 6%. The effects on the UK depend heavily on whether monetary policy worldwide responds to the shock. Figure 12 shows the GDP response (% difference from base) when monetary policy is responsive (red) and unresponsive (black/grey).

Figure 12 Economic effects on UK GDP of a 6% shock to Chinese domestic demand.



The estimated effects of the shock assuming responsive monetary policies are shown in Figures 13 and 14.

Effects of China shock assuming responsive monetary policy:

Figure 13 Effects on GDP of China

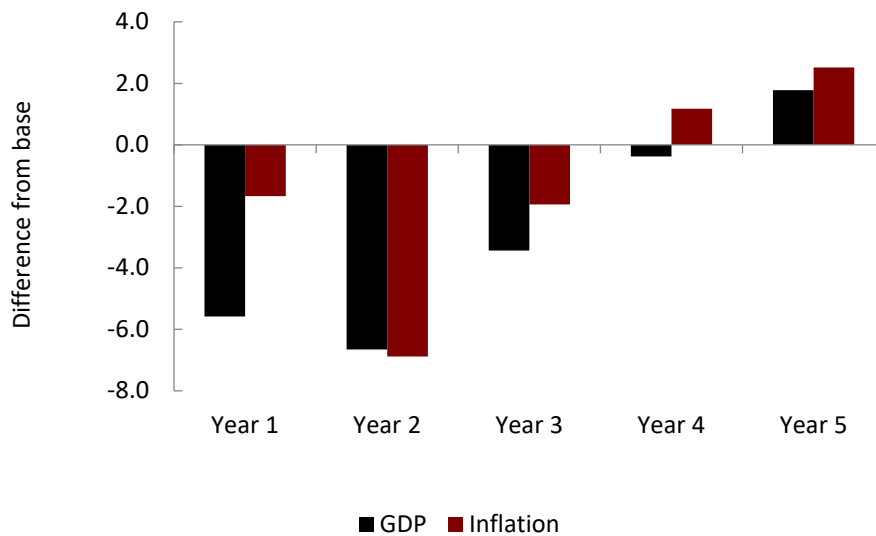
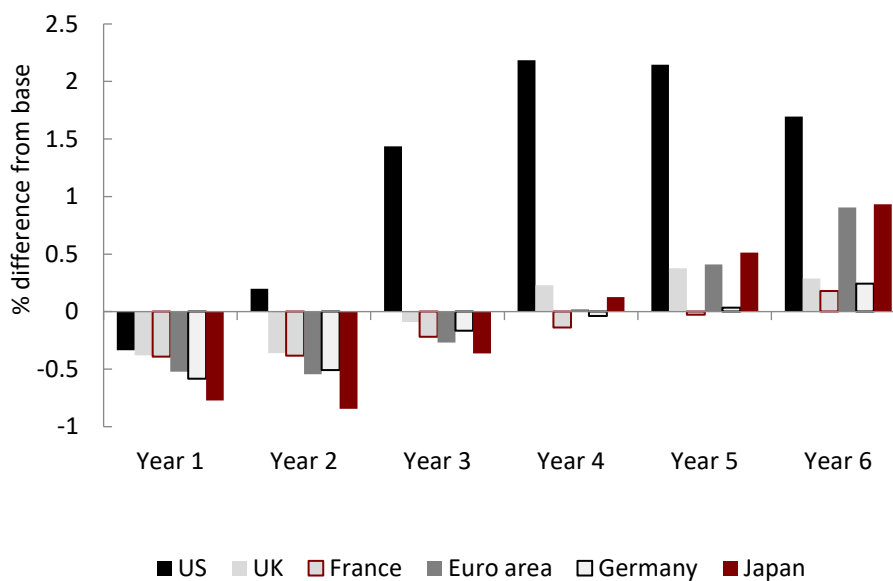


Figure 14 Effects on GDPs of other countries



The assumption that monetary policies would be responsive is questionable, because many central banks have exhausted their scope for easing monetary policy. We have therefore, run a revised scenario where monetary policy is exogenous for in Japan, the United States, the euro area and the United Kingdom. The results are shown in Figure 15a and b.

Effects of China shock assuming that monetary policy is unresponsive for 5 years in the USA, Japan, the euro area and the UK:

Figure 15a Effects on GDP of China

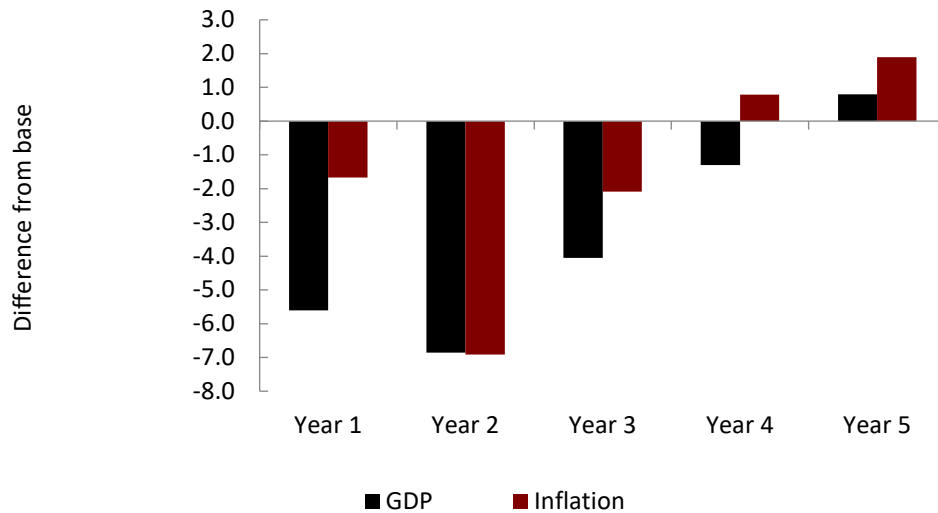
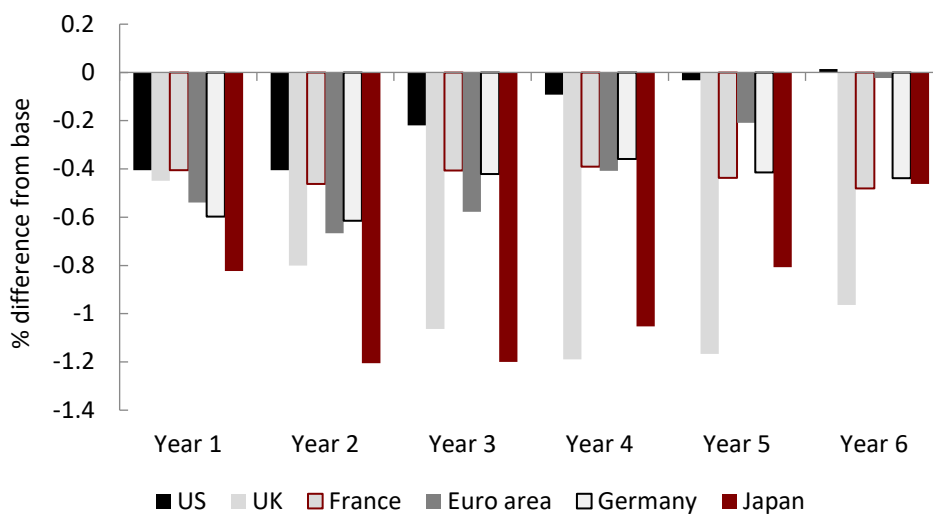


Figure 15b Effects on GDPs of other countries



The scenarios discussed so far do not incorporate any exogenous financial market shock. But it is reasonable to assume that a China hard landing would be accompanied by a drop in the price of risky assets, especially if the source of the shock was leverage/bad debts (section 10). In another variant, therefore, we have additionally shocked global equity prices through the equity risk premium variable. The results are shown in Figures 16 a - c.

Effects of China shock assuming that monetary policy is unresponsive for 5 years in the USA, Japan, the euro area and the UK, and allowing for fall in risky asset prices:

Figure 16a Effects on GDP of China

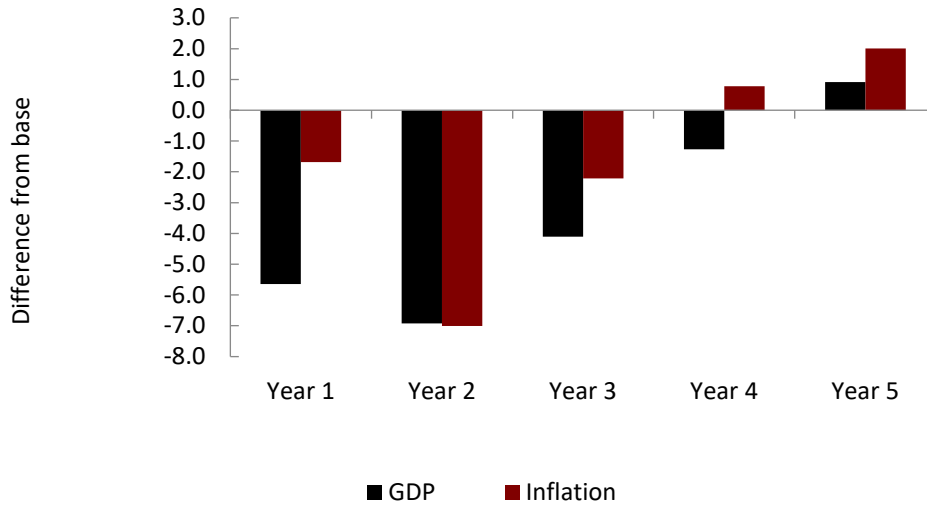


Figure 16b Effects on equity prices (% difference from base)

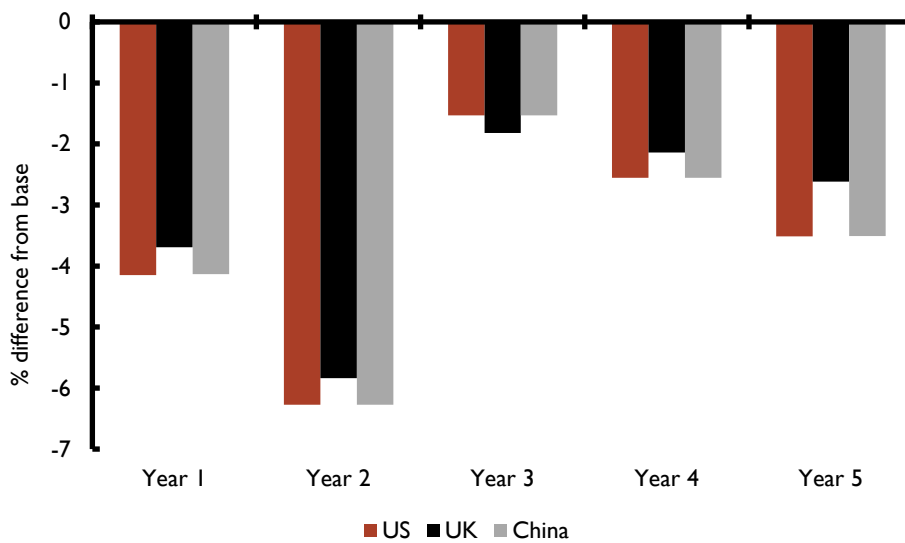
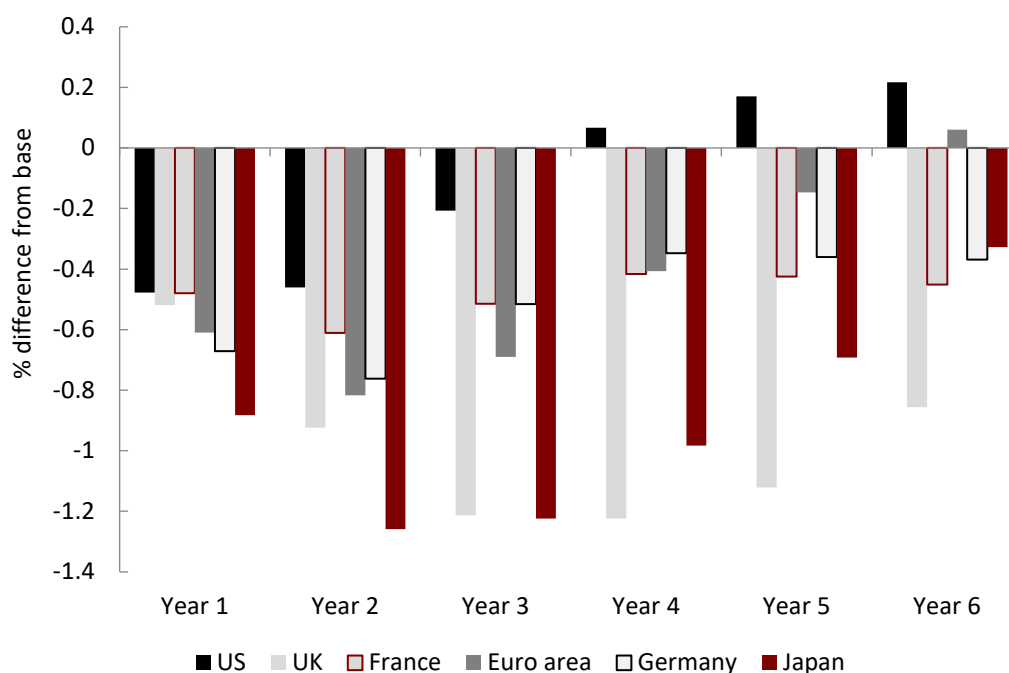


Figure 16c Effects on GDPs of other countries

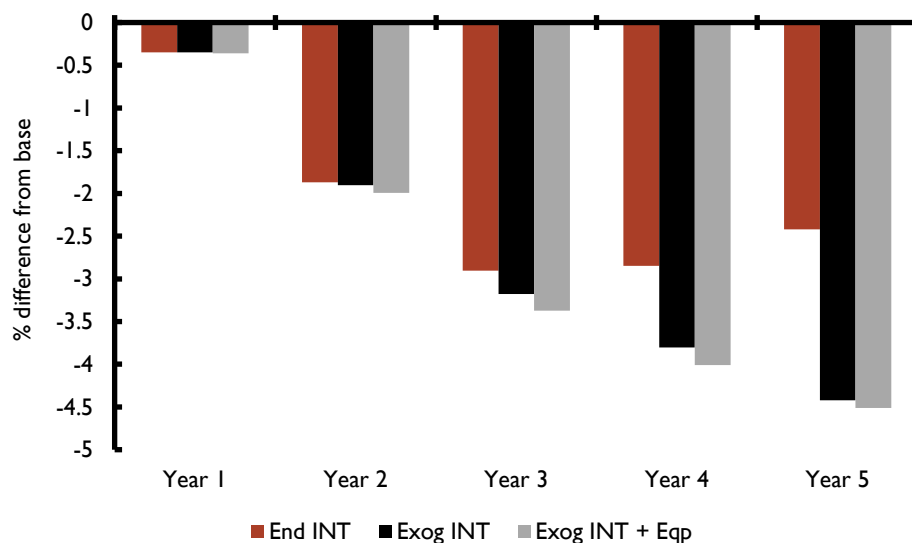


Taking all this together, our preferred scenario is the one that includes the shock to domestic demand and equity prices (through the equity risk premium) and assumes exogenous monetary policy in advanced economies.

What NiGEM can capture is the trade volume/price channels and some of the financial market linkages. The model has various commodities (oil, gas and coal) and in this scenario, commodity prices fall. The oil price falls by around 5% (Figure 17). There are studies that suggest that the oil price response to a slowdown in Chinese economic activity could be larger, but we have not deviated from the model equation in these simulations. Lower commodity prices, particularly oil, would be beneficial to the UK consumer.

The other health warning relates to exchange rates. We have assumed fixed nominal exchange rates. Again, one could paint a scenario where the Chinese hard landing leads to a depreciation in the exchange rates of countries that are exposed to China, e.g. Australia. This has not been explored.

Figure 17 **Effects on world oil price**



b. Trade war between the USA and China

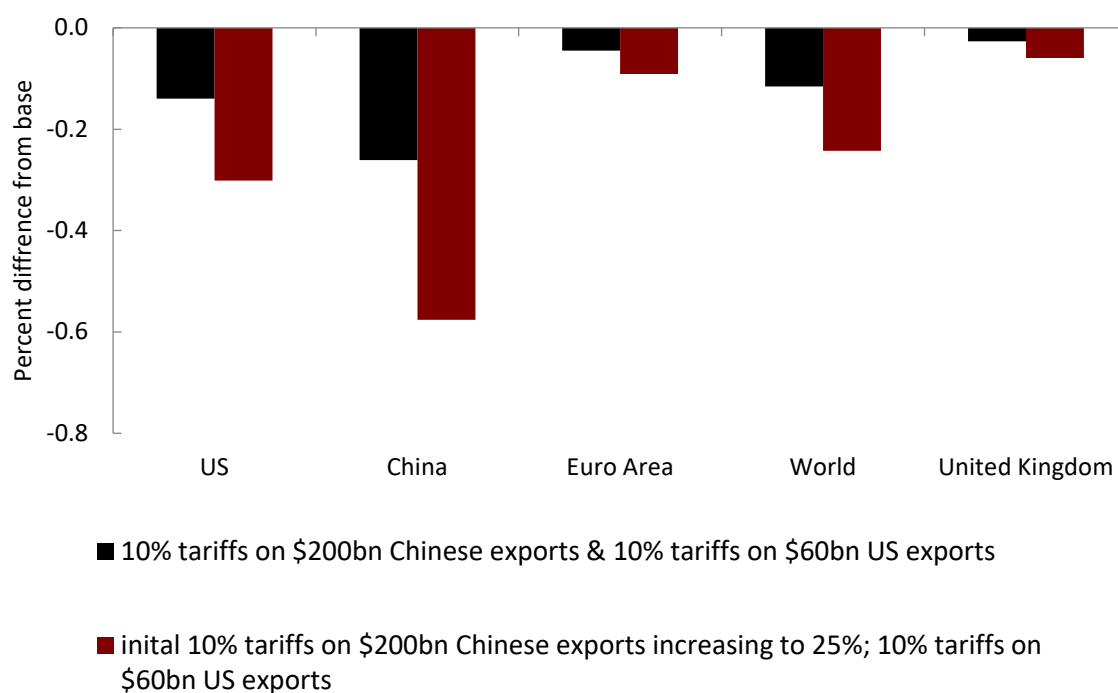
We conducted two sets of simulations.

- i. To mimic the introduction of 10 per cent duties on US\$200bn worth of US imports from China we increased prices of non-commodity exports of goods and services to the US from China by 10 per cent adjusted by the share of US\$200bn in US total imports from China (about US\$524bn). Similarly, to impose 10 per cent levy on US\$60bn worth of Chinese imports from the US, prices of non-commodity exports of goods and services to China from the US were raised by 10 per cent adjusted by the share of US\$60bn in the US total exports to China (about US\$188bn). Both shocks are exogenous, are applied from the third quarter of year 1 till the end of year 3 (10 quarters in total) and then are allowed to return gradually to base as we assume that prices adjust.
- ii. The second simulation incorporates a further increase in the levy on US imports from China, from 10 to 25 per cent. The shocks in the previous simulation are taken as a starting point and from the first quarter of year 2 a 25 per cent shock is applied to Chinese non-commodity export prices to the US adjusted by the share of US\$200bn in US total imports from China (about US\$524bn). As in the previous simulation, shocks

are applied till the end of year 3 and are allowed to return to base gradually afterwards.

The results are shown in Figure 18.

Figure 18 GDP impact of trade war (% difference from base)



c. Non-tariff barriers.

The debate over Huawei suggests that the UK could have to choose between a relatively close relationship with China at the expense of its relationship with the USA, and a relatively close relationship with the USA at the expense of its relationship with China. There are many possible outcomes. For the present, we simulate two scenarios in which the trading relationship (goods and services) between the UK and China is severely restricted because of non-trade barriers.

- i. The volume of Chinese imports from the UK falls by 90% (Black).
- ii. The volume of UK exports to and imports from China fall by 90% (Blue).

Both scenarios can be thought of as a consequence of a set of non-tariff barriers that are imposed by China or the UK or both. This is a simple set of scenarios where the shock is applied to Chinese and UK import volumes in such a way that trade between the two countries grinds to a virtual halt (90% reduction). Other economies, such as the US and EU, are not directly involved in this simulation, and other important channels, such as productivity, FDI and tariffs, have not been considered. We also assume that monetary policy is endogenous, and we have not considered any spillover effects that drive the risk premium higher/asset prices lower. The results of this exercise should therefore be treated as partial and illustrative. In our judgment, a fuller analysis would show larger effects.

Some of the economic impacts on the UK are shown in Figures 19 – 23 below.

Figure 19 Impact of non tariff barriers on UK GDP (% difference from base).

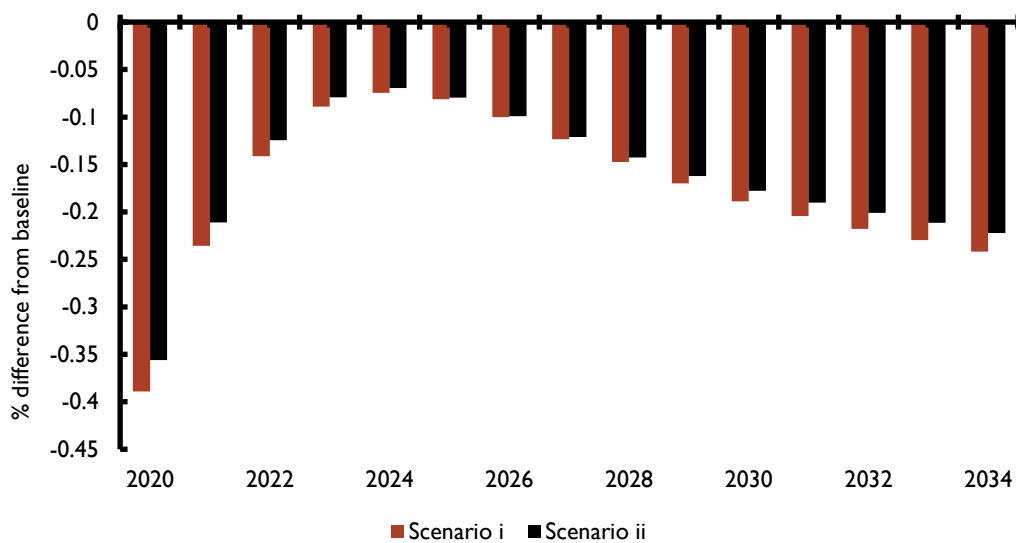


Figure 20 Impact of non-tariff barriers on UK inflation (% difference from base).

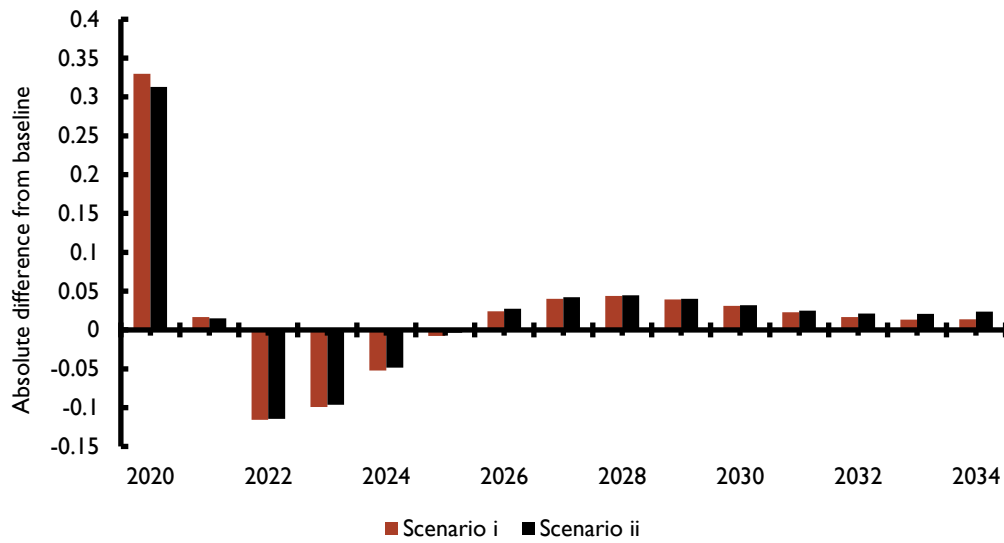


Figure 21 Impact of non-tariff barriers on UK short-term interest rates (% difference from base).

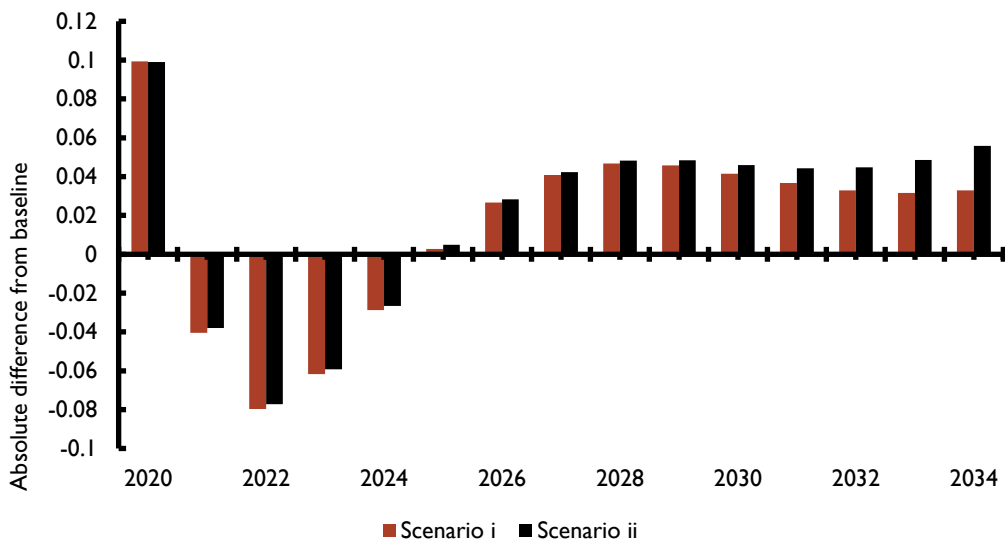


Figure 22 Impact of non-tariff barriers on UK trade volumes (% difference from base).

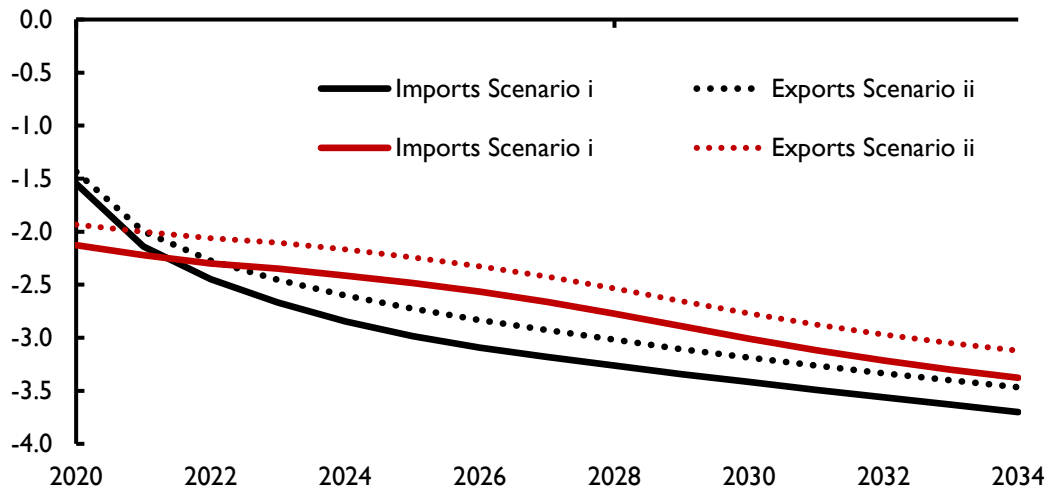
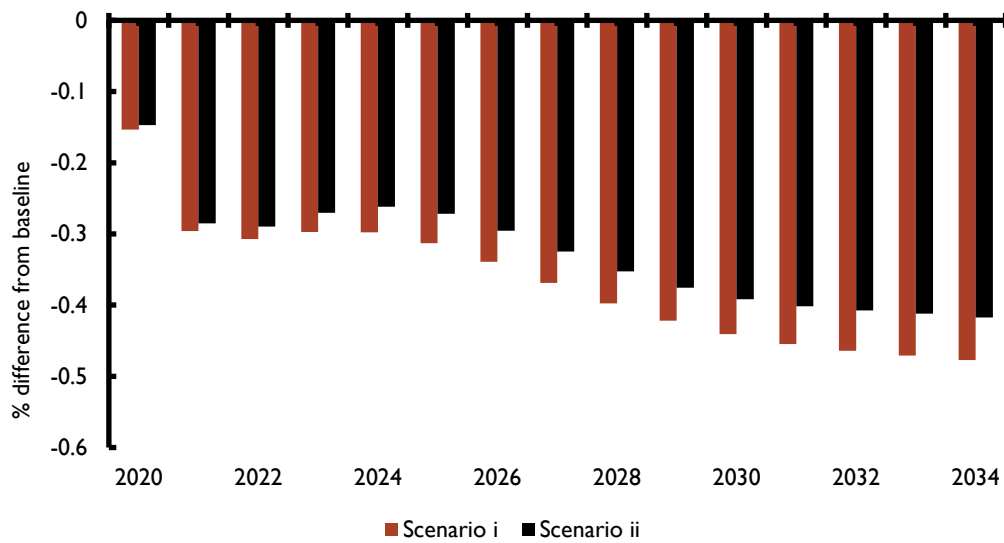


Figure 23 Impact of non-tariff barriers on UK consumption (% difference from base).



References

Allen, W.A. (2013), *International liquidity and the financial crisis*, Cambridge University Press.

Bolton, P. (2019), 'Higher Education Funding in England', House of Commons Briefing Paper No 7393.

British Council (2013), 'Culture means business', <https://www.britishcouncil.org/research-policy-insight/policy-reports/culture-means-business>

British Council (2015), 'A golden future for China and the UK', <https://www.britishcouncil.org/research-policy-insight/insight-articles/golden-future-china-uk>

British Council (2020) 'HE institutions face battle for Chinese students as 39 per cent of applicants unsure about cancelling study plans', blog, <https://protect-eu.mimecast.com/s/MbfECj8OxulJWpLURcBiK?domain=britishcouncil.org>

Chadha. J. (2017). The external financing position, Gresham College Lecture, 27 April 2017. <https://www.gresham.ac.uk/lectures-and-events/the-external-financing-position>

Conlon, G., A. Litchfield and G. Sadler (2011), 'Estimating the value to the UK of education exports', BIS research paper no 46, <https://www.gov.uk/government/publications/education-exports-estimating-their-value-to-the-uk>

Dolton, P. (2020), 'The Economics of the UK University System in the Time of Covid-19', NIESR Policy Paper no 19, May 2020, <https://www.niesr.ac.uk/publications/economics-uk-university-system-time-covid-19>.

Foliano, F., and Riley, R. (2017). "International Trade and UK de-industrialisation". *National Institute Economic Review*, 242(1), R3–R13.

Hall, R. E. (2017). "Low Interest Rates: Causes and Consequences", *International Journal of Central Banking*, Vol. 13 (3). P103-117.

House of Commons (2020) 'Coronavirus: implications for the higher and further education sectors in England', House of Commons Library.

ISC (2020), *ISC Census and Annual Report*
https://www.isc.co.uk/media/6686/isc_census_2020_final.pdf

UUK (2019), *Universities UK Facts and Figures 2019*,
<https://www.universitiesuk.ac.uk/International/Documents/2019/International%20facts%20and%20figures%20slides.pdf>

Venture Education (2019), https://61e921b4-a9e9-4291-9c12-f60d2c38cae4.filesusr.com/ugd/4a371f_086b4d14d6064a83a332a4985c0c07b0.pdf

Wei, R. and J. Su (2012), 'The statistics of English in China', *English Today*, 111, vol 28 no 3, pp 10 – 14 <https://www.cambridge.org/core/journals/english-today/article/statistics-of-english-in-china/2F55A5328DE99C8F3CD4C4E7BCD9F5FB> .