Appendix A: Summary of key forecast assumptions by Iana Liadze

The forecasts for the world economy and the UK economy reported in this *Review* are produced using the National Institute's global econometric model, NiGEM. NiGEM has been in use at NIESR for forecasting and policy analysis since 1987, and is also used by a group of more than 40 model subscribers, mainly in the policy community. Further details, including articles by model users, are provided in the May 2018 edition of the *Review*. Most countries in the OECD are modelled separately,[1] and there are also separate models for Argentina, Brazil, Bulgaria, China, Hong Kong, India, Indonesia, Romania, Russia,

Singapore, South Africa, Taiwan and Vietnam. The rest of the world is modelled through regional blocks so that the model is global in scope. All models contain the determinants of domestic demand, export and import volumes, prices, current accounts and net assets. Output is determined in the long run by factor inputs and technical progress interacting through production functions, but is also affected by demand in the short to medium term. Economies are linked through trade, competitiveness and financial markets and are fully simultaneous. Further details on NiGEM are available on http://nimodel.niesr. ac.uk/.

Table A1. Interest rates   *Per cent per annum*

		Central bank intervention rates					10–year government bond yields				
		US	Canada	Japan	Euro Area	UK	US	Canada	Japan	Euro Area	UK
2015		0.26	0.65	0.10	0.05	0.50	2.1	1.5	0.4	1.0	1.8
2016		0.51	0.50	−0.08	0.01	0.40	1.8	1.3	0.0	0.7	1.3
2017		1.10	0.70	−0.10	0.00	0.29	2.3	1.8	0.1	1.0	1.2
2018		1.90	1.40	−0.10	0.00	0.60	2.9	2.3	0.1	1.1	1.4
2019		*2.39*	*1.75*	*−0.11*	*0.00*	*0.75*	*2.3*	*1.6*	*0.0*	*0.5*	*1.0*
2020		*2.20*	*1.51*	*−0.21*	*0.00*	*0.85*	*2.3*	*1.8*	*0.2*	*0.6*	*1.2*
2021–25		*2.60*	*1.98*	*0.10*	*0.46*	*1.46*	*3.1*	*2.7*	*1.0*	*1.8*	*2.3*
2017	Q1	0.80	0.50	−0.10	0.00	0.25	2.4	1.7	0.1	1.1	1.3
2017	Q2	1.05	0.50	−0.10	0.00	0.25	2.3	1.5	0.0	1.0	1.0
2017	Q3	1.25	0.79	−0.10	0.00	0.25	2.2	1.9	0.0	1.0	1.2
2017	Q4	1.30	1.00	−0.10	0.00	0.41	2.4	2.0	0.0	0.9	1.3
2018	Q1	1.53	1.20	−0.10	0.00	0.50	2.8	2.2	0.1	1.0	1.5
2018	Q2	1.80	1.25	−0.10	0.00	0.50	2.9	2.3	0.0	1.0	1.4
2018	Q3	2.01	1.47	−0.10	0.00	0.66	2.9	2.3	0.1	1.1	1.4
2018	Q4	2.28	1.69	−0.10	0.00	0.75	3.0	2.3	0.1	1.2	1.4
2019	Q1	2.50	1.75	−0.10	0.00	0.75	2.7	1.9	0.0	0.9	1.2
2019	Q2	2.50	1.75	−0.10	0.00	0.75	2.3	1.6	−0.1	0.6	1.0
2019	Q3	2.40	1.75	−0.10	0.00	0.75	2.0	1.5	0.0	0.2	0.7
2019	*Q4*	*2.17*	*1.75*	*−0.13*	*0.00*	*0.75*	*2.1*	*1.6*	*0.1*	*0.4*	*0.9*
2020	*Q1*	*2.18*	*1.50*	*−0.15*	*0.00*	*0.75*	*2.2*	*1.7*	*0.2*	*0.5*	*1.0*
2020	*Q2*	*2.19*	*1.51*	*−0.20*	*0.00*	*0.75*	*2.3*	*1.8*	*0.2*	*0.6*	*1.1*
2020	*Q3*	*2.20*	*1.52*	*−0.23*	*0.00*	*0.88*	*2.4*	*1.9*	*0.3*	*0.7*	*1.3*
2020	*Q4*	*2.21*	*1.53*	*−0.26*	*0.00*	*1.00*	*2.5*	*2.0*	*0.3*	*0.8*	*1.4*

Table A2. Nominal exchange rates

	Percentage change in effective rate								Bilateral rate per US $			
	US	Canada	Japan	Euro Area	Germany	France	Italy	UK	Canadian $	Yen	Euro	Sterling
2015	13.3	−11.2	−6.3	−6.0	−3.7	−3.8	−3.0	5.6	1.299	121.1	0.902	0.654
2016	5.2	0.3	15.1	4.7	2.4	2.4	2.9	−10.0	1.314	108.8	0.904	0.741
2017	0.4	2.0	−2.6	2.8	1.3	2.0	1.9	−5.3	1.294	112.2	0.887	0.776
2018	0.1	−1.8	1.5	4.9	2.6	2.6	3.3	2.1	1.314	110.4	0.847	0.749
2019	2.6	0.5	4.0	−1.0	−0.5	−0.7	−0.6	−1.2	1.321	108.9	0.886	0.784
2020	−0.4	1.4	2.0	0.5	0.3	0.3	0.3	−1.4	1.302	106.9	0.879	0.791
2017 Q1	1.0	−0.2	−3.0	−0.7	−0.4	−0.3	−0.2	0.8	1.339	113.6	0.939	0.807
2017 Q2	−2.5	0.0	1.0	1.1	0.6	0.7	0.7	1.1	1.330	111.1	0.909	0.781
2017 Q3	−3.4	7.3	−1.5	4.3	2.3	2.3	2.6	−1.6	1.229	111.0	0.852	0.764
2017 Q4	1.4	−3.7	−1.6	0.7	0.4	0.4	0.6	1.8	1.277	112.9	0.849	0.753
2018 Q1	−2.1	−2.2	2.3	1.8	0.8	1.0	1.2	1.9	1.294	108.3	0.814	0.718
2018 Q2	2.3	−0.7	0.7	−0.4	−0.2	−0.2	−0.1	0.3	1.313	109.2	0.839	0.735
2018 Q3	2.5	1.8	0.9	1.2	0.7	0.4	0.7	−1.7	1.304	111.5	0.860	0.767
2018 Q4	2.0	−2.4	−0.1	−0.6	−0.3	−0.4	−0.4	0.0	1.343	112.8	0.876	0.778
2019 Q1	−1.0	0.2	1.6	−0.8	−0.5	−0.4	−0.4	1.4	1.337	110.2	0.880	0.768
2019 Q2	0.7	0.3	1.0	−0.3	−0.1	−0.2	−0.2	−0.5	1.338	110.0	0.890	0.778
2019 Q3	−0.6	2.4	1.9	0.0	−0.1	0.0	−0.1	−2.7	1.305	107.8	0.886	0.795
2019 Q4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.305	107.8	0.886	0.795
2020 Q1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.305	107.8	0.886	0.795
2020 Q2	−0.2	0.1	0.5	0.4	0.2	0.2	0.2	0.0	1.303	107.2	0.881	0.792
2020 Q3	−0.2	0.1	0.5	0.4	0.2	0.2	0.2	0.1	1.301	106.6	0.877	0.789
2020 Q4	−0.2	0.1	0.5	0.4	0.2	0.2	0.2	0.0	1.299	105.9	0.872	0.787

The key interest rate and exchange rate assumptions underlying our current forecast are shown in tables A1–A2. Our short-term interest rate assumptions are generally based on current financial market expectations, as implied by the rates of return on treasury bills and government bonds of different maturities. Long-term interest rate assumptions are consistent with forward estimates from short-term interest rates, allowing for a country-specific term premium. Where term premia do exist, we assume they gradually diminish over time, such that long-term interest rates in the long run are simply the forward convolution of short-term interest rates.

Short-term interest rates are expected to remain unchanged over the course of this year in the UK, Euro Area, and Japan, but to be reduced in the US, which is broadly consistent with the path signalled by the Federal Open Market Committee (FOMC) minutes from their June meeting. As discussed in the UK chapter in this *Review,* we expect UK economic growth to return to a rate that is close to its potential within two years. Our main-case scenario assumes elevated uncertainty and is conditioned on Bank Rate rising 25 basis points in August 2020. Bank Rate is expected to reach 1.5 per cent in 2023, this being the point at which the MPC is

assumed to stop reinvesting the proceeds from maturing gilts it currently holds, allowing the Bank of England's balance sheet to shrink 'naturally'.[2]

Figure A1 illustrates the recent movement in, and our projections for, 10-year government bond yields in the US, Euro Area, the UK and Japan. The average levels of 10-year sovereign bond yields in the US, Euro Area, the UK and Japan decreased in the second quarter of 2019 relative to the previous quarter. While in the US and Euro Area they decreased by about 30 basis points, in the UK and Japan they have fallen by less, by about 10–20 basis points. Expectations currently for bond yields for the end of 2019 are lower, for the US, Euro Area and the UK by about 40–60 basis points, and by around 10 basis points for Japan, compared to expectations formed three months ago.

Sovereign risks in the Euro Area were a major macroeconomic issue for the global economy and financial markets over several years after the financial crisis. Figure A2 depicts the spread between 10-year government bond yields of Spain, Italy, Portugal and Ireland over Germany's. Political and budgetary issues led to Italy experiencing the largest increase in spreads

Figure A1. 10–year government bond yields

Forecast

Per cent per annum
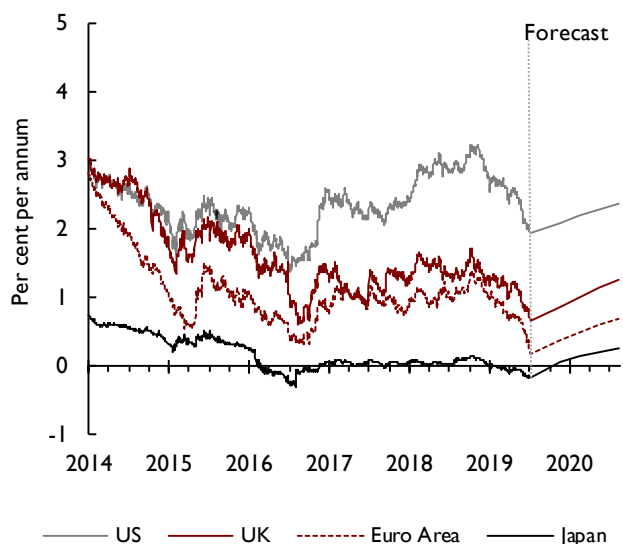
Source: Datastream and NIESR projections.

US — UK ------- Euro Area — Japan

Figure A2. Spreads over 10–year German government bond yields
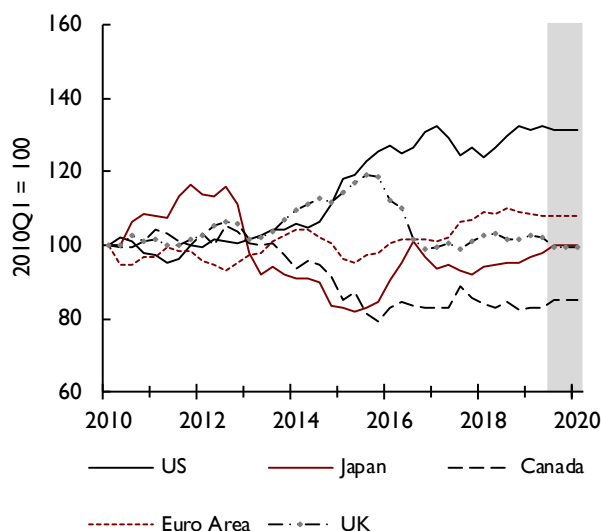

Percentage points

Ireland — Italy
Portugal — Spain
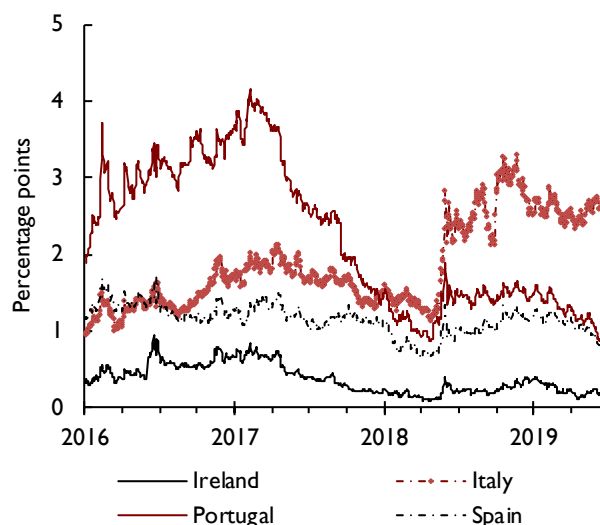
Source: Derived from Datastream series.

Figure A3. Corporate bond spreads. Spread between BAA corporate and 10–year government bond yields

Percentage points

------- US — Euro Area — UK
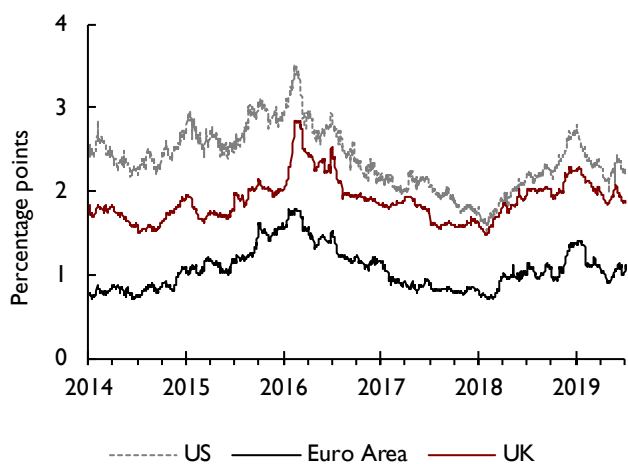
Source: Derived from Datastream series.

Figure A4. Effective exchange rates

2010Q1 = 100

US — Japan — – – Canada
------- Euro Area — ·– UK

Source: NiGEM database and NIESR forecasts. Weights based on 2016 goods and services trade shares.

in 2018 since 2013. Spreads in Italy remain elevated, leaving it as the worst performer, after Greece. We have assumed that spreads over German bond yields narrow in all Euro Area countries over the course of the forecast horizon.

Figure A3 shows the spreads of corporate bond yields over government bond yields in the US, UK and Euro Area. This acts as a proxy for the margin between private sector and 'risk-free' borrowing costs. Since the end of 2017, corporate bond spreads in the US, UK and Euro Area have been elevated, with private sector borrowing costs reducing less than the observed decrease in risk-free rates. However, spreads are still lower than the most recent peak in the beginning of 2016. Our forecast assumption for corporate spreads
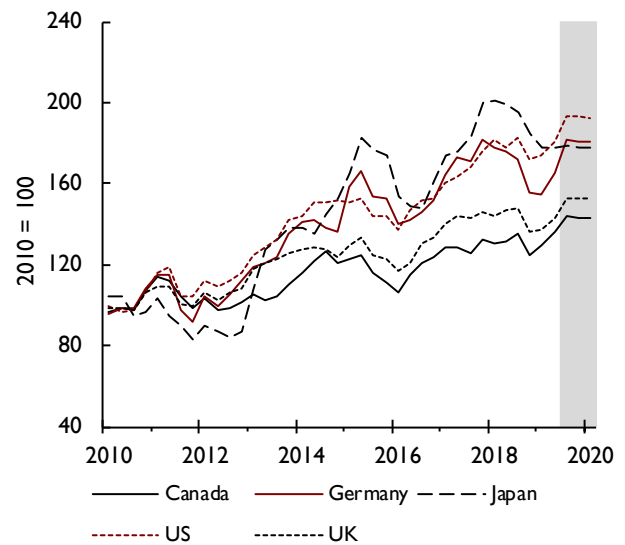
Figure A5. Oil prices
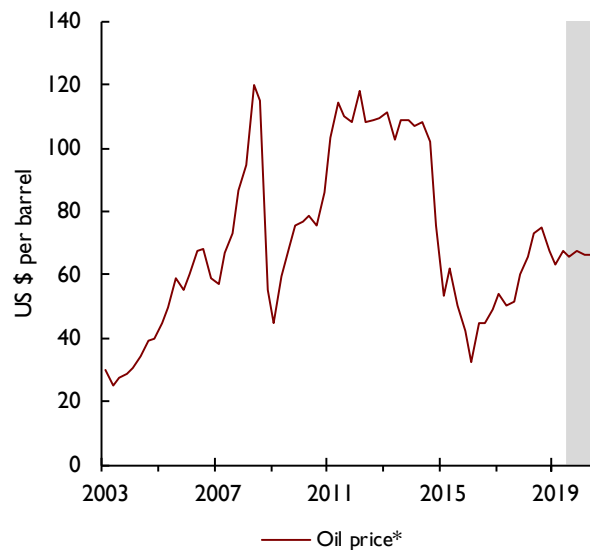
Source: NiGEM database and NIESR forecast.
Note: *Average of Dubai and Brent spot prices.

Figure A6. Share prices

Source: NiGEM database and NIESR forecast.

is that they gradually converge towards their long-term average level.

Nominal exchange rates against the US dollar are generally assumed to remain constant at the rate prevailing on 5 July 2019 until the end of March 2020. After that, they follow a backward-looking uncovered-interest parity condition, based on interest rate differentials relative to the US. Figure A4 plots the recent history as well as our short-term forecast of the effective exchange rate indices for Canada, the Euro Area, Japan, UK, and the US. After appreciating by about 7 per cent, in trade-weighted terms, over the course of last year, the US dollar depreciated, by about 1 per cent, since the end of 2018. After having strengthened by about 9 per cent over the past two years, the euro lost slightly (about 1 per cent) in value in effective terms since the end of 2018. Among the emerging market currencies in our model, the largest movement in trade-weighted terms between the second and the first quarters of 2019 has been the depreciation of the Argentinian peso and Turkish lira by about 10 and 8 per cent, respectively. Meanwhile Russian and Indian currencies strengthened in effective terms by about 7 and 2 per cent, respectively.

Our oil price assumptions for the short term generally follow those of the US Energy Information Administration (EIA), published in June 2019, and updated with daily spot price data available up to 5 July 2019. The EIA

uses information from forward markets as well as an evaluation of supply conditions. As illustrated in figure A5, oil prices, in US dollar terms, have fallen since the recent peak in October 2018, by about 10 per cent. Expectations for oil prices by the end of 2019 are largely unchanged from the expectation three months ago, which still leaves oil prices about $40 per barrel lower than their nominal level in mid-2014.

Our equity price assumptions for the US reflect the expected return on capital. Other equity markets are assumed to move in line with the US market, but are adjusted for different exchange rate movements and shifts in country-specific equity risk premia. Over the course of the last six months equity prices have risen in most developed as well as developing economies, as sentiment in stock markets has turned. Equity prices in some cases have even reached new peaks. Figure A6 illustrates the key short-term equity price assumptions underlying our current forecast.

NOTES

1 With the exception of Iceland and Israel.
2 Interest rate assumptions are based on information available for the period to 5 July 2019.