

Appendix A: Summary of key forecast assumptions by Iana Liadze and Barry Naisbitt

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, Lithuania, 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	1.93	1.40	-0.10	0.00	0.60	2.9	2.3	0.1	1.1	1.5
2019	2.78	2.09	0.03	0.06	1.08	3.4	2.9	0.4	1.6	2.0
2020	3.18	2.58	0.23	0.58	1.58	3.6	3.3	0.8	2.1	2.5
2021–25	3.56	3.45	0.82	1.41	2.41	3.9	3.9	1.7	3.1	3.4
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	2.38	1.67	-0.10	0.00	0.75	3.2	2.5	0.1	1.3	1.6
2019 Q1	2.54	1.75	-0.05	0.00	0.92	3.3	2.7	0.3	1.4	1.8
2019 Q2	2.70	2.00	-0.01	0.00	1.00	3.3	2.8	0.4	1.6	1.9
2019 Q3	2.86	2.25	0.06	0.00	1.16	3.4	2.9	0.5	1.7	2.1
2019 Q4	3.02	2.34	0.11	0.25	1.25	3.5	3.0	0.6	1.8	2.2
2020 Q1	3.08	2.44	0.16	0.42	1.42	3.5	3.1	0.7	1.9	2.3
2020 Q2	3.15	2.53	0.20	0.50	1.50	3.5	3.2	0.8	2.0	2.4
2020 Q3	3.21	2.63	0.25	0.66	1.66	3.6	3.3	0.9	2.1	2.5
2020 Q4	3.28	2.72	0.30	0.75	1.75	3.6	3.4	1.0	2.2	2.6

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	4.8	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	-0.2	-1.2	1.7	5.2	2.7	2.8	3.5	2.7	1.305	110.3	0.845	0.745
2019	2.3	0.9	1.5	0.9	0.6	0.3	0.7	1.0	1.305	111.7	0.864	0.755
2020	-0.8	0.2	2.1	1.7	0.9	0.9	1.0	0.1	1.297	108.8	0.842	0.744
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	2.4	-0.7	0.8	-0.3	-0.1	-0.2	-0.1	0.4	1.313	109.2	0.839	0.735
2018 Q3	2.5	1.5	1.0	1.3	0.8	0.4	0.8	-1.7	1.307	111.5	0.860	0.767
2018 Q4	0.8	0.5	0.2	-0.1	0.0	-0.1	0.0	2.1	1.305	112.4	0.868	0.759
2019 Q1	0.0	-0.1	0.2	0.0	0.0	0.0	0.0	0.1	1.307	112.3	0.868	0.758
2019 Q2	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.0	1.307	112.3	0.868	0.758
2019 Q3	-0.2	0.1	0.5	0.4	0.2	0.2	0.3	0.0	1.305	111.5	0.862	0.755
2019 Q4	-0.2	0.1	0.5	0.5	0.3	0.2	0.3	0.0	1.303	110.8	0.856	0.752
2020 Q1	-0.2	0.1	0.6	0.4	0.2	0.2	0.3	0.0	1.300	110.0	0.850	0.748
2020 Q2	-0.2	0.1	0.6	0.4	0.2	0.2	0.3	0.0	1.298	109.2	0.845	0.745
2020 Q3	-0.2	0.1	0.6	0.4	0.2	0.2	0.3	0.0	1.296	108.4	0.839	0.742
2020 Q4	-0.2	0.1	0.6	0.4	0.2	0.2	0.3	0.0	1.295	107.6	0.834	0.739

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.

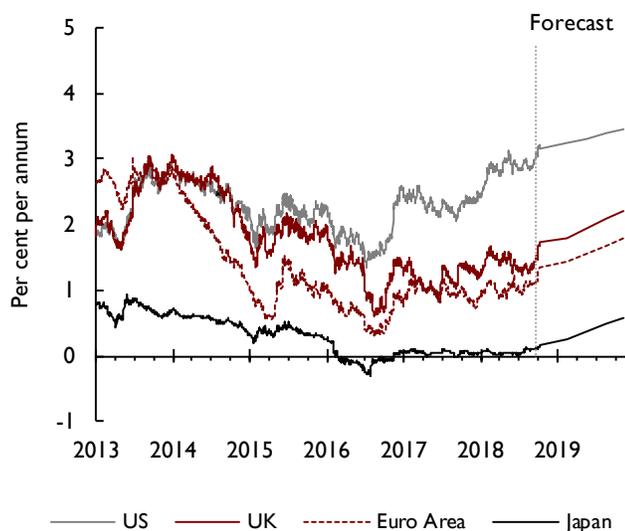
Short-term interest rates in the US are expected to rise again in 2018, but remain unchanged in the Euro Area, the UK and Japan. Interest rates in the US are broadly consistent with the path signalled by the most recent Federal Open Market Committee (FOMC) minutes. As discussed in the UK chapter in this Review, we expect UK economic growth to stabilise at a rate that is close to its potential. Our central forecast assumes a soft Brexit scenario and is conditioned on Bank Rate rising 25 basis points in February 2019. Bank Rate is expected to reach 1.5 per cent in 2020, 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 all four economies in the third quarter of 2018 remained largely unchanged relative to the second quarter. Expectations currently for bond yields for the end of 2018 are slightly higher, by about 10–20 basis points, for the UK, US and the Euro Area compared to expectations formed three months ago, but are largely unchanged for Japan. The forecast implies gradual increases for 10-year bond yields but, given the risks around the forecast, more volatile paths could emerge.

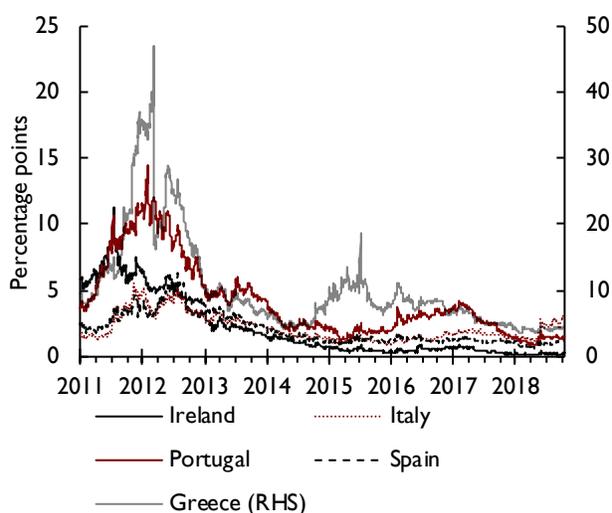
Sovereign risks in the Euro Area were a major macroeconomic issue for the global economy and financial markets over several years after the financial crisis. Figure A2 depicts the spread between 10-year government bond yields of Spain, Italy, Portugal, Ireland and Greece over Germany's. In Portugal, after increasing somewhat in May they stayed marginally elevated. Political and budgetary issues led to Italy

Figure A1. 10-year government bond yields



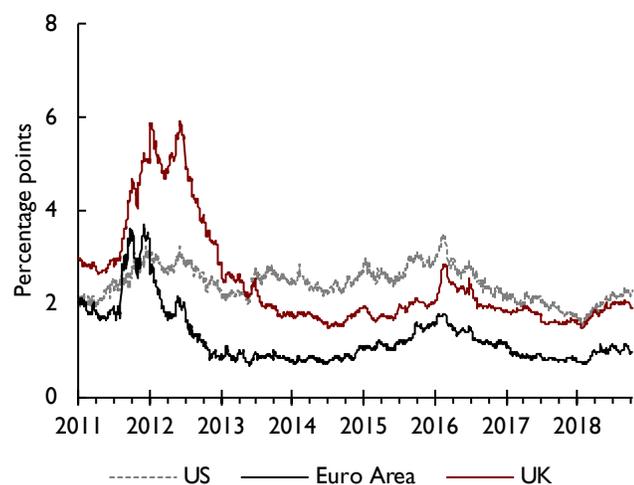
Source: Datastream and NIESR projections.

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



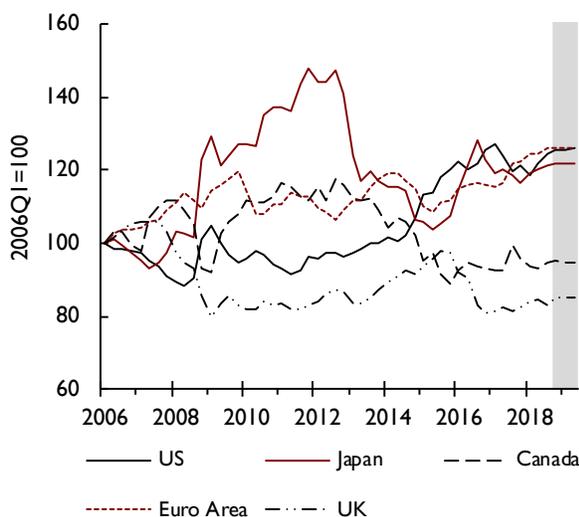
Source: Derived from Datastream series.

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



Source: Derived from Datastream series.

Figure A4. Effective exchange rates



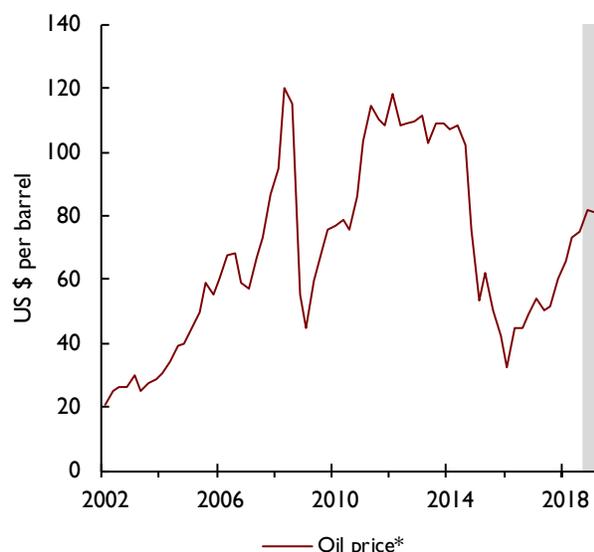
Source: NiGEM database and NIESR forecasts. Weights based on 2016 goods and services trade shares.

experiencing the largest increase in spreads since 2013 and it continues to be 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 beginning of February corporate bond spreads in the US, UK and Euro Area have been on an upward trend, with private sector borrowing costs rising more than the observed increase in risk-free rates. However, recently spreads have diverged, falling in the UK and the Euro Area, where an unexpected jump in government bond

Figure A5. Oil prices

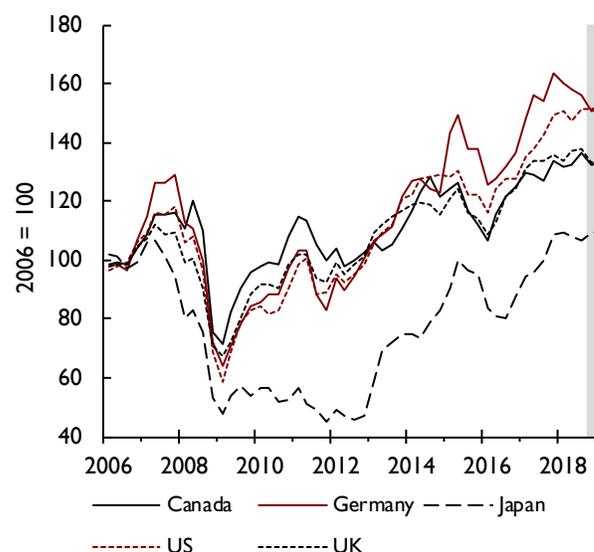


Source: NiGEM database and NIESR forecast.
Note: *Average of Dubai and Brent spot prices.

yields was larger than the increase in corporate bond yields, and rising in the US. Our forecast assumption for corporate spreads 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 11 October 2018 until the end of June 2019. 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. Between the second and third quarters of 2018, in trade-weighted terms, the US dollar appreciated further, by about 2.5 per cent, which leaves it at just about 2 per cent below the recent peak reached at the beginning of 2017. After having strengthened over the past year, the euro continued to gain in value in effective terms in the first three quarters of this year, albeit at a slower pace. Among the emerging market currencies in our model, the largest movement in trade-weighted terms between the third and the second quarters of 2018 has been the depreciation of the Argentinian peso by about 23 per cent, followed by the Turkish lira, which lost about 20 per cent of its value, and the Russian rouble, which depreciated by about 9 per cent.

Figure A6. Share prices



Source: NiGEM database and NIESR forecast.

Our oil price assumptions for the short term generally follow those of the US Energy Information Administration (EIA), published in October 2018, and updated with daily spot price data available up to 11 October 2018. 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 continued to increase since their recent trough in 2016, and have gained about 11 per cent since the second quarter of 2018. Expectations for oil prices by the end of 2019 are somewhat higher than the expectation three months ago, which leaves oil prices about \$29 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. Since the second quarter of this year stock market performance has been mixed, with equity prices generally falling in European economies, while steadying in the US. 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 11 October 2018.