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
2014	0.25	1.00	0.10	0.16	0.50	2.5	2.2	0.6	1.9	2.5
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	*1.91*	*1.35*	*–0.10*	*0.00*	*0.60*	*2.9*	*2.2*	*0.1*	*1.1*	*1.4*
2019	*2.69*	*1.94*	*–0.10*	*0.06*	*1.08*	*3.2*	*2.8*	*0.3*	*1.6*	*2.0*
2020–24	*3.55*	*3.29*	*0.26*	*1.31*	*2.31*	*3.9*	*3.8*	*1.1*	*3.0*	*3.4*
2016 Q1	0.50	0.50	0.00	0.04	0.50	1.9	1.2	0.1	0.8	1.5
2016 Q2	0.50	0.50	–0.10	0.00	0.50	1.7	1.3	–0.1	0.7	1.4
2016 Q3	0.50	0.50	–0.10	0.00	0.34	1.6	1.1	–0.1	0.4	0.8
2016 Q4	0.55	0.50	–0.10	0.00	0.25	2.1	1.5	0.0	0.8	1.3
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	*2.08*	*1.43*	*–0.10*	*0.00*	*0.66*	*2.8*	*2.2*	*0.0*	*1.0*	*1.3*
2018 Q4	*2.24*	*1.50*	*–0.10*	*0.00*	*0.75*	*3.0*	*2.3*	*0.1*	*1.2*	*1.5*
2019 Q1	*2.42*	*1.75*	*–0.10*	*0.00*	*0.92*	*3.1*	*2.5*	*0.2*	*1.4*	*1.8*
2019 Q2	*2.60*	*1.88*	*–0.11*	*0.00*	*1.00*	*3.2*	*2.7*	*0.3*	*1.5*	*2.0*
2019 Q3	*2.78*	*2.01*	*–0.10*	*0.00*	*1.16*	*3.3*	*2.8*	*0.3*	*1.7*	*2.1*
2019 Q4	*2.96*	*2.13*	*–0.08*	*0.25*	*1.25*	*3.4*	*3.0*	*0.4*	*1.8*	*2.3*

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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
2014	3.8	–5.7	–5.5	3.1	1.6	1.5	2.5	7.4	1.112	105.8	0.754	0.607
2015	13.2	–11.2	–6.3	–6.0	–3.7	–3.8	–3.1	5.6	1.299	121.1	0.902	0.654
2016	5.2	0.3	15.2	4.8	2.4	2.5	2.9	–9.9	1.314	108.8	0.904	0.741
2017	0.6	2.0	–2.4	3.0	1.3	2.0	2.0	–5.2	1.294	112.2	0.887	0.776
2018	*–0.8*	*–1.5*	*0.9*	*4.7*	*2.5*	*2.6*	*3.1*	*2.4*	*1.306*	*110.3*	*0.842*	*0.742*
2019	*1.2*	*–0.4*	*0.7*	*0.8*	*0.5*	*0.3*	*0.5*	*–0.4*	*1.317*	*110.9*	*0.849*	*0.753*
2016 Q1	1.6	4.2	6.5	2.5	1.3	1.2	1.5	–5.6	1.323	115.2	0.908	0.699
2016 Q2	–1.7	2.1	5.7	1.1	0.5	0.8	0.7	–1.6	1.289	107.9	0.886	0.697
2016 Q3	1.1	–1.2	5.9	0.3	0.0	0.4	0.0	–7.9	1.310	102.4	0.896	0.762
2016 Q4	3.6	–0.6	–4.1	0.0	–0.1	0.1	0.2	–2.6	1.333	109.5	0.927	0.805
2017 Q1	1.1	–0.1	–2.9	–0.6	–0.4	–0.2	–0.2	0.8	1.339	113.6	0.939	0.807
2017 Q2	–2.4	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	1.3	–3.7	–1.7	0.6	0.3	0.4	0.5	1.7	1.277	112.9	0.849	0.753
2018 Q1	–1.9	–2.1	2.5	2.0	0.9	1.2	1.4	2.0	1.294	108.3	0.814	0.718
2018 Q2	2.0	1.0	0.5	–0.4	–0.1	–0.4	–0.2	0.1	1.291	109.2	0.840	0.736
2018 Q3	*2.1*	*–1.5*	*–0.3*	*0.3*	*0.3*	*0.0*	*0.2*	*–1.0*	*1.320*	*111.9*	*0.856*	*0.757*
2018 Q4	*0.0*	*–0.1*	*–0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*1.321*	*112.0*	*0.857*	*0.757*
2019 Q1	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*	*1.321*	*112.0*	*0.857*	*0.757*
2019 Q2	*–0.2*	*0.1*	*0.5*	*0.5*	*0.3*	*0.2*	*0.3*	*0.1*	*1.318*	*111.3*	*0.851*	*0.755*
2019 Q3	*–0.2*	*0.1*	*0.5*	*0.5*	*0.3*	*0.3*	*0.3*	*0.1*	*1.316*	*110.6*	*0.846*	*0.752*
2019 Q4	*–0.2*	*0.1*	*0.6*	*0.5*	*0.3*	*0.3*	*0.3*	*0.0*	*1.314*	*109.8*	*0.840*	*0.749*

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, UK and Canada are expected to rise in 2018, but remain unchanged in the Euro Area 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 the 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 August this year and 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 levels of 10-year sovereign bond yields in the second quarter of 2018 have increased slightly since the first quarter in the US by about 20 basis points, but remained largely unchanged in the Euro Area, the UK and Japan. Expectations currently for bond yields for the end of 2018 are slightly lower, by about 30 basis points, for the UK compared to expectations formed just three months ago, but are largely unchanged for the US, the Euro Area and 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

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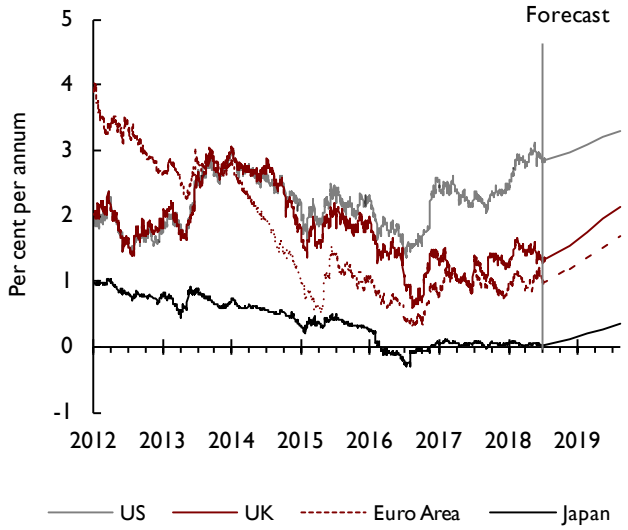
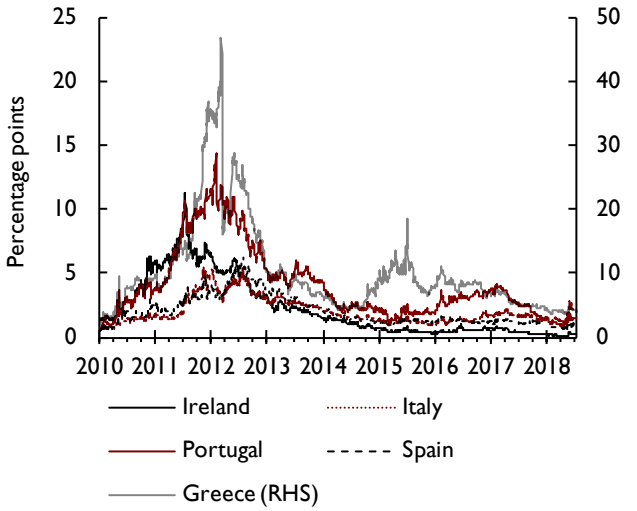
Figure A1. 10–year government bond yields



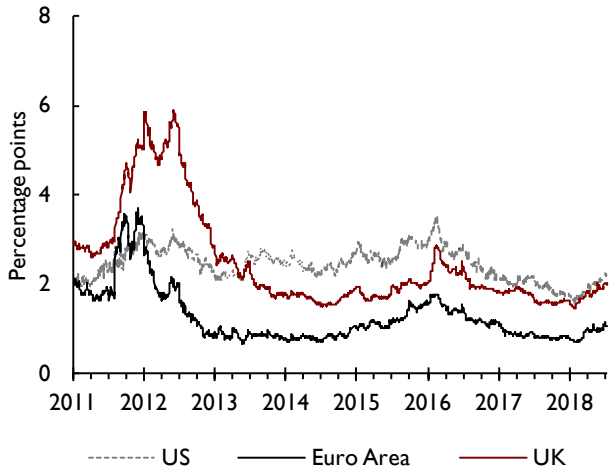
Source: Datastream and NIESR projections.

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



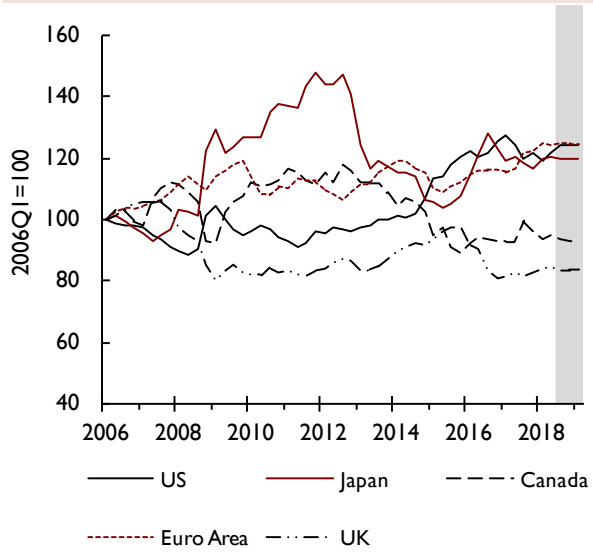
Source: Derived from Datastream series.

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 2010 goods and services trade shares.

and Greece over Germany's. After remaining relatively flat or somewhat decreasing over the course of last year, spreads increased in May and have remained elevated since. Italy experienced the largest increase in spreads. In our current forecast, we have assumed that spreads over German bond yields narrow slightly in all Euro Area countries.

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

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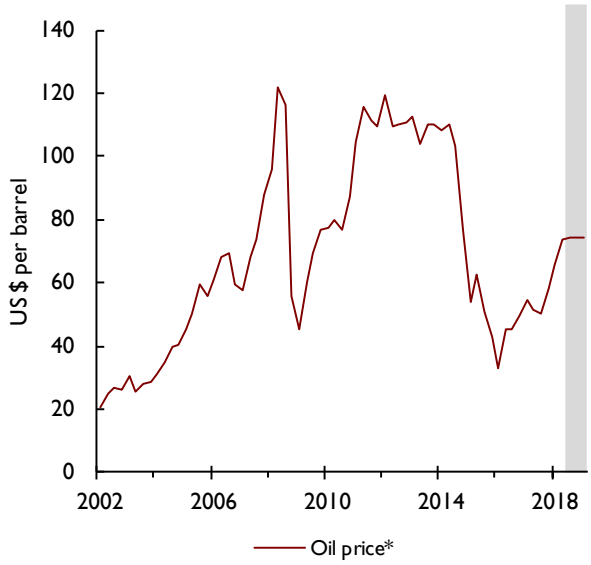
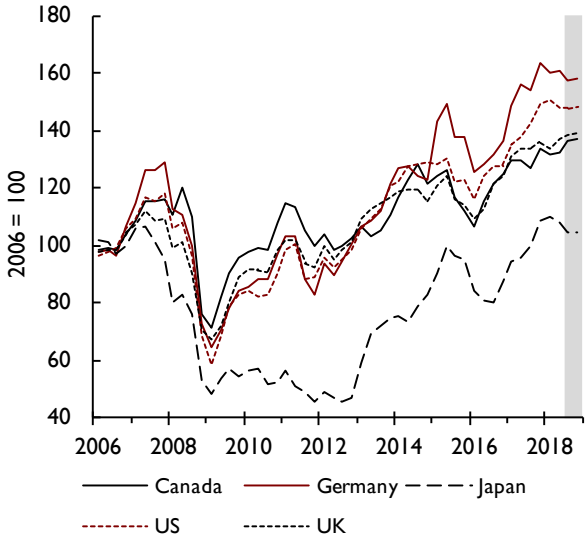
Figure A5. Oil prices



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

Figure A6. Share prices



Source: NiGEM database and NIESR forecast.

the observed increase in risk-free rates. 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 12 July 2018 until the end of March 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 first and the second quarters of 2018, in trade-weighted terms, the US dollar appreciated slightly, by about 2 per cent, which leaves it at just about 4 per cent below the recent peak reached at the beginning of 2017. After having strengthened over the past year, the euro weakened marginally in effective terms in the second quarter of this year relative to the previous quarter. Among the emerging market currencies in our model, the largest movement in trade-weighted terms between the second and the first quarters of 2018 has been the depreciation of the Argentinian peso by about 13 per cent, followed by the Turkish lira, which lost about 11 per cent of its value, and the Brazilian real, which depreciated by about 8 per cent.

Our oil price assumptions for the short term generally follow those of the US Energy Information Administration (EIA), published in July 2018, and updated with daily spot price data available up to 12 July 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 gained about 12 per cent between the second and the first quarters of 2018. Expectations of oil prices by the end of 2019 are somewhat higher, compared to the expectation three months ago, which leaves oil prices about $35 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 beginning of this year stock market performance has been mixed, without major falls or gains in equity prices in the largest developed economies. 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 12 July 2018.

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