

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. 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 tied down in the long run by factor inputs and technical progress interacting through production functions, but is driven 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/>.

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

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	1.89	1.42	-0.11	0.00	0.60	2.9	2.3	0.1	1.1	1.6
2019	2.64	2.08	-0.11	0.09	1.08	3.3	2.9	0.4	1.6	2.3
2020–24	3.61	3.41	0.30	1.24	2.35	3.9	3.8	1.2	3.0	3.5
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	1.83	1.25	-0.10	0.00	0.50	2.8	2.1	0.0	0.9	1.4
2018 Q3	2.01	1.50	-0.11	0.00	0.66	2.9	2.3	0.1	1.1	1.6
2018 Q4	2.19	1.75	-0.12	0.00	0.75	3.1	2.5	0.2	1.3	1.8
2019 Q1	2.37	1.88	-0.14	0.00	0.92	3.2	2.7	0.3	1.4	2.0
2019 Q2	2.55	2.01	-0.12	0.00	1.00	3.3	2.8	0.4	1.6	2.2
2019 Q3	2.74	2.14	-0.10	0.09	1.16	3.4	3.0	0.4	1.7	2.3
2019 Q4	2.92	2.27	-0.08	0.26	1.25	3.5	3.1	0.5	1.9	2.5

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	-4.0	0.9	1.2	5.2	2.6	3.0	3.5	4.1	1.262	107.5	0.811	0.709
2019	-0.6	0.2	1.5	1.2	0.7	0.6	0.8	0.6	1.257	105.6	0.798	0.699
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	-2.3	0.1	2.3	1.9	0.8	1.1	1.3	1.9	1.265	108.4	0.814	0.719
2018 Q2	-0.5	0.1	1.0	0.5	0.3	0.3	0.4	1.7	1.262	107.2	0.810	0.706
2018 Q3	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.260	107.2	0.809	0.706
2018 Q4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.260	107.2	0.809	0.706
2019 Q1	-0.2	0.0	0.5	0.4	0.2	0.2	0.3	0.1	1.259	106.6	0.805	0.703
2019 Q2	-0.2	0.0	0.5	0.4	0.2	0.2	0.3	0.0	1.257	105.9	0.800	0.700
2019 Q3	-0.2	0.0	0.5	0.4	0.2	0.2	0.3	0.0	1.256	105.2	0.795	0.698
2019 Q4	-0.2	0.1	0.6	0.5	0.3	0.2	0.3	0.0	1.254	104.5	0.790	0.695

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 continue rising 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, which are broadly in line with current implied market expectations. As discussed in the UK chapter in this *Review*, we expect the UK economic growth to stabilise at a level that is close to its potential. Given that inflation is expected to exceed the BoE's target of 2 per cent for the next two years, we expect further 25 basis point increases in August this year and February 2019. Bank Rate is expected to reach 2 per cent in the second half of 2021, 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 first quarter of 2018 have increased slightly since the fourth quarter of 2017 in the UK, the US and the Euro Area – by about 10–40 basis points – but remained largely unchanged in Japan. Expectations currently for bond yields for the end of 2018 are slightly lower for the Euro Area, compared to expectations formed just three months ago; marginally higher for the US, and largely unchanged for the UK and Japan. For the Euro Area they are down by about 20 basis points, and up by about 10 basis points for the US. 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. These have either remained relatively flat or somewhat decreased. In our current forecast, we have assumed that spreads over German

Figure A1. 10-year government bond yields

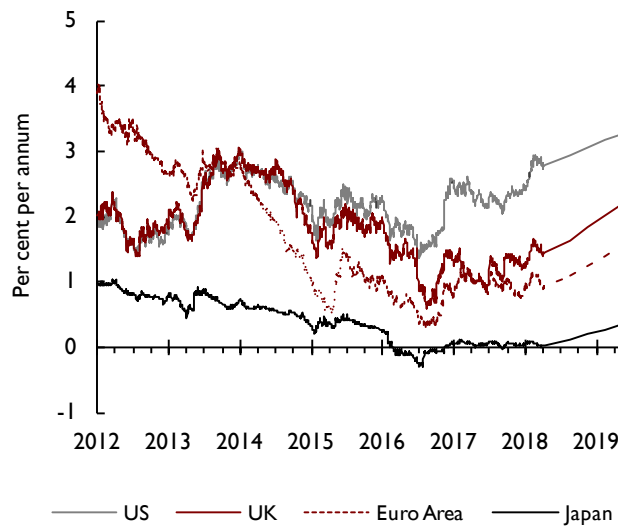
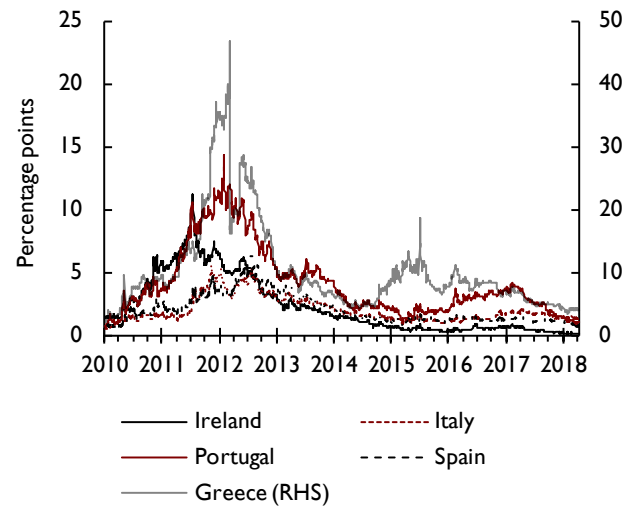
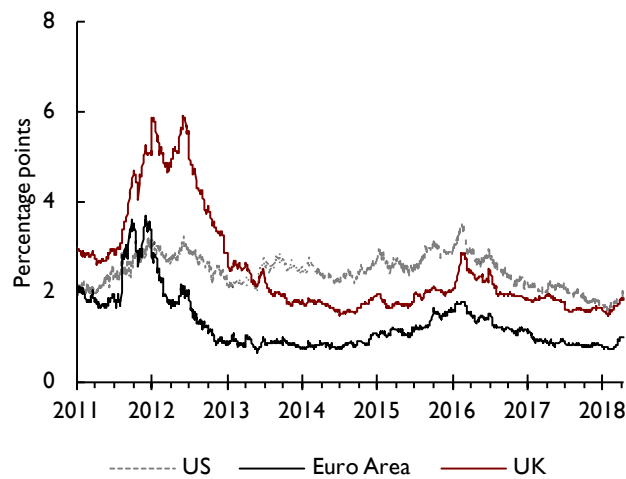


Figure A2. Spreads over 10-year German government bond yields



Source: Derived from Datastream series.

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

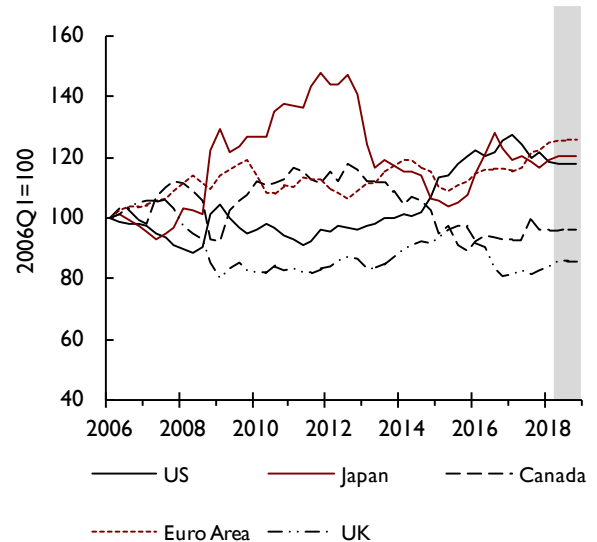


Source: Derived from Datastream series.

bond yields continue to 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. Reflecting the tightening of financial conditions, corporate bond spreads widened at the beginning of 2016, but have subsequently narrowed barring the jump observed

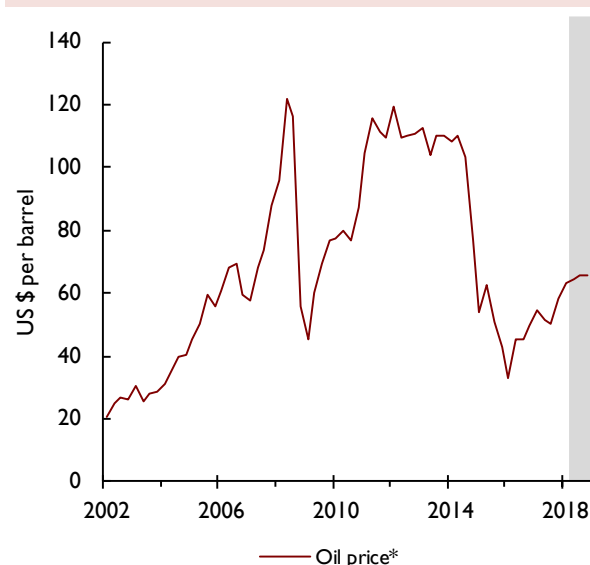
Figure A4. Effective exchange rates



Source: NiGEM database and NIESR forecasts. Weights based on 2010 goods and services trade shares.

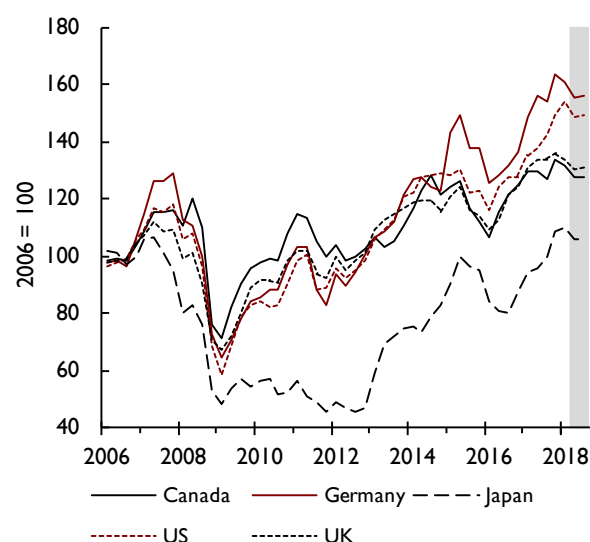
around the period of the UK’s decision to leave the EU. Since the beginning of February corporate bond spreads in the US, UK and Euro Area have been on an upward trend, as private sector borrowing costs have risen more than the observed increase in risk-free rates. Our forecast assumption for corporate spreads is that they gradually converge towards their long-term average level.

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.

Nominal exchange rates against the US dollar are generally assumed to remain constant at the rate prevailing on 11 April 2018 until the end of December 2018. 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 fourth quarter of 2017 and the first quarter of 2018 the US dollar depreciated slightly, by about 2 per cent, in trade-weighted terms, and remained at about 7 per cent below the recent peak reached at the beginning of 2017. The euro continued to strengthen, gaining about 2 per cent in effective terms in the first quarter of this year compared to the last quarter of 2017. Among the emerging market currencies in our model, the largest movement in trade-weighted terms between the fourth quarter of 2017 and the first quarter of 2018 has been the depreciation of the Argentinian peso by about 10 per cent, and appreciation of the South African rand by around 12 per cent.

Our oil price assumptions for the short term generally follow those of the US Energy Information Administration (EIA), published in April 2018, and updated with daily spot price data available up to 11 April 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 9 per cent between the first quarter of 2018 and fourth quarters of last year. Expectations of oil prices by the end of 2019 are largely unchanged, compared to the expectation three months ago, which still leaves oil prices about \$39 lower than their nominal level in mid-2014. A simulation of the NiGEM model considering higher oil prices was presented in the February 2018 *Review*.³

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. Figure A6 illustrates the key equity price assumptions underlying our current forecast. Equity prices in most countries declined between the end of 2017 and the first quarter of 2018, after buoyant performance observed since early 2016.

NOTES

- 1 With the exception of Iceland and Israel.
- 2 Interest rate assumptions are based on information available for the period to 11 April 2018.
- 3 Lennard, J. and Theodoridis, K. (2018), 'Oil and the macroeconomy', *National Institute Economic Review*, 243, pp. F48–9.