Introducing Brexit to NiGEM

UN project LINK meeting 2019
Glen Cove, New York, USA
17/19th June 2019

Amit Kara
a.kara@niesr.ac.uk
Twitter: @amit_kara

National Institute of Economic and Social Research

Plan

1. **Background**

   a) Economics and politics of Brexit
   b) A brief introduction to NiGEM

2. **Modelling Brexit in NIGEM**

3. **Results**

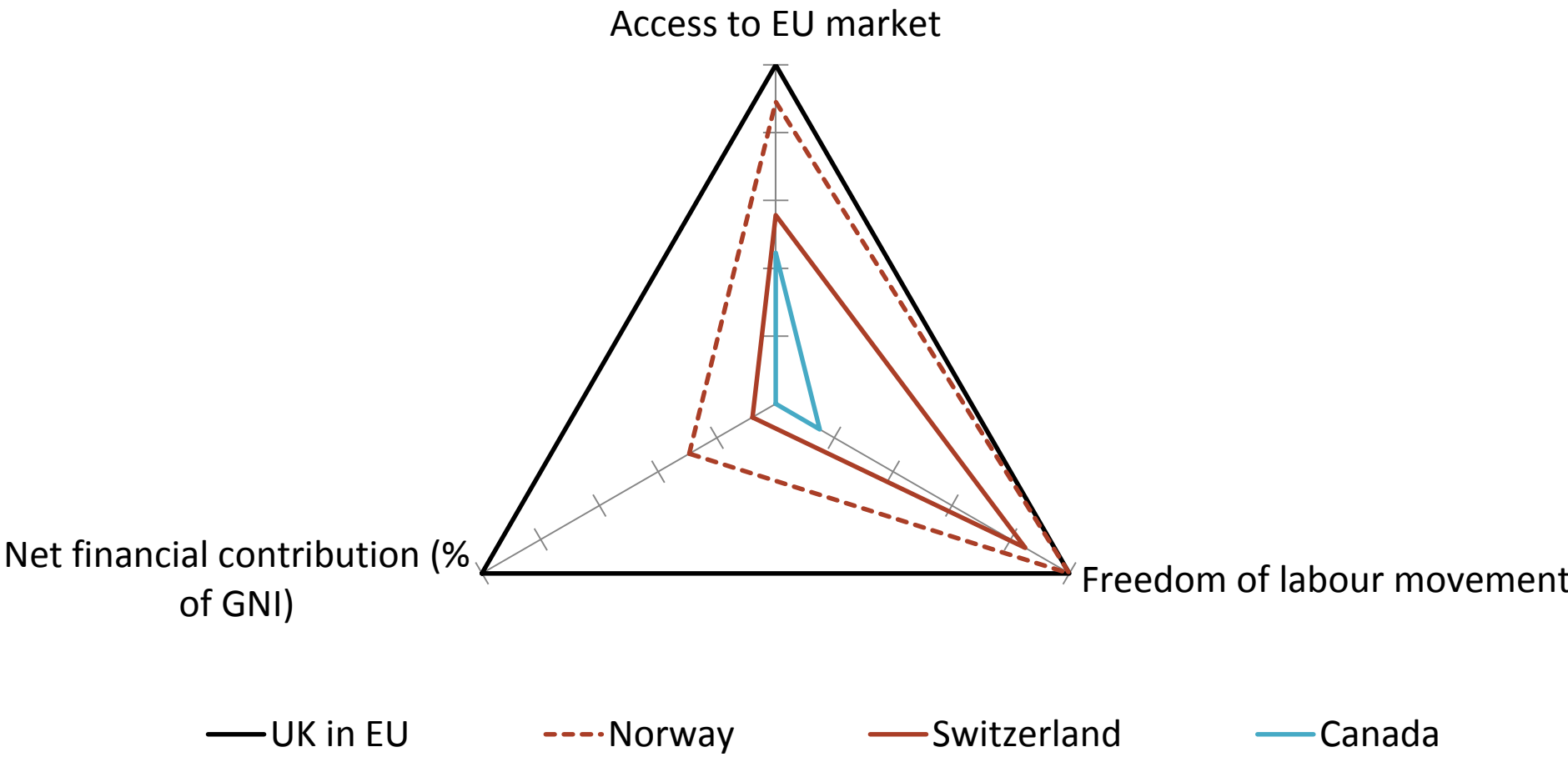
BACKGROUND

a) Economics and politics of Brexit
b) A brief introduction to NiGEM

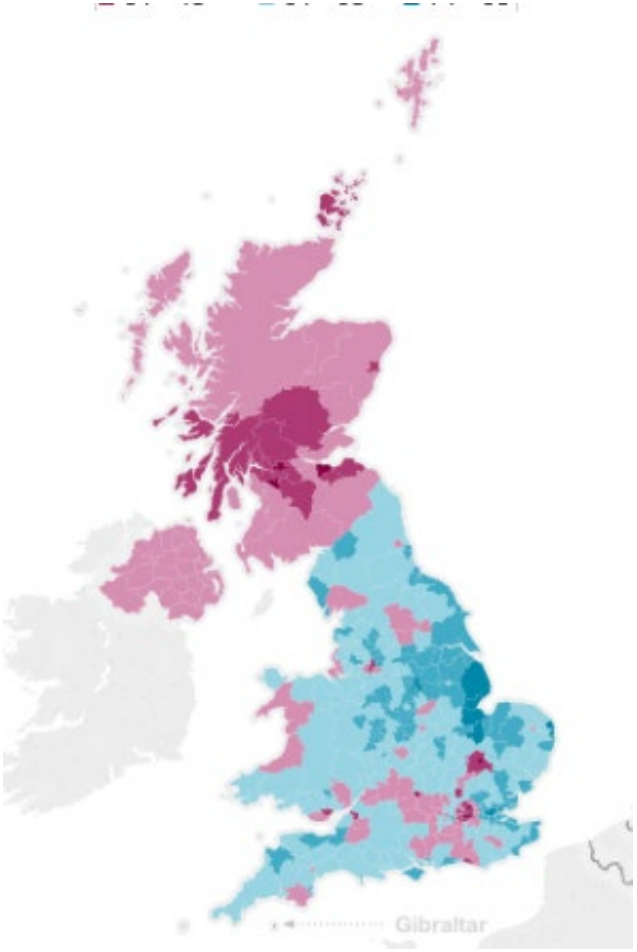
Economics: types of trading relationships

- **WTO rules:** no special trading relationship ('Hard' or 'Orderly'Brexit) with EU and 50+ countries. Free to negotiate FTA with 3rd countries. Particularly restrictive for services trade.
- **Free trade agreement:** enable reciprocal market opening by granting preferential access to markets. Free to negotiate FTA with 3rd countries. Primarily for goods, much less for services trade. EU has FTAs with more than 50 countries ('Deal + FTA').
- **Customs Union:** Common external tariffs and barriers. Countries in a CU negotiate FTAs with 3rd countries as a block. EU rules apply in all participating countries ('Deal + Backstop')
- **EU Single Market:** free movement of goods, services, capital and people. Applies to EU member states as EEA countries. This 4 rights are indivisible for the EU.
- **European Economic Area**: EU Member States + Norway, Liechtenstein + Iceland (Single Market but not in the CU, therefore trade frictions arising from Rules of Origin
- **European Free Trade Area**: EEA + Switzerland

The economic trade-off



Politics: what is the backstop?



- Map shows the referendum outturn. Broadly speaking, England & Wales voted to exit while Scotland & N. Ireland voted to remain.
- Both parties committed to the *Good Friday* or *Belfast Agreement*
- If no trade deal is achieved by 2020 that avoids a hard border in the island of Ireland & the transition period is not extended, then the backstop will be triggered. Under the backstop, "a single customs territory between the (European) Union and the United Kingdom“ will be created.
- The UK will in effect remain in a customs union with the EU and therefore, unable to negotiate trade agreements with 3rd countries.

1. BACKGROUND

a) Economics and politics of Brexit

b) A brief introduction to NiGEM

NiGEM Overview

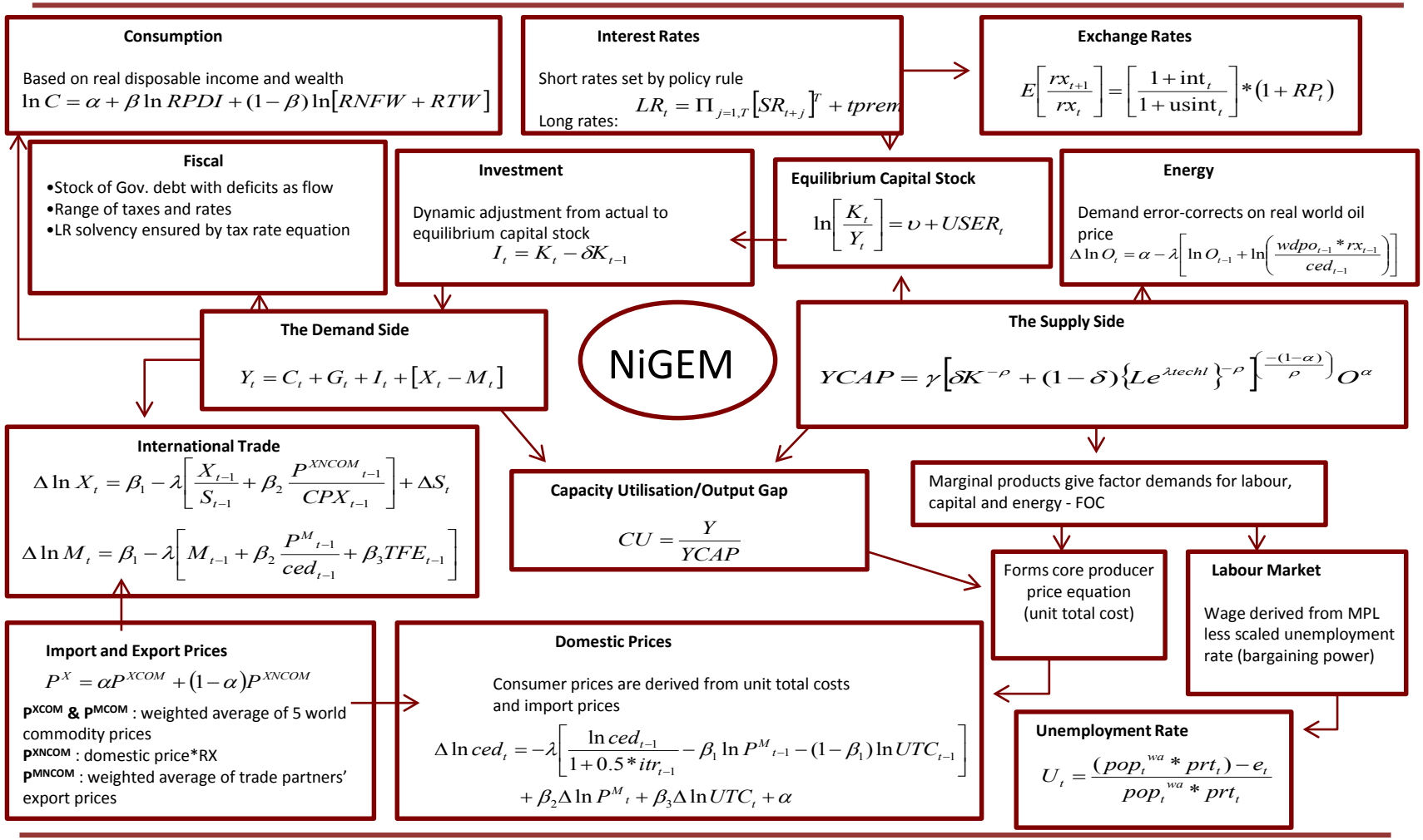
- NiGEM is a large model of the world economy and is used for **forecasting** and **scenario** analysis
- Discrete models for most **OECD** economies and other countries such as India, China, Brazil, South Africa etc. There are regional blocks for the remaining countries in Asia, America, Africa, the Middle East and Europe

- Models depend on both **theory and data**
- There is a common (estimated and calibrated) **underlying structure** across all economies
- **Long-run structure relatively rigid**
- Contains both **forward looking, rational expectations and adaptive learning**.
- **Flexible policy** environments

Structure of NiGEM

- The country models have complete demand and supply sides, also full asset structures
- Most behavioural equations estimated in error-correction format
- Rational expectations options
  - Financial markets
  - Labour markets
  - Consumption
- Country Linkages
  - trade and competitiveness
  - interacting financial markets
  - through international stocks of assets
- Supply-side
  - based on CES relationship between capital (K) and labour (L), embedded in a Cobb-Douglas framework with oil (M)
- Government
  - direct and indirect taxes, government spending and interest payments.
  - tax rule to ensure long run solvency

The Structure



National Institute of Economic and Social Research

Modelling GDP

- In the short- to medium-term, GDP is driven by the demand side

$$Y = C + I + G + XVOL - MVOL$$

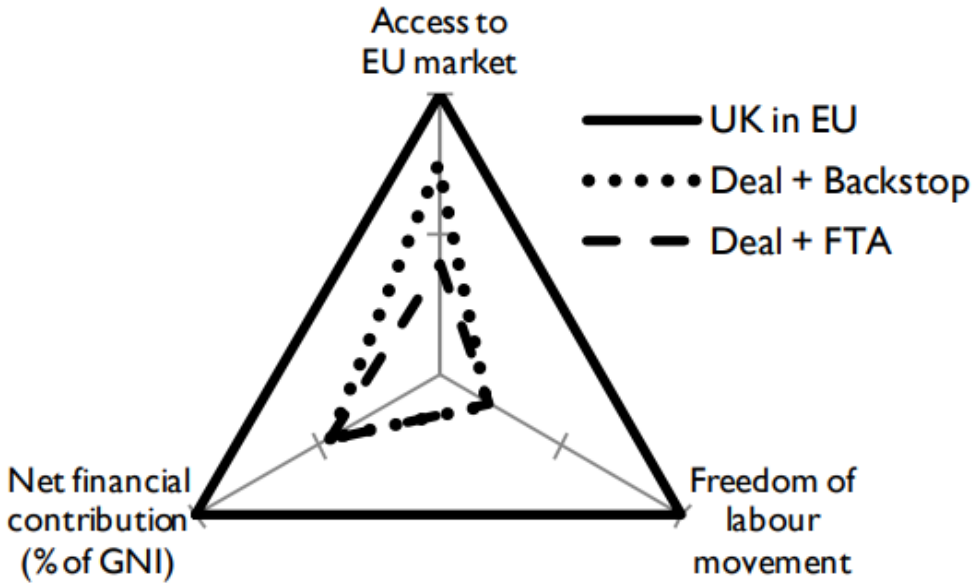
- In the longer term, GDP is driven by the supply side

$$YCAP = \gamma[\delta K^{-\rho} + (1-\delta)(Le^{\lambda techl})^{-\rho}]^{-(1-\alpha)/\rho} M^{\alpha}$$

2. MODELLING BREXIT IN NIGEM

Ebell Monique, Hurst Ian, Warren James: Modelling the long-run economic impact of leaving the European Union. *Economic Modelling* 59(2016) 196-209

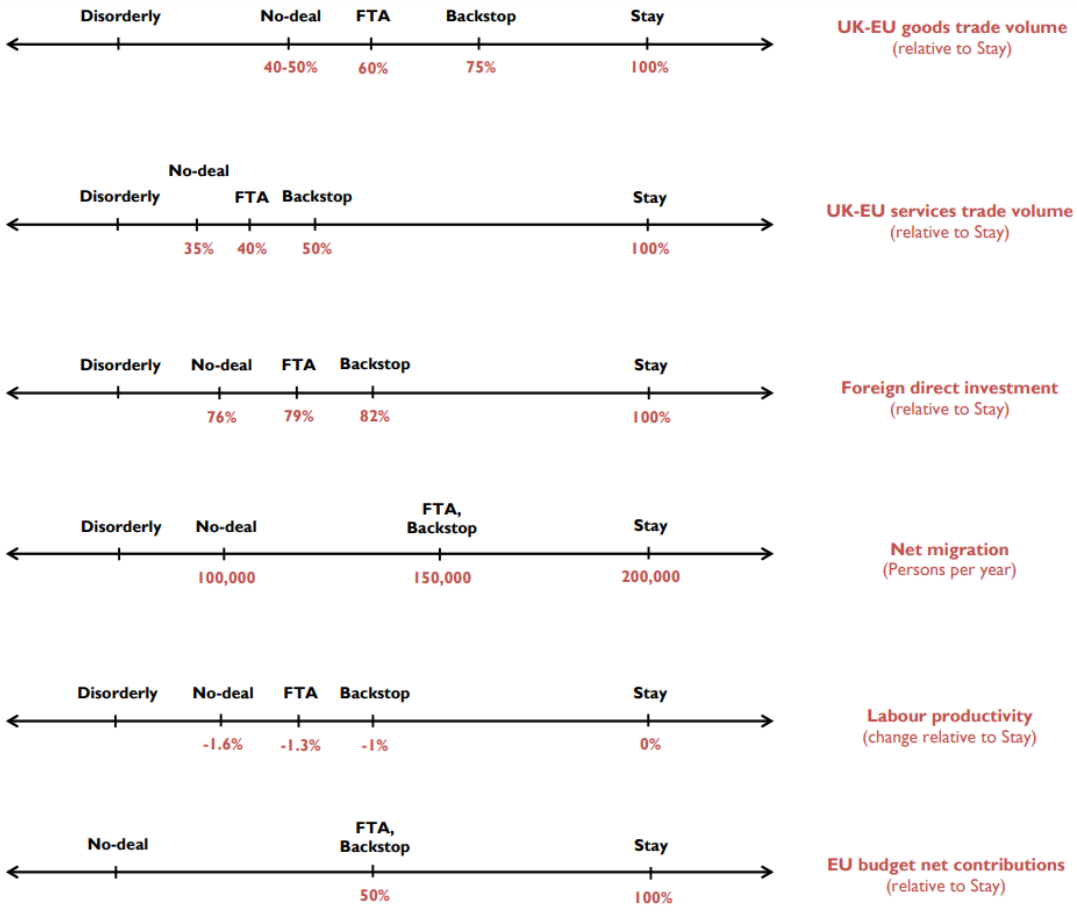
The Engagement Triangle



- As a member of the Single Market, the UK enjoys complete market access, allows free labour movement and pays around 0.5% of GNI to the EU.
- Trade access will be heavily restricted under the Backstop and FTA scenarios. Greater restrictions will apply under a simple FTA.
- We assume that labour movement will be heavily restricted and the fiscal contribution will be much smaller under the Backstop and FTA scenarios

Assumptions

Modelling the Brexit deal



1. Reduction in trade (non-tariff barriers)

- Export and Import volume equations are in error correction form and trade volumes are driven by price and demand

Export volume equation in NiGEM

$$\Delta \log(xvol_t) = \beta_1 \Delta \log\left(\frac{pxncom}{cpx}_t\right) + \beta_2 \Delta \log(S_t) - \lambda_1 \left(log\left(\frac{\mathrm{xvol}_{t-1}}{S_{t-1}}\right) + \alpha_1 \log\left(\frac{pxncom}{cpx}_{t-1}\right)\right)$$

1. Reduction in trade (non-tariff barriers)

- The loss of access to the EU is modelled through the export market size variable (S_t) and phased in over a two-year period

$$S_t = \sum_0^{eu} \phi_{eu}\, \epsilon_{eu} mvol_{t,eu} + \sum_0^{rw} \phi_{rw}\, mvol_{t,rw}$$

- For the No deal Brexit scenario we have assumed a 56% reduction in trade from the EU and a 38% reduction under the Customs Union scenario.

2. Labour productivity

- The loss of access to the EU is modelled through the export market size variable (S_t) and phased in over a two-year period

$$YCAP = \gamma\left[\delta K^{-\rho} + (1-\delta)\left\{Le^{\lambda techl}\right\}^{-\rho}\right]^{\left(\frac{-(1-\alpha)}{\rho}\right)} O^{\alpha}$$

- Lower labour productivity (techl) by 1.6% by 2030 under the no-deal scenario and by 1% for the Customs Union scenario

RESULTS

Main results

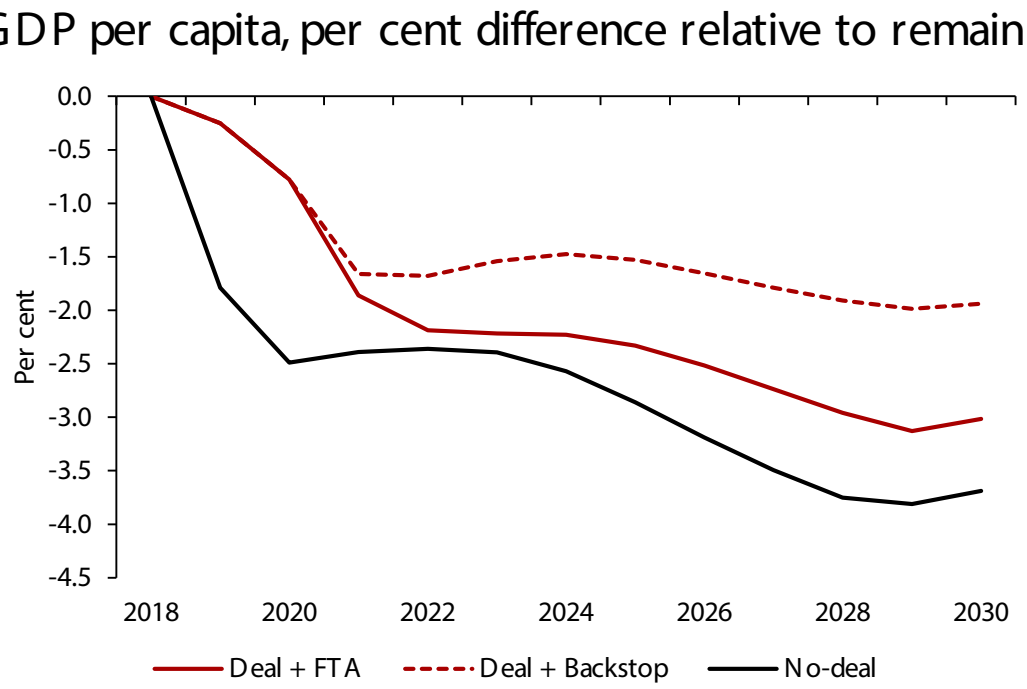
Summary table: Long-run economic impact of different Brexit scenarios
Difference relative to Stay scenario in 2030

	GDP % difference	GDP £2016 prices	GDP per head % difference	GDP per head £ 2016 prices
Deal + FTA (Proposed deal)	–3.9%	–£100 bn	–3.0%	–£1,090
Deal + Backstop	–2.8%	–£70 bn	–1.9%	–£700
Orderly no deal	–5.5%	–£140 bn	–3.7%	–£1,330

Source: NIESR. The Stay scenario is an estimate of how the economy would develop if the UK were to stay in the EU.

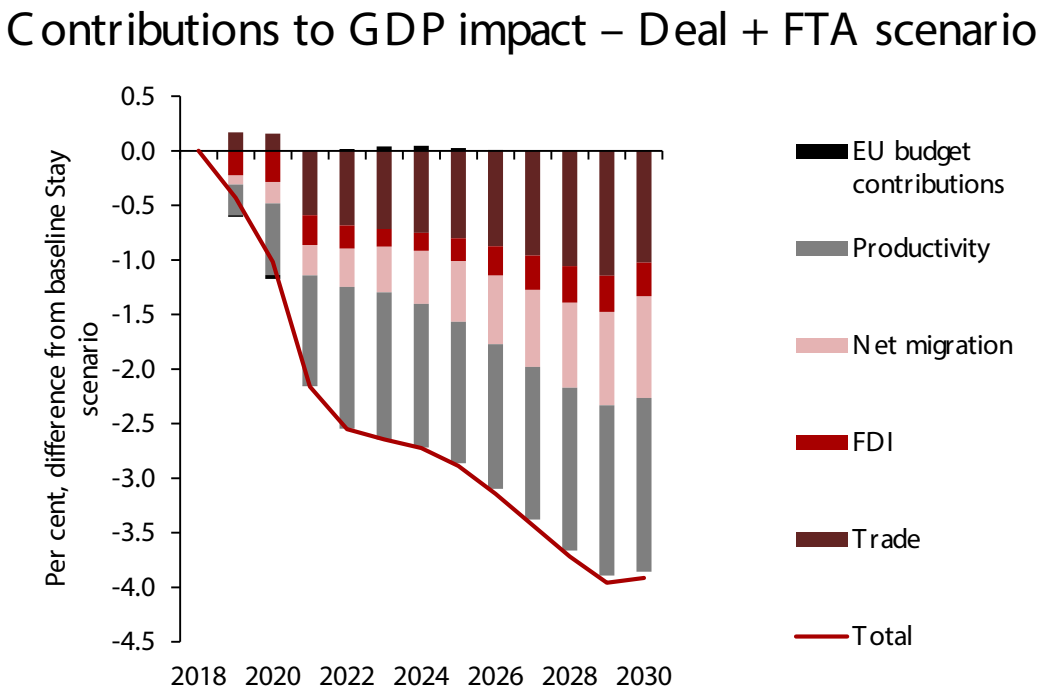
- Under the proposed deal, the economy will be around 4% smaller in 2030 relative to a scenario where the UK stays in the EU. This implies a per capita GDP loss of 3% or around £1,090.
- The losses are smaller if the backstop is activated.
- Under our orderly no-deal scenario, the GDP loss is 5.5% over the same period.

The level of GDP



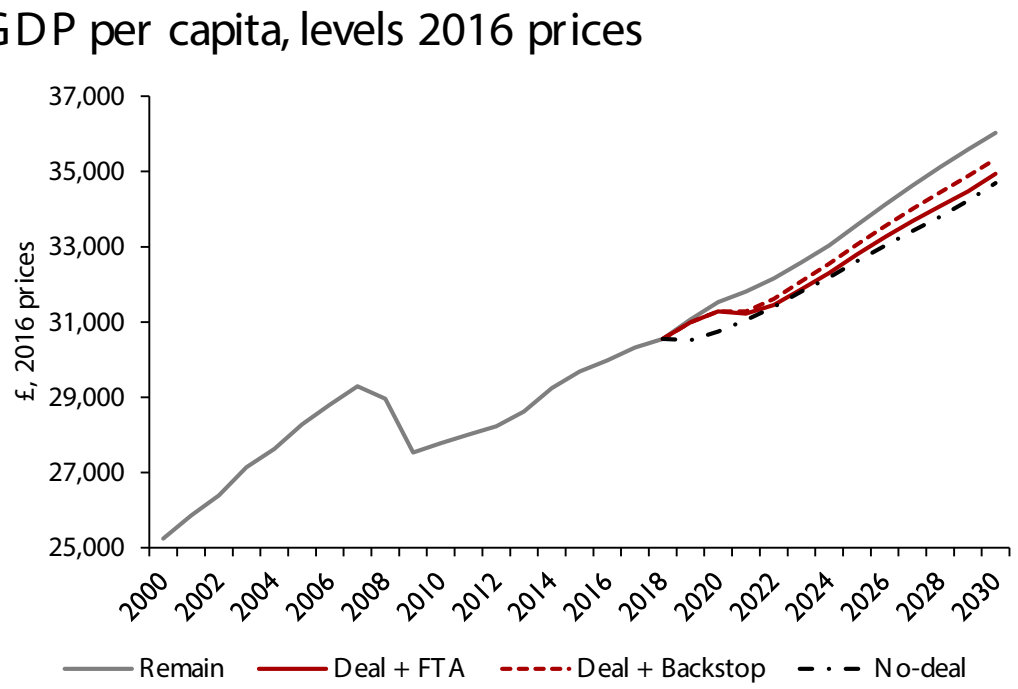
- The path to the long term is uncertain, but the impact of the shock is likely to be front-loaded

What explains the lower level of GDP?



- The 3 channels that explain the bulk of the loss in output are: productivity, migration and trade

GDP per capita



- GDP per capita will expand under all scenarios in the long term, but people will be permanently less well-off compared with the counterfactual Stay scenario.

National Institute of Economic and Social Research

THE ECONOMIC EFFECTS OF THE GOVERNMENT'S PROPOSED BREXIT DEAL

Arno Hantzsche, Amit Kara and Garry Young

26 November 2018

ADDITIONAL SLIDES

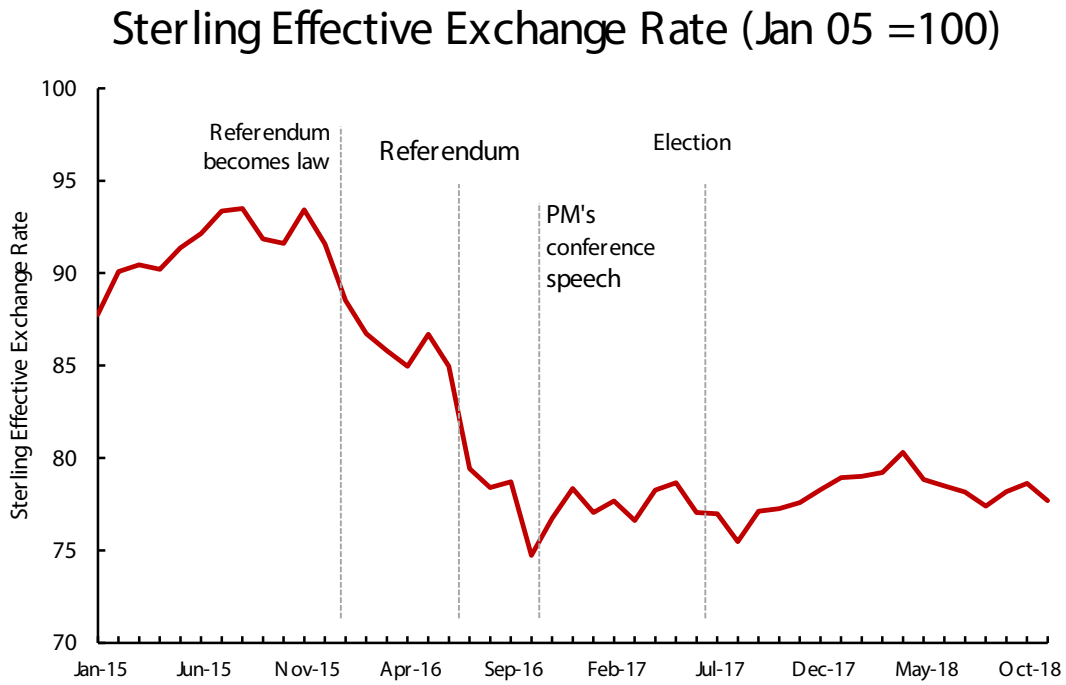
How do we compare?

Comparison of Brexit deal impact studies

		Close relationship	FTA	Orderly no-deal
Long run				
NIESR	% GDP	-2.8%	-3.9%	-5.5%
	% GDP per capita	-1.9%	-3.0%	-3.7%
UK in a Changing Europe	% GDP	n/a	n/a	n/a
	% GDP per capita	-5.5%		-8.7%
HM Government	% GDP	-2.1% to -3.9%	-4.9% to -6.7%	-7.7% to -9.3%
	% GDP per capita	-2.1% to -2.7%	-4.9% to -5.4%	-7.6% to -8.1%
Medium run (2023)				
NIESR	% GDP	-2.6%	-2.0%	-3.2%
Bank of England	% GDP	-1.25% to -3.75%		-7.75%

Notes: 'Close relationship' encompasses comparable scenarios with stronger regulatory convergence compared to a free trade agreement but characterised by non-tariff barriers in particular to services trade. This includes NIESR's 'Deal + Backstop' scenario and the scenario by HM Government called 'White Paper w/ 50% NTB sensitivity'.
Source: NIESR.

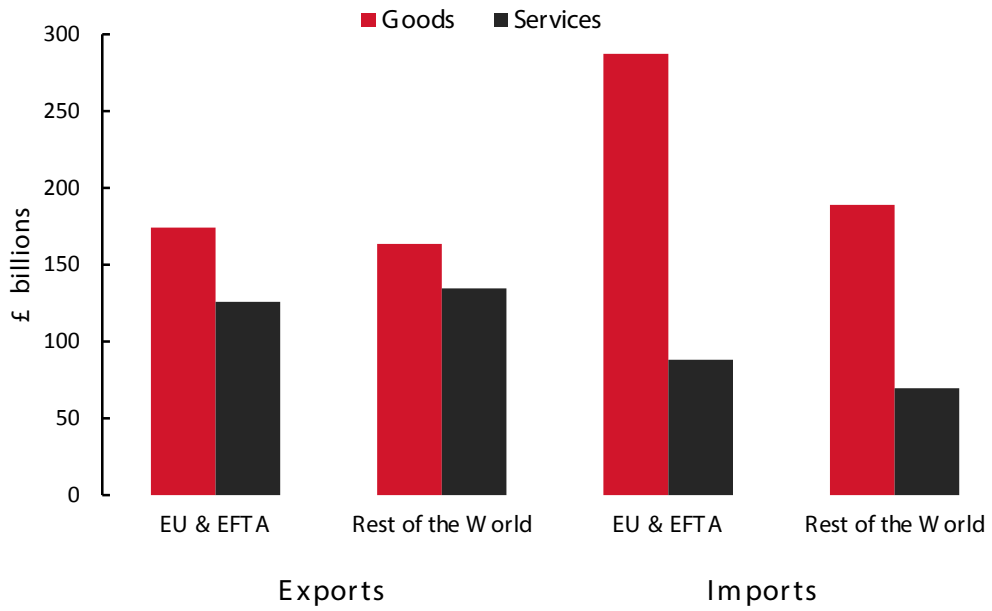
Brexit and the exchange rate



Source: NIESR, ONS

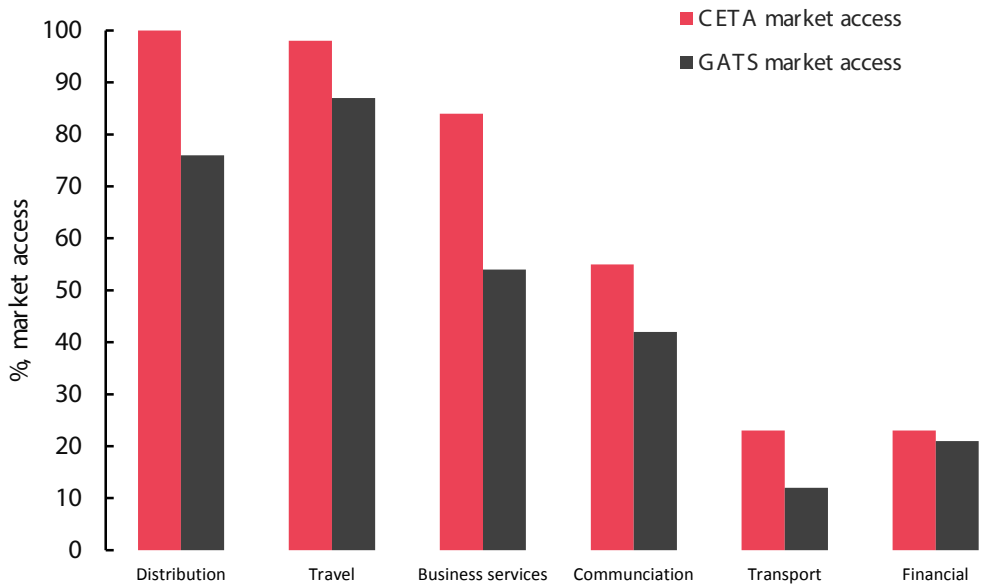
Trade assumptions: exposure to the EU

UK export and imports, EU and rest of the world, 2017



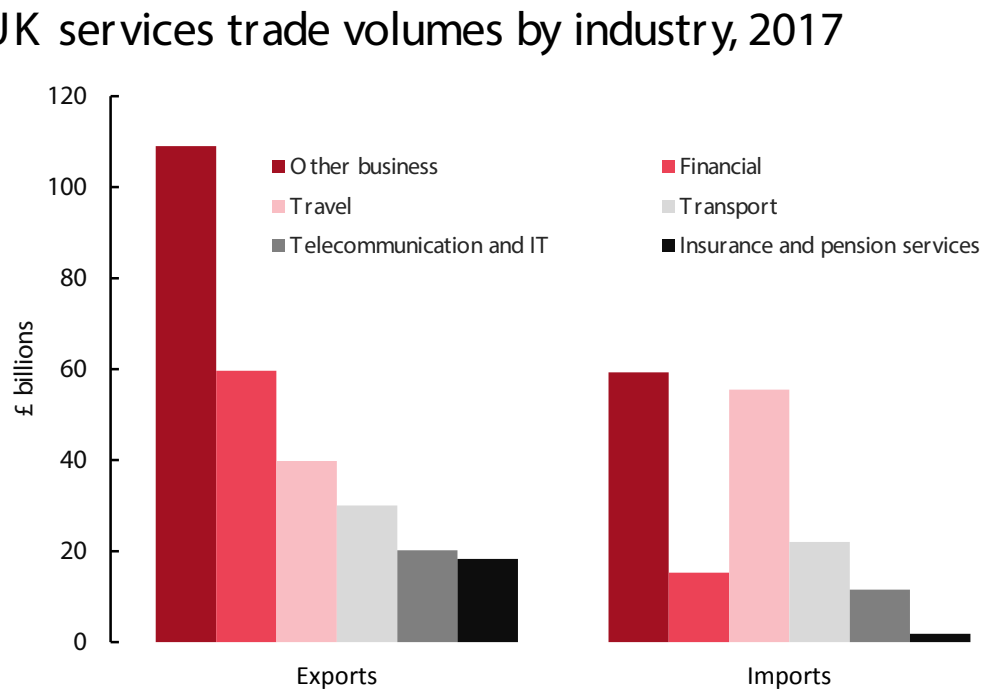
- UK has a large trade exposure to the EU/EFTA for both goods and services
- UK has a trade deficit in goods with the EU/EFTA. This is partially offset by a surplus in services

Services sector: under GATS and CETA



- The services sector is particularly vulnerable because access under GATS is less comprehensive that the Single Market. The EU-Canada FTA is ambitious but…
- … the financial sector, communications and transport are vulnerable under CETA as well

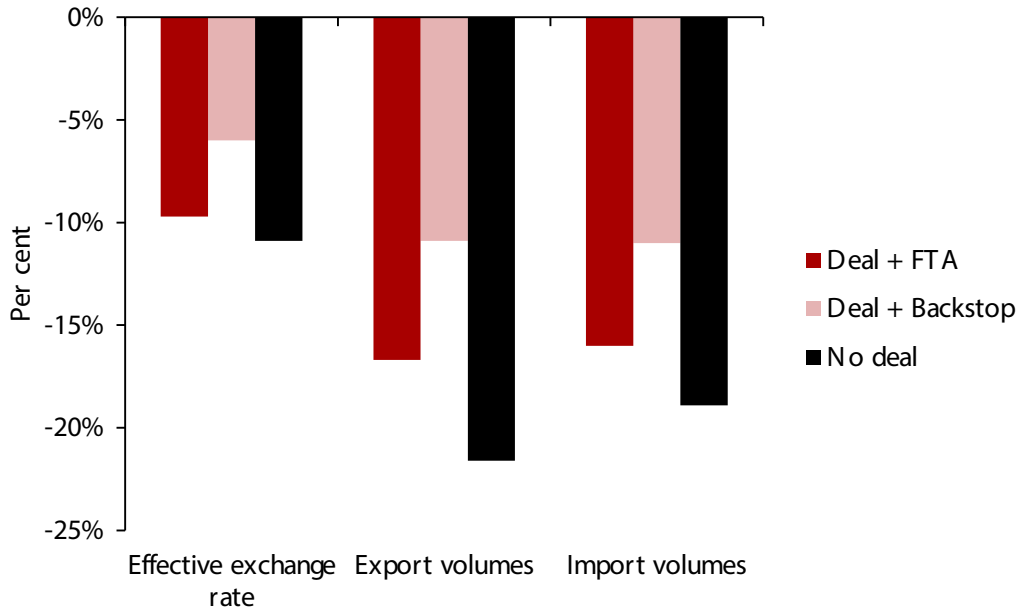
Service sector: major exports



The financial sector, telecommunications and transport are important for the UK

The external sector

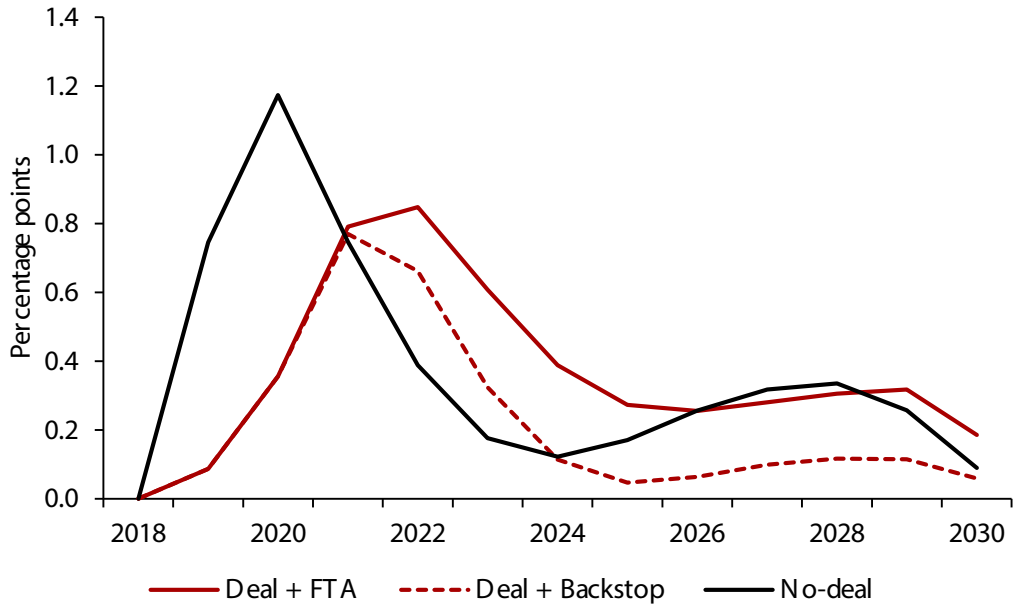
Impact on UK trade, per cent difference to remain



Both export and import volumes will fall in spite of the currency depreciation

Labour market

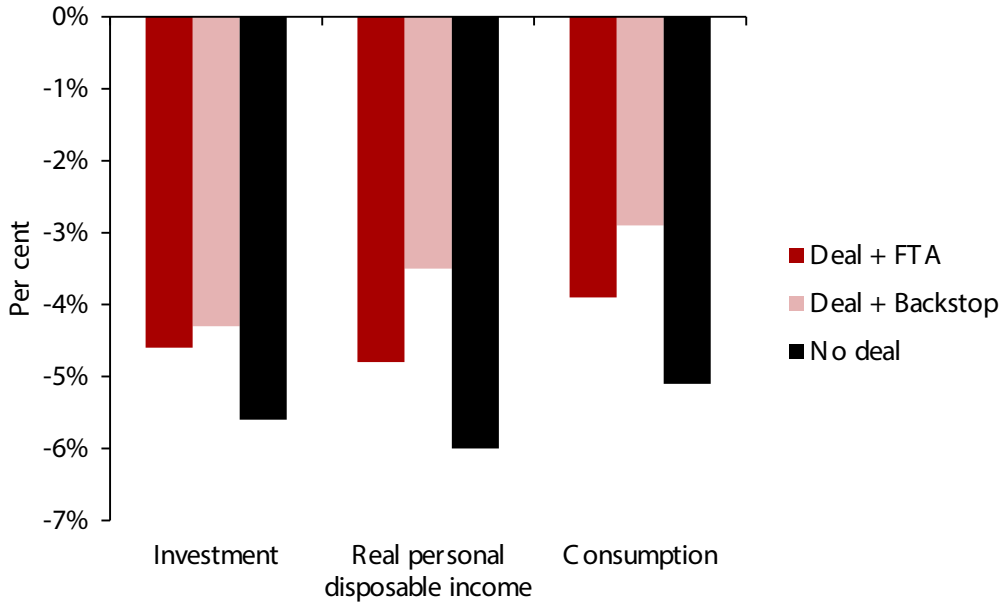
Impact on Unemployment rate, per cent difference to remain



- The unemployment rate will be higher in the short run. Wages adjust in the long term.

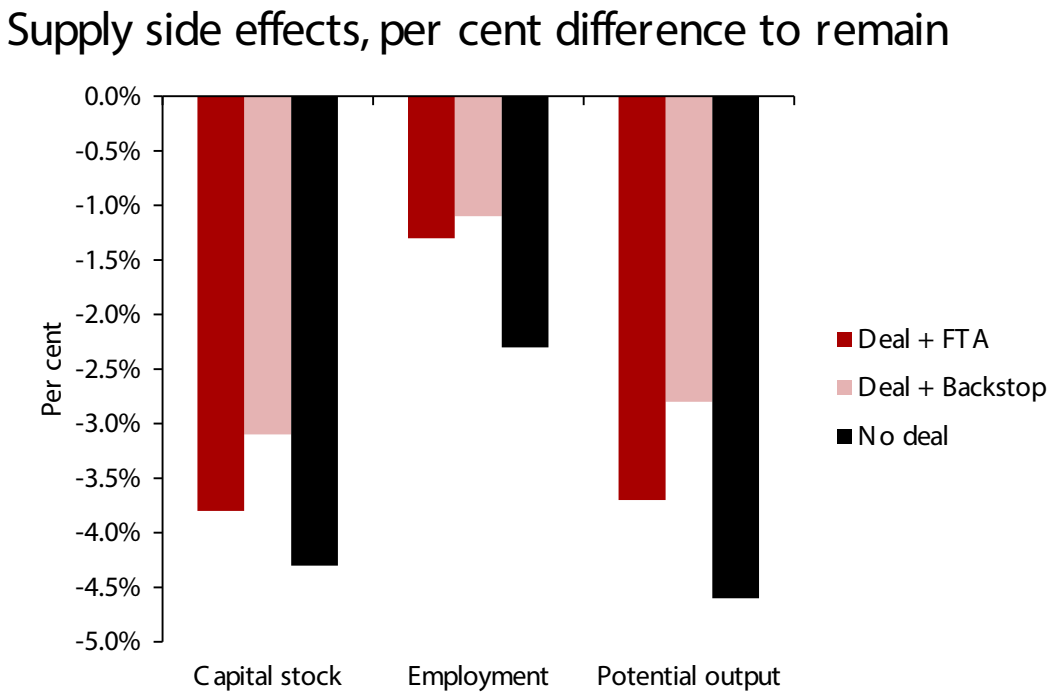
Investment, wages and consumption

Impact on investment and income, per cent difference to remain



- Investment will fall by £19-21 bn each year. This leads to lower wages and also lower consumer spending.

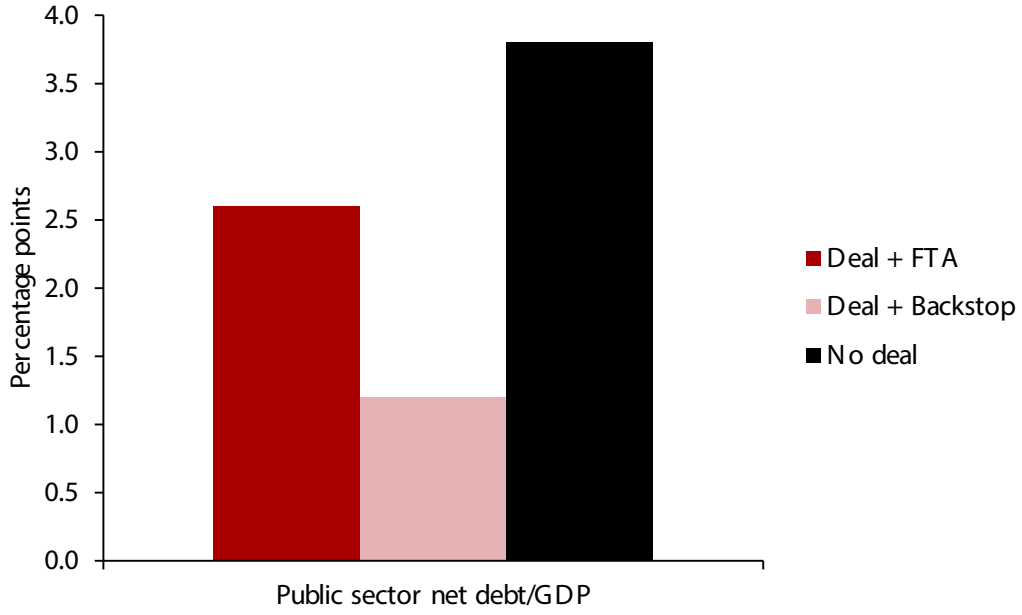
Supply side



The long run is driven by the supply side. Potential output has been eroded by lower investment/capital stock

Public finance: fiscal debt

Impact on public finances, percentage points difference to remain



The fiscal debt will be higher even after considering the lower level of EU contributions

Sensitivity of our estimates

GDP per cent difference relative to remain, long-run impact in 2030

	Main result	Alternative trade and productivity assumptions	Main case with trade deals with non-EU countries
Deal + FTA	–3.9%	–3.1%	–3.7%
Deal + Backstop	–2.8%	–2.1%	n/a
No deal	–5.5%	n/a	–5.2%

Source: NIESR.

- The results do not change materially to alternative assumptions
- GDP impact is somewhat smaller if we halve the shock to productivity and trade
- GDP will be just 0.2pp higher if the UK strikes trade deals with the BRIICS and the Anglosphere

Financial transactions with the EU

Transactions with the European Union on a 'no Brexit' counterfactual (£, billion)

	2017–18 (outturn)	2018–19	2019–20	2020–21	2021–22	2022–23	2023–24
GNI based contribution	11.8	13.9	15.6	15.4	15.5	15.3	15.4
VAT payments to the EU	3.0	3.1	3.2	3.1	3.2	3.3	3.5
UK abatement	–4.5	–4.6	–4.6	–4.4	–4.5	–4.5	–4.5
Receipts from the EU to cover the costs of collecting Traditional Own Resources	–0.7	–0.7	–0.7	–0.7	–0.7	–0.7	–0.7
Total expenditure transfers included in AME, TME and PSNB	9.5	11.7	13.5	13.5	13.6	13.5	13.6
Traditional Own Resources	3.4	3.3	3.3	3.4	3.4	3.5	3.5
Public sector receipts from the EU	–4.5	–5.0	–5.3	–6.1	–6.0	–6.1	–6.2
Net contribution to the EU budget	8.4	10.0	11.6	10.8	11.0	10.8	10.9

Source: Office for Budget Responsibility, Supplementary Fiscal Tables October 2018, Table 2.25.

The structure of a model equation

- Long run - what factors drive economic variables

$$y_t = a + b * x_t + e_t$$

- Adjustment - how long does it take to reach equilibrium

$$\Delta y_t = \lambda \left[y_{t-1} - a - b * x_{t-1} \right] + dynamics + error$$