A short and long-term general equilibrium analysis of the impact of Brexit.

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➢ Objectives:

- Impact assessment of Brexit and the role of foreign direct investment (FDI) in the United Kingdom (UK).

- Shed light on the role of FDI in the context of Brexit.

- Offer an estimation of the impact of the new Brexit agreement struck by Boris Johnson in Brussels last November 2019.

➢ Models:

- Static GTAP model
- Dynamic Recursive GTA model

➢ Our model involves:

- 5 regions: UK, EU, US, China, and ROW.
- 4 factors: land, capital, skilled and unskilled labor.
- 21 sectors

➢ **Data:** GTAP10 dataset for 2014 (Aguiar et al., 2019b)

➢ Simulations:

- *Soft Brexit* – Tariffs (zero), NTBs (25%) of Dhingra et al. (2017) barriers.

- *Johnson's Brexit* – Tariffs (zero). NTBs (38% goods, 44% services)

These percentages are based on the fact that the political declaration suggests future lower convergence in service than in goods regulations.

- *Hard Brexit* – Tariffs (MFN), NTBs (50%)

- *FDI* -we assume decreases in FDI stocks by 6.77, 10, 16.77, 20 and 30 percent

We simulate potential reductions in the inflow of FDI coming to the UK, proxied by reductions in the UK's Capital stock.

➢ Macroeconomic Results:

Table 4. Macroeconomic results.

	Static CGE											Recursive Dynamic CGE		
												Bariers to Trade		
												Cumulative results for the UK (2030)		
	Barriers to Trade			Reduction in FDI stock					Soft Brexit + FDI 6.77%	Johnson's Brexit + FDI 10%	Hard Brexit + FDI 16.77%	Soft Brexit	Johnson's Brexit	Hard Brexit
	Soft Brexit	Johnson's Brexit	Hard Brexit	6.77%	10.00%	16.77%	20.00%	30.00%						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
GDP														
United Kingdom	-0.49	-0.73	-1.09	-0.46	-0.68	-1.07	-1.32	-2.06	-0.95	-1.41	-2.13	-0.96	-1.43	-2.13
Rest of the European Union	-0.06	-0.1	-0.14	0.00	0.00	0.00	0.00	-0.01	-0.07	-0.10	-0.14	-0.09	-0.13	-0.21
United States	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03	0.04
China	0.01	0.01	0.02	0.00	0.00	0.00	-0.01	-0.01	0.00	0.01	0.01	0.03	0.04	0.07
Rest of the World	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.08	0.12

- The effect of Brexit seems to be confined to the two regions directly involved in it, while for the rest the impact would be negligible.
- The impact of Brexit would be more harmful to the UK than to the EU.
- Using the static model we can decompose the contribution of the trade barriers (columns 1-3) and FDI components (columns 4-6) to the total results (columns 9-11).

➢ Macroeconomic Results:

- The simultaneous trade and FDI impacts in the UK derived with the static model (columns 9-11) are very close to those obtained with the dynamic model (columns 12-14), at least in terms of GDP.

Table 4. Macroeconomic results.

	Static CGE			Recursive Dynamic CGE		
				Bariers to Trade		
				Cumulative results for the UK (2030)		
	Soft Brexit + FDI 6.77%	Johnson's Brexit + FDI 10%	Hard Brexit + FDI 16.77%	Soft Brexit	Johnson's Brexit	Hard Brexit
	(9)	(10)	(11)	(12)	(13)	(14)
GDP						
United Kingdom	-0.95	-1.41	-2.15	-0.96	-1.43	-2.15
Rest of the European Union	-0.07	-0.10	-0.14	-0.09	-0.13	-0.21

- Thus, under the soft Brexit, the two static shocks together, barriers to trade (column 1) and FDI reduction (column 3) (-0.49% + -0.46% = -0.95%) yield a very similar impact on GDP (column 9) to the one that combines both shocks in the dynamic setting, which yields a -0.96 percent loss in UK's GDP (column 12).

➢ Macroeconomic Results:

United Kingdom															
	Static CGE											Recursive Dynamic CGE		
												Bariers to Trade		
												Cumulative results for the UK (2030)		
	Barriers to Trade			Reduction in FDI stock					Soft Brexit + FDI 6.77%	Johnson's Brexit + FDI	Hard Brexit + FDI 16.77%	Soft Brexit	Johnson's Brexit	Hard Brexit
	Soft Brexit	Johnson's	Hard Brexit	6.77%	10.00%	16.77%	20.00%	30.00%						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Wages														
Skilled	-2.11	-3.14	-4.59	0.05	0.08	0.13	0.16	0.25	-2.06	-3.06	-4.45	-1.92	-2.82	-4.06
Unskilled	-2.35	-3.46	-5.09	0.14	0.21	0.34	0.43	0.65	-2.2	-3.25	-4.74	-1.99	-2.9	-4.18
Capital Rents	-2.11	-2.90	-4.31	0.77	1.14	1.81	2.32	3.53	-1.35	-1.77	-2.51	-1.27	-1.85	-2.49
Capital Stock				-1.05	-1.55	-2.43	-3.10	-4.64	-1.05	-1.55	-2.43	-1.05	-1.56	-2.43
Welfare	-0.86	-1.28	-1.82	-0.23	-0.34	-0.53	-0.67	-1.02	-1.09	-1.61	-2.33	-1.47	-2.16	-3.03
Aggregate exports	-2.40	-3.33	-6.24	-1.28	-1.89	-2.96	-3.78	-5.64	-3.68	-5.20	-9.14	-4.82	-6.74	-11.27
Aggregate imports	-5.19	-7.41	-11.89	0.04	0.05	0.09	0.11	0.16	-6.24	-8.92	-13.73	-4.29	-6.11	-9.72

✓ Trade Barriers

- Wages of skilled and unskilled workers go down, as capital remuneration does.

- There would be a reduction in welfare.

✓ FDI

- There is an increase in capital rents with less capital the remaining one becomes more productive
- Wages of skilled and unskilled workers go up.
- FDI reduction brings about a drop in total production and an increase in aggregate imports in order to supply the local market.

➢ Microeconomic Results:

✓ Trade Barriers

- The increase of barriers to trade will reduce exports in agriculture, other primary, food, textiles, and motor vehicles to a larger extent than exports in wood and paper, chemicals, other transport, and electronics.

- That is because, these sectors are the ones that will face the largest barriers to trade once Brexit comes into force.

Table 6. Impact on production, exports and imports in the UK under the Boris Johnson's brexit scenario (percentage change)

Sector	Static CGE		
	Barriers to Trade		
	Production	Exports	Imports
	(1)	(2)	(3)
Agriculture	1.22	-40.63	-14.80
Other Primary	-0.28	-58.26	-14.06
Food	0.28	-35.23	-24.87
Textiles	-0.53	-15.67	-6.88
Wood and Paper	2.12	-3.41	-9.22
Chemicals	1.16	-5.18	-7.98
Metals	4.12	3.07	-3.58
Motor Vehicles	-3.65	-14.77	-12.57
Other Transport	1.76	-1.60	-13.60
Electronics	1.73	-6.35	-5.65
Other Machinery	4.12	9.15	-3.77
Other Manufactures	1.60	0.04	-8.52
Construction	-2.81	11.64	-10.96
Water Transport	1.72	2.15	-5.36
Air Transport	0.96	3.22	-3.11
Communications	-0.33	2.11	-9.61
Finance	0.76	1.84	-7.25
Insurance	0.46	5.58	-8.59
Businness Services	0.20	0.27	-9.08
Personal Services	0.26	7.59	-6.27
Other Services	-0.29	7.62	-6.29

Source: Authors' estimations.

➢ Microeconomic Results:

✓ FDI

- Reductions in the capital stock bring about a fall in production across the board, with the only exception of construction.

- The results from the static model suggest:

  - Contractions in manufacturing goods would be related to both (reductions in the stock of FDI and the fall in exports and imports).

  - In services sectors the decline in production would be explained to a higher extent by the reduction in FDI.

Table 6. Impact on production, exports and imports in the UK under the Boris Johnson's brexit scenario (percentage change)

Sector	Static CGE		
	Reduction in FDI stock (10%)		
	Production	Exports	Imports
	(4)	(5)	(6)
Agriculture	-0.92	-1.79	0.19
Other Primary	-1.55	-1.70	-0.77
Food	-0.88	-1.79	0.22
Textiles	-1.43	-2.06	0.12
Wood and Paper	-1.11	-2.26	0.21
Chemicals	-1.29	-1.65	-0.24
Metals	-1.44	-1.65	-0.71
Motor Vehicles	-1.07	-1.36	-0.02
Other Transport	-1.38	-2.10	0.63
Electronics	-1.64	-1.88	-0.26
Other Machinery	-1.38	-2.08	0.25
Other Manufactures	-1.06	-2.52	0.51
Construction	0.18	-3.66	2.14
Water Transport	-0.64	-0.62	0.13
Air Transport	-0.88	-1.24	0.01
Communications	-0.66	-2.78	0.90
Finance	-0.96	-1.82	0.26
Insurance	-1.04	-2.84	0.75
Businness Services	-0.84	-2.25	0.50
Personal Services	-0.82	-2.82	0.75
Other Services	-0.59	-2.28	0.55

Source: Authors' estimations.

➢ Microeconomic Results:

- Putting both effects together (i.e., the increase of barriers to trade and the reduction of the FDI stock) in the static model, we obtain results that are similar to the ones of the dynamic model.

- Motor Vehicles would be one of the most severely hurt sectors in the UK.

    - Motor vehicle's trade with the EU is very intense, accounting for 43.15 and 82.97 percent of its total exports and imports, respectively.

    - In addition, Motor vehicles exhibits one of the highest trade barriers.

Table 6. Impact on production, exports and imports in the UK under the Boris Johnson's brexit scenario (percentage change)

Sector	Recursive Dynamic CGE Barriers to Trade Cummulative Results for the UK (2030)		
	Production	Exports	Imports
	(7)	(8)	(9)
Agriculture	2.72	-34.10	-10.71
Other Primary	-7.94	-59.72	-10.99
Food	0.87	-34.97	-18.42
Textiles	-1.47	-20.18	-3.88
Wood and Paper	1.66	-4.03	-6.58
Chemicals	0.34	-6.31	-5.94
Metals	3.22	2.74	-2.55
Motor Vehicles	-4.06	-16.40	-7.20
Other Transport	1.85	-2.99	-8.71
Electronics	2.06	-6.74	-2.58
Other Machinery	4.06	10.96	-3.93
Other Manufactures	0.83	-2.02	-5.62
Construction	-2.42	4.37	-6.56
Water Transport	1.08	1.48	-4.12
Air Transport	0.03	1.92	-2.73
Communications	-1.05	-1.23	-6.75
Finance	-0.07	0.44	-5.74
Insurance	-0.28	3.90	-6.43
Businness Services	-0.56	-1.68	-6.51
Personal Services	-0.52	4.93	-4.95
Other Services	-0.98	4.38	-4.79

Source: Authors' estimations.

➢ Conclusions:

✓ The joint impact of a fall in the stock of FDI and barriers to trade with the static model are quite close to the results obtained with the dynamic model. Once we combine the resulting fall in the stock of FDI in the dynamic setting with the ones of the barriers to trade, we can reproduce the dynamic results for GDP in our static setting.

- In Johnson's Brexit scenario, the drop in GDP by -1.41% involves a fall of -0.73% and -0.68% caused by barriers to trade and FDI, respectively.
- These results suggest that FDI impacts turned to be as sizeable as trade impacts in a static setting.
- The static model allows us to disentangle the contribution of trade and FDI to the total impact of Brexit in the dynamic model.

➢ Conclusions (Cont.):

✓ **At the sectoral level**, we derive that effects of trade clearly contrast with the ones from a reduction in the stock of FDI.

- Barriers to trade cause a reduction in production on motor vehicles, other primary, textiles, construction, communications, and other services.

- FDI causes a drop in output across the board, since all sectors experience a decrease in the capital available for production.

✓ **Motor vehicles** would be one of the most hurt sectors in the UK, compared to the BAU scenario.

- Production would decline by -4.06% under Johnson's Brexit scenario in 2030. Which involves of -3.6% and -1.0% caused by barriers to trade and FDI, respectively.

- Exports and imports flows decrease by -16.40% and -7.20%.

➢ Conclusions (Cont.):

✓ Although **Boris Johnson's proposal** is not as favourable as a soft Brexit, his Brexit agreement would be better for the UK than leaving the EU without a deal.

✓ **Hard Brexit** would cause a -2.15% fall in GDP while Johnson's Brexit implies -1.43% 2030

- Brexit will be harmful for the UK and to a lesser extent for the EU.
- Restrictions to trade, FDI, and migration will imply the loss of access to a wide variety of resources at convenient costs.
- The UK could lose its attractiveness to attract new investors and trade partners, leading to a drop in it GDP, welfare, and factors remunerations.

➢ Conclusions (Cont.):

✓ Regarding static trade effects after Brexit, we derive even larger impacts than the ones of the influential study by Dhingra et al. (2017).

- Hard Brexit- our reduction is of -1.82%, while they obtain -2.66%.

- We can hypothesize, in line with the findings of Balistreri and Tarr (2017) and Costinot and Rodríguez-Clare (2014), that the more structure you add to the model, the larger the impact obtained compared to a more stylized model, such as New Quantitative Trade Model.

- Although our model and the one of Dhingra et al. (2017) have an important array of features in common, such as similar non-tariff barriers to trade, our CGE methodology yields deeper impacts than their New Quantitative Trade Model approach.

Thanks