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Eimear Flynn<sup>1</sup>, Janez Kren<sup>2,3</sup> and Martina Lawless<sup>2,3</sup>

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**JEL codes:** F10

**Keywords:** Brexit; free trade agreements; customs checks

*\*Corresponding author: Martina Lawless (martina.lawless@esri.ie)*

1Department of Finance

2Economic and Social Research Institute

3Trinity College Dublin

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Eimear Flynn<sup>1</sup>, Janez Kren<sup>2,3</sup>, and Martina Lawless<sup>2,3</sup>

<sup>1</sup>Department of Finance

<sup>2</sup>Economic and Social Research Institute

<sup>3</sup>Trinity College Dublin

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## Abstract

This paper examines the early months of post-Brexit trade flows in goods between Ireland and the United Kingdom. Controlling for product-level time effects across all global trade partners, we isolate the contribution of Brexit to trade in the first eight months of 2021 from other potential common drivers of trade flows including the COVID-19 pandemic. The estimated direct impact of Brexit is highly asymmetric, reducing imports from the UK to Ireland substantially but without any statistically significant impact on exports. This is likely due to the gradual implementation of customs procedures by the UK, with a range of checks to be introduced in 2022. We decompose the Irish-UK trade flows into trade with Northern Ireland separately from Great Britain. This shows that all of the decline in trade is driven by Great Britain with the majority of the reduction attributable to Brexit. In contrast, trade between Ireland and Northern Ireland trade has increased considerably.

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# 1 Introduction<sup>1</sup>

A range of previous research on the impact Brexit might have on EU member states estimated that Ireland was likely to have the greatest exposure to changes in trading costs with the UK, given the extent and composition of their bilateral trade links (for example [Lawless & Morgenroth \(2019\)](#) and [Vandenbussche et al. \(2019\)](#)). As the only member state sharing a land border with the UK, the impact of Brexit on trade flows between Ireland and Northern Ireland was a major consideration of the exit negotiations both for economic and broader political considerations. This led to a unique customs status being developed for Northern Ireland which resulted in it being a member of both the EU and UK customs areas. This paper looks in-depth at trade flows from Ireland, before and after Brexit, which uniquely allow us to distinguish between trade flows with Great Britain and Northern Ireland. This gives the first insight into how the dual customs status of Northern Ireland has impacted trade and decomposes the overall Brexit impact of trade into the relative shares for Great Britain and Northern Ireland.

We use the most timely available data source on monthly goods export flows to estimate the effect of the exit date of 1st January 2021 on the levels and composition of trade. To isolate the impact of Brexit, a comprehensive set of product-time and partner country fixed effects are applied to control for other changes in trade patterns, most specifically the changes in trade flows across 2020 as a result of the COVID-19 pandemic. Our key result is that the decline in Ireland-UK trade since January 2021 is driven entirely by flows with Great Britain while Ireland-Northern Ireland trade has increased considerably.

Consistent with the findings of [Flynn et al. \(2021\)](#) on the impact of Brexit on overall EU-UK trade, we find an asymmetric impact with Irish imports from Great Britain falling considerably more than Irish exports to Great Britain. This is most likely due to the more gradual introduction of customs procedures on the British side with a range of checks still to to

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<sup>1</sup> This work is part of a joint research programme on Taxation, the Macroeconomy and Banking between the ESRI, Department of Finance and Revenue Commissioners. We would like to thank everyone involved in the programme for helpful comments and the Central Statistics Office for assistance with the data. The views expressed in this paper are those of the authors alone and do not represent the official views of the Department of Finance, Revenue Commissioners or the ESRI. Any remaining errors are our own. Corresponding author: Martina Lawless ([martina.lawless@esri.ie](mailto:martina.lawless@esri.ie))

be implemented in January 2022 and July 2022, as laid out in the Border Operating Model ([HM Government, 2021](#)).<sup>2</sup>

We should note that this research looks at the early impacts of Brexit and, given the gradual phasing in of customs checks on goods entering Great Britain, it may take further time for the full effects of Brexit to materialise. We are able to examine in detail changes in trade flows between Ireland and Northern Ireland and between Ireland and Great Britain in this work. However, data for Northern Ireland that identifies sales to Great Britain is collected on an annual basis and is therefore not yet available for the post-Brexit period so we are unable to address the question of whether the increase in cross-border trade on the island of Ireland comes from an overall increase in Northern Ireland's trade or is offset to some degree by changes in its level of trade with Great Britain.

The paper is organised as follows: Section 2 briefly recounts the background to the exit of the UK from the EU and to the special customs status of Northern Ireland. Section 3 describes the data and methodology. Section 4 looks at the broad patterns and sectoral composition of trade between Ireland and the UK focusing in particular on recent shifts in trade between Northern Ireland and Great Britain. Section 5 estimates how much of the change in trade can be identified as due to Brexit. Section 6 concludes.

## 2 Background and Brexit timeline

The UK officially ceased to be an EU member from January 31, 2020, following the conclusion of a withdrawal agreement in October 2019.<sup>3</sup> This formal exit was followed by transition period to negotiate the terms of a future relationship between the UK and EU, particularly in relation to trade flows. During this period, the UK continued to have the status of an EU member in terms of economic access so the *de facto* Brexit date when the UK left the EU Single Market and Customs Union was December 31st, 2020. Just days before the deadline, a Trade and Cooperation Agreement (TCA) was finalised removing the threat of tariffs on trade between the EU and UK. Trade would become subject to a wide range of new non-tariff requirements,

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<sup>2</sup> Some of checks had been scheduled for introduction in October 2021 but a delay in implementation was announced on 14 September 2021: See [UK Parliament statement of border controls](#)

<sup>3</sup> A detailed record of all the steps in the negotiation process and approval can be found in [Walker \(2021\)](#).

however, and this paper examines how these have impacted trade between Ireland and both Great Britain and Northern Ireland.<sup>4</sup>

The impact on Ireland and the issue of the Northern Ireland border, once it becomes an EU external border, were a major issue in withdrawal process negotiations. The core issues related to the incompatibility of the three stated objectives of the UK government in the context of outcomes for Northern Ireland, which were:

- To leave the EU customs union and single market in order to be able to negotiate independent trade deals with other countries. Continued membership in the customs union would not allow any change to tariffs to be agreed with other countries as, by definition, the customs union sets a common external tariff for goods entering the EU. Likewise, the single market sets common standards across the EU, which would not allow individual members to enter into trade agreements that did not satisfy EU rules
- No “hard” border between Northern Ireland and Ireland. The avoidance of border checks on the island of Ireland was made a core objective of the Brexit withdrawal negotiations by both the EU and British sides in order to ensure no disruption to the integration of the economy and society of the island and, in particular, due to a concern that the reemergence of physical checkpoints along the border would undermine the current peaceful situation of the island
- No separation or checks between Northern Ireland and the rest of Britain. Reassurance was also given to Northern Ireland politicians and businesses that they would not be faced with any restrictions or checks on trade flows between Northern Ireland and Britain.

These aims were dubbed the “Brexit trilemma”: it would be feasible to achieve any combination of two of these objectives, but only by not being able to deliver the third. To solve this impasse, the Withdrawal Agreement, finally reached at the European Council Summit in October 2019, provided a special status for Northern Ireland. This deal allows Northern Ireland’s firms to import goods from Great Britain without any tariffs, provided it can demonstrate that these goods will not pass into the EU. [Sargeant et al. \(2020\)](#) provides a detailed description of the Northern Ireland Protocol and potential challenges in terms of implementation. Implementation procedures

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<sup>4</sup> [Flynn et al. \(2021\)](#) uses a similar methodology to examine the aggregate impact on EU-UK trade.

are continuing to be updated and adjusted, mainly in terms of requirements on documentation for trade between Great Britain and Northern Ireland.

### 3 Methodology and data

#### 3.1 Specification

Similarly to [Flynn et al. \(2021\)](#) the baseline specification is to estimate the following:

$$T_{jpm} = \alpha_{jpm} + \beta \cdot \text{Brexit}_m * \text{UK}_j + \gamma_{pm} + \delta_j + \epsilon_{jpm} \quad (1)$$

where  $T$  represents the trade flow (either exports or imports) from Ireland to partner country  $j$  of product  $p$  in month  $m$ . *Brexit* is a dummy variable equal to one for each month following the exit of the UK from the EU (i.e. from January 2021 onwards) interacted with trade flows for the UK. All other potential drivers of trade flow variation are subsumed in the fixed effects at the product-month ( $\gamma_{pm}$ ) and partner country ( $\delta_j$ ) level. These fixed effects should absorb other confounding influences on the overall movement of trade, particularly those related to the COVID-19 pandemic, and allow us to isolate the specific impact of Brexit on trade with the UK alone. The regressions are estimated using pseudo-Poisson maximum likelihood (PPML) with high dimension fixed effects developed by [Correia et al. \(2020\)](#). The  $\beta$  coefficient estimated from this specification can be converted into a form that can be interpreted as a percentage change in trade using the transformation  $e^\beta - 1$ .

The central question in this paper is how Ireland-UK trade patterns differ between Northern Ireland and Great Britain. The baseline specification is therefore adjusted to replace the UK as a partner country with separate effects for Northern Ireland and Great Britain. We further include additional variables to examine how trade flows evolved following the Brexit referendum following June 2016. We also examine if the individual months leading up to and immediately after the January 2021 exit date show evidence of stockpiling in advance or of greater initial disruption by replacing the Brexit dummy variable with indicators of each month from August 2020 to August 2021.

### 3.2 Data

The main source of data for the impact of Brexit on Ireland's trade with partner countries across the world comes from Comext, the official trade database for the EU produced by Eurostat. The data contains trade flow information for each EU member state with all partner countries at a monthly frequency. Our sample period starts in January 2015 to control for pre-Brexit referendum trade patterns and continues until August 2021. We use the data at the 3-digit SITC level in order to keep it comparable with the data (described below) distinguishing between Northern Ireland and Great Britain as examining the special customs status accorded to Northern Ireland is one of the key questions of the paper.<sup>5</sup>

Additional data was acquired from Ireland's Central Statistics Office, which is collected on the same basis as the Comext data but with supplementary information on trade between Ireland and UK that distinguishes between trade with Northern Ireland and Great Britain. As already noted, this is available monthly at the 3-digit SITC level. Prior to Brexit it was not always possible to distinguish whether UK trade related to a trader in Great Britain or Northern Ireland. However, separately identifiable VAT numbers for Northern Irish entities were introduced in January 2021 and some retrospective revisions were made by the CSO to accurately reflect trade with Northern Ireland before and after Brexit. The revised data were published by the CSO with the May 2021 Goods Exports and Imports release and have been incorporated into this analysis. It is however possible that some of the changes in trade flows identified in this analysis as coming from Brexit may be a result of an increased incentive to distinguish more carefully between Northern Ireland and Great Britain when reporting the origin or destination of trade.<sup>6</sup>

## 4 Trade patterns between Ireland, Northern Ireland and Great Britain

The key question throughout this paper is how Brexit has impacted Irish trade and, in particular, the extent to which any Brexit impacts differ for trade with Northern Ireland (NI) and Great Britain (GB), given the special customs

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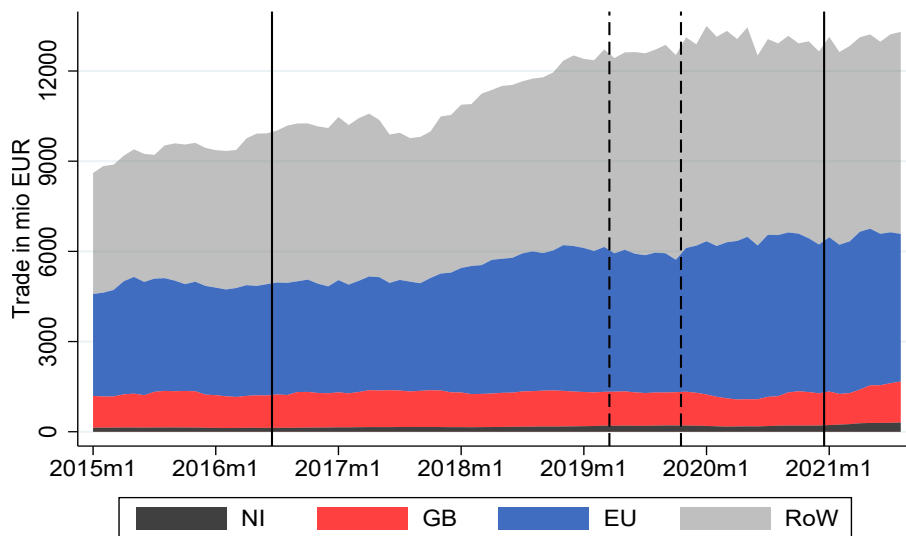
<sup>5</sup> Flynn et al. (2021) uses data at a more disaggregated product level but this is not available for pre-Brexit trade with Northern Ireland. As a result, there are some minor differences in the coefficients between the two papers for Ireland-UK trade.

<sup>6</sup> See [CSO Information Note on Revision to Trade with Northern Ireland](#).

status of Northern Ireland. This section looks at some descriptive evidence on the evolution of overall trade with the UK and the relative contributions of Great Britain and Northern Ireland to the total UK figures. It also looks at the broad composition of this trade at a sectoral level to examine if the impacts of Brexit vary across different types of goods.

Figures 1 and 2 show the main geographic destinations and origins for Irish exports and imports respectively from 2015 to 2021. Of exports, we see steady growth in the value of trade to the EU (excluding the UK) and rest of the world over this time period with trade to the UK remaining relatively stable in value terms. In terms of imports, Figure 2 shows a much larger share of the total being accounted for by the UK compared to the export graph and a much more notable reduction occurring in 2021. Total imports increase at this point however with the growth coming relatively equally both from increased EU and rest of world sources.

Figure 1: Broad geographic composition of Irish exports (5-month moving average)

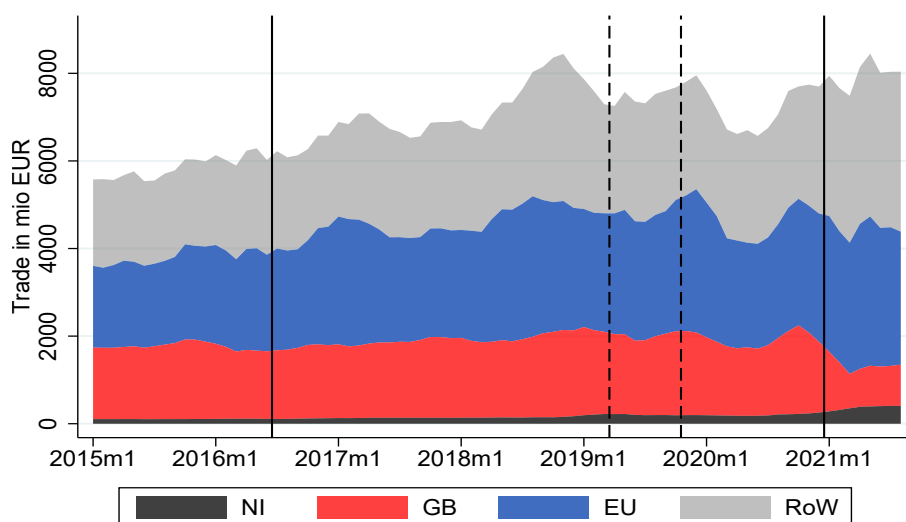


Figures 3 and 4 show imports and exports respectively for Irish trade with the UK since 2015 and how trade in each direction is allocated between Great Britain and Northern Ireland.<sup>7</sup> As would be expected from the relative sizes of the economies, trade with Great Britain accounts for the vast majority of Irish-UK trade. Northern Ireland accounted for approximately 11 and

<sup>7</sup> As the monthly data is quite volatile, we present the figures in log form.



Figure 2: Broad geographic composition of Irish imports (5-month moving average)

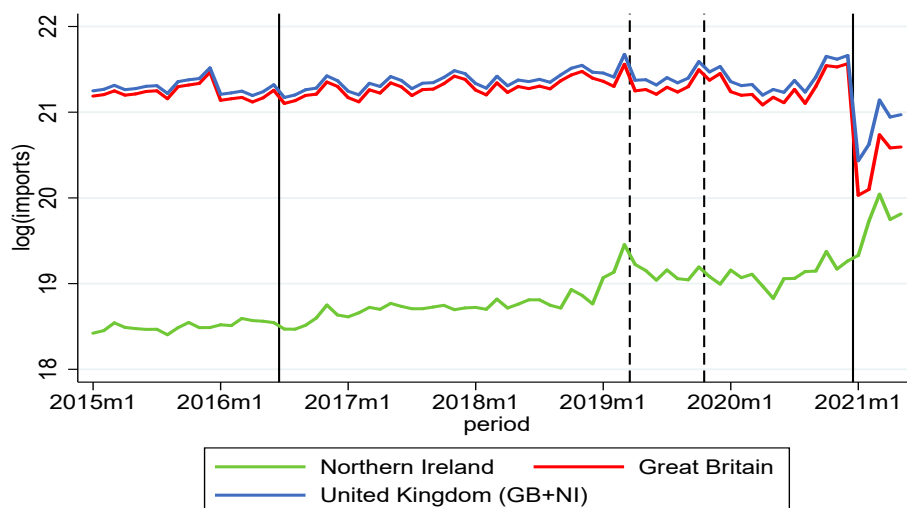


17 per cent of Irish imports from and exports to the UK in February 2020 respectively.

From these aggregate flows, it appears that imports from Ireland to Great Britain and Northern Ireland have diverged since January 2021. Figure 3 shows imports from Great Britain (and hence the overall UK figure) declined sharply following Brexit, while trade with Northern Ireland actually increased. For exports, on the other hand, Figure 4 shows comparatively less variation in overall UK and British trade in January although there is still a strong increase in trade to Northern Ireland.

We next describe the broad structure of Irish trade with the UK, Great Britain and Northern Ireland. Table 1 begins by dividing Ireland’s total goods trade into ten broad sectors (1-digit SITC level) and examining how trade with the UK is structured relative to total trade. The top panel of the table shows the shares in 2015 and the bottom panel the comparable shares in February 2021. A number of sectors stand out where their share in trade with the UK differs substantially from the sector’s share in total Irish trade. Chemicals is the most striking example, accounting for over 58 per cent of total Irish exports and 25 per cent of exports to the UK in 2015. Conversely, the food sector is considerably more important as a share of trade with the UK, both in terms of imports and exports, relative to its share in Ireland’s

Figure 3: Irish imports from Great Britain and Northern Ireland, 2015-2021

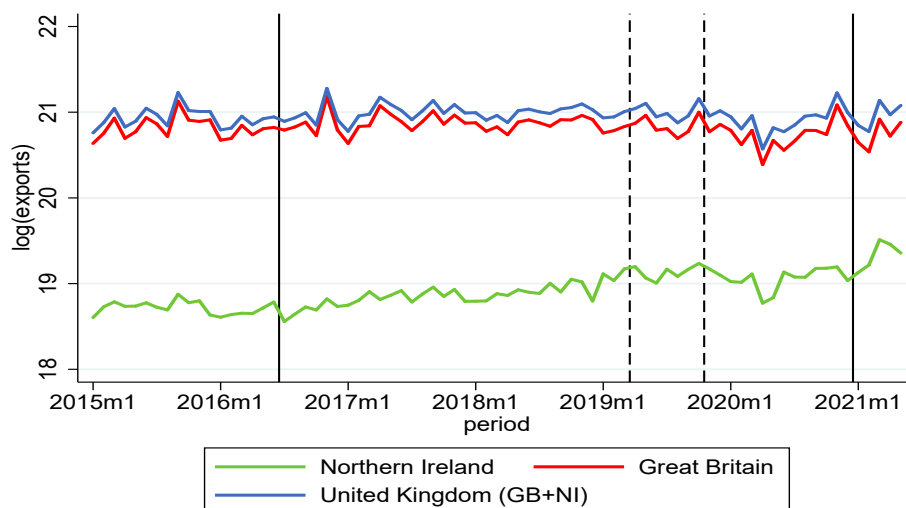


total trade. The importance of the UK as a source of fuel imports is also notable. These differences in structure can be linked to the dominant role of multinational activity in Irish exports which are broadly diversified in export markets whereas the UK remains a traditionally larger market for more traditional sectors.

For total Irish trade, the most evident difference between 2015 and 2021 is the increased share of the chemicals sector, growing to account for more than 63 per cent of total exports. Despite the fall in total values shown in Figures 3 and 4, the sectoral structure of Irish trade with the UK is broadly similar in 2015 and 2021 with the major difference being a reduction in the share in imports accounted for by fuel. This fall in the share of fuel is also evident in the aggregate imports and is likely due to travel restrictions in place due to COVID-19. This is an important reason for the econometric testing in the next section which will allow us to control for confounding factors beyond Brexit in how trade has developed in recent years.

Having looked at the main contributing sectors to Irish trade with the UK, we next look within sectors to ask how important the UK market is for each sector's trade. Table 2 calculates the share of each sector's exports and imports that are accounted for by the UK at three points in time - February of 2015, 2020 and 2021. The first point to note is the much greater share of the UK in Irish imports relative to exports and the sharp decline in this

Figure 4: Irish exports to Great Britain and Northern Ireland, 2015-2021



share between 2015 and 2021. In February 2015, the UK accounted for close to one-quarter of total Irish imports. It was a particularly important source of imports for food, beverages and fuel, accounting for over one-third of imports in each of these sectors. The share of the UK in total imports had declined to just over 12 per cent by February 2021 with falls in the UK's contribution across all sectors. For exports, the initial 2015 share of the UK in overall Irish trade was lower at 12.4 per cent and this fell to 8 per cent by 2021. The reductions in export share were more concentrated than in imports. These were particularly notable in food and beverages while the share of exports to the UK in some other sectors, such as manufacturing almost unchanged.

The next two tables examine if the sectoral structure of trade differs between Great Britain and Northern Ireland. Table 3 shows how the overall UK shares from the previous table are divided between Great Britain and Northern Ireland with exports in the top panel and imports in the bottom panel. In 2015, Northern Ireland accounted for around 1.5 per cent of both total Irish imports and exports whereas the share of Great Britain was more than twice as large for Irish imports compared to exports. The overall share of exports going to Great Britain reduces from 10.9 per cent in 2015 to 6.3 per cent in early 2021. The share of Northern Ireland in total Irish exports increases but rather more modestly, from 1.4 to 1.7 per cent. The main sectors contributing to the reduction in the British export share are food

Table 1: Broad sectoral structure of total Irish trade and Ireland-UK trade

	(1)	(2)	(3)	(4)
	Total Irish trade, Feb-2015		Irish trade with UK, Feb-2015	
	Exports	Imports	Exports	Imports
Food	9.0%	9.6%	29.5%	15.7%
Beverages	1.2%	1.0%	2.5%	1.7%
Crude minerals	1.7%	1.3%	3.3%	1.1%
Fuels	0.9%	10.7%	3.3%	19.5%
Animal fats	0.1%	0.4%	0.2%	0.3%
Chemicals	58.2%	19.7%	25.4%	12.9%
Manufactures	1.9%	7.0%	7.7%	9.7%
Machinery	12.7%	36.8%	16.8%	20.7%
Misc.	13.6%	11.3%	8.3%	14.0%
Commodities n.e.s	0.7%	2.3%	3.1%	4.3%
Total	100%	100%	100%	100%

	Total Irish trade, Feb-2021		Irish trade with UK, Feb-2021	
	Exports	Imports	Exports	Imports
Food	6.7%	8%	27%	19.8%
Beverages	0.9%	1%	2%	2.1%
Crude minerals	1.2%	1%	4%	1.6%
Fuels	0.7%	3%	3%	5.1%
Animal fats	0.1%	0%	0%	0.5%
Chemicals	63.1%	25%	26%	20.9%
Manufactures	1.6%	6%	10%	14.7%
Machinery	15.0%	43%	18%	20.3%
Misc.	10.3%	11%	11%	12.0%
Commodities n.e.s	0.4%	2%	1%	3.1%
Total	100%	100%	100%	100%

and beverages as well as fuels. For Northern Ireland, increased shares are observed in almost all sectors.

The sharp fall in the share of Great Britain in total imports (from 23.2 to 7.2 per cent) is slightly offset by an increase from 1.5 to 5 per cent for imports from Northern Ireland. Food and beverages show particularly large reductions in their shares coming from Great Britain while the share accounted for by Northern Ireland increases substantially in these same sectors - going from 5 per cent to almost 20 per cent of beverages imports between 2015 and 2021 for example.

This reorientation of trade is reflected further in Table 4 which shows the share accounted for by Northern Ireland in total Irish-UK trade. From 2015 to February 2021, Northern Ireland went from 12 per cent of Irish exports to

Table 2: UK share of Irish trade by sector

	(1)	(2)	(3)	(4)	(5)	(6)
	UK share of sector exports			UK share of sector imports		
	2015m2	2020m2	2021m2	2015m2	2020m2	2021m2
All trade	12.4%	8.8%	8.0%	24.7%	18.4%	12.2%
Food	31.6%	28.7%	25.8%	35.0%	32.9%	25.9%
Beverages	22.7%	15.5%	13.2%	36.0%	34.0%	29.1%
Crude minerals	21.0%	25.3%	24.0%	22.3%	22.7%	18.8%
Fuels	33.2%	20.7%	24.2%	37.3%	36.6%	17.3%
Animal fats	27.2%	24.3%	17.1%	20.6%	20.6%	16.0%
Chemicals	5.8%	3.7%	3.4%	17.7%	8.0%	10.5%
Manufactures	35.9%	35.1%	35.1%	31.3%	30.7%	24.3%
Machinery	15.8%	7.9%	9.3%	15.6%	12.7%	6.2%
Misc.	7.9%	7.1%	8.4%	28.9%	23.7%	13.5%
Commodities n.e.s	39.8%	37.1%	13.0%	38.4%	34.1%	18.9%

the UK up to 21 per cent. The share of Irish imports from the UK originating in Northern Ireland grew from 6 per cent to over 40 per cent in the same time. While increases in the Northern Ireland share of Irish-UK trade are apparent across the board, the growth in food and beverages are particularly notable given the importance of these sectors in total UK trade as discussed in relation to Table 1.

## 5 Estimating the Brexit impact

The descriptive evidence points to considerable changes in trade levels and composition between Ireland and the UK with varying impacts on trade with Great Britain compared to Northern Ireland between 2015 and early 2021. This section tests how much of this impact can be directly ascribed to Brexit. It does so by examining how trade between Ireland and each of the UK, Great Britain and Northern Ireland evolved at a granular level compared to trade patterns for all other trading partners. As noted earlier, this is important as some changes can be credibly explained by other factors -the reduction in fuel imports for example tracks closely travel restrictions during the COVID-19 pandemic. Isolating the impact of Brexit requires controlling carefully for all such confounding factors as described in Section 3.

The results from the baseline regressions with total Irish imports and exports as the dependent variables are presented in Table 5. The coefficients imply a significant negative impact of Brexit on imports from the UK (-49 per

Table 3: GB and NI shares of Irish trade by sector

	(1)	(2)	(3)	(4)	(5)	(6)
	GB share of sector exports			NI share of sector exports		
	2015m2	2020m2	2021m2	2015m2	2020m2	2021m2
All trade	10.9%	7.3%	6.3%	1.4%	1.5%	1.7%
Food	26.9%	23.1%	18.6%	4.8%	5.6%	7.2%
Beverages	17.6%	10.2%	7.2%	5.1%	5.3%	6.0%
Crude minerals	17.7%	19.7%	18.9%	3.3%	5.7%	5.2%
Fuels	30.9%	15.2%	18.5%	2.3%	5.5%	5.7%
Animal fats	20.5%	14.6%	6.5%	6.7%	9.7%	10.6%
Chemicals	5.5%	3.3%	2.9%	0.3%	0.4%	0.5%
Manufactures	29.1%	25.2%	22.7%	6.9%	9.9%	12.4%
Machinery	14.5%	7.1%	8.5%	1.3%	0.8%	0.8%
Misc.	6.7%	6.0%	7.2%	1.2%	1.1%	1.2%
Commodities n.e.s	32.9%	32.4%	0.6%	6.8%	4.7%	12.4%

	(1)	(2)	(3)	(4)	(5)	(6)
	GB share of sector imports			NI share of sector imports		
	2015m2	2020m2	2021m2	2015m2	2020m2	2021m2
All trade	23.2%	16.5%	7.2%	1.5%	2.0%	5.0%
Food	29.1%	26.3%	11.9%	6.0%	6.7%	14.0%
Beverages	31.0%	17.4%	9.3%	5.0%	16.6%	19.8%
Crude minerals	16.8%	17.2%	7.2%	5.5%	5.5%	11.6%
Fuels	36.9%	33.7%	11.0%	0.4%	2.9%	6.3%
Animal fats	15.7%	12.6%	6.2%	4.9%	8.0%	9.8%
Chemicals	17.1%	7.7%	4.4%	0.6%	0.3%	6.0%
Manufactures	29.1%	26.2%	16.2%	2.2%	4.5%	8.1%
Machinery	15.2%	12.0%	5.3%	0.4%	0.7%	0.8%
Misc.	28.1%	22.6%	10.3%	0.8%	1.1%	3.2%
Commodities n.e.s	34.1%	30.3%	0.2%	4.3%	3.9%	18.7%

Table 4: Irish trade with Northern Ireland as share of Ireland-UK total

	(1)	(2)	(3)
	NI share of Ireland to UK trade		
	2015m2	2020m2	2021m2
All trade	12%	17%	21%
Food	15%	19%	28%
Beverages	22%	34%	45%
Crude minerals	16%	22%	21%
Fuels	7%	27%	24%
Animal fats	25%	40%	62%
Chemicals	5%	11%	16%
Manufactures	19%	28%	35%
Machinery	8%	10%	9%
Misc.	15%	16%	15%
Commodities n.e.s	17%	13%	95%

	NI share of UK to Ireland trade		
	2015m2	2020m2	2021m2
All trade	6%	11%	41%
Food	17%	20%	54%
Beverages	14%	49%	68%
Crude minerals	25%	24%	62%
Fuels	1%	8%	36%
Animal fats	24%	39%	61%
Chemicals	3%	4%	58%
Manufactures	7%	15%	33%
Machinery	3%	6%	14%
Misc.	3%	5%	24%
Commodities n.e.s	11%	11%	99%

cent)<sup>8</sup> but the impact of Brexit on Irish exports to the UK is not statistically significant.<sup>9</sup> The results of columns 3 and 4 suggest the negative impact of Brexit is entirely concentrated on imports from Great Britain (whether the referendum impact is included or excluded). In contrast, the impact on imports from Northern Ireland is positive and implies an 82 per cent increase as a result of Brexit (including the referendum effect in column 4).

<sup>8</sup> The percentage change is calculated from the  $\beta$  coefficient using the transformation  $e^\beta - 1$  so this is  $e^{0.682} - 1 = 0.494$

<sup>9</sup> The amount of the trade fall between Ireland and the UK attributed to Brexit in this analysis is higher than that found by Flynn et al. (2021) which allowed for greater granularity in the time path of trade flows by using 8-digit product level data. However, this level of detail on product flows was not available at a monthly level for Northern Ireland which is undertaken at the 3-digit product level.

While the increase in Irish imports from Northern Ireland is significant, it is important to note that this increase is from a low base and therefore does not offset the decline in trade with Great Britain. Nevertheless, the increase in Irish trade with Northern Ireland is significant and is likely explained by changes to supply chains be it as a result of substitution by Irish and UK firms or firms redirecting trade through Northern Ireland, as well as more accurate reporting of Northern Ireland trade by UK firms since Brexit.

As in the analysis of EU-UK trade, it is necessary to account for possible stockpiling by firms ahead of Brexit. The sharp uptick in Irish imports from the UK in November and December 2020 (see Figure 3) may indicate stockpiling behaviour by Irish firms. Similar spikes were seen ahead of previous Brexit deadlines in March and October 2019 marked in the figure. Survey evidence also points to possible pre-Brexit stockpiling by Irish firms, with increases in the manufacturing PMI over the same period driven in part by increased input purchases and a sharp jump in the stocks of inputs as firms built up stocks to minimise the risk of disruptions to production at the end of the transition period.

To test for stockpiling, we replace the single Brexit time effect used in the baseline analysis with separate estimates of the monthly effects for the five months prior to Brexit and using all data available for 2021 up until August. We then break this down further and examine monthly changes in trade with Great Britain and Northern Ireland separately. The results are presented in Table 6. Surprisingly, October is the only month in which a significant increase in Irish imports from the UK is evident. However, if we break the analysis down further and look at monthly changes in UK trade at the sectoral level, we see that the October effect is driven by Machinery and Transport Equipment (SITC 7), and within that Other Transport Equipment, which consists primarily of aircraft and tends to be highly volatile on a monthly basis. Also worth noting is the change in the magnitude of Brexit's impact on Irish-UK trade over time. Despite a negative impact on Irish imports from the UK since January 2021, this impact has diminished over time, perhaps indicating adjustment by firms to the new trading arrangements.

Table 7 examines the impact of Brexit across sectors. In line with the findings for aggregate EU trade, the impact on imports has been broad based, with significant negative coefficients estimated across all sectors.<sup>10</sup>

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<sup>10</sup> The largest decline in both imports from and exports to the UK was in Commodities and transactions n.e.s. (SITC 9). However, this category consists of Coin (other than



Of particular interest is the breakdown of the impacts on exports across sectors. While Brexit did not lead to a significant reduction in total Irish exports to the UK, this is not true at the sectoral level. Rather, we see that Brexit has resulted in significant declines in exports of Food, Beverages, Fuel and Animal Fats to the UK. Table 8 confirms that falls in exports in these sectors were driven by declining exports to Great Britain, though these declines were in part offset by increased exports to Northern Ireland. These are the sectors where the impact was expected to be greatest in analysis carried out prior to Brexit, such as [Lawless & Morgenroth \(2019\)](#) and [Vandenbussche et al. \(2019\)](#).

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gold coin), non-legal tender and Gold, non-monetary and accounts for a very small share of total Irish imports.

Table 5: Brexit impact on trade flows: Baseline results

	(1) UK to IE	(2) UK to IE	(3) GB & NI to IE	(4) GB & NI to IE
Brexit*UK	-0.715*** (0.093)	-0.682*** (0.096)		
Brexit*GB			-0.998*** (0.100)	-0.959*** (0.102)
Brexit*NI			0.635*** (0.104)	0.601*** (0.107)
Referendum*UK		-0.150** (0.071)		
Referendum*GB				-0.175** (0.072)
Referendum*NI				0.176** (0.087)
Constant	16.035*** (0.015)	16.065*** (0.021)	15.952*** (0.014)	15.981*** (0.020)
Observations	1,639,436	1,639,436	1,659,638	1,659,638
Pseudo R-squared	0.767	0.767	0.760	0.760
Observations	394,197	394,197	413,722	413,722
Pseudo R-squared	0.798	0.798	0.784	0.785
	(5) IE to UK	(6) IE to UK	(7) IE to GB & NI	(8) IE to GB & NI
Brexit*UK	-0.054 (0.110)	-0.009 (0.112)		
Brexit*GB			-0.131 (0.115)	-0.078 (0.117)
Brexit*NI			0.354*** (0.122)	0.354*** (0.124)
Referendum*UK		-0.204*** (0.065)		
Referendum*GB				-0.232*** (0.064)
Referendum*NI				-0.003 (0.087)
Constant	17.296*** (0.011)	17.314*** (0.012)	17.251*** (0.010)	17.269*** (0.012)
Observations	1,716,351	1,716,351	1,735,949	1,735,949
Pseudo R-squared	0.843	0.843	0.840	0.840

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Partner country and product\*month level fixed effects included.

Table 6: Monthly changes in trade before and after Brexit deadline

	(1) UK to IE	(2) GB to IE	(3) NI to IE	(4) IE to UK	(5) IE to GB	(6) IE to NI
Referendum*region	-0.162** (0.073)	0.143 (0.088)	-0.186** (0.073)	-0.196*** (0.066)	-0.009 (0.088)	-0.222*** (0.065)
Region*Aug20	0.035 (0.162)	-0.009 (0.168)	0.429 (0.287)	-0.124 (0.337)	-0.149 (0.344)	0.029 (0.385)
Region*Sep20	0.188 (0.183)	0.165 (0.183)	0.413* (0.245)	-0.215 (0.317)	-0.257 (0.313)	0.026 (0.352)
Region*Oct20	0.304** (0.140)	0.282* (0.147)	0.520* (0.313)	-0.100 (0.270)	-0.149 (0.259)	0.182 (0.341)
Region*Nov20	-0.014 (0.306)	-0.018 (0.309)	0.026 (0.340)	0.041 (0.339)	0.043 (0.352)	0.032 (0.349)
Region*Dec20	0.094 (0.245)	0.085 (0.246)	0.185 (0.306)	-0.024 (0.310)	-0.036 (0.310)	0.048 (0.335)
Region*Jan21	-0.843*** (0.268)	-1.122*** (0.290)	0.462 (0.285)	-0.271 (0.309)	-0.326 (0.316)	0.033 (0.366)
Region*Feb21	-0.750*** (0.190)	-1.070*** (0.196)	0.642*** (0.227)	-0.271 (0.293)	-0.362 (0.288)	0.185 (0.331)
Region*Mar21	-0.662*** (0.225)	-0.901*** (0.236)	0.546** (0.256)	-0.054 (0.282)	-0.131 (0.288)	0.344 (0.325)
Region*Apr21	-0.671*** (0.229)	-0.945*** (0.240)	0.623** (0.262)	-0.049 (0.283)	-0.158 (0.292)	0.472 (0.309)
Region*May21	-0.700*** (0.256)	-1.024*** (0.264)	0.703** (0.318)	0.000 (0.257)	-0.066 (0.253)	0.356 (0.340)
Region*Jun21	-0.719** (0.313)	-0.991*** (0.334)	0.572* (0.325)	0.081 (0.291)	-0.004 (0.307)	0.512 (0.328)
Region*Jul21	-0.632*** (0.225)	-0.862*** (0.235)	0.553** (0.238)	0.267 (0.287)	0.241 (0.312)	0.423 (0.294)
Region*Aug21	-0.424** (0.179)	-0.733*** (0.244)	0.948*** (0.180)	0.062 (0.338)	-0.018 (0.362)	0.472 (0.318)
Constant	16.065*** (0.021)	15.981*** (0.020)		17.314*** (0.012)	17.269*** (0.012)	
Observations	1,639,436	1,659,638		1,716,351	1,735,949	
Pseudo R-squared	0.768	0.760		0.843	0.840	

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Partner country and product\*month level fixed effects included. Note that the monthly interactions for Great Britain and Northern Ireland were calculated as a combined regression for both regions.

Table 7: Brexit impact across sectors, UK-Ireland trade

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	UK to IE									
	Food	Beverages	Crude minerals	Fuels	Animal fats	Chemicals	Manufactures	Machinery	Misc.	Commodities
Brexit*UK	-0.666*** (0.059)	-0.427*** (0.120)	-0.359** (0.140)	-0.430** (0.190)	-0.466*** (0.150)	-0.781*** (0.206)	-0.553*** (0.057)	-0.822*** (0.179)	-1.054*** (0.084)	-1.630*** (0.093)
Referendum*UK	-0.064* (0.038)	-0.134* (0.072)	0.063 (0.089)	-0.153 (0.166)	-0.101 (0.111)	-0.154 (0.099)	-0.036 (0.036)	-0.136 (0.143)	-0.124*** (0.041)	-0.318*** (0.053)
Constant	15.134*** (0.018)	15.495*** (0.033)	13.420*** (0.027)	17.100*** (0.078)	14.052*** (0.029)	16.342*** (0.030)	14.165*** (0.014)	17.201*** (0.027)	15.073*** (0.015)	16.915*** (0.027)
Observations	203,760	28,948	114,337	18,893	17,920	202,720	335,840	371,844	326,920	18,014
Pseudo R-squared	0.828	0.911	0.710	0.773	0.859	0.789	0.821	0.822	0.836	0.963
	IE to UK									
	Food	Beverages	Crude minerals	Fuels	Animal fats	Chemicals	Manufactures	Machinery	Misc.	Commodities
Brexit*UK	-0.136* (0.075)	-0.353** (0.141)	0.080 (0.166)	-0.306 (0.278)	-0.283 (0.226)	0.083 (0.179)	0.012 (0.065)	0.145 (0.182)	0.276 (0.226)	-1.801*** (0.265)
Referendum*UK	-0.134** (0.054)	-0.343*** (0.096)	0.029 (0.119)	-0.451** (0.179)	0.144 (0.133)	-0.152* (0.079)	-0.011 (0.049)	-0.386*** (0.116)	-0.026 (0.120)	-0.385*** (0.080)
Constant	15.498*** (0.020)	16.009*** (0.019)	14.085*** (0.032)	15.771*** (0.064)	13.689*** (0.038)	18.592*** (0.013)	13.876*** (0.023)	16.053*** (0.027)	16.759*** (0.015)	16.052*** (0.039)
Observations	198,042	24,297	95,656	18,203	13,680	268,670	319,214	463,695	295,220	19,514
Pseudo R-squared	0.825	0.940	0.710	0.776	0.909	0.912	0.833	0.764	0.888	0.954

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Partner country and product\*month level fixed effects included.

Table 8: Brexit impact across sectors - comparing Great Britain and Northern Ireland

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
	<b>GB &amp; NI to IE</b>									
	Food	Beverages	Crude minerals	Fuels	Animal fats	Chemicals	Manufactures	Machinery	Misc.	Commodities
Brexit*GB	-1.092*** (0.084)	-0.984*** (0.105)	-0.895*** (0.163)	-0.508*** (0.195)	-0.740*** (0.137)	-1.223*** (0.208)	-0.806*** (0.059)	-0.944*** (0.181)	-1.258*** (0.088)	-4.985*** (0.440)
Brexit*NI	0.344*** (0.089)	0.278* (0.153)	0.406*** (0.156)	0.352 (0.271)	-0.041 (0.240)	1.247*** (0.298)	0.569*** (0.097)	0.433** (0.199)	0.751*** (0.112)	0.538*** (0.094)
Referendum*GB	0.063 (0.087)	0.799*** (0.130)	0.119 (0.132)	0.786*** (0.258)	0.006 (0.137)	0.487*** (0.172)	0.341*** (0.068)	0.309* (0.167)	0.080 (0.108)	-0.307*** (0.053)
Referendum*NI	-0.087** (0.044)	-0.360*** (0.087)	0.045 (0.088)	-0.190 (0.167)	-0.146 (0.112)	-0.179* (0.100)	-0.070* (0.037)	-0.152 (0.143)	-0.131*** (0.041)	-0.319*** (0.055)
Constant	14.883*** (0.019)	15.139*** (0.035)	13.243*** (0.025)	16.963*** (0.077)	13.897*** (0.027)	16.292*** (0.029)	14.015*** (0.013)	17.175*** (0.027)	15.006*** (0.015)	16.689*** (0.027)
Observations	206,640	29,192	116,782	19,752	18,240	205,438	339,656	375,912	329,372	18,414
Pseudo R-squared	0.799	0.890	0.689	0.761	0.846	0.785	0.808	0.820	0.831	0.960

	<b>IE to GB &amp; NI</b>									
	Food	Beverages	Crude minerals	Fuels	Animal fats	Chemicals	Manufactures	Machinery	Misc.	Commodities
Brexit*GB	-0.280*** (0.083)	-0.536*** (0.121)	0.009 (0.160)	-0.377 (0.301)	-0.899*** (0.168)	0.037 (0.200)	-0.102 (0.070)	0.088 (0.184)	0.302 (0.249)	-3.078*** (0.876)
Brexit*NI	0.406*** (0.081)	-0.004 (0.185)	0.343* (0.203)	0.056 (0.307)	0.298 (0.376)	0.521*** (0.168)	0.286*** (0.088)	0.657*** (0.252)	0.128 (0.207)	-0.205 (0.186)
Referendum*GB	0.049 (0.079)	-0.306*** (0.071)	0.104 (0.159)	0.325 (0.238)	0.190 (0.313)	0.311** (0.126)	0.211*** (0.078)	-0.226 (0.141)	0.063 (0.151)	-0.507*** (0.134)
Referendum*NI	-0.165*** (0.055)	-0.357*** (0.114)	0.014 (0.117)	-0.532*** (0.185)	0.118 (0.111)	-0.182** (0.081)	-0.076 (0.049)	-0.399*** (0.118)	-0.042 (0.117)	-0.360*** (0.083)
Constant	15.314*** (0.018)	15.884*** (0.018)	13.950*** (0.029)	15.605*** (0.063)	13.493*** (0.042)	18.577*** (0.013)	13.565*** (0.022)	16.024*** (0.027)	16.719*** (0.014)	15.792*** (0.042)
Observations	200,920	24,555	97,743	18,837	14,000	271,352	323,284	467,683	297,618	19,797
Pseudo R-squared	0.808	0.937	0.694	0.754	0.869	0.912	0.809	0.762	0.885	0.943

Standard errors in parentheses. \*\*\* p<0.01, \*\* p<0.05, \* p<0.1. Partner country and product\*month level fixed effects included.

## 6 Conclusions

Given the central role in the Brexit negotiations of the customs arrangements to be put in place for Northern Ireland, this paper examines trade flows in goods between Ireland with Great Britain and separately for Northern Ireland before and after January 2021. This shows that Irish imports from and exports to Great Britain declined sharply following Brexit. However the effect on exports is not statistically significant, which is likely due to the phased implementation of customs checks by UK. This suggests that it may take further time for the full effects of Brexit to materialise. In contrast, trade between Ireland and Northern Ireland increased substantially.

The extent to which the increases in trade between Northern Ireland and Ireland are a result of substitution away from trade with Great Britain by Northern Ireland firms cannot be estimated at this point without evidence on a corresponding reduction in Northern Ireland to Great Britain trade. As trade between Northern Ireland and Great Britain is internal trade, it is not included in the collection of international trade statistics. Firm activity data for Northern Ireland that identifies sales to Great Britain is collected on an annual basis so this issue of substitution and the impact of the Northern Ireland Protocol on firm trade orientation is a potential avenue of research as this becomes available for the post-Brexit period in coming years.

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