Brexit and consumer food prices: 2023 update

Jan David Bakker, Nikhil Datta, Richard Davies, Josh De Lyon
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Jan David Bakker¹, Nikhil Datta², Richard Davies³, Josh De Lyon⁴

Brexit continues to affect the UK economy. The results in this report are updates to the original study of Bakker et al. (2022), showing that higher non-tariff barriers due to Brexit are affecting food price inflation and costing households in the UK. While the original paper used data up to January 2022, this report updates the dataset through to March 2023. The methodology is otherwise identical so for more details please consult the original paper.

Key findings

• The UK has recently faced high inflationary pressure, and inflation rates for food and non-alcoholic beverages have reached a 45-year high.

• Between December 2019 and March 2023 food prices rose by almost 25 percentage points. Our analysis suggests that in the absence of Brexit this figure would be 8 percentage points (30%) lower.

• Figure 1 presents the results of the event study estimation (equation 1), showing the difference in prices between products more exposed to imports from the EU versus those less exposed over time. Before Brexit, these products had similar price trends. After Brexit, there has been a notable relative increase for more exposed products, which has continued into 2023.

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Between January 2022 and March 2023, the price of food products that were more exposed to Brexit (due to their reliance on imports from the EU before the referendum), increased by approximately 3.5 percentage points more than those that were not.

These changes were entirely driven by products with high non-tariff barriers. Food products which fall into this category, such as meat and cheese imported from the EU, have seen price increases in the region of 10 percentage points higher relative to similar products which were not exposed to Brexit since January 2021, when the trade and cooperation (TCA) agreement began.

The cost of Brexit to each household now stands at £250 when only considering the impacts on food since December 2019. This aggregates up to £6.95 billion overall for UK households.

The observed price increases of products more exposed to Brexit are not correlated with macro events which could be associated with inflationary pressures such as Covid...
lockdowns, or the Russian invasion of Ukraine. Furthermore, the fact that the results are driven entirely by products with high NTBs imported from the EU offers strong evidence that Brexit is the driving force behind these effects.
1. Data

We use detailed microdata on consumer prices matched with data on international trade flows of goods at the monthly level from January 2011 to March 2023.

Information on prices is obtained from the Office for National Statistics (ONS). We use the micro data collected by ONS every month on prices and expenditure weights, which it uses to construct the UK Consumer Price Index.

In addition to the matched price and trade data, we use information on ad-valorem tariff equivalent (AVE) estimates of non-tariff barriers collected from two sources. First, the World Bank provides ad-valorem equivalents (AVE) estimates for detailed HS6 product categories, these are only available unilaterally for the EU. Second, the Global Trade Analysis Project (GTAP) provides bilateral AVE estimates but at a much broader product classification (Bown, Kee, & Nicita, 2016). We use GTAP data on NTBs between EU and Canada because we believe that the UK-EU TCA is most similar to the EU-Canada Trade Agreement.

2. Empirical Strategy

The source of identifying variation in the analysis is the exposure of products to imports from the EU in the year before the Brexit referendum. For each product $i$, we compute the share of imports in 2015 that are from the EU, where imports is measured in quantity, defined as $\frac{M_{i,2015}^{EU}}{M_{i,2015}^{Total}}$.

We estimate changes in consumer prices due to increases in trade costs introduced by Brexit. Our baseline event study strategy relates (the log of) consumer prices for product $p$ with (the log of) exposure to EU imports in 2015. The equation is specified as:
\[
\log(P_{it}) = \sum_{k \in J} \beta^k \log \left( \frac{M_{i,2015}^{EU}}{M_{i,2015}^{Total}} \right) \times \mathbb{1}_t = k + \alpha_i + \tau_t + \epsilon_{it}
\]

where \(P_{it}\) is the mean consumer price of product \(i\) at time \(t\), \(M_{i,2015}^{EU}/M_{i,2015}^{Total}\) is the share of imports of product \(i\) from the EU in 2015 measured in quantity terms, \(\alpha_i\) is a product fixed effect, \(\tau_t\) is a time (month-year) fixed effect, \(\epsilon_{it}\) is an error term, and \(J\) is the set of normalising periods in the event study (which traditionally only contained the period before treatment). Since some food prices may be very seasonal, we also estimate a version where we replace \(\alpha_i\) with the product-month fixed effect \(\alpha_i \times \gamma_m\).

In addition to the event study, we estimate the impact of increased trade barriers on consumer prices in a difference-in-differences framework. We define two post periods. The first post period covers the period after Prime Minister Johnson wins the General Election (Post \(E_i^E\)) and the second post period is the period after the new trading arrangements are imposed under the TCA (Post \(B_i^B\)). The difference-in-differences specification is defined as:

\[
\log \left( P_{it} \right) = \beta^E \times \text{Post}^E_i \times \log \left( \frac{M_{i,2015}^{EU}}{M_{i,2015}^{Total}} \right) + \beta^B \times \text{Post}^B_i \times \log \left( \frac{M_{i,2015}^{EU}}{M_{i,2015}^{Total}} \right) + \alpha_i + \tau_t + \epsilon_{it}
\]

(2)

We propose that the mechanism through which Brexit affected consumer prices was that the TCA increased NTBs faced by UK importers and this was in turn passed on, at least partially, to consumers. To test this mechanism, we add a further interaction in the difference-in-differences specification for the extent of NTBs for food product \(i\). We define \(NTB_i\) to be a dummy variable that splits products into high (above median) and low (below median) values of their estimated NTB AVE, based on data from either GTAP or the World Bank. When estimating specification (3), if higher NTBs after Brexit drive the effects on
prices, we expect estimated coefficient on the interactions with $1\{NTB_i > NTB_p^{50}\}$ to be higher than on the interactions with $1\{NTB_i \leq NTB_p^{50}\}$.

$$log (P_{it}) = \beta_H^E \times Post^E \times log \left( \frac{M_{EU,i,2015}}{M_{Total,i,2015}} \right) \times 1\{NTB_i > NTB_p^{50}\}$$

$$+ \beta_L^E \times Post^E \times log \left( \frac{M_{EU,i,2015}}{M_{Total,i,2015}} \right) \times 1\{NTB_i \leq NTB_p^{50}\}$$

$$+ \beta_H^B \times Post^B \times log \left( \frac{M_{EU,i,2015}}{M_{Total,i,2015}} \right) \times 1\{NTB_i > NTB_p^{50}\}$$

$$+ \beta_L^B \times Post^B \times log \left( \frac{M_{EU,i,2015}}{M_{Total,i,2015}} \right) \times 1\{NTB_i \leq NTB_p^{50}\}$$

$$+ Post^E \times NTB_i + Post^B \times NTB_i + \alpha_i + \tau_t + \epsilon_{it}$$

(3)

3. Results

Figure 1 presents the estimated coefficients and associated 95% confidence intervals from equation 1. We estimate the event study at the monthly level. As in the original paper, the results show we cannot reject parallel trends, during the untreated period, and in the lead up to, and following the implementation of the TCA food prices of more exposed products increased faster than those unexposed, and the trend has continued upwards over the proceeding years after implementation, suggesting that barriers to trade are continuing to impact consumer prices. As of March 2023, the difference is in the region of 8 percentage points.

The results of the difference-in-differences estimates from equation 2 are presented in Table 1.

<table>
<thead>
<tr>
<th>Table 1: The effect of NTBs on prices</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log EU Share × Post Brexit</td>
<td>0.0726***</td>
<td>0.0721***</td>
</tr>
<tr>
<td></td>
<td>(0.0155)</td>
<td>(0.0157)</td>
</tr>
<tr>
<td>Log EU Share × Post Election</td>
<td>0.0368**</td>
<td>0.0364**</td>
</tr>
</tbody>
</table>
Table 2: The effect of NTBs on prices

<table>
<thead>
<tr>
<th>Model</th>
<th>(1) Log Price</th>
<th>(2) Log Price</th>
<th>(3) Log Price</th>
<th>(4) Log Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low NTB × Log EU Share × Post Brexit</td>
<td>-0.00732</td>
<td>-0.00901</td>
<td>0.0470</td>
<td>0.0451</td>
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<td></td>
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<td>(0.0331)</td>
<td>(0.0322)</td>
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<td>0.0997***</td>
<td>0.0997***</td>
<td>0.0884***</td>
<td>0.0886***</td>
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<tr>
<td></td>
<td>(0.0140)</td>
<td>(0.0140)</td>
<td>(0.0137)</td>
<td>(0.0137)</td>
</tr>
<tr>
<td>Low NTB × Log EU Share × Post Election</td>
<td>-0.0389</td>
<td>-0.0390</td>
<td>0.0108</td>
<td>0.00957</td>
</tr>
<tr>
<td></td>
<td>(0.0259)</td>
<td>(0.0261)</td>
<td>(0.0281)</td>
<td>(0.0279)</td>
</tr>
<tr>
<td>High NTB × Log EU Share × Post Election</td>
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<td>0.0640***</td>
<td>0.0550***</td>
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<tr>
<td></td>
<td>(0.00929)</td>
<td>(0.00942)</td>
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<td>(0.00958)</td>
</tr>
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<td>Yes</td>
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<td>Product FE</td>
<td>Yes</td>
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<td>Yes</td>
<td>No</td>
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<td>Observations</td>
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<td>$R^2$</td>
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<td>NTB Data Source</td>
<td>World Bank</td>
<td>World Bank</td>
<td>GTAP</td>
<td>GTAP</td>
</tr>
</tbody>
</table>

Notes: This table presents the estimates of equation 2. Standard errors are clustered at the product level.

The results suggest that the average long run impacts between January 2021 and March 2023 now stand at approximately 7.3 percentage points, which is almost a 20% increase when compared to the original results up to January 2022 in Bakker et al. (2022).

Table 2 presents the results from equation 3, testing the importance of NTBs in generating the observed price effects. Columns (1) and (2) classify products using the World Bank estimates for NTBs while columns (3) and (4) are based on GTAP. Our preferred specification uses the World Bank data as these are available at a more granular product...
level. As was the case in the original paper, all the action is coming from products with high NTB exposure. There is no statistically significant change in prices for products with low NTBs. This provides strong evidence in support of the mechanism that EU exporters and/or UK importers face higher costs due to the Brexit-induced rise in NTBs and pass at least part of these costs on to consumers through higher prices.

4. Welfare Calculation

To quantify the overall welfare effects of the rise in non-tariff barriers of food imports in the UK we introduce a simple partial equilibrium framework. UK consumers have quasi-linear preferences over “all other goods in the economy” \( C \) and food \( F \).

\[
U = C + v(F)
\]

(4)

where \( v \) fulfills the standard assumptions on utility functions: \( \lim_{F \to 0} v'(F) = \infty, v' > 0, v'' < 0 \).

To calculate the welfare effects, we take a first-order approximation of \( v(F) \) around the initial equilibrium, thus we treat demand for food products to be locally linear. Given Brexit can be represented by a negative supply shock, the loss of consumer surplus is given by the typical trapezium when prices move up a demand curve. In the absence of new estimates on demand effects, we assume the slope of the demand curve is consistent with that estimate in Bakker et al. (2022). Specifically, we calculate

\[
\Delta \text{Consumer surplus} = (\Delta P \times Q_2) + \frac{(\Delta P \times \Delta Q)}{2}
\]

(5)

Combining data on the initial equilibrium from Bakker et al. (2022) and the new estimates on price changes, they imply that Brexit caused a welfare loss of £250 for the average household between December 2019 and March 2023, or £6.95 billion overall, when looking at its impact on the food market alone.
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Further reading
