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BREXIT AND THE COST OF LIVING: A TALE OF TWO PHASES^{*}

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Abstract

We employ Synthetic Control Method techniques to estimate the causal effect of Brexit on the consumer price index (CPI) in the United Kingdom. We construct a counterfactual CPI index from a weighted pool of comparable economies and find that the price level of the United Kingdom rose approximately 7 percentage points more than its synthetic counterpart, between 2016Q2 and 2024Q4. This accounts for over a quarter of total inflation during the period. We attribute about 2 percentage points of this increase to the depreciation of the British pound after the Referendum and the remaining 5 percentage points to the change in trading relationships that ensued the 2021 Trade and Cooperation Agreement.

JEL Classification: C32, E31, F13, G10. **Keywords**: Brexit, Exchange Rate, Trade Barriers and Consumer Prices.

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1 Introduction

Trade policy has been at the forefront of the economic debate in recent months. In this paper we quantify the effects of trade fragmentation by leveraging a quasi-natural experiment: Brexit. On 23 June 2016, the United Kingdom (UK) held a referendum on its membership in the European Union (EU). A majority voted in favor of leaving the EU. The Brexit vote and subsequent implementation represent a unique, recent, case study on the effects of economic fragmentation for an advanced economy with expansive trading linkages.

The specifics of the withdrawal plan remained highly uncertain for some time after the Brexit vote, yet a notable shift in consumer prices was evident from the start. In this paper, we study the dynamics of the UK Consumer Price Index (CPI) through the end of 2024. Born et al. (2019) document a fall in real activity in the aftermath of the referendum. Given the weakening in aggregate demand, one might have expected some downward pressure on prices. Yet, we observe the opposite. Overall, our estimates suggest that Brexit increased prices by 7% by the end of 2024, raising the average annual inflation rate by approximately 0.8 percentage points. Brexit accounts for over 25% of the price increase from the referendum until the end of 2024.

By comparing and contrasting UK CPI with a suitably defined counterfactual, we identify two distinct phases of price acceleration. The first begins immediately after the vote. It is relatively modest in size and is primarily driven by the depreciation of sterling in the summer of 2016. This pattern is consistent with firms gradually passing the effects of the depreciation onto consumers. This process was largely completed by mid-2019. Over three years, we estimate that UK CPI growth exceeded our counterfactual by about 2.5 to 2.9 percentage points. This translates into an average annual inflation effect of about three-quarters of a percentage point over that period. Ultimately, we trace these effects to Brexit expectations or Brexit-related news.

A second phase of price acceleration follows the implementation of the Trade and Cooperation Agreement (TCA) on 1 January 2021. We consider this adjustment to be the result of the actual EU withdrawal, which reflects increased trade barriers. This phase appears to be completed at some point in early 2023. Over two years, the UK CPI index grew about 6 percentage points more than our counterfactual, which translates into an average increase in annual CPI inflation of about 3 percentage points. Our estimates suggest that the Brexitrelated upward pressure on prices may have unfolded completely as of 2023. Since early 2023, annual CPI inflation has been, if anything, somewhat lower than our counterfactual benchmark.

The accuracy of our estimates rests on the reliability of our estimated counterfactual, which, in turn, depends on two critical assumptions: i) the outcome of the referendum was largely unanticipated, and ii) the Leave vote began to affect economic decisions well before the TCA was even devised. Initially, Brexit was associated with the expectation of a future increase in trade barriers, based on news, and later with the operationalization of the TCA. Importantly for our analysis, financial markets did not anticipate the referendum result but reacted swiftly after the outcome. This is evident in asset price movements observed follow-

ing the vote.

Broadbent (2017b) and Broadbent (2017a) document how financial markets priced in Brexitrelated news in the referendum's immediate aftermath. Market-based inflation expectations responded sharply. Within a month, inflation expectations increased by approximately 0.25 percentage points, with a more pronounced effect at shorter horizons. Sterling depreciated by 10.5% following the referendum. This sharp, unexpected market reaction is crucial to our empirical strategy, as it provides a clean setting to analyze the effects of Brexit-related shocks on consumer prices.

To do so, we employ the Synthetic Control Method (SCM) as described by Abadie and Gardeazabal (2003), to construct a counterfactual for the UK's CPI index. SCM works by computing the weighted average of price levels from other economies that best track UK CPI prior to the treatment date. As the referendum's outcome was unexpected and its effects began right after, this corresponds to the referendum date. Our working assumption is that the same weighted average of price indices would have continued to track UK CPI closely had Brexit not occurred. The difference we observe between actual UK CPI and this synthetic control serves as our measure of the effects of Brexit on UK consumer prices.

Born et al. (2019) employ a similar approach to measure the effect of Brexit on economic activity.¹ However, their analysis stops before the actual exit date from the EU, leaving the post-Brexit impact unexamined. Glass (2019) and Mann (2022) present some policy-brief analysis of the impact of Brexit on prices. We carry out a comprehensive quantitative exercise that extends well past the TCA and make two key contributions. First, we clearly isolate two periods in which prices in the UK grew faster than in our counterfactual before returning to grow at about the same pace. Second, we discuss the extent to which the immediate reaction of financial markets – measured by market inflation expectations the pound depreciation – foresaw the unfolding of Brexit.

As mentioned earlier, the price increase observed in the news phase is primarily due to anticipatory effects, mainly captured by the depreciation of the pound. In a small open economy like the UK, this exerts upward pressure on consumer prices. We quantify the exchange rate pass-through at about 30%. A 10% depreciation of sterling would then result in a price increase of approximately 3%. This finding is consistent with Breinlich et al. (2022), which measures the impact of sterling depreciation on goods prices at 2.9% using micro-data. According to our estimates, it took UK firms about three years to fully pass this effect from the original depreciation onto consumers (with subsequent price adjustments possibly due to further revaluations).

The observed price dynamics during the implementation phase, however, are not, prima facie, consistent with the effects of a depreciation of the pound. If anything, we think that exchange rate fluctuations in this period may have cushioned the impact of the TCA on prices. Rather, our estimates for this second phase are consistent with those reported by Bakker et al. (2022), who find that Brexit-induced Non-Tariff Barriers (NTBs) raised prices by 6%, with a pass-through of 50–80%.

¹For estimates on the impact on goods trade, see Springford (2021).

We derive three important lessons from Brexit that can apply to the current economic scenario. First, announcements matter even if the exact details of new trading arrangements are not fully specified. Financial markets react immediately and firms' pricing decisions reflect variations in exchange rates. Second, the effects of trade impairment on aggregate price inflation can be substantial, upwards to one percentage point by our estimation. Third, inflation targeting remains effective regardless of the shock. After a period of faster growth in prices, inflation returns to its normal behavior: the effects on the level of prices appear to be largely permanent but those on inflation (price growth) are not.

Related Literature. Our analysis speaks to the literature exploring the role of trade policy and the effects of economic fragmentation, Brexit representing an instance of a "deglobalization shock" (Gourinchas and Hale 2017). We focus on the impact of these shocks on aggregate prices.

A number of recent papers have studied the impact of Brexit along different dimensions. Born et al. (2019) and Vlieghe (2019) focus on the period immediately after the referendum with a focus on GDP. Fetzer and Wang (2020) find that the Brexit vote gave rise to significant and uneven economic losses across UK regions, with short-term job gains masking deeper productivity challenges and potential future labor market disruptions.² We complement these findings with a focus on prices and by extending the analysis to the post-TCA period, which, we show, has had a larger impact on UK consumer prices than the period that intervened between the referendum and the TCA. In this paper, we construct a different sample (both in terms of periods and countries), refine the estimation technique, and relate our findings to asset price variations.

Others have analyzed the impact of Brexit on consumer, import, and energy prices using disaggregated data. Breinlich et al. (2022) find that the depreciation of sterling raised UK consumer prices by 2.9%, costing households some £870 annually. Graziano, Handley, and Limão (2024) document that higher trade policy uncertainty from Brexit increased UK import prices, reduced product variety, and lowered real incomes. Köse and Ünal (2025) report that, while overall inflation remained unchanged after the vote and EU exit, energy and transport prices rose significantly compared to other European countries. Costa, Dhingra, and Machin (2024) show that industries facing larger currency depreciations experienced rising import costs without corresponding export revenue gains, which drove down real wages and contributed to a 3–3.6% decline in aggregate real wage growth over three years. By focusing on aggregate CPI, we can calculate the overall impact of Brexit on the prices of both goods and services.³ Our findings also align qualitatively with those of Geiger and Güntner (2024), who develop a high-frequency instrument for Brexit-related surprises to show that Brexit shocks act as a supply shock, slowing GDP growth and increasing CPI inflation.

²Using SCM, Campos, Coricelli, and Moretti (2019) and Grassi (2024) show that EU accession significantly increased economic growth for new members, largely driven by productivity improvements and economic convergence.

³Corsetti, Crowley, and Han (2022) find that exchange rate pass-through was complete for transactions invoiced in the producer's currency but initially low for those invoiced in other currencies—a gap that narrowed within six quarters. A weaker currency did not result in a lasting improvement in price competitiveness for UK exports.

Our work also relates to other papers that quantify the effects of Brexit on trade (Dhingra et al. 2017; Sampson 2017; de Lucio et al. 2024), foreign direct investment (McGrattan and Waddle 2020), financial market volatility and stock returns (Davies and Studnicka 2018), and uncertainty (Steinberg 2017; Bloom et al. 2018; Faccini and Palombo 2020; Hassan et al. 2020). Broadbent et al. (2024) build a structural model to study the dynamic adjustments of the UK economy post-referendum. Using SCM, our paper reconciles the entire price dynamics following Brexit with previous studies.

The remainder of the paper is organized as follows. Section 2 describes the data, while Section 3 outlines the methodology. Section 4 presents the main results, and Section 5 concludes.

2 Data

The immediate effects of the Referendum. Our analysis hinges on the outcome of the Brexit referendum as a genuine shock. As such, we require the result to have been largely unanticipated, creating a stir only after the result was uncovered.

Figure 1 illustrates financial markets' reaction to the referendum. Panel (a) shows that market-based inflation expectations, as computed by the Bank of England, increased across different time horizons after the Brexit vote.⁴ Markets almost immediately priced in a 0.4 percentage point rise in inflation, which represents about half the increase we estimate for the pre-TCA phase of our analysis. Importantly, markets anticipated a significant increase in inflation expectations for about four years. This aligns well with our estimates, which show that inflation in the UK was higher than our estimated counterfactual for about three years after the referendum, before leveling off when the TCA took effect in 2021.

Panel (b) illustrates the extent to which markets were surprised on the morning of June 24, 2016. The yield on index-linked bonds was fairly stable in the run-up to the referendum but dropped substantially thereafter. If we average the first half of 2016 and compare it to the second, the drop is approximately 0.7%. This fall reflects an increase in inflation expectations, a possible contraction in underlying 'equilibrium' real rates, and variations in premia. Taken at face value, this variation surprisingly closely aligns with our measured average effect of Brexit on annual inflation between 2016 and 2024.

Panel (c) depicts the nominal effective exchange rate in the UK from 2015.⁵ This is the one variable that shows anticipatory behavior regarding potential changes in the future trading relationship with the EU. The British pound started to depreciate ahead of the referendum in the second quarter of 2015. This coincides with the introduction of the European Union Referendum Bill to the House of Commons on May 28, 2015, and its approval in December of the same year. However, it is difficult to determine whether this was due to market pricing in a possible leave vote or simply the uncertainty surrounding it. Importantly for our analysis,

⁴For the calculation of market-based expectations, see https://www.bankofengland.co.uk/statistics/yieldcurves.

⁵The nominal effective exchange rate (broad basket) is sourced from the Bank of International Settlements, https://data.bis.org/topics/EER/.

the pound depreciated by 10.5% after the referendum, suffering its largest one-day loss since the introduction of free-floating exchange rates (Dhingra et al. 2017). This drop turned out to be highly persistent, which helps isolate the degree of pass-through onto prices.⁶

Taken together, the variation in asset prices provides evidence that the economic actors at large were taken by surprise by the vote's outcome. The response was swift, however. In hindsight, we can also conclude that the Brexit effects on prices appear to have been very accurate.

The direct effect of a nominal exchange rate depreciation and the long-term impact of increased trade barriers on prices are well understood from an economic standpoint. According to theory, because pricing decisions are forward-looking, a rise in inflation expectations typically puts upward pressure on consumer prices. This increase may reflect an anticipated rise in input costs due to higher expected nominal wages and prices of imported intermediates. But it could also reflect expectations that final goods prices will rise. The depreciation of the exchange rate increases the prices of imported intermediates and final goods, thereby raising inflation over time. The extent of this effect depends on the degree of pass-through, which we can estimate from the data.

Estimating longer-term effects with the synthetic control method. Key to the construction of the synthetic UK CPI is the selection of the donor pool; i.e., the group of countries whose price indices are weighted to create the no-Brexit counterfactual. The ideal donor country is the least affected by Brexit and yet a close match for the pre-Brexit UK economy. The choice of donors represents a balancing act between the risk of overfitting the data (if the number of countries is too large relative to the number of periods) and not producing a credible counterfactual - e.g., if there is not enough variation. These considerations and the availability of long-enough and consistently defined price indices lead us to include 22 OECD countries; i.e. advanced economies with low trade barriers, as well as data for China, India, and Singapore.⁷ These three countries, in addition to being important non-OECD economies, help mitigate concerns that some OECD countries—particularly EU members—may have been affected by Brexit. However, if any donor countries were influenced by Brexit, this would likely bias our results downward by narrowing the gap between UK CPI and the synthetic counterfactual.

Data are sourced from Refinitiv. We use quarterly, seasonally adjusted consumer price indices from 1993Q1 to 2024Q4. All series are normalized to the year 2010 and log-transformed. The starting point of our sample is determined by the availability of data for a sufficiently

⁶The measure of the nominal exchange rate that uses the narrow basket instead plateaus after the Brexit vote and does not show any signs of further revaluations with the introduction of TCA.

⁷The full list of countries includes: Australia, Austria, Belgium, Canada, China, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, India, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, South Korea, Spain, Sweden, Switzerland, and the United States. We exclude other OECD countries such as Chile, Colombia, Costa Rica, Czech Republic, Estonia, Hungary, Israel, Latvia, Lithuania, Slovak Republic, Slovenia, and Turkey either because of data limitations or because the growth rate of CPI is much higher than the UK during the period of analysis. Including these countries does not alter the analysis, as these countries would take zero weight for the construction of the synthetic at the cost of the algorithm taking longer to converge. In addition, the inclusion of a higher number of countries may result in overfitting.



Figure 1: Market Reaction and Data

Notes: Panel (a) illustrates the reaction of market-based inflation expectations at different horizons (on the horizontal axis) to the outcome of the Referendum (Bank of England data and own calculations). The data is presented for the month leading up to the referendum (June 23, 2016) in black, and the month following it in red. The shaded areas represent 2 standard deviation bands, computed from the daily observations for the respective months. Panel (b) shows the daily time series of the yield on the 2% Index-linked Treasury Stock 2035 (United Kingdom Debt Management Office data). The grey shaded area denotes the post-referendum period, and the dashed red lines represent the pre- and post-referendum means. Panel (c) plots the time series for the nominal effective exchange rate from 2015. Panel (d) displays the log CPI indices in the UK (red) and in the donor countries (gray). In the last two panels, the period between the Referendum and EU withdrawal is indicated by the light blue shading and the period Post-Trade Cooperation Agreement is denoted in red.

large number of countries.

The period under analysis is marked by significant economic uncertainty and shaped by major shocks such as the global financial crisis, the COVID-19 pandemic, and the Russian invasion of Ukraine. During these three decades, several countries in our dataset have experienced large shifts in consumer price inflation — going from a prolonged stretch of low and stable inflation to a sharp rise into double-digit levels. From the point of view of the UK, this time also includes key Brexit-related events: the lead-up to the 2016 referendum, the referendum itself, the negotiation of a new trade agreement with the European Union (June 2016–December 2020), the provisional implementation of Brexit through the Trade and Cooperation Agreement on January 1, 2021 and its formal implementation on May 1, 2021.

Central to our analysis is the treatment date. That corresponds to the quarter in which Brexit

"happens". It means that we estimate our synthetic control up to that period and consider the rest of the sample as a treated period. Even though the UK officially left the EU in January 2021, our treatment date is June 23 2016 (2016Q2). The rationale is that treatment should be unexpected, and the referendum outcome was largely surprising, as discussed above. The same does not apply to the TCA, which was widely anticipated. Indeed, our analysis of asset prices shows clearly that markets priced in an inflationary effect of Brexit right after the referendum.

Our choice of the treatment date enables us to capture potential anticipatory effects. We deliberately refrain from taking a stance on whether the economic impact of Brexit was driven primarily by the referendum outcome (Brexit news) or by its formal introduction. Instead, our analysis allows us to assess both phases separately. In doing so, we find that both the news and implementation phases had significant, yet distinct, effects on consumer prices.

Panel (d) of Figure 1 reports the level of log CPI in the UK (in red) alongside those from the donor countries (in grey). The series are normalized using the average value in the year 2010, which explains why the series fan out before and after that date. The extent of homogeneity across countries can be assessed by observing how closely the lines align. Importantly, the UK series falls well within the range spanned by the donor pool both before and after the referendum. This visual inspection highlights that a suitably weighted average of the price indices for those countries has the potential to track the dynamics of CPI prior to treatment. If this is the case, we can be confident that the same weighted combination of prices serves as a reliable counterfactual for what the UK price index would have been had Brexit not occurred.

It is also important to note that for all countries, there is a clear price acceleration at the end of the sample. We can trace this back to the supply shortages (associated with the pandemic) and the recent surge in energy-driven inflation. Against this background, a simple visual inspection reveals that the UK CPI series grew faster than average post-referendum due.

Strong economic parallels between the UK and the countries in the donor pool are essential. Following the synthetic control literature (Abadie and Gardeazabal 2003), we include country covariates to capture similarities (or lack thereof) between the UK and donor pool countries beyond price levels. Omitting covariates could lead to overfitting the data before the treatment period, while placing excessive weight on them may weaken the pre-treatment fit. We consider the following covariates: the ratios of nominal consumption, investment, government spending, and imports (of goods and services) to nominal Gross Domestic Product, as well as quarterly GDP growth per capita in 2021 constant PPP terms. All data are annual, sourced from the World Bank's World Development Indicators, normalized to the year 2010, and averaged over the pre-treatment period.

3 Methodology

We use the Synthetic Control Method (SCM) as our main empirical approach, following Abadie and Gardeazabal (2003). The methodology consists of constructing a synthetic counterfactual - also referred to as a Doppelgänger or look-alike - that estimates how UK CPI would have evolved had Brexit never occurred. By comparing the actual UK CPI with its synthetic counterpart, we quantify the causal impact of Brexit on the consumer price level. The chosen methodology ensures that the observed inflationary effects are isolated from global economic shocks, such as the COVID-19 pandemic and rising energy prices due to the war in Ukraine.

We consider quarters $t = 1, ..., T_0, T_0 + 1, ..., T_1$, where period t = 1 corresponds to the first quarter of 1993 in our application. T_0 corresponds to the second quarter of 2016, which marks the quarter when the referendum takes place, the treatment date. T_1 is the last quarter in our datasets, 2024Q4.

For each period *t*, we observe the log-level CPI for *J* countries (our *donor pool*), $p_{j,t}$, where j = 1, ..., J represents each country in the *donor pool*. We label UK CPI as $p_{0,t}$. Our sample of $J \times T_0$ observations is augmented with the so-called covariates, i.e. a set of cross-sectional moments from the same set of countries. The covariates include the sample averages of the shares of nominal consumption, investment, government spending, and imports to nominal Gross Domestic Product, as well as quarterly GDP growth per capita.

The counterfactual CPI for the UK, denoted as $\hat{p}_{0,t}$, is a linear combination of CPI indices (in logs) from donor countries:

$$\hat{p}_{0,t} = \sum_{j=1}^{J} \omega_j^* p_{j,t}, \quad \text{where} \quad \omega_j^* \ge 0, \quad \sum_{j=1}^{J} \omega_j^* = 1.$$
 (1)

 ω_j^* represents the optimally selected weight assigned to country *j*. They are pinned down by solving:

$$\min_{\underline{\omega}} \left(\underline{p}_0 - \mathbf{P} \underline{\omega} \right)' \mathbf{V} \left(\underline{p}_0 - \mathbf{P} \underline{\omega} \right), \tag{2}$$

where $\underline{\omega} = (\omega_1, ..., \omega_J)'$ is the vector of weights. The vector $\underline{p}_0 = (p_{0,1}, ..., p_{0,T_0}, \bar{x})'$ contains UK CPI observations prior up to the treatment date and a vector of N_0 covariates, \bar{x} . The matrix $\mathbf{P} = [\underline{p}_1, ..., \underline{p}_J]$ is a $(T_0 + N_0) \times J$ matrix, where each column $\underline{p}_j = (p_{j,1}, ..., p_{j,T_0}, \bar{x}_j)'$ represents the CPI time series of a donor country up to the referendum date, augmented by the country covariates. The weighting matrix \mathbf{V} is a $(T_0 + N_0) \times (T_0 + N_0)$ diagonal matrix that assigns relative importance to different pre-treatment periods, optimized following the methodology of Abadie and Gardeazabal (2003), Abadie, Diamond, and Hainmueller (2010), and Born et al. (2019).

Once the optimal weights ω_j^* are determined, the Doppelgänger for the UK CPI in the post-Brexit period is computed as:

$$\hat{p}_{0,t} = \sum_{j=1}^{J} \omega_j^* p_{j,t}, \quad \text{for} \quad T_0 < t \le T_1.$$
 (3)

The estimated Brexit effect on the UK CPI, p_t can be then estimated as:

$$\mathfrak{p}_t = p_{0,t} - \hat{p}_{0,t}, \quad \text{for} \quad T_0 < t \le T_1,$$
(4)

which we will denote as the standardized Doppelgänger gap, and we will express in percentage terms by multiplying it by 100.

4 Results

Panel (a) of Figure 2 shows graphically the main estimation result, comparing the UK CPI index (in logs) with the Doppelgänger counterfactual. The data is first normalized using the average value in the year 2010 prior to running the algorithm run, and then it is restored to its original level. The optimally weighted average of CPI indices from the donor pool closely tracks the UK benchmark during the pre-referendum period, which serves as the estimation sample. The shaded area represents a two-standard-deviation band, which is calculated from the gap between observed and synthetic data before the treatment date. The observed CPI data lies within the bands during the period leading to the Brexit Referendum, which indicates that our approach effectively captures the aggregate price dynamics in the UK for over 23 years' worth of quarterly data and provides a reliable control group for assessing post-referendum effects.

Since the second half of 2016, we observe a wedge opening between the two series. The actual UK CPI lies above its synthetic no-Brexit benchmark. Panel (b) of Figure 2 zooms in this wedge, which is our estimate of p_t . We can easily detect periods when the wedge opens up and when it levels off. A gap begins to emerge in the second half of 2017 and grows until the end of 2019, after which it plateaus and partially reverses in 2020. We refer to this initial period as the anticipation—or news—phase, as no changes in trading arrangements had materialized at that time. The exchange rate serves as a natural measure of the anticipation effect. We attribute most of the observed price gap to the 10.5% depreciation of the pound following the referendum, with only minor subsequent revaluations of sterling.

Three years after sterling's initial depreciation, prices had increased by approximately 2.9% more than under our no-Brexit benchmark. This finding is broadly consistent with the study by Breinlich et al. (2022) and with an estimate suggesting that exchange rate variations fully pass through to prices at about 30% after three years (see more below). These dynamics also support the interpretation by Broadbent et al. (2024), who argue that the Brexit shock can be viewed as a negative productivity shock affecting the tradable sector once the UK exits the European Union, with the exchange rate depreciation reflecting that expectation.

The gap between the observed UK CPI and the Doppelgänger widens sharply again in 2021 when the TCA took effect following the UK's departure from the EU. We refer to this as the implementation phase, which had larger and more immediate effects. This period was marked by rising cost pressures—from energy prices, supply chain disruptions, and tight labor market conditions. However, there is no reason to believe these factors were unique to the UK. Indeed, our Doppelgänger price index also steepens, reflecting the global inflation surge. Nonetheless, inflation in the UK rose even more sharply following the TCA.

The effects of the UK's departure from the EU can be better appreciated through the decomposition in Panel (c) of Figure 2. We construct this decomposition by computing the an-

Figure 2: Main Results





Notes: Panel (a) shows the log of the UK CPI index (blue) and the Doppelgänger counterfactual (red). Grey bands represent confidence intervals. Panel (b) depicts the gap between the observed CPI and its synthetic counterpart, quantifying the impact of Brexit on UK consumer prices. Panel (c) decomposes annual consumer price inflation into Brexit-related shocks (red) and global/other UK-specific shocks (blue). The period between the Referendum and EU withdrawal is indicated in shaded light blue, while the post-TCA period is shaded red. Panel (d) presents the gradient of the Doppelgänger gap. The gradient is zero when the observed and synthetic CPI move in parallel (marked by red dots). Vertical dotted lines indicate full pass-through and key dates. Panel (e) displays a pie chart with the optimally computed weights that minimize the distance between actual and synthetic data before the Brexit Referendum.

nual inflation rate post-treatment using both the observed CPI series and its synthetic counterpart. The difference between these inflation rates captures the impact of Brexit. However, non-Brexit shocks account for most of the rise in annual inflation between 2021 and 2024. Still, we identify a Brexit-related component contributing up to 3 percentage points to inflation, with the peak effect occurring in 2022 and early 2023.

Panels (b) and (c) also show that while the effects of Brexit on the price level may never fully reverse, the effects on inflation have. This is reassuring from a technical perspective because it suggests that our weighted average of donor-pool country prices serves as a good proxy for UK price dynamics not only before 2016 but also as late as 2024. Economically, this finding aligns with expectations in a pool of mostly inflation-targeting economies. Eventually, inflation reverts to the inflation target and the gap between realized UK prices and the synthetic counterfactual stabilizes. Importantly, our analysis indicates that these two distinct waves differ primarily in magnitude and, to a lesser extent, in duration.

Panel (d) of Figure 2 clearly illustrates the time when the actual and synthetic price indices began to diverge and when they resumed growing at roughly the same pace. A zero gradient indicates that the observed CPI and its synthetic counterpart attain the same trend, implying that the depreciation of sterling has fully passed through to prices. In fact, the exchange rate pass-through was completed three years after the Brexit referendum, around mid-2019. The same is true for the second phase of price acceleration, which we estimate to be complete around 2023Q2.

Finally, Panel (e) of Figure 2 reports a summary of our estimated ω_j^* . We can isolate two underlying economic phenomena. UK CPI is highly correlated mostly with that of small open advanced economies, such as Belgium (8.92%), Cyprus (0.79%), Japan (22.18%), New Zealand (15.10%), Singapore (23.56%), Finland (15.07%), and Iceland (4.28%) and tightly related to India (10.10%), due to their close economic and financial ties. Importantly, for our purposes, EU member-states do not get the lion's share of the weight. This mitigates the risk that price indices in our donor pool may also have been affected by Brexit, which we will return to in the following section. Interestingly, the weight attached to the US and Germany (and indeed the remaining members of the donor pool) is essentially zero.

4.1 Robustness

In this section, we show that our main results are robust to alternative modeling choices. First, our findings do not depend on the selection of individual countries. Next, we examine whether Brexit affects donor countries with non-zero weights and whether results are sensitive to alternative treatment dates (picking up possible anticipation effects). We also analyze if the choice of the normalization date or the omission of covariates alters our baseline results.

Individual Countries. We evaluate the contribution of individual donor pool countries with non-zero weights to the Doppelgänger by iteratively re-estimating our baseline model omitting each of them in turn. Removing countries from the donor pool reduces the goodness of fit. We carry out this exercise to show that our key findings do not rest on the inclusion

of any specific country. Panel (a) of Figure 3 in the Appendix presents the baseline Doppelgänger gap alongside the results from these restricted donor pools. While some variation exists, the results are robust to the exact composition of the donor pool. In fact, in each case, we can clearly identify two distinct phases of price acceleration. Notably, our baseline lies roughly in the middle of the pack. Even in the estimation with the smallest effect, CPI remains 5% higher toward the end of 2024.

Placebo tests. We consider the hypothetical scenario in which one of the countries in the estimation receiving positive weights is subjected to a placebo treatment at the time of the Brexit referendum. We estimate these hypothetical Doppelgängers by iteratively re-estimating the model for each of the countries with non-zero weights.

Following Born et al. (2019), we then consider two statistics for assessing how well the model fits the data before and after treatment – an event affecting the UK. The first is the Root Mean Squared Prediction Error (RMSPE). The second is the Maximum Absolute Prediction Error (MAPE). They are reported in panels (b) and (c) of Figure 3.⁸ By comparing post-treatment to pre-treatment errors, these ratios indicate whether the model's predictive performance worsened after the treatment. A ratio significantly greater than 1 suggests that the treatment had an effect. Note that Belgium is the only country showing some signs of price acceleration after the Referendum. Since Belgium is part of the EU, it may have been indirectly affected. However, its overall importance is relatively small. If anything, the inclusion of Belgium increases the growth rate of the synthetic, making the gap a conservative estimate. Importantly, excluding Belgium, as we did in the previous exercise, does not alter the main conclusion.

We also conduct a series of time placebos, by letting the treatment date vary arbitrarily, between 2014Q1 and 2016Q2. This should capture any anticipatory effect in the run-up to the vote. We re-estimate the model by changing the treatment dates iteratively. Panel (d) illustrates that the resulting gaps (shown in the gray lines) are very much aligned with the baseline gap (shown in red).

Normalization. The choice of normalization date does not affect our main results. We normalize the data at different points in time—specifically, to the years 1996, 2003, and 2010—before running the algorithm. As shown in panel (d) of Figure 3, the Doppelgänger changes only slightly when using these alternative normalization dates. These dates were selected to cover the full sample period while excluding the initial and treatment periods. However, our results also remain robust even when accounting for the starting year of the sample and the treatment year in the normalization

Removing co-variates. Excluding the covariates from the analysis does not change the main

⁸The relative RMSPE (ρ_1) is the ratio of the root mean squared prediction error after treatment to that before treatment. The RMSPE is an average measure of how much the model's predictions deviate from the actual values. The relative MAPE (ρ_2) is the ratio of the maximum absolute prediction error after treatment to that before treatment. The MAPE focuses on the single largest deviation between the model's prediction and the observed data.

message. When we do so, the algorithm assigns higher weights to countries whose CPI index is more closely aligned with that of the UK, even if they do not match the UK along other dimensions. This is particularly true for Singapore, whose CPI serves as a very strong proxy for the UK in the absence of covariates (with a weight of 40%). The algorithm also assigns larger weights to countries such as China and India, which present quite substantial structural differences relative to the UK along other dimensions. If anything, excluding covariates produces a Doppelgänger that fits the observed UK CPI prior to treatment better. Indeed, the role of the covariates is to avoid overfitting by ensuring that weights are assigned to countries not exclusively based on their CPI index.

5 Conclusion

Brexit provides a valuable case study for assessing the economic impact of rising trade barriers. It serves as a quasi-natural experiment, as the referendum outcome was largely unanticipated by markets.

Our study is an attempt to estimate the causal effects of Brexit on UK prices without imposing a fully-specified model of the economy. By applying SCM techniques, we estimate that the UK's price level increased by approximately 7 percentage points more than its synthetic counterpart between 2016Q2 and 2024Q4. The Brexit effect accounted for over 25% of the total inflation variation over the period or, according to a different metric, a 0.8 percent higher average annual inflation.

Our estimation shows that the effects of Brexit accrued over two distinct phases. The first, immediately following the referendum, was primarily driven by the depreciation of the British pound, which in turn we can trace back to the expected effects of a foreseeable trading agreement. We estimate full-pass through from the exchange rate to aggregate prices to be around 30% over the course of three years. The second phase, starting from the implementation of the Trade and Cooperation Agreement (TCA), in 2021, captures the effects of additional trade frictions. This second phase has had both larger and faster effects.

Overall, our results suggest that the rise in trade barriers and currency depreciation following the Brexit referendum has had substantial and persistent effects on UK consumer prices. The impact of Brexit on inflation may be complete, but the cumulated impact on the level of prices is unlikely to reverse any time soon. Future research should explore the sectoral implications of these inflationary effects and assess the long-term impact on economic growth and household welfare.

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Appendix



Figure 3: Robustness

