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Impacts of the Brexit referendum on UK employment: a synthetic control method approach

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ABSTRACT

We estimate the impact of the 2016 Brexit referendum on the UK (un-)employment rate up to January 2020 by comparing the observed performance of the indicators in the UK with those of a synthetic control. The decline in the UK unemployment rate recorded after the referendum mimics the trend of the synthetic indicator and, similarly, the increase in UK employment follows the trend of the synthetic control. Overall, we find that the Brexit referendum has had little effect on the UK (un-)employment rate.

I. Introduction

On 23 June 2016, the United Kingdom electorate decided that the UK would leave the European Union (EU). The surprising outcome of the Brexit referendum was the culmination of a bitter political campaign between 'Leavers' and 'Remainers'. In particular, there have been accusations to both camps of misleading the voters regarding the way Brexit would pan out and its socio-economic implications. Of particular concern for the 'Remain camp' were economic impacts due to protracted uncertainty and restricted access to the EU's single market. Remainers also stressed the geopolitical security implications arising from a 'divorce' from strategic (and geographically proximate) allies. On the positive side, the proponents of the 'Leave camp' emphasized the increased policy space and the return of sovereignty that the UK citizens would gain, coupled with the liberation of the UK from the yoke of Brussels bureaucracy.

Independently of ex-ante expectations and predictions, Brexit constituted a (potentially consequential) policy experiment and a unicum since no other country to date has left the EU. Several estimates of the economic consequences of the decision to leave exist. These include estimates of economic costs of Brexit in terms of GDP loss (Born et al., 2019; Fetzer and Wang 2020) and the impact on foreign direct investment towards the UK (Simionescu 2018) and on its financial markets (Opatrny 2021) and labour productivity

(Farid 2020). However, no study has applied impact evaluation techniques focusing on employment. We apply the Synthetic Control Method (SCM), which is particularly apt to study and quantify the impact of single major events (as in the case of significant policy decisions); we do this in the context of the Brexit referendum in order to estimate the difference that the 2016 Brexit referendum made on UK employment in the short term. The issue of unemployment is particularly salient since, apart from being an important factor for social and individual well-being, some of the arguments made for and against Brexit focused precisely on the impacts that leaving the EU would have on jobs (Mortiaux 2018).

II. The synthetic control method

We are making use of SCM to discern and quantify the effect of the Brexit referendum on UK employment. SMC is a statistical technique gaining increasing popularity in the field of impact evaluation, given its potential to attribute impacts to specific interventions (see Abadie, Diamond, and Hainmueller 2010; Abadie and Gardeazabal 2003; Kahane and Sannicandro 2019; López-Cazar, Papyrakis, and Pellegrini 2020; Pellegrini, Tasciotti, and Spartaco 2021). SCM is a data-driven technique that constructs synthetic comparative units via combining other sample units (typically referred to as 'donors' or 'donor pool') that

did not experience the same treatment. The intervention here is the referendum to withdraw from the EU. The synthetic unit is constructed with an optimal combination of donor weights (based on an algorithm) that minimize the distance (the root mean squared of the prediction error) for a specific outcome variable – (un)employment, in our case – between the treated unit (that experiences the intervention) and its corresponding synthetic unit. This is formally presented in Equation (1), where X corresponds to the labour-market outcome variable, m indicates the number of donor countries (ranging between 1 and n) and W is an $(m \times 1)$ vector of non-negative weights which sum to one.

$$min(X_{UK} - \sum_{m=1}^{n} X_m W)^2 \, subject \, to \, w_m \geq 0 \quad (1)$$

For our analysis, SCM produces a synthetic control unit that imitates the (un)employment patterns of the UK economy before the intervention (i.e. prior to the 2016 Brexit referendum). Any deviations (in (un)employment) in the aftermath of the intervention can then be attributed to the treatment, and their statistical significance is typically derived through ex-post tests. The estimated gaps between the UK and its synthetic counterpart approximate how the two indicators on the UK labour market would have performed – had the 2016 referendum not been in favour of leaving the EU – by using the estimated synthetic values as a counterfactual.

III. Data

We make use of the SCM to estimate the effect of Brexit-related uncertainty on two labour-market indicators for the UK, namely the unemployment rate (monthly series) and the employment rate (yearly series). Our donor pool consists of 27 OECD countries, for which complete time-series data exist for our labour-market outcome variables (see Appendix 1). Our period of analysis is between January 2012 and January 2020 for the monthly unemployment series and between 2008 and 2019 for the yearly employment series. Data comes from the Eurostat database .[1] Our analysis uses a list of predictors to construct the synthetic control unit (Table 1); the predictor

Table 1. List of covariates used.

Unemployment, monthly rate (in %)	Yearly employment for those aged 20–64 (in %)
Lagged unemployment, monthly rate (in %)	Lagged yearly employment for those aged 20–64 (in %)
Part-time employment and temporary contracts (in logs)	Tertiary education (levels 5–8) (in %)
Wage-adjusted labour productivity (in %)	Population (in logs)
Average personnel cost in the manufacturing industry (in thousand euros)	
General government gross debt (as % of the GDP)	

Notes: Authors' calculation using Eurostat (2021) data.

variables have been identified based on their ability to forecast the time evolution of the un(employment) outcome variables in the pre-Brexit referendum period and the best pre-intervention match between the synthetic and treated units. In line with earlier synthetic control analyses (e.g. see Ando 2015; Villar and Papyrakis 2017), we also include lagged (pre-intervention) values of the dependent variables in the list of their covariates, as this controls for unobservable characteristics and helps to produce a better-fitting pre-intervention model.

IV. Analysis

Figure 1 shows how the monthly unemployment UK indicator behaves vis-à-vis the synthetic one in the period between January 2012 and January 2020 (the estimated weights per donor country are presented in Appendix 1); we interrupt the analysis before the Covid-19 pandemic since it created an exogenous shock that affected OECD countries differently at different points in time, potentially creating confounding effects. The black vertical line indicates the time of the intervention (namely, June 2016 when the Brexit referendum took place). The small difference between the pre-intervention values for the observed and synthetic series signifies a good pre-intervention fit for our synthetic control model (with the difference being smaller than 7.5% of the average unemployment rate, see also Bonander, Humphreys, and Degli Esposti 2021). In the aftermath of the Brexit referendum, the UK unemployment appears to be consistently higher in relation to the synthetic unit; the gap also seems to widen over time although it
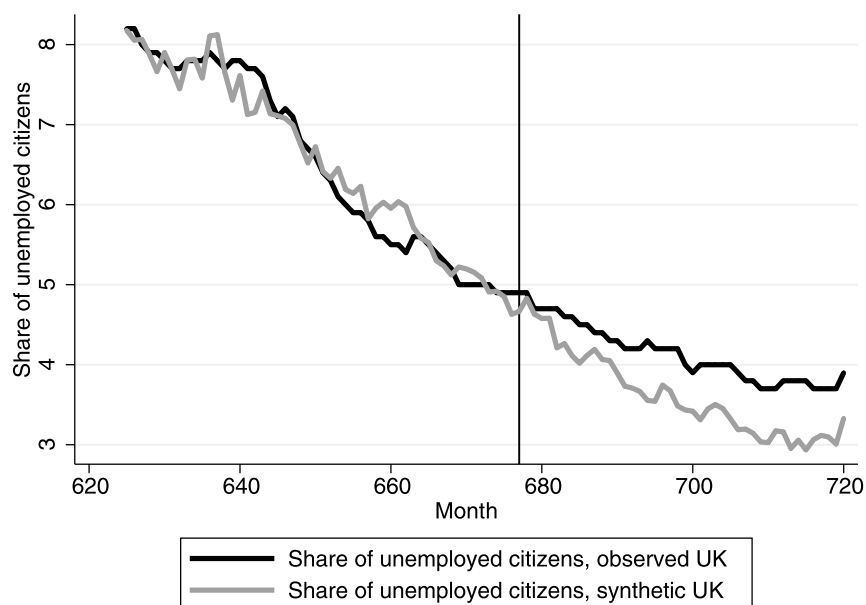
Figure 1. Unemployment rate (monthly), 2012–2020, observed and synthetic control. Notes: Authors' calculation using Eurostat (2021) data.

remains modest, close to approximately half a percentage point (of additional unemployment) about a year later. The statistical inference suggests that this moderately sized gap between observed and synthetic control unemployment is insignificant. This is based on placebo tests that replicate the exact synthetic control exercise for each of the donor pool countries; the calculated p-values correspond to the share of donor countries that have an estimated effect at least as large as to the one of the UK economy.

Figure 2 presents the actual and synthetic values for yearly employment between 2008 and 2019 for those aged 20–64 (donor weights are again presented in Appendix 1). Results are largely in line with Figure 1 but less pronounced. The British labour market could be marginally underperforming when compared to the synthetic unit. The gap is small (less than half a percentage point) and is not statistically significant (the placebo graphs and the p-values of the statistical inference are available from the authors upon request).
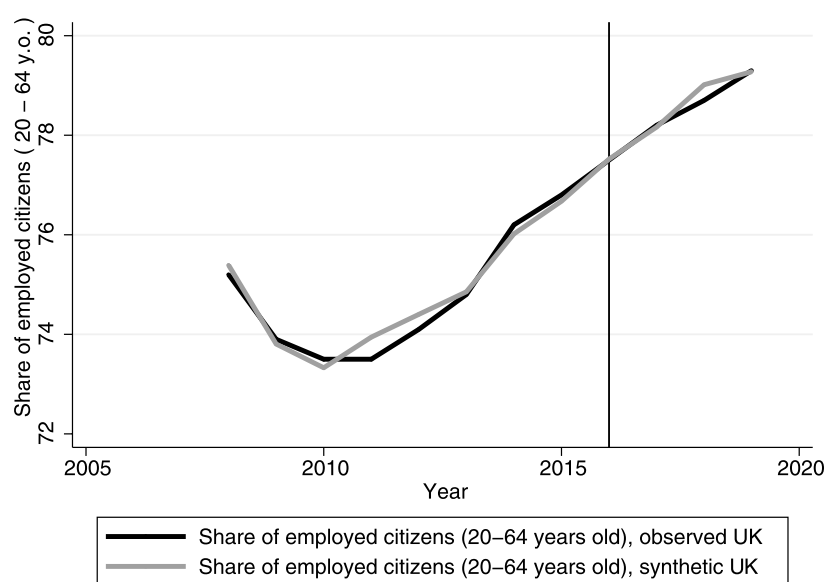

Figure 2. Employment rate (yearly) 2008–2019, observed and synthetic control. Notes: Authors' calculation using Eurostat (2021) data. The employment rate refers to citizens in the 20–64-year-old category.

As a robustness check, we varied the timing of the intervention. Given that the Brexit referendum was announced about a year before it took place, it is of interest to assess the presence of any anticipation effects that could arise prior to the actual referendum. For this reason, we replicated the synthetic control exercise by adopting intervention points 6 and 12 months prior to the referendum. Similarly, we also replicated the synthetic control procedure for two later cut-off points 6 and 12 months after the referendum to check whether there is any delayed effect following the Brexit referendum (instead of an immediate one), as markets started factoring in the related uncertainties. In all cases, all post-intervention effects are consistently statistically insignificant.

V. Concluding remarks

Our results suggest that the 2016 Brexit referendum had little effect on the UK labour market. While the UK experienced a decline in unemployment and an increase in employment rates after the referendum, the observed trends are similar to those of the synthetic control that we constructed on the basis of the performance of other OECD countries. Existing studies, while overlooking the impact of Brexit on (un-) employment, have estimated the economic costs associated with the uncertainty generated by the process of withdrawing from the EU. In particular, the impact in terms of GDP growth has been estimated to be negative (Born et al., 2019). Our results can be reconciled with this evidence since, facing uncertainty, companies might have postponed capital investment and (partially) substituted investment with a larger workforce (as reflected in the declining UK labour productivity post-Brexit, see Farid 2020). This substitution effect is likely to be temporary, and the long-term effects of Brexit on (un-)employment remain to be seen.

Disclosure statement

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