FISCAL STUDIES, vol. 39, no. 4, pp. 581–623 (2018) 0143-5671

The Economic Effects of Brexit: Evidence from the Stock Market*

HOLGER BREINLICH,† ELSA LEROMAIN,‡ DENNIS NOVY,§ THOMAS SAMPSON◊ and AHMED USMAN^

†*University of Surrey; CEP; Centre for Economic Policy Research (CEPR)*
(h.breinlich@surrey.ac.uk)
‡*Centre for Economic Performance (CEP)*
(e.leromain@lse.ac.uk)
§*University of Warwick; CEP; CEPR*
(d.novy@warwick.ac.uk)
◊*London School of Economics; CEP; CEPR*
(t.a.sampson@lse.ac.uk)
^*Centre for Finance, Credit and Macroeconomics (CFCM), University of Nottingham*
(ahmed.usman@nottingham.ac.uk)

Abstract

We study stock market reactions to the Brexit referendum on 23 June 2016 in order to assess investors' expectations about the effects of leaving the European Union on the UK economy. Our results suggest that initial stock price movements were driven by fears of a cyclical downturn and by the sterling depreciation following the referendum. We also find tentative evidence that market reactions to two subsequent speeches by Theresa May (her Conservative party conference and Lancaster House speeches) were more closely correlated with potential changes to tariffs and non-tariff barriers on UK–EU trade, indicating that investors may have updated their expectations in light of the possibility of a 'hard Brexit'. We do not find a correlation between the share of EU immigrants in different industries and stock market returns.

* Submitted April 2018.

The authors gratefully acknowledge financial support through Economic and Social Research Council (ESRC) Research Grant ES/R001804/1. They thank the editor and three referees for constructive comments.

Keywords: Brexit, depreciation, event study, recession, stock market, tariffs.

JEL classification numbers: F15, F23, G14.

Policy points

- Stock market reactions to the Brexit referendum were mainly driven by exchange rate movements and investors' expectations of an economic slowdown.
- Poor stock market performance of companies more exposed to the UK market is highly persistent.
- There is weaker evidence that investors also expect higher future tariff barriers with the EU.
- Reliance on EU immigrants does not determine sectoral stock market performance in response to the referendum.

I. Introduction

On 23 June 2016, the UK electorate voted to leave the European Union (EU). This decision is likely to be the most important change in UK economic policy for a generation. Most studies conducted prior to the referendum concluded that the long-run effect of a UK exit from the EU ('Brexit') would be a reduction in British living standards.[1] Because Brexit will not take place before March 2019, it is too early to evaluate the actual long-run impact on the UK economy. However, an increasing number of studies have documented that the referendum has already had negative short-term consequences such as lower GDP growth and higher inflation.[2]

In this paper, we add to the emerging literature on the short-run effects of Brexit by studying stock market reactions to the referendum result and subsequent policy announcements that clarified the likely form Brexit would take – the speeches by the UK Prime Minister, Theresa May, at the Conservative party conference in October 2016 and at Lancaster House in January 2017.

Besides providing direct evidence on share prices and the associated changes in stock market capitalisation and wealth, we hope that stock price reactions will also be useful to gauge the future economic impact of Brexit. Share prices are, in essence, aggregates of all information available to market participants at any given point in time. They reflect expectations about the future profitability of individual companies and sectors. Expected future changes in economic conditions such as changes in trade barriers post-Brexit will thus lead to immediate stock price reactions. Of course, market participants may be wrong, and share price movements might not correctly capture the effects of such changes. But given the information aggregation function of stock markets, share price reactions capture the 'consensus view' of a large

[1] See, for example, HM Treasury (2016), OECD (2016), National Institute of Economic and Social Research (2016) and Dhingra et al. (2017).

[2] See Born et al. (2017) and Breinlich et al. (2017).

number of well-informed economic actors such as banks, insurance companies and investment funds. They are thus a useful alternative to estimates based on the work of individual experts, which form the basis of existing forecasts. Indeed, this is the motivation behind a large body of stock market event studies that use share price reactions to specific policy or regulatory events to infer likely future effects.[3]

For each of our three events, we estimate abnormal returns for up to 350 UK-listed firms and regress these returns on indicators capturing exposure to the potential effects of a future exit from the EU. Besides standard variables such as firm size and profitability, we use firms' export and import status, their engagement in EU and UK markets, and whether they report in currencies other than sterling. We also look at sector-level variables such as likely future EU tariff and non-tariff barriers, business-cycle sensitivity and the share of EU immigrants in the workforce of an industry.

We find that stock price changes on 24 June 2016, the first trading day after the referendum, are best explained by variables capturing firms' dependence on the UK market, business-cycle sensitivity, and firms' export status and reporting currency. We interpret these results as evidence that initial market reactions were driven by fears of an economic slowdown in the UK and by the consequences of the steep depreciation of sterling that followed the Leave vote. By contrast, prospective trade barriers do not have a significant impact, suggesting that market participants either did not have sufficient knowledge about such barriers or considered their imposition unlikely or unimportant.

This pattern is partially reversed when we look at reactions to Theresa May's speeches at the Conservative party conference on 5 October 2016 and at Lancaster House on 17 January 2017. In our baseline specification, the only variable that has a consistently significant impact on 5 October 2016 is tariffs. In particular, firms in sectors with higher current EU import tariffs saw lower abnormal returns. We believe this is consistent with the idea that May's speech, as well as other policy announcements during the Conservative party conference, was the first official confirmation that the UK would be aiming for an exit from both the EU Customs Union and the Single Market (a so-called 'hard Brexit'). The Lancaster House speech confirmed these intentions and provided additional detail, as well as clarifying that the UK was prepared to fall back on World Trade Organisation (WTO) trading terms in the event of a breakdown of negotiations with the EU. Results are less clear-cut for this event, but we also find negative coefficients on both tariff and non-tariff barriers in our abnormal returns regressions. Compared with our results for the day after the referendum, however, these additional findings appear somewhat less robust and are sensitive to the length of the event window chosen. By

[3]See Binder (1998) for a survey.

contrast, our proxies for recessionary expectations and sterling's depreciation retain explanatory power over longer event windows beyond 24 June 2016.

Our work contributes to a growing literature on the observed effects of the Brexit vote on the UK economy. It is most closely related to three papers that also study stock market reactions to the referendum and subsequent events. Schiereck, Kiesel and Kolaric (2016) focus more narrowly on the financial sector and show that stock prices of banks dropped sharply after the referendum, particularly for EU banks. Ramiah, Pham and Moosa (2016) look at a much wider range of sectors and discuss whether the observed price reactions are in line with prior expectations. They do not regress abnormal returns on explanatory variables, however, and thus cannot formally test hypotheses about differential sector-level impacts advanced in the pre-referendum literature. Similar to our paper, Davies and Studnicka (2018) correlate abnormal returns with a number of explanatory variables, focusing on the role of global value chains. We study a wider range of determinants, however, and link our choice of explanatory variables more closely to forecasts made before the referendum. This makes our results more relevant for a comparison of expert forecasts with the expectations of market participants. For example, we show that investors shared concerns regarding the potential for an economic downturn stressed by pre-referendum forecasts as well as (to a lesser extent) the importance of future trade barriers.

The present paper is also related to a small number of studies that look at stock price reactions to trade policy events. Hartigan, Perry and Kamma (1986), Hartigan, Kamma and Perry (1989), Hughes, Lenway and Rayburn (1997), Bloningen, Tomlin and Wilson (2004) and Crowley and Song (2014) look at stock price reactions to sector-specific anti-dumping duties. Grossman and Levinsohn (1989) use stock price reactions to test the specific factors model of international trade. Moser and Rose (2014) estimate the impact of regional trade agreements on aggregate stock market indices, and Brander (1991), Thompson (1993) and Breinlich (2014) follow stock price movements surrounding the ratification process of the US–Canada Free Trade Agreement of 1989. Our paper differs from these studies in that we look at stock market reactions to an arguably much more significant policy change that is expected to have strong effects beyond its direct implications for trade policy. In contrast to the literature on free trade agreements, Brexit also presents an interesting policy experiment in that it is expected to *increase*, rather than lower, future trade barriers.

The rest of this paper is structured as follows. Section II outlines the mechanisms through which Brexit may affect stock prices. Section III discusses the stock market event study methodology we use. Section IV describes the specific events as well as our explanatory variables and data sources in more detail. Section V presents results for our abnormal returns regressions and carries out a number of robustness checks. Section VI concludes.

II. Economic mechanisms

The stock market response to the Brexit referendum 'shock' is expected to be greater for firms that are more exposed to the shock and its consequences. The shock has several different dimensions. First, the referendum result led to an immediate depreciation of sterling. On 24 June 2016, the pound depreciated by 8.1 per cent against the US dollar and 5.8 per cent against the euro. Second, leaving the EU could lead to major changes in future trade and migration policy. Third, the Leave vote increased uncertainty about UK economic policy and may have caused investors to downgrade their expectations for future UK growth in both the short run and over longer horizons.

The impact of the depreciation of sterling depends on firms' participation in international markets. Multinational firms that earn revenue in currencies other than sterling will experience a direct increase in their sterling-denominated earnings following the depreciation. This is likely to raise their market value, since we study stock prices quoted in sterling. The depreciation may also boost exporters' profits in foreign markets through increased competitiveness and higher markups, while negatively affecting importers by increasing the cost of foreign goods.

Once the UK leaves the EU, it may no longer be a member of the EU's Single Market or Customs Union. Instead, it might sign a free trade agreement with the EU or it could trade with the EU under WTO rules. Trading on WTO terms would lead to higher tariffs between the UK and the EU. Brexit is also likely to increase border non-tariff barriers such as customs procedures and rules of origin requirements. These barriers would be particularly costly for firms with complex international supply chains. To the extent that there is regulatory divergence between the UK and the EU after Brexit, exporters will also face additional costs of complying with EU product standards. Overall, exposure to future changes in UK–EU trade barriers is higher for firms that participate in international trade through either exporting or importing, for multinational firms with affiliates in EU countries and for firms in sectors where the EU currently has high tariff or non-tariff barriers on trade with WTO members.

Since high levels of EU immigration were arguably an important driver of the Leave vote, it is possible that the UK will impose tighter restrictions on EU immigration after Brexit. Consequently, firms employing a high share of EU immigrants may be more affected by the Leave vote, as they could suffer from a reduction in labour supply.

Before the referendum, a majority of forecasters predicted a slowdown in economic growth or even a recession in the event of a Leave victory. Thus, firms in sectors that are less 'recession-proof' may be expected to suffer more in the aftermath of the referendum. Since the likelihood of a slowdown or a recession depends on investors' expectations about the form Brexit will take, the impact of policy announcements such as Theresa May's speeches at the

Conservative party conference and at Lancaster House could also depend on firms' business-cycle sensitivities.

Finally, exposure to Brexit may also be related to firm characteristics such as performance and size. Larger and more profitable firms might be more resilient and better able to withstand any negative effects of Brexit. However, such firms are also likely to be more engaged in the international economy through trade or foreign investment. Consequently, the overall correlation of these characteristics with exposure to Brexit is ambiguous.

The next two sections describe how we test the importance of these mechanisms in explaining stock price responses to the Brexit vote. We first explain the methodology used for estimating abnormal stock returns and then discuss the variables employed to capture the different channels outlined above.

III. Methodology

We follow a two-step procedure to estimate the impact of a number of Brexit-related variables on the abnormal returns of UK-listed firms. First, we estimate a model of 'normal' stock returns which adjusts for differences in risk and other characteristics of stocks. A standard approach in the literature is to use the so-called market model which relates the return, r_{it}, on stock i at time t to a stock-specific constant, α_i, and the return on the market portfolio, R_{mt}:[4]

$$(1) \qquad r_{it} = \alpha_i + \beta_i R_{mt} + e_{it}, \quad t \in T_1,$$

where e_{it} is the mean-zero random component of the return-generating process and T_1 is the so-called pre-event window of stock price data on which equation 1 is estimated. This method controls for differences in average returns across stocks (α_i), a stock's (non-diversifiable) risk as measured by β_i and movements in the market portfolio. On event dates, stock returns also have an 'abnormal' component, τ_{it}, which in the present context could be caused by the arrival of unexpected news about Brexit and its effects on the UK economy. Thus, on event dates, stock returns are given by

$$(2) \qquad r_{it} = \alpha_i + \beta_i R_{mt} + \tau_{it} + e_{it}, \quad t \in T_2,$$

where T_2 denotes the event window (for example, 24 June 2016 for our referendum event). Having obtained estimates of α_i and β_i using stock price data from the pre-event window only, we compute abnormal returns estimates, $\hat{\tau}_{it}$, as a prediction error for the event window:

[4]Campbell, Lo and MacKinlay, 1997; Binder, 1998.

$$\begin{aligned}(3)\qquad \hat{\tau}_{it} &= r_{it} - \hat{r}_{it} \\ &= r_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}, \quad t \in T_2,\end{aligned}$$

where the predicted values, $\hat{r}_{it} = \hat{\alpha}_i + \hat{\beta}_i R_{mt}$, have been constructed using the pre-event window estimates of α_i and β_i and the return on the market portfolio on the event day.

The second step is to model abnormal returns as a function of variables that explain variation in abnormal returns across firms and sectors:

$$(4)\qquad \tau_{it} = \kappa + X_i\gamma + Z_j\delta + \mu_{it}, \quad t \in T_2,$$

where τ_{it} denotes the true abnormal return of firm i on event date t, κ is the regression constant, X_i is an $N \times k_1$ vector of k_1 firm-level regressors and Z_j is an $N \times k_2$ vector of k_2 sector-level regressors where j denotes firm i's industry (N denotes the number of stocks included in the regression). We are interested in the signs and magnitudes of two coefficient vectors, γ and δ, which describe the correlation between our regressors and firm-level abnormal returns.[5]

An important issue for inference in event studies is the correct computation of standard errors for the coefficient estimates of interest (γ and δ). To get a clearer understanding of the issues at stake, note from equations 2 and 3 that the relationship between the true abnormal return, τ_{it}, and the estimated abnormal return, $\hat{\tau}_{it}$, is given by

$$\begin{aligned}(5)\qquad \hat{\tau}_{it} &= \tau_{it} + (\alpha_i - \hat{\alpha}_i) + (\beta_i - \hat{\beta}_i)R_{mt} + e_{it} \\ &= \tau_{it} + \eta_{it}, \quad t \in T_2,\end{aligned}$$

where $\eta_{it} = (\alpha_i - \hat{\alpha}_i) + (\beta_i - \hat{\beta}_i)R_{mt} + e_{it}$. Furthermore, recall that we have assumed that abnormal returns are a function of observables and a mean-zero random component, μ_{it}, as given by equation 4. Combining this expression with equation 5 allows us to state our basic estimating equation as follows:

$$\begin{aligned}(6)\qquad \hat{\tau}_{it} &= \tau_{it} + \eta_{it} \\ &= \kappa + X_i\gamma + Z_j\delta + \mu_{it} + \eta_{it} \\ &= \kappa + X_i\gamma + Z_j\delta + \varepsilon_{it}, \quad t \in T_2,\end{aligned}$$

[5]In principle, one could also directly use overall returns, r_{it}, as the dependent variable in the second-stage regression. We follow the standard practice in the event-study literature of using abnormal returns because we want to examine the part of a stock's return that is driven by the event in question, rather than other return patterns specific to the stock or its correlation with the market portfolio. If such stock-specific return patterns are correlated with our second-stage regressors, then using overall returns would bias our coefficient estimates. In practice, overall and abnormal returns are highly correlated (in excess of 95 per cent on all three event dates) and, in our robustness checks below, we show that none of our qualitative findings is changed when using overall returns as the dependent variable.

where $\varepsilon_{it} = \mu_{it} + \eta_{it}$. This expression shows that heteroskedasticity and cross-sectional dependence of the residuals in regressions using estimated abnormal returns as the dependent variable can arise from a number of sources. First, there could be heteroskedasticity and/or cross-sectional dependence in the random component of the abnormal returns themselves (μ_{it}). Second, heteroskedasticity and/or cross-sectional dependence in the random component of the return-generating process (e_{it}) could be present. Finally, the forecasting error, $(\alpha_i - \hat{\alpha}_i) + (\beta_i - \hat{\beta}_i)R_{mt}$, might introduce both heteroskedasticity and dependence; this source of error will become smaller as the length of the event period increases, however.

Karafiath (1994) and Harrington and Shrider (2007) carry out Monte Carlo simulations under different assumptions about the error terms e_{it} and μ_{it} and find that simple ordinary least squares (OLS) with heteroskedasticity-robust standard errors performs well compared with other methods such as feasible generalised least squares (GLS). To account for possible cross-sectional dependence in ε_{it}, we will also cluster standard errors by industry throughout this paper.[6]

IV. Events and data sources

This section provides further information about the three events we will study, the choice of explanatory variables for our abnormal returns regressions and our data sources.

1. Description of events

We analyse stock market reactions to three events. The first is the referendum on EU membership itself. While the referendum took place on 23 June 2016, the outcome was not known until the early hours of the next day and we use 24 June 2016 (a Friday) as our first event date. The referendum result took market participants by surprise. Opinion polls had predicted a close vote but betting markets implied a probability of around 85 per cent that the UK would choose to remain in the EU,[7] reflecting the conventional wisdom that undecided voters would opt for the status quo. Once it became clear that the UK had voted to leave, the pound depreciated sharply against all major currencies and share prices dropped when markets reopened on 24 June.[8]

[6] See Cameron and Miller (2015) for further details as well as the relevant formula. In our data, firms are classified by our main data provider Bureau van Dijk into one of 150 NACE four-digit industries. However, the number of industries actually included varies across regression samples and lies between 60 and 140.

[7] *Economist*, 2016.

[8] The FTSE All-Share index declined by 3.8 per cent on 24 June 2016. In our robustness checks, we will look at longer event windows to capture potential anticipation effects or delayed effects of the referendum.

Our second and third events centre on two speeches by Theresa May outlining the likely form Brexit would take. While the referendum determined that the UK would leave the EU, it remained unclear which of the many possible post-Brexit arrangements would be chosen. For example, would the UK continue to participate in the Single Market like Norway or form a customs union with the EU similar to Turkey? Our second and third events revealed information about the likely nature of future EU–UK relations, which is why they represent useful additions to the analysis of post-referendum stock market reactions. Theresa May's speech at the Conservative party conference on 5 October 2016 outlined her vision for a post-Brexit UK. Most observers deemed this vision incompatible with continued membership of the Single Market and possibly the Customs Union. For example, May promised restrictions on future EU immigration and an end to the European Court of Justice's jurisdiction in the UK, both of which are incompatible with integral parts of the Single Market. Theresa May's Lancaster House speech on 17 January 2017 provided the first detailed outline of the main objectives for the upcoming exit negotiations with the EU and stated explicitly that the UK would leave the Single Market and the Customs Union. It also clarified that the UK was prepared to fall back on WTO trading terms in the event of a breakdown of negotiations with the EU.

While both speeches represented a shift towards a 'hard Brexit', it is less clear to what extent they led to significant changes in market participants' expectations. In both cases, at least some of the information contained in the speeches had been made available to the public beforehand. Nevertheless, at least the Conservative party conference speech seems to have caught investors unprepared[9] and it led to a further 4.3 per cent depreciation of sterling against the US dollar in the week following 5 October. By contrast, there seems to have been a more concerted effort to prepare markets for the Lancaster House speech as information about some of its key points had been released a couple of days earlier. Sterling in fact rose by about 1.4 per cent during the speech, presumably since investors valued greater certainty about the government's plans for Brexit.[10] In order to capture potential anticipation effects, we will use longer event windows for both the Conservative party conference and Lancaster House speeches as part of our robustness checks.

2. Variables, data sources and descriptive statistics

For the computation of abnormal returns, we require information on stock prices and market portfolio returns. Stock price information is taken from Datastream and information about market portfolio returns is obtained from

[9] *Financial Times*, 2016.
[10] *Financial Times*, 2017.

the websites of the London Stock Exchange and the website investing.com. All returns in the paper are measured as percentage changes, implying that abnormal returns are measured in percentage changes as well. We use the FTSE All-Share index as our market portfolio proxy in most specifications. However, we will also check the sensitivity of our results to using other proxies such as the MSCI Europe as well as to controlling for multiple market indices representing Asia, Europe and the US.

Regarding our regressors, we consider various sets of firm- and sector-specific variables (X_i and Z_j in equation 6) as outlined below. These regressors are related to the economic mechanisms discussed in Section II.

First, we use a firm's return on assets (ROA) and the value of its annual sales (in logs) as measures of profitability and size, respectively. We obtain data for both variables for the year before the referendum from Bureau van Dijk's Orbis database. The expected signs of these two regressors are a priori unclear. As explained in Section II, on the one hand more profitable and larger firms might be better able to withstand negative shocks. But on the other hand they might be more vulnerable as they tend to be more exposed internationally.

Second, we follow Davies and Studnicka (2018) in using information from Orbis on the share of a firm's subsidiaries in the UK and the rest of the EU, as well as the total count of subsidiaries.[11] Davies and Studnicka interpret the share variables as measuring the exposure of a firm's global value chain (GVC) to future trade barriers brought about by Brexit. The count of subsidiaries is used as a proxy for the complexity of a firm's GVC, with more complex GVCs making a firm more vulnerable to the effects of leaving the EU. An alternative interpretation of the share of UK affiliates, however, is as a measure of exposure to the domestic UK market. In the light of Davies and Studnicka's results, we expect all three variables to be negatively correlated with abnormal returns.

Third, we use information on a firm's export and import status from Dun & Bradstreet to construct three dummy variables for whether a firm is an exporter, an importer or an exporter-importer.[12] While these indicators do not convey any information about the intensity with which firms trade, they are the best available proxies for firms' involvement in international trade. Given the steep depreciation of sterling on 24 June 2016, we would expect exporters to benefit from gaining competitiveness in foreign markets and importers to be negatively affected by the higher cost of foreign goods. Exchange rate effects were smaller and less immediate for the other two events, with the Lancaster House speech actually leading to a slight appreciation of the pound. Hence,

[11] Throughout this paper, we are using the terms 'affiliate' and 'subsidiary' interchangeably.

[12] Dun & Bradstreet provide information on whether the company is an exporter ('Yes or No') or importer ('Yes or No') and we create a dummy variable for export and import status of the company using this information. If a company is reported both as an exporter and as an importer, we classify that company as an exporter-importer. Dun & Bradstreet's sources include annual reports, Company House reports, industry reports and a network of 5,000 employees who check the accuracy of the data.

the expected sign and significance patterns of the trade status dummies are less clear for these events.

Fourth, our final firm-level indicator is a dummy variable for whether a firm reports earnings in a currency other than sterling, again obtained from Orbis. This variable serves as a proxy for whether a firm earns a substantial amount of its profits in foreign currencies. If the pound depreciates, earnings measured in pounds will increase, which will tend to push up the firm's FTSE All-Share stock price (which is quoted in pounds).[13]

We also include four sector-level regressors. First, we compute the share of EU immigrants in the workforce of an industry, using data from the UK Labour Force Survey published by the Office for National Statistics.[14] As explained in Section II, given that high levels of EU immigration were arguably a key driver of the Leave vote, it is likely that the UK will see tighter restrictions on EU immigration after Brexit. Hence, we may expect sectors with a higher share of EU immigrants to see stronger negative abnormal returns. This should be true for the reaction to the referendum result itself as well as for the two speeches which explicitly mentioned future restrictions on EU immigration.

Second, we include a dummy variable for industries that tend to outperform the market in recessions. We use the classification by Emsbo-Mattingly et al. (2017), who classify consumer staples, healthcare, telecommunication and utilities as 'recession outperformers'.[15] Since a majority of forecasters predicted a growth slowdown or even a recession in the event of a Leave victory, we expect 'recession-proof' stocks to do better on 24 June 2016.[16] By October 2016, however, it had become clear that the referendum result had not led to an immediate economic slowdown. For example, the UK was still the fastest-growing economy in the G7 at the end of 2016.[17] Growth eventually slowed during 2017,[18] but this was not yet evident at the time of the Lancaster House speech. Thus, we do not expect a significant correlation between the recession-proof dummy and abnormal returns for our last two events.

Finally, we include two measures of firms' exposure to future trade barriers between the UK and the EU. For goods-producing industries, we use the

[13]We do not directly observe the geographic split of firm-level profits in our data. However, for a subsample of firms, we have information on the distribution of sales based on subsidiary data. This information shows that firms reporting in a foreign currency do indeed earn a smaller share of revenues in pounds than firms reporting in GBP, and that this share is also small in absolute terms (on average, only 25 per cent of revenues come from inside the UK for firms reporting in a foreign currency).

[14]As is standard in the migration literature that uses this data set, we focus on the country of birth of workers rather than their citizenship to define the share of EU immigrants.

[15]See exhibits 6 and 7 in Emsbo-Mattingly et al. (2017).

[16]In the month immediately after the referendum, there was indeed a sharp deterioration of indicators of business confidence. For example, IHS Markit's Purchasing Manager Index (PMI) dropped from 52 in June to 47 in July 2016, a decrease of a magnitude last seen at the onset of the financial crisis in 2008.

[17]OECD, 2018.

[18]Born et al., 2017.

EU's most-favoured nation (MFN) tariffs, which are charged on imports from countries that do not have a preferential trade agreement with the EU.[19] While the Lancaster House speech stressed that the UK would be seeking EU market access through a comprehensive free trade agreement, it also did not rule out the UK leaving the EU without an exit deal. In that case, the UK would have to fall back on trade governed by WTO rules. This would imply facing EU MFN tariffs as well as, in all likelihood, imposing such tariffs on imports from the EU. For services trade, future trade restrictions are harder to predict and would take the form of non-tariff barriers (NTBs). If the UK were to leave the Single Market, as implied by May's Conservative party conference speech and explicitly stated in her Lancaster House speech, it would lose preferential access to EU services markets. Moreover, rules and regulations would likely diverge from the EU over time, leading to further increases in NTBs. Hence, we use the Services Trade Restrictiveness Index (STRI) developed by the World Bank to measure EU member countries' policies as applicable to non-EU providers.[20]

For both tariff and non-tariff barriers, we use two types of procedures to map trade barriers to firms. First, we calculate an average across all the industries a firm is reported to be active in; second, we use a narrower measure that only uses tariffs and NTBs for a firm's core industry as reported in Orbis. We use the wider measure in our baseline specification because it yields a significantly higher number of observations. The narrower measure is included as part of our robustness checks.

We start with data for all 636 companies in the FTSE All-Share at the time of our data download (October 2017). We use the FTSE All-Share because it provides a broad-based sample including firms with substantial international activities as well as more domestically focused companies. We drop eight companies that only report data for the financial year 2016 and with a closing date after the referendum.[21] We discard a further 26 firms that do not report financial information at all in Orbis. For the estimation of the market model parameters in equation 1, we require one year of pre-event stock price data, which leads us to drop another 26 companies with short stock price time series. A substantial share (32 per cent) of the remaining companies are investment trusts.[22] We exclude them from our baseline regressions because, in principle,

[19] We use *ad-valorem*-equivalent tariff rates for 2015, which is the most recent year available in the World Bank's WITS database (our data source).

[20] Data are for the year 2008, the only year available in the STRI. The STRI tries to measure the effect of EU regulations that discriminate against foreign services or service providers.

[21] We only use financial information for the year before the referendum because the Leave vote itself may have directly affected firms' financial outcomes.

[22] Investment trusts are collective investments where investors' money is pooled together from the sale of a fixed number of shares which a trust issues when it launches. This money is then invested in a similar fashion to open-ended investment funds and in a variety of assets, such as listed equities, government and corporate bonds or real estate from any region in the world.

TABLE 1

Descriptive statistics

Variable	*No. of observations*	*Mean*	*Standard deviation*	*Minimum*	*Maximum*
Log(assets)[a]	394	21.34	1.94	16.69	28.51
ROA[a]	393	0.05	0.10	–0.68	0.47
Non-GBP reporting currency[a]	394	0.19	0.39	0.00	1.00
Share EU affiliates[a]	394	0.18	0.20	0.00	1.00
Share UK affiliates[a]	394	0.53	0.32	0.00	1.00
Log(number of affiliates)[a]	394	4.16	1.46	0.00	8.32
Log(sales)[a]	380	20.73	1.78	14.52	26.30
EU MFN (narrow)[b]	138	0.04	0.08	0.00	0.57
STRI (narrow)[b]	88	0.15	0.15	0.00	0.55
EU MFN (wide)[b]	143	0.05	0.08	0.00	0.57
STRI (wide)[b]	152	0.13	0.13	0.00	0.55
Share EU immigrants[b]	394	0.09	0.08	0.00	0.46
Recession-proof[b]	394	0.15	0.35	0.00	1.00
Exporter[a]	366	0.29	0.46	0.00	1.00
Importer[a]	366	0.23	0.42	0.00	1.00
Exporter-importer[a]	366	0.08	0.27	0.00	1.00

[a]Firm-level variables.

[b]Sector-level variables.

Note: Descriptive statistics are calculated over the baseline sample of firms, excluding investment trusts. 'Log(assets)' is the logarithm of the value of a firm's assets. 'ROA' is a firm's return on assets. 'Non-GBP reporting currency' is a dummy variable for whether a firm reports earnings in a currency other than sterling. 'EU MFN' is the current EU most-favoured nation tariff applied to third countries for goods-producing industries, while 'STRI' is the Services Trade Restrictiveness Index developed by the World Bank for services industries. 'Recession-proof' is a dummy variable for industries that tend to outperform the market in recessions. 'Exporter', 'Importer' and 'Exporter-importer' are dummies for firms' trade status. Narrow and wide refer to the type of industry mapping methodology used.

they can invest anywhere in the world and it is unclear what effect Brexit would have on them. There is also, of course, a problem of double-counting for cases where investment trusts invest in other companies listed on the FTSE All-Share index.[23] Finally, missing values for some of the regressors used in our analysis reduce the sample further, leaving us with around 350 stocks for our baseline regression. In addition to this baseline sample, we also consider a subsample of firms in goods-producing industries (for which we observe EU MFN tariffs) and a subsample of service-producing firms for which we have data on EU NTBs as measured by the STRI.

Table 1 presents descriptive statistics for the independent variables just discussed. Tables 2–4 show raw and abnormal returns on our three main event

[23]As part of our robustness checks, we show that extending the sample to investment trusts does not qualitatively change our findings.

TABLE 2

Best- and worst-performing stocks on 24 June 2016

Company name	*Industry (NACE four-digit)*	*Return*	*Abnormal return*	*t-statistic*
Top 10 performers				
ACACIA MINING PLC	Precious metals production	17.0%	18.4%	5.69
RANDGOLD RESOURCES LIMITED	Precious metals production	14.2%	14.0%	5.64
FRESNILLO PLC	Other mining and quarrying nec	11.9%	14.1%	5.96
CENTAMIN PLC	Mining of other non-ferrous metal ores	10.5%	11.3%	3.88
HOCHSCHILD MINING PLC	Precious metals production	6.0%	7.6%	1.71
POLYMETAL INTERNATIONAL PLC	Mining of other non-ferrous metal ores	5.8%	7.4%	3.50
SIRIUS MINERALS PLC	Mining of other non-ferrous metal ores	5.6%	8.1%	1.55
NMC HEALTH PLC	Other human health activities	5.0%	7.4%	3.39
COMPASS GROUP PLC	Restaurants and mobile food service activities	3.9%	6.6%	6.69
HOGG ROBINSON GROUP PLC	Travel agency activities	3.8%	4.7%	2.29
Bottom 10 performers				
INTERNATIONAL CONSOLIDATED AIRLINES GROUP S.A.	Passenger air transport	–22.5%	–18.3%	–19.85
GRAFTON GROUP PUBLIC LIMITED COMPANY	Other retail sale of new goods in specialised stores	–23.7%	–20.5%	–11.20
BARRATT DEVELOPMENTS P L C	Development of building projects	–23.8%	–20.2%	–14.35
BOVIS HOMES GROUP PLC	Construction of residential and non-residential buildings	–24.3%	–20.6%	–13.34

(*Continued*)

TABLE 2
Continued

Company name	*Industry (NACE four-digit)*	*Return*	*Abnormal return*	*t-statistic*
BELLWAY P L C	Construction of residential and non-residential buildings	–24.5%	–21.5%	–12.00
VIRGIN MONEY HOLDINGS (UK) PLC	Activities of holding companies	–24.9%	–21.0%	–12.57
CREST NICHOLSON HOLDINGS PLC	Manufacture of machinery for mining, quarrying and construction	–26.5%	–22.9%	–9.79
PERSIMMON PUBLIC LIMITED COMPANY	Construction of residential and non-residential buildings	–27.6%	–24.2%	–12.67
TAYLOR WIMPEY PLC	Construction of residential and non-residential buildings	–29.3%	–25.6%	–15.23
ALDERMORE GROUP PLC	Activities of holding companies	–32.0%	–28.7%	–15.71
Average across all companies in sample		–6.4%	–3.5%	

Note: The table lists the best- and worst-performing stocks on 24 June 2016. It reports each company's main sector of activity, overall stock return, and the abnormal return and associated *t*-statistic (computed following Campbell, Lo and MacKinlay (1997)).

dates for the companies with the 10 highest and 10 lowest raw returns. On 24 June 2016, companies from the construction and related sectors accounted for 6 out of the 10 worst-performing stocks, while precious metal producers and other mining companies dominated among the 10 best performers. This provides some first evidence that investors seem to have dumped business-cycle-sensitive shares on 24 June 2016 in favour of 'safe-haven' stocks such as gold producers (for example, Acacia Mining or Randgold Resources). By contrast, no clear pattern is evident on the other two event dates. Finally, note that both average returns and abnormal returns were strongly negative on the day after the referendum but not on 5 October 2016 nor on 17 January 2017. This is consistent with our prior that the two later events led to less significant changes in market participants' expectations.

TABLE 3

Best- and worst-performing stocks on 5 October 2016

Company name	*Industry (NACE four-digit)*	*Return*	*Abnormal return*	*t-statistic*
Top 10 performers				
TESCO PLC	Retail sales, non-specialised stores	9.8%	10.4%	5.64
ALDERMORE GROUP PLC	Activities of holding companies	6.9%	7.5%	2.91
RENOLD PUBLIC LIMITED COMPANY	Manufacture of bearings, gears, gearing and driving elements	5.8%	6.2%	2.29
KENMARE RESOURCES PUBLIC LIMITED COMPANY	Other mining and quarrying nec	5.1%	5.8%	0.80
CAMBIAN GROUP PLC	Other human health activities	4.6%	5.2%	0.94
SPEEDY HIRE PLC	Renting/leasing of other machinery, equipment and tangible goods nec	3.9%	4.4%	1.28
JOHN MENZIES PLC	Non-specialised wholesale trade	3.5%	3.7%	2.28
ELECTROCOMPONENTS PLC	Wholesale of electronic and telecommunications equipment and parts	3.3%	3.7%	1.90
COATS GROUP PLC	Manufacture of other special-purpose machinery nec	3.2%	3.3%	1.75
STV GROUP PLC	Television programming and broadcasting activities	3.2%	3.4%	1.50
Bottom 10 performers				
CARCLO PLC	Manufacture of other outerwear	–3.7%	–3.5%	–1.20
RANDGOLD RESOURCES LIMITED	Precious metals production	–4.0%	–4.1%	–1.66
LSL PROPERTY SERVICES PLC	Real estate agencies	–4.0%	–3.8%	–1.99
UNITED UTILITIES GROUP PLC	Water collection, treatment and supply	–4.4%	–4.0%	–4.56
DEVRO PLC	Manufacture of other food products nec	–4.7%	–4.4%	–2.81
LOW & BONAR PUBLIC LIMITED COMPANY	Manufacture of household and sanitary goods and toilet requisites	–5.2%	–4.9%	–2.60
POLYMETAL INTERNATIONAL PLC	Mining of other non-ferrous metal ores	–5.7%	–5.7%	–2.70

(*Continued*)

TABLE 3

Continued

Company name	*Industry (NACE four-digit)*	*Return*	*Abnormal return*	*t-statistic*
HOCHSCHILD MINING PLC	Precious metals production	–6.1%	–6.2%	–1.39
PAYPOINT PLC	Activities of collection agencies and credit bureaus	–6.2%	–6.0%	–3.70
TOPPS TILES PLC	Wholesale of wood, construction materials and sanitary equipment	–8.7%	–8.6%	–5.04
Average across all companies in sample		–0.4%	0.0%	

Note: The table lists the best- and worst-performing stocks on 5 October 2016. It reports each company's main sector of activity, overall stock return, and the abnormal return and associated *t*-statistic (computed following Campbell, Lo and MacKinlay (1997)).

TABLE 4

Best- and worst-performing stocks on 17 January 2017

Company name	*Industry (NACE four-digit)*	*Return*	*Abnormal return*	*t-statistic*
Top 10 performers				
CAMBIAN GROUP PLC	Other human health activities	7.1%	8.1%	1.47
GAMES WORKSHOP GROUP PLC	Manufacture of games and toys	6.3%	6.4%	3.53
ROLLS-ROYCE HOLDINGS PLC	Manufacture of air and spacecraft and related machinery	4.4%	6.1%	2.89
DECHRA PHARMACEUTICALS PLC	Manufacture of pharmaceutical preparations	4.1%	4.5%	3.08
HARGREAVES LANSDOWN PLC	Security and commodity contracts brokerage	3.9%	5.5%	4.24
ZOTEFOAMS PLC	Manufacture of other plastic products	3.9%	4.2%	2.42
INTERNATIONAL PERSONAL FINANCE PLC	Activities auxiliary to financial services, excluding insurance and pension	3.7%	5.2%	1.87
PREMIER OIL PLC	Extraction of crude petroleum	3.6%	6.9%	1.29
EASYJET PLC	Passenger air transport	3.4%	4.3%	2.81
MORGAN ADVANCED MATERIALS PLC	Manufacture of other chemical products nec	3.1%	4.6%	2.63

(*Continued*)

TABLE 4
Continued

Company name	*Industry (NACE four-digit)*	*Return*	*Abnormal return*	*t-statistic*
Bottom 10 performers				
WOLSELEY PLC	Wholesale of hardware, plumbing and heating equipment and supplies	–3.2%	–1.9%	–1.48
INTERTEK GROUP PLC	Technical testing and analysis	–3.2%	–2.3%	–1.65
PZ CUSSONS PLC	Manufacture of soap and detergents, cleaning and polishing preparations	–3.5%	–2.6%	–1.68
CARNIVAL PLC	Sea and coastal passenger water transport	–3.5%	–2.3%	–1.62
JIMMY CHOO PLC	Retail sale of footwear and leather goods in specialised stores	–3.6%	–2.6%	–1.05
VEDANTA RESOURCES PLC	Casting of other non-ferrous metals	–3.8%	–1.5%	–0.38
BRITISH AMERICAN TOBACCO P.L.C.	Manufacture of tobacco products	–3.8%	–2.9%	–3.78
FERREXPO PLC	Mining of iron ores	–4.0%	–2.4%	–0.40
GULF MARINE SERVICES PLC	Building of ships and floating structures	–6.0%	–5.2%	–1.83
HUNTSWORTH PLC	Market research and public opinion polling	–7.3%	–6.9%	–3.13
Average across all companies in sample		–0.2%	0.7%	

Note: The table lists the best- and worst-performing stocks on 17 January 2017. It reports each company's main sector of activity, overall stock return, and the abnormal return and associated *t*-statistic (computed following Campbell, Lo and MacKinlay (1997)).

V. Results

1. Baseline results

Table 5 shows our baseline results. Columns 1–3 look at abnormal returns on 24 June 2016, the first trading day following the referendum, and columns 4–9 examine abnormal return patterns on our other two event dates.

In column 1, we exclude our two trade barrier measures, allowing us to use the largest possible sample (352 stocks). As seen, most but not all coefficient signs confirm our prior expectations. Firms reporting in currencies other than sterling experienced additional positive abnormal returns of around 3.6 percentage points. By contrast, increasing the share of subsidiaries in the UK or the EU by 10 percentage points reduces abnormal returns by

TABLE 5

Baseline results

Variable	24 June 16 *(1)* *AR(t)*	24 June 16 *(2)* *AR(t)*	24 June 16 *(3)* *AR(t)*	5 Oct 16 *(4)* *AR(t)*	5 Oct 16 *(5)* *AR(t)*	5 Oct 16 *(6)* *AR(t)*	17 Jan 17 *(7)* *AR(t)*	17 Jan 17 *(8)* *AR(t)*	17 Jan 17 *(9)* *AR(t)*
ROA	–0.0568	–0.0546	–0.0508	–0.0292**	–0.0249	–0.0400**	–0.0141	–0.0135	–0.00457
	(0.0344)	(0.0443)	(0.0835)	(0.0130)	(0.0167)	(0.0165)	(0.0100)	(0.0131)	(0.0205)
Log(sales)	0.00176	0.00802**	–0.000739	0.000986	–0.000271	0.00257**	–0.000461	–0.00205	–0.000166
	(0.00210)	(0.00345)	(0.00413)	(0.000751)	(0.00168)	(0.00119)	(0.000758)	(0.00129)	(0.00132)
Non-GBP currency	0.0361***	0.0251**	0.0301	0.00601	0.00417	0.00508	0.00123	0.00420	0.00337
	(0.00809)	(0.0115)	(0.0212)	(0.00375)	(0.00603)	(0.00465)	(0.00290)	(0.00531)	(0.00550)
Share EU affiliates	–0.0431	–0.0737***	–0.0458	–0.000184	0.00195	–0.00210	0.00394	–0.00328	0.0143
	(0.0271)	(0.0273)	(0.0803)	(0.00661)	(0.0146)	(0.0112)	(0.00629)	(0.0110)	(0.0120)
Share UK affiliates	–0.0946***	–0.0785***	–0.0934***	0.00601	0.00747	0.00861	0.0120***	0.0119	0.00818
	(0.0151)	(0.0265)	(0.0296)	(0.00476)	(0.0113)	(0.00728)	(0.00433)	(0.00789)	(0.00983)
Log(no. of affiliates)	–0.00202	–0.00402	–0.00195	–0.000500	0.00158	–0.00107	0.000892	0.00141	0.00142
	(0.00290)	(0.00482)	(0.00673)	(0.000834)	(0.00187)	(0.00131)	(0.000945)	(0.00151)	(0.00170)
Share EU immigrants	0.0178	–0.0275	0.00425	0.00293	0.00402	–0.00919	0.00244	0.00797	0.000812
	(0.0324)	(0.0243)	(0.0795)	(0.0135)	(0.0155)	(0.0213)	(0.00887)	(0.0120)	(0.0230)
Recession-proof	0.0356***	0.0195**	0.0606***	–0.00402	–0.00188	–0.00592	–0.00628**	–0.00663*	–0.0113**
	(0.00779)	(0.00758)	(0.0143)	(0.00351)	(0.00321)	(0.00829)	(0.00259)	(0.00334)	(0.00489)
Exporter	0.0139**	0.000739	0.0319**	0.00578**	0.00765	0.00186	–0.000489	0.00122	–0.00216
	(0.00685)	(0.0111)	(0.0135)	(0.00239)	(0.00562)	(0.00439)	(0.00215)	(0.00353)	(0.00429)

(*Continued*)

TABLE 5

Continued

Variable	24 June 16 *(1)* *AR(t)*	24 June 16 *(2)* *AR(t)*	24 June 16 *(3)* *AR(t)*	5 Oct 16 *(4)* *AR(t)*	5 Oct 16 *(5)* *AR(t)*	5 Oct 16 *(6)* *AR(t)*	17 Jan 17 *(7)* *AR(t)*	17 Jan 17 *(8)* *AR(t)*	17 Jan 17 *(9)* *AR(t)*
Importer	–0.00160	–0.00730	0.00561	0.00731**	0.0116	0.00374	0.000656	0.00109	–0.00400
	(0.00796)	(0.0141)	(0.0124)	(0.00353)	(0.00694)	(0.00607)	(0.00185)	(0.00437)	(0.00282)
Exporter-importer	0.0224**	0.0235	0.0112	–0.00539	–0.00702	–0.00363	–0.00388	–0.00473	0.0104
	(0.00997)	(0.0148)	(0.0179)	(0.00502)	(0.00824)	(0.00984)	(0.00485)	(0.00558)	(0.00794)
EU MFN (wide)		–0.0267			–0.0446**			–0.0137	
		(0.0393)			(0.0208)			(0.0150)	
STRI (wide)			0.0819			0.00173			–0.0247*
			(0.0505)			(0.0177)			(0.0132)
No. of observations	352	131	130	353	131	130	353	131	130
R-squared	0.372	0.398	0.339	0.075	0.131	0.098	0.071	0.143	0.099

Note: The dependent variable in columns 1–3 is the abnormal returns (AR) on the first trading day following the referendum. The dependent variable in columns 4–6 is the abnormal returns after Theresa May's speech at the Conservative party conference. The dependent variable in columns 7–9 is the abnormal returns after the Lancaster House speech. Columns 1, 4 and 7 estimate the baseline equation 6 for the overall sample. Columns 2, 5 and 8 estimate the baseline equation 6 including the measure of the MFN tariff rate for goods-producing industries. Columns 3, 6 and 9 estimate the baseline equation 6 including the measure of NTBs for selected service industries. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

0.9 percentage points and 0.4 percentage points, respectively. Contrary to the results reported in Davies and Studnicka (2018), however, the latter effect is not statistically significant.[24] Our recession-proof dummy is also positive and significant as expected, indicating that stocks in industries that perform better during downturns experienced abnormal returns that were 3.6 percentage points higher. Finally, the trade status indicators broadly conform to our priors; export status is associated with higher and import status with lower abnormal returns, and exporter-importers saw abnormal returns of an additional 2.24 percentage points. With the exception of import status, all trade indicators are statistically significant at the 5 per cent level.

The remaining regressors are all statistically insignificant. Contrary to Davies and Studnicka (2018), we do not find a significant effect of the total number of subsidiaries.[25] Our proxies for size and profitability (ROA and log sales) are also insignificant, as is the share of EU immigrants in an industry.[26]

Overall, abnormal return patterns on 24 June 2016 are mainly driven by the exchange rate devaluation and the fear of a possible economic slowdown or recession. The signs and significance patterns of the non-UK currency dummy and the trade status indicators are consistent with the expected impact of the sharp depreciation of the pound. The fact that stocks in 'recession-proof' industries did significantly better and that firms with more affiliates in the UK, and hence more exposure to the domestic market, did worse points to the additional role of recessionary expectations. Both sets of independent variables together explain around 34 per cent of the total variation in abnormal returns on 24 June 2016. Adding the remaining regressors from Table 5 only increases this slightly to 37 per cent.[27]

What role did expectations of higher trade barriers play in explaining abnormal return patterns? The results in columns 2 and 3, where we include tariff barriers for goods-producing industries and non-tariff barriers for selected service industries, respectively, suggest that such expectations did not matter as both trade barrier proxies are insignificant. We caution that sample sizes are, of course, considerably smaller in both regressions, explaining why some of the

[24]The insignificance of the EU share variable seems to be driven by the inclusion of regressors not used by Davies and Studnicka (2018). After dropping the recession-proof and trade status dummies, as well as using log(assets) instead of log(sales) as in Davies and Studnicka (2018), the coefficient on the EU share regressor becomes significant at the 1 per cent level.

[25]Again, this seems to be due to the inclusion of additional control variables in our regressions. When we drop the recession-proof and trade status dummies, the coefficient on the number of affiliates decreases to –0.0052 and becomes statistically significant at the 5 per cent level.

[26]Looking across columns in Table 5, the impact of higher ROA is always negative but only statistically significant on two occasions. The coefficients on log(sales) and the EU immigrant share are less stable and sometimes switch signs.

[27]Using only the two recession proxies still yields an R^2 of 26 per cent and only using the exchange rate proxies yields an R^2 of 20 per cent. By contrast, all the other regressors together only explain around 7 per cent of the variation in abnormal returns.

other indicators also become statistically insignificant. Interestingly, the share of affiliates in the EU becomes significantly negative in the goods-producing subsample regression (column 2), possibly suggesting that dependence on EU supply chains is more important for manufacturing firms. The only indicators that are consistently statistically significant across all three samples (columns 1–3) are the indicators we associate with expectations of a future recession (i.e. the recession-proof dummy and the share of affiliates in the UK).

Columns 4–6 and columns 7–9 in Table 5 examine abnormal return patterns on our other two event dates. As seen, the number of significant variables and the overall explanatory power of the regressors drop significantly, in line with our prior that these events only led to relatively minor changes in investor expectations. A number of interesting results emerge nevertheless.

First, the MFN tariff variable becomes significantly negative on 5 October 2016, consistent with Theresa May's Conservative party conference speech signalling the intent to pursue a hard Brexit.[28] In terms of magnitudes, the coefficient estimate suggests that a 1 percentage point increase in future MFN tariffs is associated with 0.045 percentage points lower abnormal returns. Given that the average MFN tariff in our sample is 4.5 per cent, our results suggest that the expectation of higher tariffs was associated with negative abnormal returns of around 0.2 percentage points in the average industry. However, this average hides significant variation across sectors. For example, the MFN tariff at the 90th percentile of the distribution of tariffs across sectors is 15 per cent and the maximum tariff (for the dairies and cheese-making industry) is 57 per cent, corresponding to abnormal return changes of 0.7 and 2.6 percentage points, respectively.[29]

Second, MFN tariffs are also associated with more negative abnormal returns on 17 January 2017, the day of Theresa May's Lancaster House speech, although the effect is smaller than in October and statistically insignificant. By contrast, the STRI variable proxying for non-tariff barriers in the service sector is now negative and statistically significant for the first time.

[28]Inclusion of the MFN tariff variable also raises the explanatory power of the regression substantially from an R^2 of 7.5 per cent to an R^2 of 13 per cent. In terms of R^2 increases, it is the best explanatory variable for the goods-producing subsample on 5 October 2016.

[29]It is standard practice in the trade literature to break down overall tariff changes into import tariffs (payable by EU exporters to the UK), export tariffs (payable by UK exporters to the EU) and intermediate input tariffs (i.e. import tariffs leading to increases in the cost of domestic producers importing foreign intermediate inputs). Unfortunately, this decomposition is not feasible here. First, the most likely scenario is that the EU and the UK will impose the same MFN tariffs on each other in a WTO scenario. Second, we tried computing intermediate input tariffs using the UK's input–output matrix but, given the level of aggregation available in UK input–output tables, the resulting tariff was highly correlated with the MFN tariff (correlation coefficient of around 0.8). One case where the exclusion of intermediate input tariffs is clearly problematic is the sugar producer Tate & Lyle, who mainly use cane sugar and would benefit from a possible lowering of UK import tariffs after Brexit. Indeed, dropping Tate & Lyle from our sample decreases the MFN tariff coefficient to –0.05.

A final pattern that emerges on 17 January is that the two recession proxies (the recession-proof dummy and the share of affiliates in the UK) now have the opposite signs to the post-referendum day, although coefficient magnitudes are much smaller in absolute terms. It is not entirely clear how to interpret this result but it would be consistent with the generally positive market reactions to the Lancaster House speech mentioned in Section IV.2.

To conclude, the abnormal return patterns on 24 June are best interpreted as capturing the effects of the steep depreciation of sterling and fears of an imminent growth slowdown or recession. By contrast, future trade barriers and immigration shares across industries played no role in explaining abnormal returns. There is, however, some tentative evidence that share price reactions on 5 October and 17 January were at least in part due to expectations of higher future tariff and non-tariff barriers.[30]

2. Robustness checks

Tables 6–12 present a number of robustness checks. We focus on what we consider the most important checks here and report additional results in Appendix B (available online).[31]

Table 6 uses two alternative measures for the importance of UK and EU affiliates, focusing on the full sample of firms. Columns 1–3 use share data from Orbis based on the sales rather than the count of affiliates in the UK and the EU. Columns 4–6 use segment data from the annual accounts of parent companies, which report the geographic breakdown of overall sales (also obtained from Orbis). Both variables are likely to be better proxies for the importance of the domestic market and the EU market for UK-listed firms than share measures based on simple counts of affiliates. However, this comes at the cost of a substantial decrease in sample size.[32] The results are qualitatively similar to those in Table 5 although the proxies for the sterling depreciation are less significant.[33]

[30]Note that, throughout, we are assuming that no firm-specific information is revealed on event dates that is systematically correlated with our regressors of interest. Unfortunately, we do not have detailed enough data on firm announcements to explicitly control for such potentially confounding factors.

[31]These additional robustness checks are: (i) including investment trusts in our regression sample; (ii) applying a narrower definition of our trade barrier measures by using only data for a firm's core industry rather than an average barrier across all industries a firm is active in; (iii) including dummy variables for broad NACE one-digit industry groups (agriculture and mining, manufacturing, utilities and construction, finance and insurance, and other services); (iv) using a different market portfolio proxy for the computation of abnormal returns (the MSCI Europe instead of the FTSE All-Share); and (v) using a six-month instead of a one-year estimation period for the computation of abnormal returns.

[32]See Appendix A (available online) for details on how we compute these two alternative measures.

[33]We do not report results for the goods-producing and services subsamples because the number of observations drops to as few as 50. Coefficient estimates on the MFN tariff and STRI variables are almost identical to those in Table 5, although significance levels drop. Depending on the specification, both remain significant at the 10 per cent level, however.

TABLE 6

Alternative measures for importance of UK and EU affiliates (columns 1–3: sales shares; columns 4–6: segment sales)

Variable	24 June 2016 *(1)* *AR(t)*	5 Oct 2016 *(2)* *AR(t)*	17 Jan 2017 *(3)* *AR(t)*	24 June 2016 *(4)* *AR(t)*	5 Oct 2016 *(5)* *AR(t)*	17 Jan 2017 *(6)* *AR(t)*
ROA	–0.0488	–0.0201	–0.0145	–0.122**	–0.0292	–0.0276
	(0.0356)	(0.0129)	(0.0108)	(0.0530)	(0.0260)	(0.0264)
Log(sales)	0.00453*	0.000679	–0.000770	0.00109	0.000533	0.000602
	(0.00254)	(0.000848)	(0.000702)	(0.00398)	(0.00112)	(0.00154)
Non-GBP currency	0.0332***	0.00762*	0.00366	0.0131	0.00750	0.00604
	(0.00860)	(0.00407)	(0.00325)	(0.00926)	(0.00495)	(0.00508)
Share EU affiliates	–0.0601**	–0.00455	0.00255	–0.0446	–0.00293	0.00981
	(0.0252)	(0.00797)	(0.00707)	(0.0273)	(0.00810)	(0.00941)
Share UK affiliates	–0.0919***	0.00620	0.0120**	–0.111***	–0.00311	0.0170***
	(0.0159)	(0.00504)	(0.00472)	(0.0177)	(0.00510)	(0.00495)
Log(no. of affiliates)	–0.00195	–0.00131	0.000642	–0.00500	–0.00140	0.000818
	(0.00403)	(0.00103)	(0.000900)	(0.00336)	(0.00123)	(0.00150)
Share EU immigrants	0.0432	–0.000228	–0.00579	–0.0165	0.00541	0.0192
	(0.0356)	(0.0171)	(0.0106)	(0.0490)	(0.0180)	(0.0190)
Recession-proof	0.0303***	–0.00396	–0.00449*	0.0509***	–0.00355	–0.00435
	(0.00694)	(0.00391)	(0.00265)	(0.00953)	(0.00541)	(0.00533)

(*Continued*)

TABLE 6
Continued

Variable	24 June 2016 *(1)* *AR(t)*	5 Oct 2016 *(2)* *AR(t)*	17 Jan 2017 *(3)* *AR(t)*	24 June 2016 *(4)* *AR(t)*	5 Oct 2016 *(5)* *AR(t)*	17 Jan 2017 *(6)* *AR(t)*
Exporter	0.0140*	0.00495*	0.000461	0.00839	0.00867**	0.00449
	(0.00764)	(0.00271)	(0.00230)	(0.00847)	(0.00338)	(0.00396)
Importer	–0.00676	0.00866**	0.00242	–0.0108	0.00733*	0.00170
	(0.00885)	(0.00401)	(0.00221)	(0.0135)	(0.00432)	(0.00342)
Exporter-importer	0.0236**	–0.00410	–0.00496	0.0198	–0.0158**	–0.0183
	(0.0116)	(0.00599)	(0.00531)	(0.0174)	(0.00706)	(0.0112)
No. of observations	294	295	295	149	149	149
R-squared	0.374	0.085	0.070	0.516	0.113	0.136

Note: The dependent variable in columns 1 and 4 is the abnormal returns (AR) on the first trading day following the referendum. The dependent variable in columns 2 and 5 is the abnormal returns after Theresa May's speech at the Conservative party conference. The dependent variable in columns 3 and 6 is the abnormal returns after the Lancaster House speech. Columns 1–3 estimate the baseline equation 6 for the overall sample using sales shares from Orbis rather than affiliate count to measure the importance of EU and UK affiliates. Columns 4–6 estimate the baseline equation 6 using segment data from the annual accounts of parent companies, which report the geographic breakdown of overall sales. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

TABLE 7

Augmented abnormal return regressions (four market indices: FTSE All-Share, S&P 500, MSCI Asia, MSCI Europe)

Variable	24 June 2016 *(1)* *AR(t)*	24 June 2016 *(2)* *AR(t)*	24 June 2016 *(3)* *AR(t)*	5 Oct 2016 *(4)* *AR(t)*	5 Oct 2016 *(5)* *AR(t)*	5 Oct 2016 *(6)* *AR(t)*	17 Jan 2017 *(7)* *AR(t)*	17 Jan 2017 *(8)* *AR(t)*	17 Jan 2017 *(9)* *AR(t)*
ROA	–0.101***	–0.120***	–0.0806	–0.0225	–0.0150	–0.0349**	0.00166	0.0106	0.00539
	(0.0374)	(0.0321)	(0.0908)	(0.0139)	(0.0187)	(0.0156)	(0.0123)	(0.0176)	(0.0205)
Log(sales)	0.00238	0.00855**	–0.00240	0.000912	–0.000327	0.00278**	–0.000730	–0.00226	0.000446
	(0.00213)	(0.00366)	(0.00410)	(0.000771)	(0.00168)	(0.00115)	(0.000787)	(0.00136)	(0.00121)
Non-GBP currency	0.0413***	0.0349**	0.0245	0.00487	0.00248	0.00522	–0.000427	0.000936	0.00572
	(0.00941)	(0.0136)	(0.0212)	(0.00370)	(0.00592)	(0.00455)	(0.00308)	(0.00587)	(0.00493)
Share EU affiliates	–0.0495*	–0.0816**	–0.0500	0.000934	0.00256	–0.000559	0.00660	–0.000214	0.0153
	(0.0277)	(0.0324)	(0.0772)	(0.00688)	(0.0157)	(0.0112)	(0.00664)	(0.0132)	(0.0108)
Share UK affiliates	–0.0956***	–0.0862***	–0.102***	0.00632	0.00879	0.00965	0.0126***	0.0149	0.0113
	(0.0169)	(0.0284)	(0.0300)	(0.00481)	(0.0117)	(0.00700)	(0.00443)	(0.00920)	(0.00894)
Log(no. of affiliates)	–0.00242	–0.00446	–0.00165	–0.000480	0.00159	–0.00111	0.00106	0.00158	0.00127
	(0.00278)	(0.00485)	(0.00624)	(0.000843)	(0.00187)	(0.00124)	(0.000938)	(0.00159)	(0.00150)
Share EU immigrants	–0.00207	–0.0357	–0.0167	0.00524	0.00421	–0.00756	0.0102	0.0118	0.00973
	(0.0363)	(0.0319)	(0.0849)	(0.0137)	(0.0154)	(0.0209)	(0.0102)	(0.0149)	(0.0237)
Recession-proof	0.0231**	0.00119	0.0547***	–0.00270	0.000130	–0.00522	–0.00151	0.000247	–0.00895**
	(0.00907)	(0.0105)	(0.0138)	(0.00359)	(0.00323)	(0.00809)	(0.00292)	(0.00426)	(0.00441)
Exporter	0.0125*	–0.00106	0.0272*	0.00630***	0.00808	0.00283	–0.000112	0.00176	–0.000535
	(0.00694)	(0.0111)	(0.0137)	(0.00238)	(0.00564)	(0.00441)	(0.00225)	(0.00404)	(0.00427)

(*Continued*)

TABLE 7
Continued

Variable	24 June 2016 *(1)* *AR(t)*	24 June 2016 *(2)* *AR(t)*	24 June 2016 *(3)* *AR(t)*	5 Oct 2016 *(4)* *AR(t)*	5 Oct 2016 *(5)* *AR(t)*	5 Oct 2016 *(6)* *AR(t)*	17 Jan 2017 *(7)* *AR(t)*	17 Jan 2017 *(8)* *AR(t)*	17 Jan 2017 *(9)* *AR(t)*
Importer	–0.000273	–0.00265	0.00415	0.00706**	0.0109	0.00399	0.000173	–0.000647	–0.00341
	(0.00875)	(0.0144)	(0.0125)	(0.00347)	(0.00673)	(0.00594)	(0.00220)	(0.00520)	(0.00287)
Exporter-importer	0.0255**	0.0238	0.0203	–0.00596	–0.00716	–0.00521	–0.00470	–0.00494	0.00702
	(0.0111)	(0.0160)	(0.0187)	(0.00496)	(0.00815)	(0.00967)	(0.00506)	(0.00643)	(0.00780)
EU MFN (wide)		–0.000967			–0.0482**			–0.0233	
		(0.0447)			(0.0212)			(0.0180)	
STRI (wide)			0.0628			0.00401			–0.0182
			(0.0501)			(0.0171)			(0.0127)
No. of observations	352	131	130	353	131	130	353	131	130
R-squared	0.376	0.437	0.334	0.059	0.111	0.100	0.057	0.122	0.076

Note: The dependent variable in columns 1–3 is the abnormal returns (AR) on the first trading day following the referendum. The dependent variable in columns 4–6 is the abnormal returns after Theresa May's speech at the Conservative party conference. The dependent variable in columns 7–9 is the abnormal returns after the Lancaster House speech. Abnormal returns are computed using four market indices (FTSE All-Share, S&P 500, MSCI Asia and MSCI Europe; see Section V.2 for details). Columns 1, 4 and 7 estimate the baseline equation 6 for the overall sample. Columns 2, 5 and 8 estimate the baseline equation 6 including the measure of the MFN tariff rate for goods-producing industries. Columns 3, 6 and 9 estimate the baseline equation 6 including the measure of NTBs for selected service industries. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

TABLE 8

Allowing for event-induced changes in market model parameters

Variable	24 June 2016 *(1)* *AR(t)*	24 June 2016 *(2)* *AR(t)*	24 June 2016 *(3)* *AR(t)*	5 Oct 2016 *(4)* *AR(t)*	5 Oct 2016 *(5)* *AR(t)*	5 Oct 2016 *(6)* *AR(t)*	17 Jan 2017 *(7)* *AR(t)*	17 Jan 2017 *(8)* *AR(t)*	17 Jan 2017 *(9)* *AR(t)*
ROA	–0.0494**	–0.0406	–0.0638	–0.0187**	–0.0204***	–0.0234	–0.00142	–0.00270	0.0114
	(0.0226)	(0.0362)	(0.0474)	(0.00775)	(0.00632)	(0.0158)	(0.00559)	(0.00805)	(0.00761)
Log(sales)	–4.39e–05	0.00321	–0.00209	0.000398	–0.00104	0.00155*	–9.91e–06	–0.000700	–0.000140
	(0.00137)	(0.00244)	(0.00253)	(0.000536)	(0.000922)	(0.000849)	(0.000297)	(0.000502)	(0.000554)
Non-GBP currency	0.0135**	0.00565	0.0124	0.00373*	0.00217	0.00498	0.00153	0.00461**	0.00196
	(0.00546)	(0.00786)	(0.0142)	(0.00203)	(0.00338)	(0.00352)	(0.00126)	(0.00187)	(0.00192)
Share EU affiliates	–0.0289*	–0.0442**	–0.0292	0.00229	–0.00168	0.00723	0.00453	–0.00109	0.00143
	(0.0169)	(0.0218)	(0.0515)	(0.00476)	(0.00927)	(0.00714)	(0.00319)	(0.00626)	(0.00361)
Share UK affiliates	–0.0648***	–0.0513***	–0.0689***	0.00675**	0.00501	0.00734	0.00227	–0.00610	0.00242
	(0.00936)	(0.0167)	(0.0195)	(0.00307)	(0.00663)	(0.00492)	(0.00217)	(0.00505)	(0.00266)
Log(no. of affiliates)	–0.00201	–0.00268	–0.00280	–4.36e–05	0.00160	–0.000888	0.000313	–0.000588	0.000822
	(0.00171)	(0.00315)	(0.00370)	(0.000629)	(0.00124)	(0.00112)	(0.000461)	(0.000739)	(0.000908)
Share EU immigrants	0.0210	–0.0114	0.0280	–0.00494	–0.0106	–0.00669	–9.55e–05	–0.00242	0.0124
	(0.0201)	(0.0190)	(0.0515)	(0.00873)	(0.00906)	(0.0144)	(0.00469)	(0.00451)	(0.00889)
Recession-proof	0.0235***	0.0183***	0.0384***	–0.00237	0.000740	–6.13e–05	–0.000943	–0.000354	–0.00150
	(0.00447)	(0.00504)	(0.00954)	(0.00244)	(0.00293)	(0.00527)	(0.00111)	(0.00126)	(0.00157)
Exporter	0.00363	–0.00610	0.0145	0.00275*	0.00259	–0.000174	–0.00169	–0.00278	–0.00264
	(0.00459)	(0.00784)	(0.00896)	(0.00155)	(0.00296)	(0.00314)	(0.00121)	(0.00169)	(0.00205)

(*Continued*)

TABLE 8

Continued

Variable	24 June 2016 *(1)* *AR(t)*	24 June 2016 *(2)* *AR(t)*	24 June 2016 *(3)* *AR(t)*	5 Oct 2016 *(4)* *AR(t)*	5 Oct 2016 *(5)* *AR(t)*	5 Oct 2016 *(6)* *AR(t)*	17 Jan 2017 *(7)* *AR(t)*	17 Jan 2017 *(8)* *AR(t)*	17 Jan 2017 *(9)* *AR(t)*
Importer	–0.00280	–0.0120	0.00336	0.00294	0.00497	0.00331	0.000139	–0.00118	–0.00209
	(0.00518)	(0.00931)	(0.00745)	(0.00230)	(0.00388)	(0.00419)	(0.00136)	(0.00323)	(0.00184)
Exporter-importer	0.0161**	0.0242**	0.0115	–0.00190	–0.00116	–0.00208	0.000321	0.00205	0.00327
	(0.00708)	(0.0103)	(0.0126)	(0.00341)	(0.00518)	(0.00641)	(0.00200)	(0.00374)	(0.00335)
EU MFN (wide)		–0.0216			–0.0228*			0.000638	
		(0.0268)			(0.0124)			(0.00706)	
STRI (wide)			0.0545*			–0.00487			–0.00287
			(0.0300)			(0.0104)			(0.00595)
No. of observations	352	131	130	353	131	130	353	131	130
R-squared	0.319	0.293	0.327	0.058	0.134	0.108	0.023	0.106	0.058

Note: The dependent variable in columns 1–3 is the abnormal returns (AR) on the first trading day following the referendum. The dependent variable in columns 4–6 is the abnormal returns after Theresa May's speech at the Conservative party conference. The dependent variable in columns 7–9 is the abnormal returns after the Lancaster House speech. Abnormal returns are computed using MSCI Europe market portfolio. Columns 1, 4 and 7 estimate the baseline equation 6 for the overall sample. Columns 2, 5 and 8 estimate the baseline equation 6 including the measure of the MFN tariff rate for goods-producing industries. Columns 3, 6 and 9 estimate the baseline equation 6 including the measure of NTBs for selected service industries. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

TABLE 9

Overall returns as dependent variable

Variable	24 June 2016 *(1)* *OR(t)*	24 June 2016 *(2)* *OR(t)*	24 June 2016 *(3)* *OR(t)*	5 Oct 2016 *(4)* *OR(t)*	5 Oct 2016 *(5)* *OR(t)*	5 Oct 2016 *(6)* *OR(t)*	17 Jan 2017 *(7)* *OR(t)*	17 Jan 2017 *(8)* *OR(t)*	17 Jan 2017 *(9)* *OR(t)*
ROA	–0.0228	0.00428	–0.00957	–0.0214*	–0.0124	–0.0315**	–0.00105	0.00840	0.0106
	(0.0338)	(0.0403)	(0.0803)	(0.0128)	(0.0161)	(0.0153)	(0.00953)	(0.0134)	(0.0180)
Log(sales)	–0.00259	0.00166	–0.00453	0.000336	–0.00119	0.00198*	–0.00186**	–0.00407***	–0.00140
	(0.00229)	(0.00403)	(0.00430)	(0.000738)	(0.00152)	(0.00114)	(0.000777)	(0.00133)	(0.00126)
Non-GBP currency	0.0251***	0.0189	0.0211	0.00437	0.00325	0.00368	–0.00231	0.00220	0.000432
	(0.00828)	(0.0131)	(0.0217)	(0.00334)	(0.00524)	(0.00424)	(0.00256)	(0.00515)	(0.00467)
Share EU affiliates	–0.0338	–0.0694**	–0.0396	0.00122	0.00228	–0.00123	0.00700	–0.00215	0.0162
	(0.0274)	(0.0297)	(0.0800)	(0.00653)	(0.0142)	(0.0108)	(0.00608)	(0.0106)	(0.0119)
Share UK affiliates	–0.0915***	–0.0716**	–0.0922***	0.00616	0.00838	0.00855	0.0128***	0.0140*	0.00840
	(0.0147)	(0.0277)	(0.0297)	(0.00469)	(0.0108)	(0.00677)	(0.00412)	(0.00714)	(0.00866)
Log(no. of affiliates)	–0.00284	–0.00292	–0.00269	–0.000652	0.00174	–0.00123	0.000605	0.00176	0.00115
	(0.00289)	(0.00529)	(0.00678)	(0.000831)	(0.00175)	(0.00126)	(0.000947)	(0.00147)	(0.00163)
Share EU immigrants	0.0252	–0.0255	0.00930	0.00476	0.00476	–0.00695	0.00538	0.00897	0.00362
	(0.0333)	(0.0264)	(0.0812)	(0.0130)	(0.0142)	(0.0218)	(0.00826)	(0.0120)	(0.0215)
Recession-proof	0.0437***	0.0261***	0.0701***	–0.00267	–0.000925	–0.00443	–0.00359	–0.00453	–0.00817*
	(0.00823)	(0.00797)	(0.0152)	(0.00344)	(0.00295)	(0.00814)	(0.00246)	(0.00333)	(0.00472)
Exporter	0.0139*	–0.00189	0.0371***	0.00564**	0.00701	0.00251	–0.000595	0.000173	–0.000591
	(0.00727)	(0.0133)	(0.0133)	(0.00228)	(0.00501)	(0.00431)	(0.00210)	(0.00360)	(0.00416)

(*Continued*)

TABLE 9

Continued

Variable	24 June 2016 *(1)* *OR(t)*	24 June 2016 *(2)* *OR(t)*	24 June 2016 *(3)* *OR(t)*	5 Oct 2016 *(4)* *OR(t)*	5 Oct 2016 *(5)* *OR(t)*	5 Oct 2016 *(6)* *OR(t)*	17 Jan 2017 *(7)* *OR(t)*	17 Jan 2017 *(8)* *OR(t)*	17 Jan 2017 *(9)* *OR(t)*
Importer	–0.00512	–0.0180	0.00914	0.00675*	0.00976	0.00444	–0.000504	–0.00252	–0.00273
	(0.00806)	(0.0167)	(0.0125)	(0.00344)	(0.00639)	(0.00609)	(0.00190)	(0.00506)	(0.00258)
Exporter-importer	0.0250**	0.0306*	0.00675	–0.00506	–0.00598	–0.00446	–0.00305	–0.00246	0.00880
	(0.0102)	(0.0169)	(0.0191)	(0.00482)	(0.00762)	(0.00986)	(0.00473)	(0.00607)	(0.00751)
EU MFN (wide)		0.00852			–0.0377*			–0.00113	
		(0.0453)			(0.0195)			(0.0150)	
STRI (wide)			0.108**			0.00611			–0.0158
			(0.0518)			(0.0174)			(0.0122)
No. of observations	352	131	130	353	131	130	353	131	130
R-squared	0.313	0.260	0.321	0.054	0.109	0.072	0.117	0.228	0.098

Note: The dependent variable in columns 1–3 is the overall return (OR) on the first trading day following the referendum. The dependent variable in columns 4–6 is the overall return after Theresa May's speech at the Conservative party conference. The dependent variable in columns 7–9 is the overall return after the Lancaster House speech. Columns 1, 4 and 7 estimate the baseline equation 6 for the overall sample. Columns 2, 5 and 8 estimate the baseline equation 6 including the measure of the MFN tariff rate for goods-producing industries. Columns 3, 6 and 9 estimate the baseline equation 6 including the measure of NTBs for selected service industries. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

TABLE 10

Longer event windows (t–1 to t+1)

Variable	23, 24, 27 June 2016 *(1)* *AR(t–1,t+1)*	23, 24, 27 June 2016 *(2)* *AR(t–1,t+1)*	23, 24, 27 June 2016 *(3)* *AR(t–1,t+1)*	4–6 Oct 2016 *(4)* *AR(t–1,t+1)*	4–6 Oct 2016 *(5)* *AR(t–1,t+1)*	4–6 Oct 2016 *(6)* *AR(t–1,t+1)*	16–18 Jan 2017 *(7)* *AR(t–1,t+1)*	16–18 Jan 2017 *(8)* *AR(t–1,t+1)*	16–18 Jan 2017 *(9)* *AR(t–1,t+1)*
ROA	–0.0629	–0.0813	0.0133	–0.0159	0.0289	–0.0539*	–0.0206	–0.0186	–0.00173
	(0.0501)	(0.0764)	(0.0914)	(0.0262)	(0.0380)	(0.0299)	(0.0154)	(0.0236)	(0.0346)
Log(sales)	0.00214	0.0156**	–0.00115	0.00234*	0.00505*	0.00372**	–0.000232	–0.00259	–8.39e–05
	(0.00384)	(0.00779)	(0.00743)	(0.00140)	(0.00290)	(0.00182)	(0.00102)	(0.00222)	(0.00150)
Non-GBP currency	0.0760***	0.0525**	0.0668**	–0.00804	–0.0264**	0.00510	0.00313	0.0155*	–0.00233
	(0.0141)	(0.0231)	(0.0293)	(0.00599)	(0.0109)	(0.00786)	(0.00463)	(0.00850)	(0.00925)
Share EU affiliates	–0.0683**	–0.107**	–0.0845	0.00910	0.0359	–0.0172	0.00640	0.00257	0.000683
	(0.0338)	(0.0496)	(0.0797)	(0.0157)	(0.0329)	(0.0174)	(0.00975)	(0.0182)	(0.0159)
Share UK affiliates	–0.150***	–0.129***	–0.126***	–0.00393	–0.00559	–0.00351	0.00108	–0.0129	–0.00369
	(0.0221)	(0.0418)	(0.0409)	(0.00958)	(0.0191)	(0.0131)	(0.00767)	(0.0168)	(0.0126)
Log(no. of affiliates)	0.00251	–0.00658	0.00680	0.00164	–0.00152	–0.000381	–0.000553	–0.000715	0.000455
	(0.00529)	(0.00934)	(0.00948)	(0.00167)	(0.00365)	(0.00201)	(0.00126)	(0.00290)	(0.00200)
Share EU immigrants	0.0155	–0.0524	–0.0664	0.0452**	0.0517*	0.0358	–0.00375	–0.0139	0.0597*
	(0.0462)	(0.0525)	(0.134)	(0.0224)	(0.0302)	(0.0415)	(0.0214)	(0.0270)	(0.0323)
Recession-proof	0.0671***	0.0260	0.101***	–0.00371	–0.00327	–0.0123	–0.00447	–0.0104*	–0.00749
	(0.0110)	(0.0161)	(0.0250)	(0.00710)	(0.00713)	(0.0112)	(0.00442)	(0.00619)	(0.00697)
Exporter	0.0234*	0.00240	0.0494**	0.00175	0.0154*	–0.00951	–0.00152	–0.00648	0.00145
	(0.0120)	(0.0214)	(0.0238)	(0.00471)	(0.00905)	(0.00762)	(0.00448)	(0.00720)	(0.00557)

(*Continued*)

TABLE 10
Continued

Variable	23, 24, 27 June 2016 *(1)* *AR(t–1,t+1)*	23, 24, 27 June 2016 *(2)* *AR(t–1,t+1)*	23, 24, 27 June 2016 *(3)* *AR(t–1,t+1)*	4–6 Oct 2016 *(4)* *AR(t–1,t+1)*	4–6 Oct 2016 *(5)* *AR(t–1,t+1)*	4–6 Oct 2016 *(6)* *AR(t–1,t+1)*	16–18 Jan 2017 *(7)* *AR(t–1,t+1)*	16–18 Jan 2017 *(8)* *AR(t–1,t+1)*	16–18 Jan 2017 *(9)* *AR(t–1,t+1)*
Importer	–0.00154	–0.00787	0.0163	0.00270	0.00389	0.000199	0.00981**	0.0164	0.00180
	(0.0141)	(0.0265)	(0.0260)	(0.00496)	(0.00838)	(0.00821)	(0.00465)	(0.0105)	(0.00554)
Exporter-importer	0.0391**	0.0342	0.0116	0.00508	–0.00939	0.00963	–0.00664	–0.0149	0.00452
	(0.0187)	(0.0320)	(0.0375)	(0.00840)	(0.0123)	(0.0132)	(0.00730)	(0.0144)	(0.00998)
EU MFN (wide)		–0.0213			–0.0697*			0.0132	
		(0.0705)			(0.0416)			(0.0264)	
STRI (wide)			0.110			–0.0171			0.00660
			(0.0755)			(0.0223)			(0.0169)
No. of observations	353	131	130	353	131	130	353	131	130
R-squared	0.388	0.395	0.329	0.053	0.181	0.105	0.028	0.106	0.054

Note: Abnormal returns (AR) are computed over a three-day window. The dependent variable in columns 1–3 is the abnormal returns from 23 June to 27 June 2016. The dependent variable in columns 4–6 is the abnormal returns from 4 October to 6 October 2016. The dependent variable in columns 7–9 is the abnormal returns from 16 January to 18 January 2017. Columns 1, 4 and 7 estimate the baseline equation 6 for the overall sample. Columns 2, 5 and 8 estimate the baseline equation 6 including the measure of the MFN tariff rate for goods-producing industries. Columns 3, 6 and 9 estimate the baseline equation 6 including the measure of NTBs for selected service industries. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

In Tables 7 and 8, we examine the sensitivity of our results to different specifications of our first-stage market model estimation (equation 1). In Table 7, we include three market indices in addition to the FTSE All-Share: the S&P 500, the MSCI Asia and the MSCI Europe. Ramiah, Martin and Moosa (2013) argue that this is necessary to control for the effects of asynchronicity, stock market integration and spillover effects in event studies. In Table 8, we allow for the possibility that our events led to persistent changes in systematic risk. Following Ramiah et al. (2013) and Breinlich (2014), we do so by interacting the market model equation's stock-specific intercepts and correlations with the market portfolio with dummy variables taking the value 1 after each of the events.[34] Both modifications yield results that are very similar to our baseline estimates, consistent with the notion that for short event windows such as ours, the exact model used for the computation of abnormal returns is of lesser importance.[35,36]

In Table 9, we use overall instead of abnormal returns as the dependent variable in our regressions (i.e. r_{it} in the notation of Section III). As we explained in Section III, abnormal returns are our preferred dependent variable because they control for stock-specific return patterns that are unrelated to the event in question and might be correlated with our second-stage regressors. This said, returns on the market portfolio are likely to have been driven by the events in question to some extent, especially for our referendum event, so that we might not want to eliminate this part of overall returns. In practice, however, abnormal and overall returns are highly correlated in our sample. The correlation coefficient between the two returns is 97 per cent on 24 June 2016, 99 per cent on 5 October 2016 and 95 per cent on 17 January 2017. Not surprisingly then, the results presented in Table 9 are very similar to our baseline results.

Tables 10–12 explore the effect of varying the length of our event windows. In Table 10, we add the trading day before and after the event in question and use cumulative abnormal returns over these three-day windows as our dependent variable. This does not significantly affect coefficient patterns for the referendum event (now 23–27 June 2016 as no trading took place on 25

[34]That is, we now replace equation 1 with $r_{it} = \alpha_i + \beta_i R_{mt} + \sum_v d_{post,v}(\alpha_i + \beta_i R_{mt}) + e_{it}$, where v denotes our three events and $d_{post,v} = 1$ for dates on or after event v. Note that in order to be able to estimate this new equation, we need to extend our original estimation period to include and go beyond our event dates. In practice, we use data up to 31 May 2017.

[35]See Andrade, Mitchell and Stafford (2001).

[36]Note that allowing for persistent changes in systematic risk by augmenting the market model equation with additional interaction terms is not suitable for controlling for more short-term changes in risk premiums. To see this, note that, in the extreme, one might want to allow for event-day-specific changes in market model parameters, which would mean fitting observed returns perfectly with no abnormal returns left to explain. Thus, we caution that our results might at least in part pick up short-term changes in firm-specific risk perceptions in addition to changes in the future profitability of individual companies.

and 26 June). Significance levels are reduced for the other two events although the coefficient on the MFN tariff variable is around 50 per cent larger than before for the Conservative party conference event.

Table 11 uses time windows that are more specific to the events in question. As discussed, the Leave vote came as a clear surprise to market participants so that using a longer pre-event window does not seem appropriate. Instead, we extend our window to include an additional trading week after the event, so the window now runs from 23 June to 1 July. By this time, both the FTSE 100 and the FTSE All-Share indices had regained their initial losses, so it is of interest to see whether our coefficient pattern remains the same over this longer event horizon.

For our two other events, it seems likely that at least some of the relevant information reached market participants before the actual speeches, so we extend our event window to include the entire trading week surrounding the event. This is sufficient to include other speeches at the Conservative party conference as well as interviews given to prepare market participants ahead of the Lancaster House speech.[37]

For the referendum event, results for the longer event window are qualitatively similar to before. Our proxies for recession expectations remain highly statistically significant and coefficient estimates are larger in magnitude than for our baseline results. The same is true for the dummy variable indicating whether firms report in a currency other than pounds, although the effect for the goods-producing subsample is not statistically significant. Coefficient signs for the trade status indicators are similar to before but statistical significance is again lower.

Turning to the other two event windows, results are less consistent with previous estimates. The signs on the two trade barrier variables are still negative for the Conservative party conference speech event but no longer statistically significant; by contrast, the MFN tariff variable is positive (although insignificant) for the Lancaster House speech.[38] This is surprising given that information about the likely form of Brexit had leaked in the days prior to the two speeches and casts doubt on whether market participants really based stock price valuations on likely future trade barriers. By contrast,

[37]Two events of particular importance in this context were a brief speech by Theresa May on Sunday 2 October 2016 and an interview of Philip Hammond, the Chancellor of the Exchequer, with the German newspaper *Welt am Sonntag* on Sunday 15 January 2017. Both events provided information about the content of the subsequent speeches. However, they were both more low-key than Theresa May's main speeches on 5 October and 17 January, and the main negative reaction in currency markets only occurred after the 5 October speech. This is why we focus on the dates of the main speeches in our baseline regressions.

[38]The inclusion of Tate & Lyle again seems to strongly influence estimates for the MFN variable on 5 October 2016; as discussed previously, Tate & Lyle would stand to gain from potentially lower intermediate input tariffs after Brexit (see footnote 29). Excluding Tate & Lyle from the regression does indeed nearly double the coefficient on the tariff variable to –0.049, a magnitude similar to that in our baseline regressions.

TABLE 11

Longer event windows (event-specific)

Variable	23/6–1/7/16 *(1)* *AR(t–1,t+5)*	23/6–1/7/16 *(2)* *AR(t–1,t+5)*	23/6–1/7/16 *(3)* *AR(t–1,t+5)*	3–7/10/16 *(4)* *AR(t–2,t+2)*	3–7/10/16 *(5)* *AR(t–2,t+2)*	3–7/10/16 *(6)* *AR(t–2,t+2)*	16–20/1/17 *(7)* *AR(t–1,t+3)*	16–20/1/17 *(8)* *AR(t–1,t+3)*	16–20/1/17 *(9)* *AR(t–1,t+3)*
ROA	–0.0846	–0.190***	0.0493	–0.0504	0.000228	–0.100**	–0.0445*	–0.0276	–0.0794
	(0.0669)	(0.0650)	(0.133)	(0.0353)	(0.0407)	(0.0385)	(0.0238)	(0.0304)	(0.0616)
Log(sales)	–0.00661	0.00299	–0.0117	–0.00154	0.00424	–0.00297	–0.000661	–0.00366	0.00103
	(0.00451)	(0.00798)	(0.00915)	(0.00176)	(0.00256)	(0.00244)	(0.00124)	(0.00281)	(0.00224)
Non-GBP currency	0.0642***	0.0383	0.0674**	0.00738	–0.00888	0.0120	0.000883	0.0126	–0.0110
	(0.0154)	(0.0230)	(0.0296)	(0.00780)	(0.0113)	(0.0119)	(0.00626)	(0.0106)	(0.0148)
Share EU affiliates	–0.0674	–0.103	–0.0811	0.00257	0.0574	–0.0585**	0.00208	0.00549	–0.00515
	(0.0412)	(0.0671)	(0.0748)	(0.0194)	(0.0354)	(0.0222)	(0.0120)	(0.0251)	(0.0190)
Share UK affiliates	–0.164***	–0.156***	–0.127***	–0.0341***	–0.0255	–0.0430***	–0.00129	–0.000211	–0.0139
	(0.0243)	(0.0526)	(0.0416)	(0.0118)	(0.0213)	(0.0158)	(0.00862)	(0.0216)	(0.0172)
Log(no. of affiliates)	0.00310	–0.00773	0.00889	0.000963	–0.00164	–0.000663	–0.00182	0.00240	–0.00347
	(0.00485)	(0.00997)	(0.0116)	(0.00218)	(0.00333)	(0.00229)	(0.00183)	(0.00378)	(0.00347)
Share EU immigrants	0.0203	–0.0185	–0.0789	0.0375	0.0235	0.0358	–0.0100	–0.0291	0.0429
	(0.0578)	(0.0672)	(0.136)	(0.0287)	(0.0354)	(0.0534)	(0.0299)	(0.0300)	(0.0371)
Recession-proof	0.0951***	0.0483***	0.135***	–0.00369	–0.0142*	–0.00523	–0.00797	–0.0203***	–0.0121
	(0.0155)	(0.0143)	(0.0308)	(0.00793)	(0.00791)	(0.0156)	(0.00574)	(0.00577)	(0.00793)
Exporter	0.0120	–0.0245	0.0365	0.00543	0.0208*	–0.0142	0.00317	0.000537	0.00941
	(0.0130)	(0.0241)	(0.0246)	(0.00569)	(0.0107)	(0.00868)	(0.00548)	(0.00963)	(0.00756)

(*Continued*)

TABLE 11

Continued

Variable	23/6–1/7/16 *(1)* *AR(t–1,t+5)*	23/6–1/7/16 *(2)* *AR(t–1,t+5)*	23/6–1/7/16 *(3)* *AR(t–1,t+5)*	3–7/10/16 *(4)* *AR(t–2,t+2)*	3–7/10/16 *(5)* *AR(t–2,t+2)*	3–7/10/16 *(6)* *AR(t–2,t+2)*	16–20/1/17 *(7)* *AR(t–1,t+3)*	16–20/1/17 *(8)* *AR(t–1,t+3)*	16–20/1/17 *(9)* *AR(t–1,t+3)*
Importer	–0.00884	–0.0448	0.0371	0.00760	0.0100	0.00579	0.0134*	0.0273*	0.00672
	(0.0167)	(0.0373)	(0.0233)	(0.00583)	(0.0125)	(0.0108)	(0.00696)	(0.0158)	(0.00742)
Exporter-importer	0.0339	0.0699*	–0.0233	0.00499	–0.00595	0.0123	–0.0113	–0.0314*	0.000432
	(0.0222)	(0.0374)	(0.0381)	(0.0107)	(0.0170)	(0.0193)	(0.00972)	(0.0187)	(0.0147)
EU MFN (wide)		0.00463			–0.0300			0.0430	
		(0.0810)			(0.0456)			(0.0405)	
STRI (wide)			0.184*			–0.0303			–0.000514
			(0.102)			(0.0233)			(0.0186)
No. of observations	353	131	130	353	131	130	353	131	130
R-squared	0.388	0.395	0.329	0.053	0.181	0.105	0.028	0.106	0.054

Note: Abnormal returns (AR) are computed over event-specific windows. The dependent variable in columns 1–3 is the abnormal returns from 23 June to 1 July 2016. The dependent variable in columns 4–6 is the abnormal returns from 3 October to 7 October 2016. The dependent variable in columns 7–9 is the abnormal returns from 16 January to 20 January 2017. Columns 1, 4 and 7 estimate the baseline equation 6 for the overall sample. Columns 2, 5 and 8 estimate the baseline equation 6 including the measure of the MFN tariff rate for goods-producing industries. Columns 3, 6 and 9 estimate the baseline equation 6 including the measure of NTBs for selected service industries. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

one of our recession proxies (the share of subsidiaries in the UK) is now significantly negative across two out of three samples for our second event (5 October).

These results indicate that the correlation between prospective trade barriers and abnormal returns found earlier seems somewhat fragile and depends on the exact specification of the relevant event windows. By contrast, the results related to sterling's depreciation and investors' expectations of a slowdown or recession are robust to short extensions of our event window. As a final robustness check, we extend the event window for the referendum event yet further, to 20 and 60 trading days after 24 June 2016, respectively. This allows us to check how long-lasting the impact of the referendum on abnormal return patterns was. We note that these results need to be interpreted with more caution than those for our shorter event windows. This is because new stock-specific information that is unrelated to the Brexit referendum will become available in the weeks and months after the event, making the interpretation of cumulative abnormal return patterns more difficult. That is, the longer the horizon, the harder it is to argue that abnormal returns are caused only (or at least mainly) by the event in question. In addition, specification choices for the abnormal returns estimation equation (for example, whether or not additional market indices are included) become much more important over longer time horizons, creating additional sources of noise.

Looking at columns 1–3 of Table 12, we see that results are still broadly similar for cumulative abnormal returns over the 20 trading days after the referendum. The main difference from our baseline results is that the coefficients on our proxies for exchange rate effects (currency dummy, trade status indicators) are smaller and less significant than before. On the other hand, the coefficients on our proxies for recessionary expectations (recession-proof dummy, share of UK affiliates) have actually increased in size and significance. Cumulative abnormal returns over the 60 trading days after the referendum (columns 4–6) show somewhat weaker patterns than before. The regression R^2 is now only around 15 per cent, compared with approximately 30 per cent for the 20-day horizon and 35 per cent for our baseline regression. The proxies for exchange rate effects are now insignificant although, interestingly, coefficient signs and magnitudes are similar to before, suggesting that the lack of significance is mainly driven by increased noise. The recession-proof dummy is now also slightly smaller in magnitude and insignificant throughout, possibly reflecting the fact that by September 2016, it had become clear that initial fears of an immediate recession were unfounded. Nevertheless, the coefficient magnitudes and significance levels of the UK affiliate share variable are still very similar to our baseline results, indicating that investors continued to take a negative view of firms with high exposure to the domestic UK market almost three months after the referendum.

TABLE 12

Longer event windows for the referendum event (20 and 60 days)

Variable	23/6–20/7/16 *(1)* *AR(t–1,t+20)*	23/6–20/7/16 *(2)* *AR(t–1,t+20)*	23/6–20/7/16 *(3)* *AR(t–1,t+20)*	23/6–14/9/16 *(4)* *AR(t–1,t+60)*	23/6–14/9/16 *(5)* *AR(t–1,t+60)*	23/6–14/9/16 *(6)* *AR(t–1,t+60)*
ROA	–0.00314	–0.183**	0.0675	–0.117	–0.303***	–0.00538
	(0.0981)	(0.0709)	(0.139)	(0.128)	(0.0829)	(0.170)
Log(sales)	–0.00660	–0.00444	–0.0101	–0.0147**	–0.0203**	–0.0160*
	(0.00489)	(0.00954)	(0.00787)	(0.00585)	(0.00958)	(0.00884)
Non-GBP currency	0.0207	0.0221	0.00310	0.0288	0.0507	–0.00710
	(0.0192)	(0.0248)	(0.0344)	(0.0263)	(0.0426)	(0.0423)
Share EU affiliates	–0.0754	–0.123	–0.0912	0.0184	0.0167	–0.0809
	(0.0547)	(0.0912)	(0.107)	(0.0690)	(0.142)	(0.110)
Share UK affiliates	–0.211***	–0.230***	–0.211***	–0.0917**	–0.129	–0.131**
	(0.0281)	(0.0604)	(0.0421)	(0.0369)	(0.0839)	(0.0633)
Log(no. of affiliates)	–0.00260	–0.00699	0.00214	–0.000674	0.00137	0.000561
	(0.00590)	(0.0128)	(0.0124)	(0.00690)	(0.0142)	(0.0116)
Share EU immigrants	0.0368	–0.00405	–0.0157	0.0197	–0.0454	–0.0847
	(0.0579)	(0.0610)	(0.127)	(0.0729)	(0.0718)	(0.138)
Recession-proof	0.0676***	0.0305	0.0937***	0.0267	–0.00694	0.0526
	(0.0159)	(0.0193)	(0.0291)	(0.0180)	(0.0245)	(0.0447)
Exporter	–0.000232	–0.0405	0.00596	0.0236	–0.00369	0.0345
	(0.0165)	(0.0309)	(0.0253)	(0.0197)	(0.0297)	(0.0316)

(*Continued*)

TABLE 12

Continued

Variable	23/6–20/7/16 *(1)* *AR(t–1,t+20)*	23/6–20/7/16 *(2)* *AR(t–1,t+20)*	23/6–20/7/16 *(3)* *AR(t–1,t+20)*	23/6–14/9/16 *(4)* *AR(t–1,t+60)*	23/6–14/9/16 *(5)* *AR(t–1,t+60)*	23/6–14/9/16 *(6)* *AR(t–1,t+60)*
Importer	–0.00918	–0.0307	–0.00275	0.00976	0.00288	0.0196
	(0.0159)	(0.0344)	(0.0198)	(0.0210)	(0.0459)	(0.0231)
Exporter-importer	0.0464*	0.0625	0.0515	0.0205	0.00966	0.0413
	(0.0269)	(0.0461)	(0.0337)	(0.0364)	(0.0617)	(0.0626)
EU MFN (wide)		0.0341			0.0696	
		(0.0786)			(0.0963)	
STRI (wide)			0.119			0.0939
			(0.0907)			(0.0782)
No. of observations	353	131	130	353	131	130
R-squared	0.288	0.282	0.277	0.112	0.182	0.158

Note: Abnormal returns (AR) are computed over specific windows. The dependent variable in columns 1–3 is the abnormal returns from 23 June to 20 July 2016. The dependent variable in columns 4–6 is the abnormal returns from 23 June to 14 September 2016. Columns 1 and 4 estimate the baseline equation 6 for the overall sample. Columns 2 and 5 estimate the baseline equation 6 including the measure of the MFN tariff rate for goods-producing industries. Columns 3 and 6 estimate the baseline equation 6 including the measure of NTBs for selected service industries. Robust standard errors in parentheses are clustered at the four-digit NACE level. $^{***}p<0.01$, $^{**}p<0.05$, $^{*}p<0.1$.

VI. Conclusions

This paper studies stock market reactions to the result of the 2016 UK referendum on EU membership and to two of the main subsequent policy announcements that clarified the likely form Brexit would take, Theresa May's Conservative party conference speech on 5 October 2016 and her Lancaster House speech on 17 January 2017. Besides providing direct evidence on share price movements, the purpose of this analysis is to use price reactions as a guide to the likely future economic impact of Brexit and the channels through which such effects might materialise. To this end, we correlated stock price reactions with indicators capturing different potential effects of Brexit, including short-run impacts linked to the depreciation of sterling and the possibility of a slowdown in economic activity, as well as measures of potential future tariff and non-tariff barriers.

Our results support the hypothesis that stock market participants expected an economic downturn or even a recession in the days after the referendum. Share price movements during this period were also affected by the depreciation of sterling. By contrast, we find little evidence for the importance of variation in EU immigrant shares across industries or future trade barriers in explaining abnormal returns following the referendum result. When analysing market reactions to Theresa May's two speeches, our proxies have less explanatory power, consistent with the idea that much of the content of the speeches was already known to investors. Nevertheless, there is some evidence that abnormal return patterns were at least partially explained by expectations about future tariff and non-tariff barriers on the days of the two speeches. This result is less robust, however, and depends on the length of the event window chosen.

While our analysis provides new insight into investors' expectations about the consequences of Brexit, real economic effects will take time to materialise and market participants may be wrong. Fears that the Leave vote would trigger an immediate recession were unfounded, but the UK's economic growth has slowed relative to other major economies since 2016.[39] It is too soon to know how Brexit will affect firms that engage in cross-border trade or investment between the UK and the EU. Crucially, the impact will depend on the nature of UK–EU relations after Brexit, which, at the time of writing, remain undecided.

Supporting information

Additional supporting information may be found online in the Supporting Information section at the end of the article.

- Appendix A
- Appendix B

[39]Born et al., 2017.

References

Andrade, G., Mitchell, M. and Stafford, E. (2001), 'New evidence and perspectives on mergers', *Journal of Economic Perspectives*, vol. 15, pp. 103–20.
Binder, J. J. (1998), 'The event study methodology since 1969', *Review of Quantitative Finance and Accounting*, vol. 11, pp. 111–37.
Bloningen, B., Tomlin, K. and Wilson, W. (2004), 'Tariff-jumping FDI and domestic firms' profits', *Canadian Journal of Economics*, vol. 37, pp. 656–77.
Born, B., Müller, G., Schularick, M. and Sedlacek, P. (2017), 'The economic consequences of the Brexit vote', Centre for Economic Policy Research (CEPR), Discussion Paper no. 12454.
Brander, J. A. (1991), 'Election polls, free trade, and the stock market: evidence from the 1988 Canadian general election', *Canadian Journal of Economics*, vol. 24, pp. 827–43.
Breinlich, H. (2014), 'Heterogeneous firm-level responses to trade liberalization: a test using stock price reactions', *Journal of International Economics*, vol. 93, pp. 270–85.
—, Leromain, E., Novy, D. and Sampson, T. (2017), 'The consequences of the Brexit vote for UK inflation and living standards: first evidence', Centre for Economic Performance (CEP), Technical Paper.
Cameron, A. and Miller, D. (2015), 'A practitioner's guide to cluster-robust inference', *Journal of Human Resources*, vol. 50, pp. 317–72.
Campbell, J., Lo, A. and MacKinlay, A. (1997), *The Econometrics of Financial Markets*, Princeton, NJ: Princeton University Press.
Crowley, M. and Song, H. (2014), 'Trade policy shocks and stock market returns: evidence from Chinese solar panels', University of Cambridge, mimeograph.
Davies, R. and Studnicka, Z. (2018), 'The heterogeneous impact of Brexit: early indications from the FTSE', *European Economic Review*, vol. 110, pp. 1–17.
Dhingra, S., Huang, H., Ottaviano, G., Pessoa, J. P., Sampson, T. and Van Reenen, J. (2017), 'The costs and benefits of leaving the EU: trade effects', *Economic Policy*, vol. 32, pp. 651–705.
Economist (2016), 'Who said Brexit was a surprise?', 24 June.
Emsbo-Mattingly, L., Hofschire, D., Litvak, A. and Lund-Wilde, J. (2017), 'The business cycle approach to equity sector investing', Fidelity Investment Leadership Series, January.
Financial Times (2016), 'Theresa May: pounding home the message', 7 October.
— (2017), 'Theresa May unveils plan to quit EU Single Market under Brexit', 17 January.
Grossman, G. M. and Levinsohn, J. A. (1989), 'Import competition and the stock market return to capital', *American Economic Review*, vol. 79, pp. 1065–87.
Harrington, S. and Shrider, D. (2007), 'All events induce variance: analyzing abnormal returns when effects vary across firms', *Journal of Financial and Quantitative Analysis*, vol. 42, pp. 229–56.
Hartigan, J. C., Kamma, S. and Perry, P. R. (1989), 'The injury determination category and the value of relief from dumping', *Review of Economics and Statistics*, vol. 71, pp. 183–6.
—, Perry, P. R. and Kamma, S. (1986), 'The value of administered protection: a capital market approach', *Review of Economics and Statistics*, vol. 68, pp. 610–17.
HM Treasury (2016), *The Long-Term Economic Impact of EU Membership and the Alternatives*, Cm 9250, London.
Hughes, J. S., Lenway, S. and Rayburn, J. (1997), 'Stock price effects of U.S. trade policy responses to Japanese trading practices in semi-conductors', *Canadian Journal of Economics*, vol. 30, pp. 922–42.

Karafiath, I. (1994), 'On the efficiency of least squares regression with security abnormal returns as the dependent variable', *Journal of Financial and Quantitative Analysis*, vol. 29, pp. 279–300.
Moser, C. and Rose, A. K. (2014), 'Who benefits from regional trade agreements? The view from the stock market', *European Economic Review*, vol. 68, pp. 31–47.
National Institute of Economic and Social Research (2016), 'The economic consequences of leaving the EU', *National Institute Economic Review*, May special issue.
OECD (2016), 'The economic consequences of Brexit: a taxing decision' (http://www.oecd.org/economy/the-economic-consequences-of-brexit-a-taxing-decision.htm).
— (2018), OECD.Stat database; accessed February 2018.
Ramiah, V., Martin, B. and Moosa, I. (2013), 'How does the stock market react to the announcement of green policies?', *Journal of Banking and Finance*, vol. 37, pp. 1747–58.
—, Pham, H. and Moosa, I. (2016), 'The sectoral effects of Brexit on the British economy: early evidence from the reaction of the stock market', *Applied Economics*, vol. 49, pp. 2508–14.
Schiereck, D., Kiesel, F. and Kolaric, S. (2016), 'Brexit: (not) another Lehman moment for banks?', *Finance Research Letters*, vol. 19, pp. 291–7.
Thompson, A. J. (1993), 'The anticipated sectoral adjustment to the Canada–United States free trade agreement: an event study analysis', *Canadian Journal of Economics*, vol. 26, pp. 253–71.