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The Effect of Brexit on the UK Economy (so far)

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Abstract

The political turmoil in the UK following the referendum on future membership of the European Union in 2016 provides a natural experiment for studying the effects of political uncertainty (in the Knightian sense) on the economy. We find that the subsequent confusion and infighting in British politics has not affected the real economy much – employment is at a historical high and output growth is positive – but there are some signs of slowing investment and house price increases. The stock market has also not been much affected although it did fall after the referendum of 2016. The main effect of the Brexit vote and the subsequent political developments is found in the currency market where news that make a hard Brexit more likely cause the currency to depreciate. We conclude that leaving the European Union without an agreement is likely to make the currency depreciate and the stock market fall while output declines. In contrast, leaving with an agreement that gives continued access to the Single Market would likely make the currency appreciate, the stock market rise and employment and output increase further.

Keywords: Brexit, growth, share price, currency market.

JEL classification: E24, E44, F31

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[1] Paper prepared for the XXXI Villa Mondragone International Economic Seminar, 25-26 June 2019: *Capitalism, global change and sustainable development*. Corresponding author: Gylfi Zoega, Department of Economics, University of Iceland, 2 Sæmundargata, 101 Reykjavik, Iceland. Email: gz@hi.is. Tel: +354 525 5230.

1 Introduction

The political turmoil in the United Kingdom beggars belief. Few would have believed the British political establishment capable of creating this level of chaos. Segments of both of its large political parties, especially the Conservative Party, spent decades stirring up antipathy towards the European Union without making any plans to leave the bloc. The government of David Cameron promised to hold a referendum before the 2015 elections to stave off a challenge from the emerging Independence Party and to please its own eurosceptics. The referendum was held in 2016 – not because the government thought it was a good idea to leave the EU but because it had to deliver on a promise made for party-political reasons. In fact, such was its dislike for the Leave option that, in the months preceding the referendum, Cameron's government did not make any preparations for leaving the European Union.

A responsible government would have presented an alternative plan to leaving, so that voters would know what they were voting for and the government would know how to proceed if the majority of voters wanted to leave. However, this was not a responsible government. Its decision to hold a referendum without a plan of action has caused the subsequent political turmoil. In this paper, we do not delve into the political background to the referendum. Instead, we are interested in the effects of the turmoil on the economy. In essence, the entire episode is a natural experiment in the effect on economic activity of a political class, riven by personal ambitions playing with the country's interests and future.

An expanding literature in economics and political science focuses on the reasons for the outcome of the Brexit vote.[2] They include the effects of international trade on income distribution and regional disparities, the effect of immigration on unskilled service workers' income, and concerns about national identity and traditional values.[3] Crafts (2019) attributes the Brexit vote to the financial crisis of 2008 and the Conservative government's ensuing

[2] See Antonucci et al. (2017) who attribute the Brexit vote to the declining financial position of the middle class; Arnorsson and Zoega (2019) on the regional characteristics of the Brexit vote (older, less educated, lower income); Colantone and Stanig (2018) on global competition and Brexit; Fidrmuch et al. (2016) on the absence of a relationship between EU regional subsidies and the remain vote; Hobolt (2016) on the divisions in society; and Inglehart and Norris (2016, 2019) on the cultural factors behind the vote. Goodwin and Heath (2016) find that turnout was generally higher in more pro-Leave areas, which implies a greater intensity among those who wanted to leave than those voters who wanted to stay.

[3] Dustman and Frattini (2014) analyse the fiscal impact of immigration on the UK economy since 1995. They find that immigrants from the European Economic Areas (EEA) have made a positive fiscal contribution while non-EEA immigrants have made a negative contribution. Since 2000, the contributions have been positive throughout, in particular for immigrants from Europe.

austerity policies of 2010, which mainly affected the regions in the north of England that voted to leave the European Union. Thus the leave vote can be interpreted as a protest vote against the austerity policies and, as such, a consequence of the financial crisis. Crafts goes so far as to suggest that if the UK had put some of the bankers in jail in 2009, the wrath of the population might have been assuaged enough to stave off the Brexit vote.

One can place the Brexit vote into the context of a broader political movement that includes the election of the current US president in 2016 and the emergence of right-wing populist movements in Northern Europe and left-wing populist movements in Southern Europe. These movements share certain features, such as having charismatic leaders, challenging conventional wisdom, and defying international organisations. Right-wing populists tend to be nativist, while left-leaning populists tend to oppose capitalism and international finance rather than opposing immigration.[4] These movements have split traditional parties on the left and right into nationalistic groups, on the one hand, and those that champion trade and migration, on the other.[5]

But does this political turmoil matter for the economy? Perhaps the economy is immune to these developments. Any change in the relationship between the UK and the European Union in the future is likely to have some economic impact, positive or negative, and expectations about this impact should affect today's asset prices, exchange rate, investment, and consumption.[6] The economy may not be immune, and the expected economic consequences may be dire. So how has the UK economy weathered the storm so far?

2 Political uncertainty

If economic agents could see into the future, if they had perfect foresight, the post-Brexit world would affect present-day share prices, exchange rates, consumption, and investment. But clearly, they do not. If they could instead have rational expectations – taking into account the probabilities of a good outcome, a bad outcome, and everything in between – we could also use market prices to decipher what the future will probably look like. Share prices would reflect available information on the likelihood that the UK will leave the European Union and

[4] See Rodrik (2018a) on the difference between left-wing and right-wing populism.
[5] See Mudde (2004, 2017) and Muller (2015, 2016) on populism.
[6] Dhingra et al. (2016) analyse the economic consequences of the UK leaving the European Union. They find that while these will depend on which policies the UK adopts following Brexit, lower trade due to reduced integration with EU countries will likely cost the UK economy much more than is gained from lower contributions to the EU budget.

the likely effects of its staying or leaving on future growth, interest rates, capital flows, and so forth. However, these probabilities cannot be calculated because the UK has never left the European Union before; therefore, no available information can be used to assess the probabilities of exit and the many different arrangements that could conceivably follow EU membership. In other words, there is uncertainty about the future relationship with the European Union.

Frank Knight (1921) made the distinction between risk and uncertainty. Risk involves well defined probabilities that can be calculated from repeated instances that are identical, such as the repeated tossing of a coin. It can also involve statistical probabilities, such as the probability of death of an individual of a certain age. Uncertainty arises when the distribution of the outcome in a group of instances is not known because the situation in question is unique, making it impossible to form a group of instances.[7] Political events such as Brexit involve uncertainty, not risk. For this reason, traders in the stock market and the currency market could be expected to find it difficult to assess the impact of the UK's leaving the European Union simply because it has never happened before and the final outcome is completely uncertain. The UK might end up belonging to the EU; it might enter the European Economic Area with Norway, Lichtenstein, and Iceland; or it might reach a bilateral trade agreement with the EU. It might also follow WTO rules.

In the following sections, we attempt to assess whether markets gauge the effect of Brexit to be positive or negative for the UK economy, and the strength of their response to news reports that make Brexit seem more or less likely. We start with the real economy.

3 The real economy

It may come as a surprise to many that the impact of the Brexit turmoil on the real economy, output, and unemployment has been muted so far. This is surprising because both consumption demand and investment demand depend on expectations of the future, which may have worsened due to the political turmoil.

For most of the three-year period since the Brexit vote, the economy has been doing well. The unemployment rate is at its lowest since the early 1970s, and employment as a share of the working-age population is at a record high (see Figure A1), while output growth has been respectable, although not very strong. The capital inflows that have generated persistent

[7] See Hill (1997) on political risk.

current account deficits since the mid-1990s have continued. Figures 1-3 show that the British economy continues to exhibit largely the same features as before; there is steady growth in output, unemployment is low and declining, and there is a current account deficit of around 4% of GDP.

The economy is driven mostly by the services sector, such as banking; economic activity is concentrated in several large cities where house prices tend to be high; employment is booming; and there are continued capital inflows, owing most likely to the country's sound institutions, law and order, protection of property rights, and impartial courts.

However, there are indications that investment has fallen slightly in recent months, as is shown in Figure A2, probably due to Brexit uncertainty. This decline may indicate that further uncertainty about Brexit – not to mention a no-deal exit – will cause output and employment to contract. In addition, house price inflation has eased, as is shown in Figure A3. However, it is noteworthy that an economy threatened by the immediate imposition of tariffs on inputs and output and the disruption of supply chains in manufacturing should manage to perform this well. Another consequence is the reduction in European immigration into the UK triggered by the rhetoric of the country's political class.[8]

[8] See Forte and Portes (2017)

Figure 1. Current account as a proportion of GDP

Figure 2. Real GDP growth

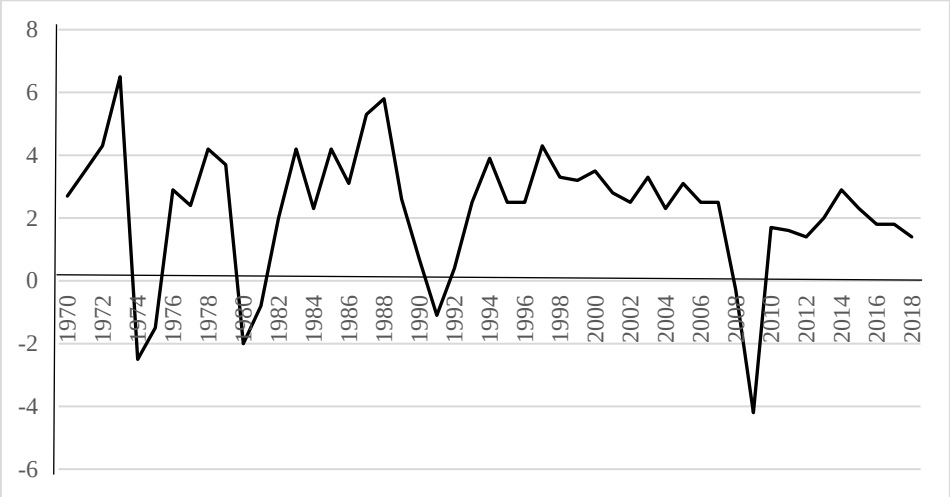
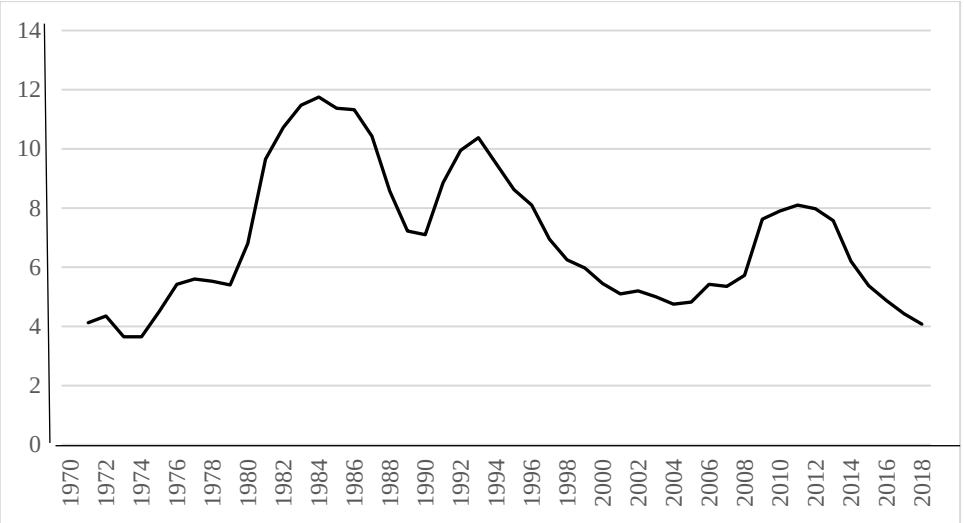


Figure 3. Unemployment rate



4. The stock market

Even if the real economy is doing well, then, the stock market must surely have been hit by the Brexit uncertainty and the probability that tariffs will be imposed! We study the FTSE250, which includes companies ranked 101-350 in terms of market capitalisation in the UK stock market, so as to omit the large international corporations included in the FTSE100 that are less affected by Brexit. The FTSE250 is shown in Figure 4 below, alongside the German DAX and the US S&P500. The effect of the Brexit vote on the index seems to have been mild[9] when looking at data from the beginning of 2015 through 3 September 2019.

We took the logarithm of the stock market index for each day and calculated the first difference of the logarithm in order to calculate the daily proportional change in the index. Then we constructed indicator variables for changes greater than four, five, and six times the standard deviation of the series. The dates of large movements in stock prices were then compared to data on Brexit-related events in Parliament (Walker, 2019) and news reports appearing in newspapers, both the day before and the day after the large change in the stock market. In this way, we attempt to determine which news reports were likely to lead to a rise in the stock market and which were likely to cause a fall.

Table 1 shows the days between 2 January 2015 and 3 September 2019 when the FTSE 250 changed by more than four standard deviations, the size of the proportional change, and the apparent cause of the change. There were 15 such large changes, 10 of them apparently Brexit-related. The fall in the index on 24 June 2016 was by far the largest change over this period. The remaining five large changes in the index all occurred before the Brexit referendum took place. The FTSE 250 spiked after the murder of Parliamentarian Jo Cox on 16 June 2016, rising by more than three standard deviations on the following day, most likely because the market thought that a leave vote was now less likely. On 20 June 2016, when the last opinion polls predicted that the Remain side would win, the index shot up by more than five standard deviations. After the results of the referendum became known on 24 June, and after markets reopened on 27 June, the index fell until the Bank of England decided to cut interest rates. The stock market responded positively to the appointment of Theresa May on 11 July but then remained stable until 6 December 2018, when the Huawei manager was arrested in Canada, indicating the intensification of the trade war between the US and China.

[9] FT250 data taken from *investing.com*.

Table 1. Large stock market movements and events between 2 Jan 2015 and 2 Sep 2019.

Deviation exceeds $6*\sigma^2$	Deviation exceeds $5*\sigma^2$	Deviation exceeds $4*\sigma^2$	Change	Reason for deviation
		8.5.2015	0,0120	(7.5.2015) PM David Cameron is re-elected after promising a referendum on Brexit. He promises to fight to keep Britain in the EU and stakes his career on the outcome.
24.8.2015			-0,0174	Black Monday in China causes stock markets to tumble.
	25.8.2015		0,0134	Markets recover from China's Black Monday
	20.1.2016		-0,0130	Market turbulance caused by falling oil prices along with pessimism in Davos.
	8.2.2016		-0,0139	New reports indicating economic slowdown triggers fears of an impending global recession.
		17.2.2016	0,0124	Markets recover from global recession fears.
		17.6.2016	0,0104	(16.6.2016) Labour MP, Jo Cox, is assassinated by a far-right extremist.
	20.6.2016		0,0140	Polls indicate growing "Remain" support.
24.6.2016			-0,0324	The results from the Brexit referendum are announced and were as follows: Remain: 16,141,241 (48.1%) Leave: 17,410,742 (51.9%). PM David Cameron announces his resignation.
27.6.2016			-0,0313	Markets open for the first time post-referendum. David Cameron discusses the implications of Brexit in congress.
	28.6.2016		0,0153	BoE responds to the vote with injections to the banking sector.
	29.6.2016		0,0138	Brexit panic recedes causing markets to jump.
		5.7.2016	-0,0104	Three large investment fund managers freeze their property funds in the UK due to uncertainty regarding Brexit.
	11.7.2016		0,0140	(11.7.2016) Confirmation that Theresa May will serve as the next PM, May did not support Brexit.
		6.12.2018	-0,0125	Escalation in the trade war between China and the US along with news of the arrest of Huawei's finance chief in Canada causes contraction in global markets. FTSE 250's drop is compounded by PM Theresa May's inability to pass her Brexit agreement through Parliament.

Sources: Authors' calculations, *investing.com*, British newspapers, and Walker (2019). *Note*: The standard deviation over the period was: $\sigma^2 = 0.00255$.

We also compared the FTSE250 to the German index and the S&P 500 for the period 4 January 2016 through 3 September 2019.[10] Each index was given a base date of 4 January 2016. All three indices in Figure 4 fall after the Brexit vote but recover quickly. Thereafter, they all increase until worries about the trade war and a possible global recession escalate at the end of 2018. The S&P rises more than the German and UK indices, the latter moving together. This camouflages an important development: UK companies have lost value in US dollar terms because of the depreciation of the pound sterling. Figure 5 shows the three

[10] Data taken from *investing.com*.

indices measured in dollars. Here the FTSE 250 falls much more in comparison to the other two indices.

Figure 4. FTSE 250 compared to the DAX and the S&P500, 2 Jan 2016 through 3 Sep 19

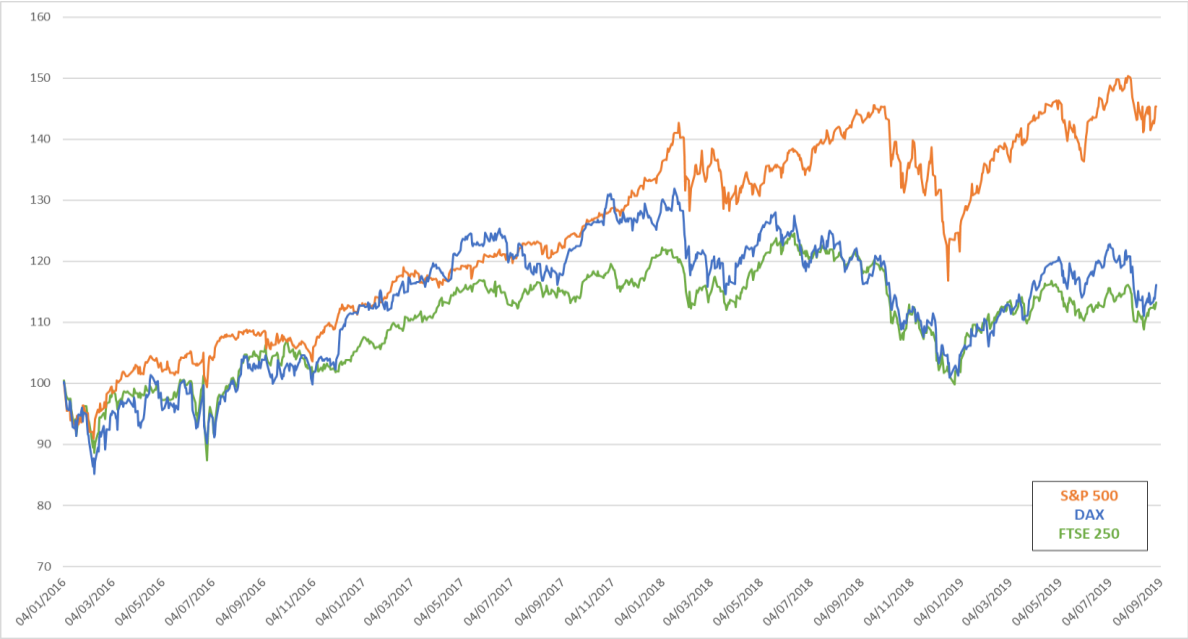
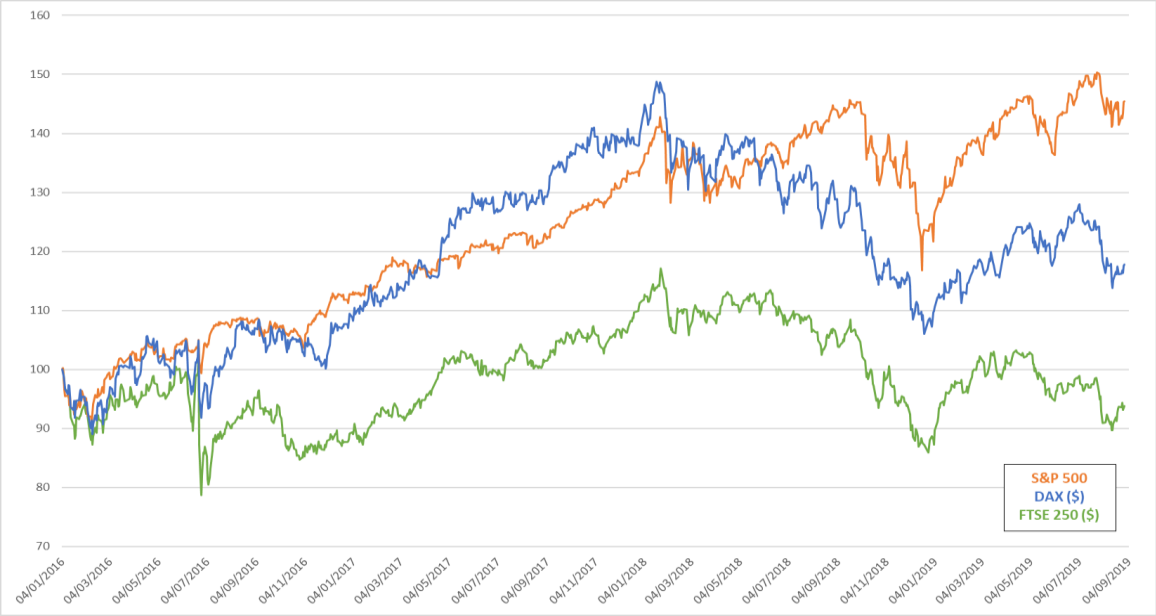


Figure 5. FTSE 250, DAX, and S&P500, in US dollars, 2 Jan 2016 through 3 Sep 2019



Source: Authors' calculations and *investing.com*.

It has been shown that the effect of the possibility of the UK leaving the EU differs across companies and industries. Davies and Studnicka (2018) found that Brexit would have the

strongest adverse effect on firms with supply chains in Europe and would affect smaller firms more than larger ones.[11] Moreover, Davies and Studnicka show that even though the stock market recovered after the initial drop in summer 2016, the businesses most strongly affected – that is, those relying on supply chains in Europe – did not recover their previous market value at the time of their writing.

5. Currency market reactions

The market most affected by the Brexit turmoil has been the currency market. The value of sterling appears to fall when an exit from the European Union becomes more likely – not to mention an exit without a prior agreement – or when there is increased uncertainty about an exit.

Figure 6 displays the pound-euro and pound-dollar exchange rates for the period from 4 January 2016 through 3 September 2019. The change of 24 June 2016, when the results of the Brexit referendum were announced, is highlighted, as are the low points in the exchange rate. The pound-dollar exchange rate fell to its lowest post-referendum level, $1.205, on 16 January 2017, the day before Prime Minister Theresa May presented her Brexit plan. The pound-euro exchange rate fell to its post-referendum trough, €1.075, on 29 August 2017, the day before the third round of negotiations between the UK and the EU began. Shortly thereafter, the Bank of England signalled that it was preparing for an interest rate increase, which led to a sharp appreciation.[12]

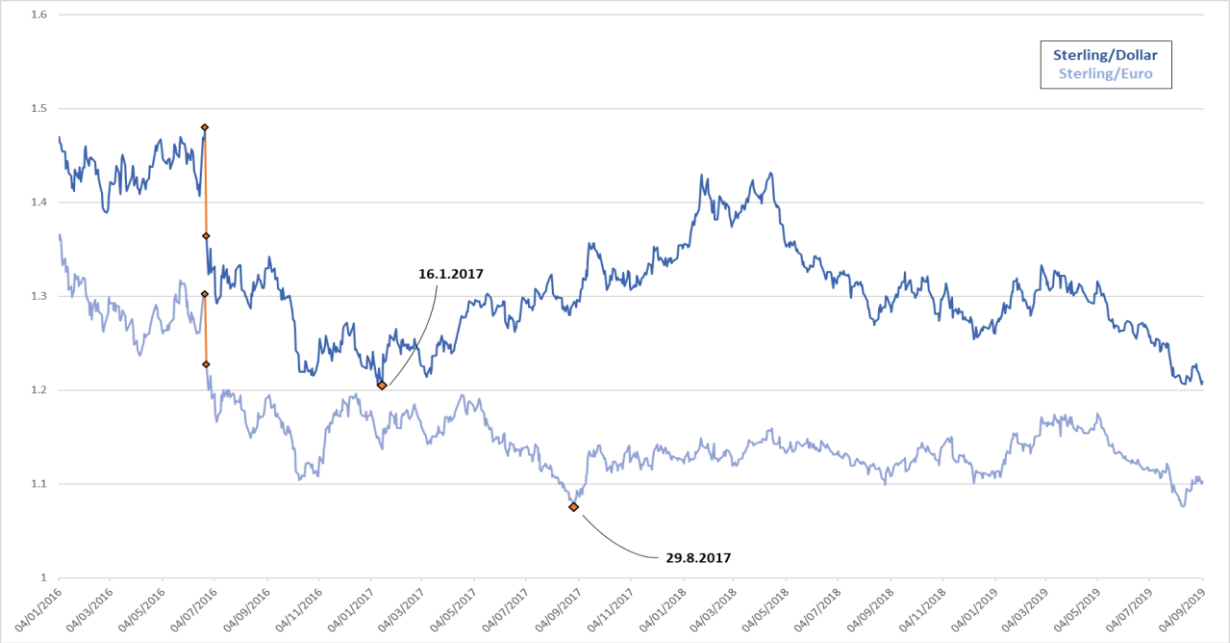
Over the next few months, the pound appreciated considerably against the dollar while holding stable against the euro. The expected interest rate increase came in November 2017, and expectations of another rise in rates pushed up the value of the pound as the dollar was depreciating. The pound-dollar exchange rate peaked on 17 April 2018 but fell sharply when new data on the UK economy revealed lower-than-expected inflation, retail sales figures, and wage growth. Comments made on the data by Bank of England Governor Mark Carney seemed to cast doubt on an expected interest rate hike in May and caused the pound to continue falling against the dollar.[13] Around this time, the dollar had begun to strengthen, causing the pound-dollar exchange rate to fall rapidly. The Bank of England delayed the

[11] See also Corsetti and Muller (2016).
[12] See https://www.independent.co.uk/news/business/news/uk-interest-rates-latest-bank-of-england-raise-coming-months-curb-inflation-mpc-economy-a7946376.html
[13] See https://www.independent.co.uk/news/business/news/pound-sterling-latest-slide-mark-carney-may-interest-rates-bank-of-england-a8313606.html

interest rate rise expected in May until August, when it raised rates to 0.75%. Since then, the bank has held its bank rate unchanged, yet in the first half of 2019, the pound slowly gained ground against both the dollar and the euro. This positive trend may indicate that, as time passed, the market found that a no-deal Brexit, or hard Brexit, was becoming less likely.

On 24 May, Theresa May announced her resignation, and it soon became clear that Boris Johnson would replace her as prime minister. This triggered a surge in volatility and uncertainty, causing the pound to plunge on 3 September 2019 to $1.196, its lowest level since 1985 (excluding the flash crash of October 2016).[14] The drop came amidst fears that Johnson would call a snap election as part of his plan to enforce a no-deal Brexit, but the pound staged a sharp recovery following the defection of Conservative MP Philip Lee, which cost the Conservatives their majority. Having lost his majority, Johnson still intends to call an early election and to suspend Parliament for a month, while MPs fight to avert a no-deal exit.

Figure 6. Pound-euro and pound-dollar exchange rates, 4 Jan 2016 through 2 Sep 2019.



Note: The pound's daily change on 24 June 2016 is highlighted, along with its post-referendum lows. *Source*: Authors' calculations and landsbanki.is.

5.1 Major exchange rate movements

We now turn to a list of major changes in the sterling exchange rate and attempt to link them to news about the UK leaving the European Union. We explore the apparent causes of the

[14] See https://www.telegraph.co.uk/business/2019/09/03/markets-live-latest-news-pound-euro-ftse-1001/

largest daily fluctuations in the value of the pound. The standard deviation in the price of a euro and the price of the dollar was used to calculate the daily change over the entire period. The daily changes in the nominal exchange rates were then used to derive four indicator variables. The first has the value "1" if the daily change is more than double the standard deviation of the series; the second, if it is more than triple the standard deviation; and the third and fourth, if it is more than quadruple and quintuple the standard deviation, respectively. We use both sterling-euro and sterling-dollar exchange rates in order to isolate fluctuations caused solely by changes in the UK economy from those in the two trading countries.

We then compare the dates with daily changes exceeding double the standard deviation to a list of noteworthy events related to the Brexit debacle over the period from 23 January 2013 through 3 September 2019. We took the events from Nigel Walker's compilation for the House of Commons (2019), as well as news reports appearing in some of the UK's 'quality press' newspapers (such as *The Daily Telegraph*, the *Independent*, *The Guardian*, and the *Financial Times)*, in an attempt to find the apparent cause of the exchange rate movements. This process made it possible to analyse which type(s) of news and events resulted in an appreciation of the pound and which resulted in a depreciation. Daily changes that exceeded double the standard deviation were quite common in the data. However, only 19 dates had daily changes exceeding triple the standard deviation. The figures below highlight those fluctuations, showing the exchange rates for these four years.

Table 2 shows the dates of the 19 daily fluctuations exceeding three times the standard deviation, the size of the change in the natural logarithm for that date, ($\Delta\log(£/€)$ and $\Delta\log(£/\$)$), and the most likely explanation for the significant deviation. Of the 19 large daily fluctuations, 16 are directly or indirectly related to Brexit. The largest daily swing by far took place on 24 June 2016, the date the results of the Brexit referendum were announced. In fact, sterling's drop on that date is proportionally the largest daily change in its value over the entire period from 4 January 1971 through 17 April 2019, as is shown in Figure A4 in the Appendix. The daily changes identified in Table 2 are displayed in Figures 2-5 and highlighted. In addition to those larger swings, several daily changes apparently connected to Brexit-related events exceeded double the standard deviation. A total of 30 daily changes exceeding double the standard deviation can be traced directly or indirectly to Brexit.

Table 2. Daily changes in the nominal exchange rate of the pound sterling exceeding triple the standard deviation, compared to Brexit-related events (2 Jan 2015 through 3 Sep 2019)

Deviation exceeds $5*\sigma^2$	Deviation exceeds $4*\sigma^2$	Deviation exceeds $3*\sigma^2$	Measured in euros/dollars	Reason for the deviation
		4.5.2015	-0.00541/ -0.00599	Polls indicate the coming elections might result in a hung Parliament.
		8.5.2015	0.00797/ 0.00651	(7.5.2015) PM David Cameron is re-elected after promising a referendum on Brexit. He promises to fight to keep Britain in the EU and stakes his career on the outcome.
		22.1.2016	0.00594/ 0.00702	Mario Draghi holds a speech in Davos which helps oil prices recover and markets to stabilize after a period of turbulance
20.6.2016			0.01256/ 0.01873	(16.6.2016) Labour MP, Jo Cox, is assassinated by a far-right extremist. Polls indicate increased support for Remain.
24.6.2016			-0.02577/ -0.03545	The results from the Brexit referendum are announced and were as follows: *Remain* : 16,141,241 (48.1%) *Leave* : 17,410,742 (51.9%). PM David Cameron announces his resignation.
27.6.2016			-0.00966/ -0.01325	Markets open for the first time post-referendum. David Cameron discusses the implications of Brexit in congress.
	5.7.2016		-0.00769/ -0.00989	Three large investment fund managers freeze their property funds in the UK due to uncertainty regarding Brexit.
		12.7.2016	0.00659/ 0.00729	(11.7.2016) Confirmation that Theresa May will serve as the next PM, May did not support Brexit.
		4.8.2016	-0.00512/ -0.00623	The Bank of England lowers interest rates in response to Brexit.
	7.10.2016		-0.00850/ -0.00797	Temporary turbulance in Asian markets causes a sterling "flash crash".
		9.1.2017	-0.00562/ -0.00674	(8.1.2017) In an interview, PM Theresa May indicates that she aims for a "Hard Brexit".
	17.1.2017		0.00795/ 0.01173	Theresa May declares that any agreement on leaving the EU will have to be rarifited by Parliament.
		18.4.2017	0.00513/ 0.00894	Theres May announces snap elections.
		9.6.2017	-0.00606/ -0.00711	(8.6.2017) The Conservative Party loses its majority in national elections but manages to form a new government.
		9.2.2018	-0.00612/ -0.00624	Michael Barnier, European Chief Negotiator for the United Kingdom Exiting the European Union, claims that a "no-deal" Brexit is a possible outcome.
		21.9.2018	-0.00581/ -0.00627	Theresa May makes a speech and says that there has been little progress in the negotiations with the EU.
		15.11.2018	-0.00725/ -0.00742	(14.11.2018) The agreement with the EU is published and meets objections both within and outside the Conservative Party; (15.11.2018) Ministers resign to protest the agreement.
		10.12.2018	-0.00704/ -0.00687	May postpones voting on the Brexit agreement.
		29.7.2019	-0.00667/ -0.00635	Boris Johnson's new government takes a tough stance on a no-deal Brexit, with Michael Gove writing in the Sunday Times that the government was now "working on the assumption" of a no-deal Brexit.

Source: Authors' calculations, British newspapers, and Walker (2019). *Note*: The standard deviation over the period was: σ^2= 0.00171 measured in euros, and σ^2= 0.00196 measured in US dollars.

5.2 A chronology of events

We now list the events that occurred on the days of large changes in the exchange rate, defined as days when the sterling exchange rate changed by more than three standard definitions, along with certain daily changes exceeding three standard deviations and apparently connected to Brexit-related events.

Figure 7. Pound-euro and pound-dollar exchange rates in 2015.

Note: The two daily changes exceeding triple the standard deviation are highlighted. *Source*: Authors' calculations and Landsbankinn (landsbanki.is).

- **4 May 2015**

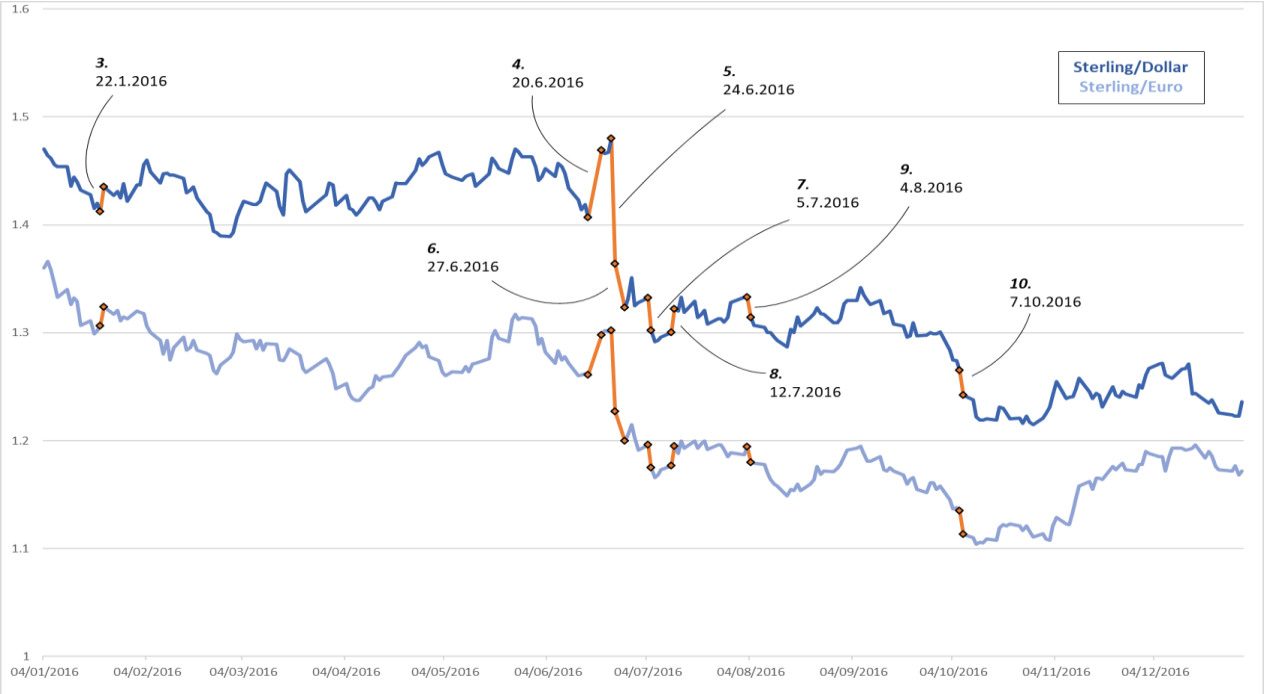
Capping a three-day continuous fall in the value of the pound, its sharp devaluation on 4 May 2015 of more than three standard deviations reflected traders' fears over a possible hung Parliament in the upcoming general election. Although Brexit was already a salient political issue at that point, we do not regard this as a Brexit-related event.

- **8 May 2015**

On the evening of 8 May 2015, then-current Electoral Commission Chair Jenny Watson announced the results of the UK's general election, with the Conservative Party winning a clear majority and David Cameron remaining prime minister. The Conservative Party had promised

a referendum on EU membership, a promise that David Cameron reiterated in his victory speech, while also stating his determination to fight against an exit. The pound appreciates, but again, this is not a Brexit-related event.

Figure 8. Pound-Euro and Pound-Dollar exchange rates in 2016.



Source: Authors' calculations and Landsbankinn.

- **22 January 2016**

Recovering oil prices and market optimism following a speech by Mario Draghi caused an appreciation exceeding triple the standard deviation.

- **20 June 2016**

On Thursday 16 June, Labour Party MP Jo Cox was assassinated by a far-right fanatic. It was the first murder of a sitting MP in the UK since 1990, and all campaigning ceased. Polls taken on 20 June indicated growing support for Remain, leading to a sharp appreciation (more than five standard deviations) of the pound sterling, the second-largest daily change in the entire period. This is our first Brexit-related event.

- **24 June 2016**

On Friday 24 June, the results of the Brexit referendum were announced.[15] That same morning, Prime Minister David Cameron announced his resignation outside 10 Downing Street. The results came as a shock to markets, in contrast to the notion of the wisdom of crowds,[16] and while Nigel Farage and other Brexiteers celebrated, the pound plummeted. The daily change in the pound's value was proportionally the largest in the history of its free-floating exchange rate. This is our second Brexit-related event.

- **27 June 2016**

Markets reopen on Monday 27 June and resume their free fall. The daily change in the exchange rate exceeds five times the standard deviation and is the third-largest over the period in question. Again, this is related to Brexit.

- **29 June 2016**

David Cameron urges the EU and the UK to be optimistic and show solidarity in his first post-referendum speech in the European Parliament. The pound slightly recovers after the chaos of the previous days. Although the appreciation is small in comparison to previous losses, just exceeding double the standard deviation, it indicates that initial reactions may have been overblown. Brexit-related.

- **30 June 2016**

Mark Carney gives a speech on Britain's future outside the EU. His expectations are gloomy and pessimistic, and he foresees that weaker growth and higher inflation could be in the offing (Carney, 2016). Following the speech, the pound depreciates by more than double the standard deviation, erasing the appreciation from the day before. Brexit-related.

- **5 July 2016**

Three large fund managers freeze their property funds in the UK due to uncertainty surrounding Brexit. A study showing slowing growth in the UK's service sector is released on the same day, resulting in a depreciation of more than four times the standard deviation.

[15] They were as follows: *Remain*: 16,141,241 (48.1%) *Leave*: 17,410,742 (51.9%).
[16] See Biggs (2008).

By the end of the day, the pound has sunk to a 31-year low against the dollar.[17] Brexit-related.

- **12 July 2016**

On 11 July, Theresa May's appointment as leader of the governing Conservative Party and as prime minister is confirmed. Boris Johnson, former mayor of London and one of Farage's leading supporters in the Leave campaign, had formerly been regarded as a likely candidate. May had been opposed to Brexit, so her appointment inspires those hoping for a soft withdrawal. In her victory speech, May nonetheless promises her party colleagues that no attempt will be made to overturn the referendum's results, saying "Brexit means Brexit." The pound reacts to the day's events with an appreciation exceeding triple the standard deviation.[18] Brexit-related.

- **14 July 2016**

Theresa May is formally appointed prime minister. The pound appreciates more than double the standard deviation. The Brexit process officially begins.

- **4 August 2016**

The Bank of England cuts its interest rates for the first time in more than seven years, in measures designed to prevent a post-Brexit recession. The cut, from 0.5% to 0.25%, is part of the bank's four-point stimulus package meant to deal with post-Brexit economic fallout. The pound's tumble, exceeding triple the standard deviation, indicates that the bank surprised markets with its response to an expected economic slowdown following the vote.

- **3 October 2016**

In her Party Conference speech, May introduces "The Great Repeal Bill" repealing the European Communities Act 1972, which gives legal authority to EU law within the UK. The bill would require that hundreds of EU laws be abolished and replaced with new British laws, without going through primary legislation. In the same speech, she confirms that she will invoke Article 50 of the Treaty on European Union before the end of March 2017, declaring that she would not require the support of the House of Commons to do so. The House of

[17] See https://www.theguardian.com/business/2016/jul/05/pound-hits-31-year-low-after-service-sector-data.
[18] See https://www.ft.com/content/ef6d5a38-4920-11e6-b387-64ab0a67014c.

Lords criticises the bill as anti-democratic. The pound responds with a depreciation exceeding double the standard deviation.[19] Brexit-related.

- **7 October 2016**

In a two-minute flash crash, the pound sterling drops more than 6% against the US dollar, and although it regains most of its losses before the end of the day, the daily depreciation still exceeds four times the standard deviation. The flood was initially believed to have been caused by a fat-finger trading error, but there were indications that it may have been a reaction to news of French President François Hollande's tough stance over Brexit negotiations.[20]

- **18 October 2016**

The High Court of Justice hears the Gina Miller case challenging Theresa May's statements that the UK government would not require the approval of Parliament to trigger Article 50. The pound appreciates more than double the standard deviation. Brexit-related.

Figure 9. Pound-euro and pound-dollar exchange rates in 2017

Source: Authors' calculations and Landsbankinn (landsbanki.is).

[19] See https://www.independent.co.uk/news/uk/politics/great-repeal-bill-brexit-law-eu-law-theresa-may-david-davis-a7343256.html.
[20] See https://www.ft.com/content/dfb375be-8c23-11e6-8cb7-e7ada1d123b1.

- **9 January 2017**

In her New Year's television interview, Theresa May suggests that the UK is heading towards a "hard Brexit" and says that Britain "will not attempt to cling on to bits of EU membership."[21] Predictably, currency markets react poorly and the pound falls, with the depreciation exceeding triple the standard deviation. Brexit-related.

- **17 January 2017**

In a speech in Lancaster House, May emphasises her intention for the UK to leave the EU's internal market but does not give definite answers regarding the customs union. Moreover, she confirms for the first time that the government will subject any deal agreed between the UK and the EU to a vote in Parliament,[22] making it clear that the government would not force through a hard Brexit without Parliament's approval. The speech results in an appreciation exceeding four times the standard deviation. Brexit-related.

- **25 January 2017**

On 24 January, the Supreme Court confirms the High Court's ruling that the government requires approval from both Houses of Parliament approval to trigger Article 50. Sterling appreciates more than double the standard deviation. Brexit-related.

- **8 February 2017**

The European Union Bill passes its third reading in the House of Commons, from where it will move on to the House of Lords. The bill permits Theresa May's government to trigger Article 50. The pound reacts by appreciating by more than double the standard deviation. This is the only instance of a positive reaction, albeit a minor one, to an event indicating an increased likelihood of Brexit.

The House of Commons' approval could be seen as an event that reduces uncertainty. From this point forward, Brexit-related news and the currency market's reactions no longer revolve mainly around whether Brexit will happen or not, but rather whether a hard Brexit, or a no-deal scenario, is more likely or less so. For the markets, it would therefore be best if negotiations were to run swiftly and smoothly, minimising uncertainty.

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[21] See https://www.independent.co.uk/news/business/news/pound-sterling-value-brexit-leaving-single-market-low-theresa-may-interview-a7516766.html.

[22] See https://www.theguardian.com/politics/2017/jan/17/key-points-from-mays-what-have-we-learned.

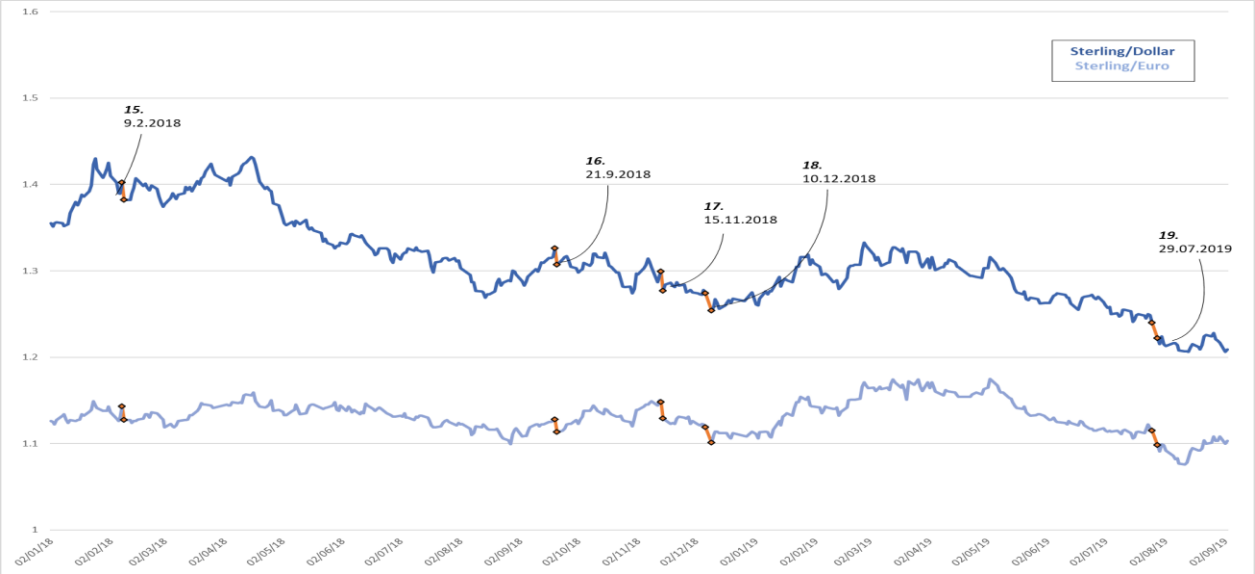
- **18 April 2017**

Theresa May unexpectedly calls a general election on 8 June 2017 in an attempt to strengthen her position for upcoming negotiations with the EU. The pound reacts positively, its gains exceeding triple the standard deviation. The appreciation comes as polls indicate that the Conservative Party could win by a large majority, which would ease the negotiation process and prevent long-term uncertainty, as the majority would be able to force difficult decisions through Parliament.[23]

- **9 June 2017**

The results of the general election are announced. The Conservative Party unexpectedly loses its majority in the election but still wins the most seats. Theresa May manages to form a new majority with support from the Northern Irish DUP Party. Her plan to strengthen the Conservative Party's position domestically, in order to be better equipped for negotiations with the EU, has backfired. Instead, results reveal a national divide adding to political uncertainty, with the small DUP Party agreeing to defend the government subject to certain conditions. Sterling depreciates by more than three times the standard deviation.

Figure 10. Pound-euro and pound-dollar exchange rates, 2 Jan 2018 through 3 Sep 2019.



Source: Authors' calculations and Landsbankinn (landsbanki.is).

[23] See https://www.theguardian.com/business/live/2017/apr/19/ftse-100-election-pound-market-imf-business-live?page=with:block-58f737d6e4b05776df18f0ca#block-58f737d6e4b05776df18f0ca.

- **9 February 2018**

The EU's Chief Negotiator, Michel Barnier, claims that May's government is unwilling to compromise on its demands, which will lead to a no-deal exit with no transition period. The main obstacle is the border between the UK and Ireland: a hard Brexit would require the reinstatement of border controls between Ireland and Northern Ireland because Ireland will remain in the EU. Such a hard border is very undesirable, however, because the open borders established by the Good Friday Agreement in 1998 played a vital part in the Northern Irish peace process. Barnier's statement leads to a depreciation of the pound exceeding triple the standard deviation. Brexit-related.

- **21 September 2018**

Theresa May releases a statement on two issues that had stood in the way of an agreement. The former concerns the post-Brexit economic relationship between the EU and the UK. The EU wants the UK either to remain part of the internal market and customs union or to set up border controls between the EU and the UK, but May finds neither option acceptable. The second issue is related to the first, as it concerns the Irish border and the so-called Irish backstop. The backstop is supposed to guarantee that a closed Irish border will be avoided, no matter what. According to May's statement, the two sides are far from reaching an agreement on how such a backstop should work. Sterling falls by more than three times the standard deviation following the prime minister's remarks. Brexit-related.

- **15 November 2018**

On 14 November 2018, the UK and the EU negotiating teams reach an agreement, and later that day, May's government publishes the Withdrawal Agreement. The agreement is met with fierce criticism from members of all parties. The next day, 15 November, Brexit Secretary Dominic Raab resigns from the Cabinet along with several other ministers. The resignations and the general negative reception of the Withdrawal Agreement cause the pound to drop by more than three times the standard deviation.[24] Brexit-related.

[24] See https://www.theguardian.com/business/2018/nov/15/pound-falls-steeply-as-brexit-resignations-rock-the-government.

- **10 December 2018**

In a statement to the House of Commons, Theresa May announces an indefinite delay in the Meaningful Vote, which is Parliament's vote on her Withdrawal Agreement, initially planned for the following day. The delay comes amidst expectations of an embarrassing defeat for May's government, as the agreement had garnered little support. The delay leads to increased uncertainty, which exacerbates the danger of a no-deal exit, causing the pound to depreciate by more than three times the standard deviation.[25] Brexit-related.

- **14 January 2019**

The prime minister discusses the Irish backstop in the House of Commons. The backstop, which gives the EU and the UK until 2022 to negotiate a new trade agreement before its activation, had been the target of severe criticism from pro-Brexit MPs. Should an agreement not be reached in time, the backstop would be activated, keeping the UK in the customs union to avoid a hard border between Ireland and Northern Ireland. Some MPs pointed out that were the backstop to be activated, both the UK and the EU would have to agree to deactivate it, potentially allowing the EU to keep the UK within the union indefinitely. Markets seem to have a more favourable impression of the backstop, as the pound appreciates more than two standard deviations following May's speech. Brexit related.

- **26 February 2019**

Theresa May promises the House of Commons a vote to rule out a no-deal Brexit on 29 March should she lose the second Meaningful Vote next month. As expected, the pound reacts positively, gaining more than double the standard deviation over the day. Brexit-related.

- **22 March 2019**

The European Council meets in Brussels and agrees to an extension of Article 50 until 22 May 2019 if May's third Withdrawal Agreement is approved by the House of Commons, or until 12 April 2019 if it is not. Because the original exit date, 29 March, is only a week away, the extension is essential to avoid a no-deal Brexit, and predictably, the pound appreciates following the news. The pound-euro exchange rate rises by more than four times the standard

[25] https://www.telegraph.co.uk/business/2018/12/11/value-pound-has-affected-theresa-may/.

deviation and the dollar-euro exchange rate by more than double the standard deviation. Brexit-related.

- **3 May 2019**

The Conservative Party loses over 1,000 councillors and control of several councils in local elections. Labour fails to gain from these losses, instead suffering some losses of its own, while the Liberal Democrats, Greens, and Independents fare well. The pound reacts poorly, depreciating more than double the standard deviation over the day. This was the beginning of a slide from which it has yet to recover, indicating growing fears of a no-deal Brexit. Brexit-related.

- **29 July 2019**

Boris Johnson's new government takes a tough stance on a no-deal Brexit, with Michael Gove writing in the Sunday *Times* that the government was now "working on the assumption" of a no-deal Brexit. While the prime minister himself doesn't claim that no-deal is the working assumption, his deputy official spokesperson does, as well as making it clear that he will not be meeting with EU leaders until an Irish backstop is off the table.[26] Markets reacted with fear, causing the pound to depreciate more than three standard deviations. Brexit-related.

5.3 Summary of effects on the exchange rate

Judging from these swings in the pound's exchange rate in response to Brexit-related news, one can conclude that markets have yet to foresee the nature of the UK's exit from the EU and that sterling tends to fall with both increased uncertainty and increased likelihood of a hard exit. The Brexit risk may raise the currency premium or the country premium.

Interestingly, the more time has passed from the Brexit referendum, the less impact specific news or reports on the state of negotiations seem to have on the pound. It is possible that the uncertainty has become so pronounced that the words of politicians have limited impact. If so, markets might avoid any gambles and wait until a Withdrawal Agreement passes through Parliament or a no-deal exit takes place. It could also be that the market had

[26] See https://www.theguardian.com/business/2019/jul/29/pound-drops-lowest-level-in-two-years-amid-no-deal-brexit-rhetoric-sterling-dollar-euro.

indeed foreseen most of the more recent developments – i.e., that Theresa May would lose the third Meaningful Vote – and had already taken them into account, limiting large swings. Even now, in the face of Johnson's strong no-deal rhetoric, markets still seem hesitant to price in the implications of such an exit, although the new prime minister's tenure in office has been followed by a steady, if slow, slide in the value of the pound.

6. Conclusions

The Brexit vote has primarily affected the sterling exchange rate. The more likely the UK is to leave the EU without an agreement, the further the exchange rate falls. The gradual rise in the exchange rate in recent years would then tell us that the currency market is leaning away from a hard Brexit outcome. There is also some effect on the FTSE 250, but this is more muted. The effect on the real economy is weak; employment is booming and capital inflows continue, although investment appears to be falling and house price inflation has lost pace.

It is clear that there is much uncertainty about future developments, and that this uncertainty dampens the response of markets and the economy. From what we can see, a hard Brexit would have a negative impact on the exchange rate, the stock market, and demand for output. But the effect would be mitigated, even neutralised, if an agreement were reached that ensured continued free trade between the UK and the Continent. Such an agreement might even raise prices and output from current levels by eliminating uncertainty.

References

Antonucci, L., Horvath, L., Kutiyski, Y. and Krouwel, A. (2017), "The malaise of the squeezed middle: Challenging the narrative of the 'left behind' Brexiter," *Competition and Change*, 21 (3), 211-229.

Arnorsson, A. and Zoega, G. (2016), "On the Causes of Brexit," *European Journal of Political Economy*, 55, 301-323.

Bank of England (2019a). Official Bank Rate history. *Bank of England Database*. Retrieved 25 April 2019 from: https://www.bankofengland.co.uk/boeapps/database/Bank-Rate.asp

Bank of England (2019b, 21 March). Bank Rate maintained at 0.75% - March 2019. *Bank of England*. Retrieved 25 April 2019 from: https://www.bankofengland.co.uk/monetary-policy-summary-and-minutes/2019/march-2019.

Biggs, Barton (2008), *Wealth, War & Wisdom*, Hoboken: John Wiley & Sons Inc.

Cameron, D. (2013, 23 January). EU speech at Bloomberg. Retrieved 20 April 2019 from: https://www.gov.uk/government/speeches/eu-speech-at-bloomberg

Carney, M. (2016, 30 June). Uncertainty, the economy and policy. *Speech by Mark Carney*. Retrieved 29 April 2019 from: https://www.bankofengland.co.uk/speech/2016/uncertainty-the-economy-and-policy

Colantone, I. and Stanig, P. (2018), "Global Competition and Brexit," *American Political Science Review*, 112 (2), 201–218. doi: 10.1017/S0003055417000685.

Corsetti, G. and Müller, G. (2016), "The Pound and the Macroeconomic Effects of Brexit," *Vox EU*. Retrieved 20 April from: https://voxeu.org/article/pound-and-macroeconomic-effects-brexit.

Crafts, N. (2019, 15 January), "Brexit: Blame it on the banking crisis," *Vox EU*. Retrieved 12 April 2019 from: https://voxeu.org/article/brexit-blame-it-banking-crisis.

Davies, R.B. and Studnicka, Z. (2018), "The heterogeneous impact of Brexit: Early indications from the FTSE," *European Economic Review*, vol. 110, 1-17. doi:10.1016/j.euroecorev.2018.08.003.

Dhingra, S., Ottaviano, G.I.P., Sampson, T. and Reenen, J. (2016), "The consequences of Brexit for UK trade and living standards," *CEP BREXIT Analysis No.2*.

Dustman, C. and Frattini, T. (2014), "The Fiscal Effects of Immigration to the UK," *The Economic Journal*, Volume 124, Issue 580, November 2014, Pages F593–F643.

Fidrmuc, J., Hulényi, M. and Tunalı, Ç. (2016), "Money Can't Buy EU Love: European Funds and the Brexit Referendum," *CESifo Working Paper Series No. 6107*.

Forte G., Portes J. (2017), "The economic impact of Brexit-induced reductions in migration," *Oxford Review of Economic Policy*, 33 (1), S31-S44. doi:10.1093/oxrep/grx008

Goodwin, M. J. and Heath, O. (2016), “The 2016 Referendum, Brexit and the Left Behind: An Aggregate level Analysis of the Result,” *The Political Quarterly*, 87, 323-332. doi:10.1111/1467-923X.12285.

Hill, Claire A. (1997), “How Investors React to Political Risk Symposium,” International Issues in Cross-Border Securitization and Structured Finance, *Duke Journal of Comparative & International Law*.

Hobolt, S. B. (2016), “The Brexit vote: a divided nation, a divided continent,” *Journal of European Public Policy*, 23 (9), 1259-1277. doi:10.1080/13501763.2016.1225785

Inglehart, R., Norris, P. (2019). *Cultural Backlash: Trump, Brexit, and Authoritarian Populism*. Cambridge: Cambridge University Press.

Inglehart, R. and Norris, P. (2016). Trump, Brexit and the rise of Populism: Economic have-nots and cultural backlash. *HKS Working Paper No. RWP16-026*. doi:10.2139/ssrn.2818659

Investing.com. DAX (GDAXI). Retrieved 25 April 2019 from: https://www.investing.com/indices/germany-30-historical-data

Investing.com. S&P 500 (SPX). Retrieved 25 April 2019 from: https://www.investing.com/indices/us-spx-500-historical-data

Investing.com. FTSE 250 (FTMC). Retrieved 25 April 2019 from: https://www.investing.com/indices/uk-250-historical-data

Johnson, M. (2017, 20 June). FTSE 250 is not the Brexit barometer that some think. *Financial Times*. Retrieved 1 May 2019 from: https://www.ft.com/content/909ea088-55c3-11e7-80b6-9bfa4c1f83d2

Kierzenkowski, R., et al. (2016), “The Economic Consequences of Brexit: A Taxing Decision,” *OECD Economic Policy Papers*, No. 16. Paris: OECD Publishing. doi: 10.1787/5jm0lsvdkf6k-en.

Korus, A. and Celebi, K. (2019), ”The Impact of Brexit news on British pound exchange rates,” *International Economics and Economic Policy*, 16 (1), 161-192. doi:10.1007/s10368-018-00423-0

London Stock Exchange. FTSE Statistics. Retrieved 23 April 2019 from: https://www.londonstockexchange.com/statistics/ftse/ftse.htm

Maidment, J. (2019, 10 May). Donald Tusk claims there is a 30 per cent chance Britain will not leave the European Union. *The Telegraph*. Retrieved 7 April 2019 from: https://www.telegraph.co.uk/politics/2019/05/10/brexit-latest-news-guy-verhofstadt-joins-sir-vince-cable-lib/

Merkel, W. and Vehrkamp, R. (2018). Populismusbarometer 2018. *Bertelsmann Stiftung*. Retrieved 7 April 2019 from: https://www.bertelsmann-stiftung.de/fileadmin/files/BSt/Publikationen/GrauePublikationen/ZD_EINWURF_04_2018_Populismusbarometer.pdf

Mudde, C. (2017). *Populism: A Very Short Introduction.* 2nd Edition. New York: Oxford University Press.

Mudde, C. (2004), "The Populist Zeitgeist," *Government and Opposition*, 39 (4), 541-563. doi:10.1111/j.1477-7053.2004.00135.x.

Müller, J.-W. (2015), "Parsing populism: Who is and who is not a populist these days?" *Juncture*, 2 (22), 80-89. doi:10.1111/j.2050-5876.2015.00842.x.

Müller, J.-W. (2016) *What is Populism*. Philadelphia: University of Pennsylvania Press.

Ramiah, V., Pham, H.N.A. and Moosa, I. (2016), "The sectoral effects of Brexit on the British economy: early evidence from the reaction of the stock market," *Applied Economics*, 49/26, 2508-2514. doi:10.1080/00036846.2016.1240352.

Rodrik, D. (2018a), "Populism and the economics of globalization," *Journal of International Business Policy*, 1 (1-2), 12-33. doi:10.1057/s42214-018-0001-4

Rodrik, D. (2018b), "Towards a More Inclusive Globalization: An Anti-Social Dumping," Scheme. *Econfip.* Retrieved 13 April 2019from: https://econfip.org/wp-content/uploads/2019/02/9.Toward-a-More-Inclusive-Globalization.pdf.

Woodford Investment Management (2016). The economic impact of 'Brexit'. Retrieved 14 April 2019 from: http://woodfordfunds.com/economicimpact-brexit-report/

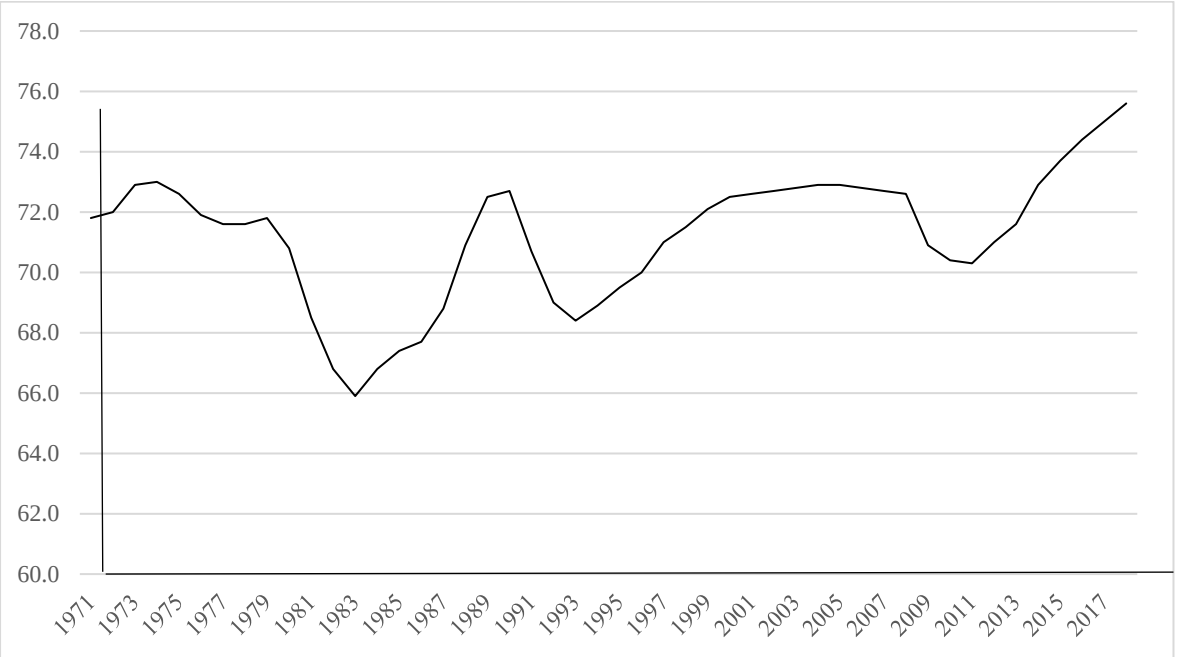
Wright, B. (2016, 28 June). Why we should be looking at the FTSE 250 and not the FTSE 100 to gauge the impact of Brexit. *The Telegraph*. Retrieved 2 May 2019 from: https://www.telegraph.co.uk/business/2016/06/27/why-we-should-be-looking-at-the-ftse-250-and-not-the-ftse-100-to/

YouGov (2019, 28 April). European Parliament voting intention. *YouGov*. Retrieved 27 April 2019 from: https://yougov.co.uk/topics/politics/articles-reports/2019/04/28/european-parliament-voting-intention-brex-28-lab-2

YouGov (2019, 16 April). Most voters have only become more sure about their EU referendum vote. *YouGov*. Retrieved 3 May 2019 from: https://yougov.co.uk/topics/politics/articles-reports/2019/04/16/most-voters-have-only-become-more-sure-about-their.

Appendix

Figure A1. Employment as a share of the population aged 16-64 (%)



Source: Office for National Statistics.

Figure A2. Annual rate of growth of UK house prices (%)

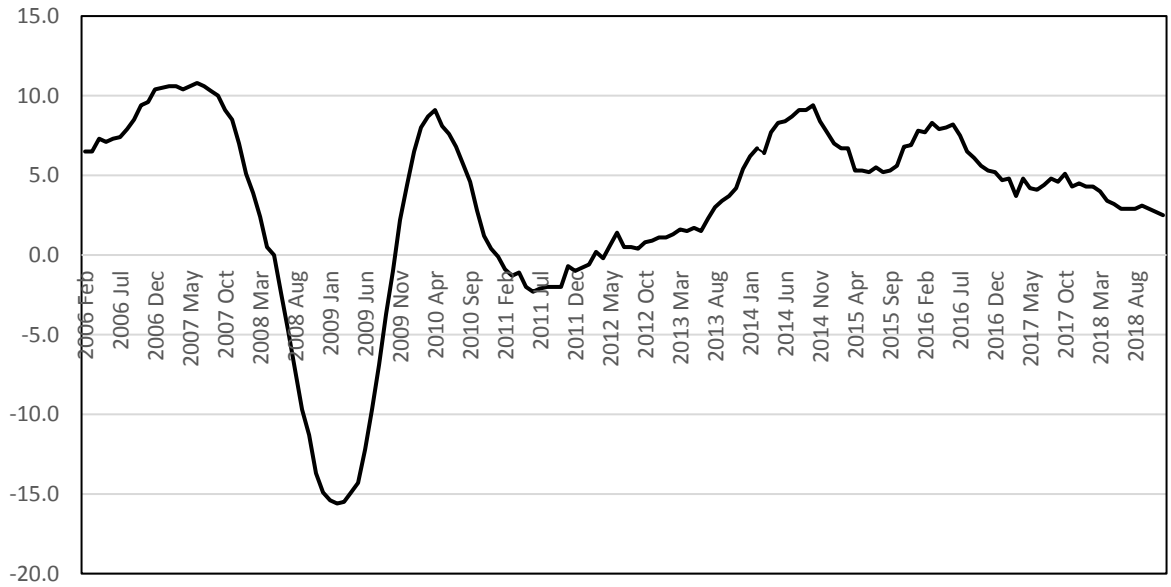
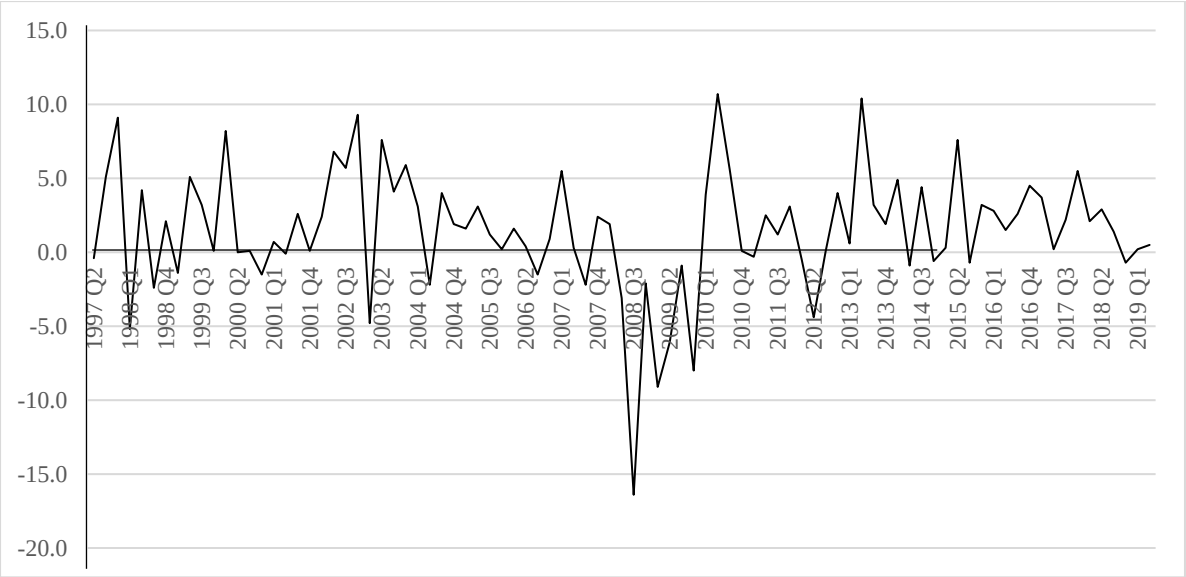


Figure A3. Gross fixed capital formation – quarterly changers (%)



Source: Office for National Statistics.

Figure A4. The pound-dollar exchange rate, 1971-2019

Sources: Authors' calculations and *investing.com*.