GLOBAL RISK INTEL

Artificial Intelligence Report

# ASSESSING THE IRISH BORDER ISSUE AND BREXIT WITH MACHINE LEARNING

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## ARTIFICIAL INTELLIGENCE REPORT

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## Bolts


Examining data, both structured and unstructured, with artificial intelligence, statistics, and analytical tools.


A subcategory of artificial intelligence in which engineered algorithms process, predict, and recognize information based on training data.


Processing and analyzing written and spoken language(s) utilizing artificial intelligence, computer science, and linguistics.


Designing, building, and replicating human behavior utilizing computers and associated models.

## Summary

One of the most complex issues policymakers face as they negotiate the United Kingdom's departure from the European Union is how to regulate the Irish border. Under British Prime Minister Boris Johnson's current Brexit deal, Northern Ireland could become both part of the UK and the EU, creating trade risks for businesses. In order to understand public opinion on issues related to the Irish border and connect them with the 2019 general election in the UK, Global Risk Intel utilized artificial intelligence to create a Twitter sentiment analysis. The results expand and deepen our understanding of what voters are thinking and associate with relevant topics, enhancing our capacity to create a modern, state-of-the-art risk analysis.

## Tags

**Irish border, Brexit, General Election, United Kingdom, European Union, Trade, Risk Management, Artificial Intelligence, Machine Learning, Sentiment Analysis.**

## List of Abbreviations:

| | |
|---|---|
| ***BERT*** | Bidirectional Encoder Representations from Transformers |
| ***DUP*** | Democratic Unionist Party |
| ***EU*** | European Union |
| ***FTA*** | Free Trade Agreement |
| ***ML*** | Machine Learning |
| ***UK*** | United Kingdom |

## Contents





## Introduction

With the general election in the United Kingdom (UK) on December 12, 2019 rapidly approaching, one may wonder how likely it is that British Prime Minister Boris Johnson's Brexit deal will be approved by the British parliament. Now that European Union (EU) leaders have accepted British Prime Minister Boris Johnson's Brexit deal, the deal must be now approved by the British government. This has thus far proven a challenge. Much is at stake in this next phase of the Brexit procedure, as it will determine the nature of long-term relations between the EU, Britain, Northern Ireland, and the Republic of Ireland. The 2019 General Election could potentially shuffle seat distribution in the British parliament and impact the adoption of Boris Johnson's Brexit deal.

Public survey results indicate that the Conservative party will likely remain the strongest party in the parliament, followed by the Labour party and the Liberal Democrats.[1] Polls have the potential to predict election outcomes, but a closer look at public opinion on social media can provide a deeper and more nuanced analysis of the Irish border issue. For this reason, Global Risk Intel has utilized Machine Learning (ML) to understand public opinion on the social media platform Twitter. Global Risk Intel applied a Sentiment Analysis, using the cutting-edge ML language model BERT (Bidirectional Encoder Representations from Transformers) to process and visualize Tweets relating to specific hashtags on Twitter. The visualized results of the Sentiment Analysis illustrate whether the public feels positive, negative, or neutral about topics relating to the Irish border issue and British politics. The analysis results grant insight into what to anticipate in the general election and the Irish border debate.

## The Irish Border Debate and the 2019 General Election

The Irish border issue has been a central point of discussion in Brexit negotiations between the UK and the EU. Northern Ireland is part of the UK and shares a border with the Republic of Ireland in the south. Decades of violent conflict between nationalist pro-Irish factions and unionist pro-UK

[1] **YouGov & The Sunday Times (2019): *YouGov/The Sunday Times survey results, 28th-29th November 2019*. Available at: https://d25d2506sfb94s.cloudfront.net/cumulus_uploads/document/3e6ngxeco2/TheSundayTimes_VI_Results_191129_w.pdf (Accessed December 1, 2019).**

factions shaped politics in Ireland until the Good Friday Agreement (or Belfast Agreement) brought the conflict to its official end in 1998. While the United Kingdom, including Northern Ireland, and the Republic of Ireland both were part of the European Union, uninhibited cross-border trade and movement were guaranteed, as they were legally established by the European Union.

The 2016 referendum on the UK's exit from the EU, however, raised the question of how to regulate the border between the Republic of Ireland, which is not part of the UK and will remain within the EU, and Northern Ireland, which will exit the EU alongside the rest of the UK. Brexit has greatly complicated the Irish border issue and has incited much debate among politicians, parties, and the public. While a departure from the EU means that a hard border with customs and tariffs would have to be reinstated between Northern Ireland and the Republic of Ireland, this solution would violate the Good Friday Agreement of 1998 and put peace and border security within Ireland at risk.

In order to strike a balance regarding Irish borders, British Prime Ministers have set out different solutions in their Brexit agreement proposals. Former Prime Minister Theresa May was unsuccessful in convincing the British parliament to approve her Brexit deal and the Irish backstop solution. Incumbent Prime Minister Boris Johnson has also been met with resistance; however, considering the public polls for the forthcoming general election, Johnson may have greater chances at receiving approval for his Brexit deal and Irish border solution by the House of Commons in the parliament.

## The Irish Border Deal

Prime Minister Boris Johnson has aimed to win the favor of the Tory Brexit party and the Northern Irish Democratic Unionist Party (DUP) with his solution on the Irish border issue. However, his two-border solution has been met with resistance from the DUP. Johnson's border deal provides that Northern Ireland and the EU remain in the EU's single market, while Northern Ireland and Britain would continue to be part of the UK's customs territory. Under this plan, Northern Ireland would

remain aligned with the EU, but would still be integrated in the UK's customs union.[2] This would result in goods being checked at the Irish border, which Northern Irish unionists have opposed.

Boris Johnson further proposed that Northern Ireland's participation in the EU's single market be subject to a vote at the Northern Ireland Assembly, also known as Stormont, every four years. Decisions would have to be made with the agreement of both unionist and nationalist parties, yet the DUP, Northern Ireland's leading unionist party, would functionally have the power to veto any decision. In making this proposal, Prime Minister Johnson intended to court the support of the DUP in the British parliament, but the DUP has distanced itself from Johnson due to the proposed two-border solution. Irish unionists disagree with Johnson since his Brexit deal would separate Northern Ireland from the rest of the UK; it would, for example, require Northern Irish businesses to fill out declaration forms when sending goods to other parts of the UK, i.e. England, Scotland, and Wales.[3] As the largest party in Northern Ireland backing a union with the UK alongside the British Conservative Party, the DUP constitutes an important strategic ally to the Conservative party and its leader Boris Johnson. Its reluctance to support Johnson's plan has made it more difficult for Johnson to receive support for his Brexit deal in the House of Commons.

Thus far, it is not entirely clear how border control in the Irish Sea will work. Boris Johnson previously promised that there would be no checks of goods at the Irish border.[4] British Home Secretary Priti Patel, however, has stated that goods moving between Britain and Northern Ireland would be subject to administrative procedures, to include a declaration form that can be filled out online.[5] The British Labour party under leader Jeremy Corbyn has strongly criticized this proposed administrative process, arguing that it effectively requires border checks and inhibits the free movement of goods between Great Britain and Northern Ireland.[6]

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**[2] The Guardian (2019): The Observer view on Boris Johnson and his Irish border tactics, *The Guardian*. Available at: https://www.theguardian.com/commentisfree/2019/oct/06/observer-view-on-boris-johnson-irish-border-tactics (Accessed: October 29, 2019).**

**[3] Ibid.**

**[4] Ibid.**

**[5] Sanford, A. (2019): Brexit: Is Boris Johnson telling the truth about Northern Ireland border checks?, *Euronews*. Available at: https://www.euronews.com/2019/10/24/brexit-is-boris-johnson-telling-the-truth-about-northern-ireland-border-checks (Accessed: October 29, 2019).**

**[6] Ibid.**

The EU Withdrawal Agreement Impact Assessment of October 21, 2019, conducted by the British government, clarifies that border controls will not include tariffs. Clause 251 of the assessment states, "As with current arrangements, there will be no tariffs payable on goods moving from Northern Ireland to Great Britain. There will be no additional costs from tariffs relative to current arrangements."[7] Essentially, Northern Ireland would retain its customs union with the rest of the UK. Meanwhile, clause 258 affirms that goods transported from Great Britain to Northern Ireland "would undergo regulatory checks in accordance with EU rules."[8] Clause 259 further clarifies that "the Protocol contains no requirement for additional regulatory checks on goods moving from Northern Ireland to Great Britain."[9] This means that checks of goods that are transported between the EU and the UK via the Irish Sea will be mainly regulatory. Priti Patel highlights that this would require a "minimal administrative process which is designed to prevent, for example, trade in endangered species."[10] This situation, however, does not assuage concerns over the free movement of goods between Northern Ireland, Great Britain, and the Republic of Ireland. Additionally, it creates ambiguity regarding Northern Ireland's territorial affiliation with the UK and the EU.

## Public Opinion and the Usefulness of Sentiment Analysis

Social media platforms like Twitter have become an important space for political conversation. We may therefore ask to what extent Twitter data can be utilized to understand the relevance of public opinion for policymaking processes and risk management. As early as 2010, scientists of the Technical University of Munich recognized that "Twitter can be considered a valid indicator of political opinion" and can suggest election outcomes, similar to election polls.[11] Twitter sentiment analysis can therefore provide a clearer view of potential election outcomes and subsequent policy

**[7] British Government (2019): *European Union (Withdrawal Agreement) Bill: Impact Assessment*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/841245/EU_Withdrawal_Agreement_Bill_Impact_Assessment.pdf (Accessed: December 1, 2019).**

**[8] Ibid.**

**[9] Ibid.**

**[10] Sanford, A. (2019): Brexit: Is Boris Johnson telling the truth about Northern Ireland border checks?, *Euronews*. Available at: https://www.euronews.com/2019/10/24/brexit-is-boris-johnson-telling-the-truth-about-northern-ireland-border-checks (Accessed: October 29, 2019).**

**[11] Tumasjan, A. et al. (2010): *Predicting elections with Twitter: What 140 characters reveal about political sentiment*, Proceedings of the Fourth International AAAI Conference on Weblogs and Social Media.**

directions in the UK, as it improves our understanding of what the public thinks about topics relating to the Irish border and Brexit.

## Methodology and Machine Learning Model

Global Risk Intel used a dataset containing 1.6 million tweets that were extracted using Twitter API. Tweets have been labelled (0 = negative, 2 = neutral, 4 = positive) and pertained to a variety of topics. Emoticons in the dataset were removed. We trained our analytic model on a training dataset and then tested the model on the data we scraped from Twitter. We collected data for political topics that are relevant to the Brexit issue and Irish border issue based on six pre-selected hashtags from 2018-12-31 to 2019-11-15.

Global Risk Intel worked with a deep neural network to enable predictive modeling. Neural networks are comprised of a set of algorithms, modeled loosely after the human brain, that are designed to recognize patterns. They interpret data through a kind of machine perception, labeling raw input. The patterns they recognize are numerical, contained in vectors, into which all real-world data must be translated. This data may include images, sound, text, or time series.

Limitations of our model were largely tied to data ambiguity and subjective human evaluation of data. The limitations include the following:

- Difficulty of detecting and labelling sarcastic tweets,
- Word ambiguity that requires the larger context of a Twitter conversation to assess data correctly,
- Abbreviations and poor spelling in tweets, and
- Relative sentiment and inclusion of both positive and negative statements in a tweet.

Finally, the confusion matrix below (see Image 1) shows that our model achieved an accuracy rate of 79% for tweets with positive sentiment and 80% for tweets with negative sentiments, which is desirable for a sentiment analysis.

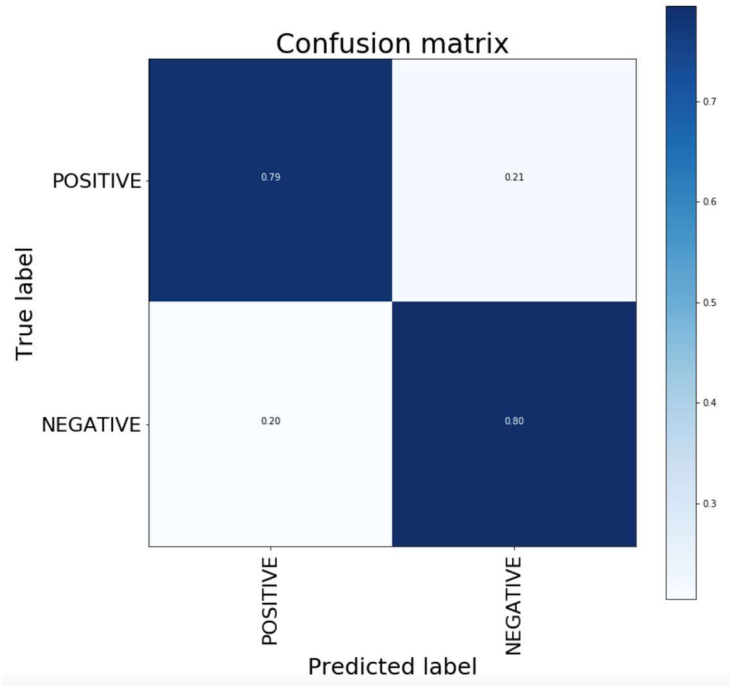


Image 1: Confusion matrix of the sentiment analysis.

## Twitter Sentiment Analysis on the Irish Border Issue

In order to gain an understanding of what Twitter users think and feel about topics related to the Irish border issue, Global Risk Intel scraped tweets containing the following six hashtags and subsequently analyzed them using BERT:

1. #BrexitDeal
2. #DUP
3. #Irishborder
4. #NorthernIreland
5. #PeoplesPrimeMinister
6. #BorisJohnson

In this sentiment analysis, Boris Johnson, being a key figure in the Brexit negotiation process, was given particular attention. Both neutral hashtags, such as #BorisJohnson and #NorthernIreland, and subjective hashtags, such as #PeoplesPrimeMinister (referring to Prime Minister Boris Johnson in a positive, supportive manner) were used to gain a deeper understanding of users' response to topics

related to the Irish border issue, Brexit, and the general election. The following images visualize Twitter users' sentiment about the selected six hashtags.

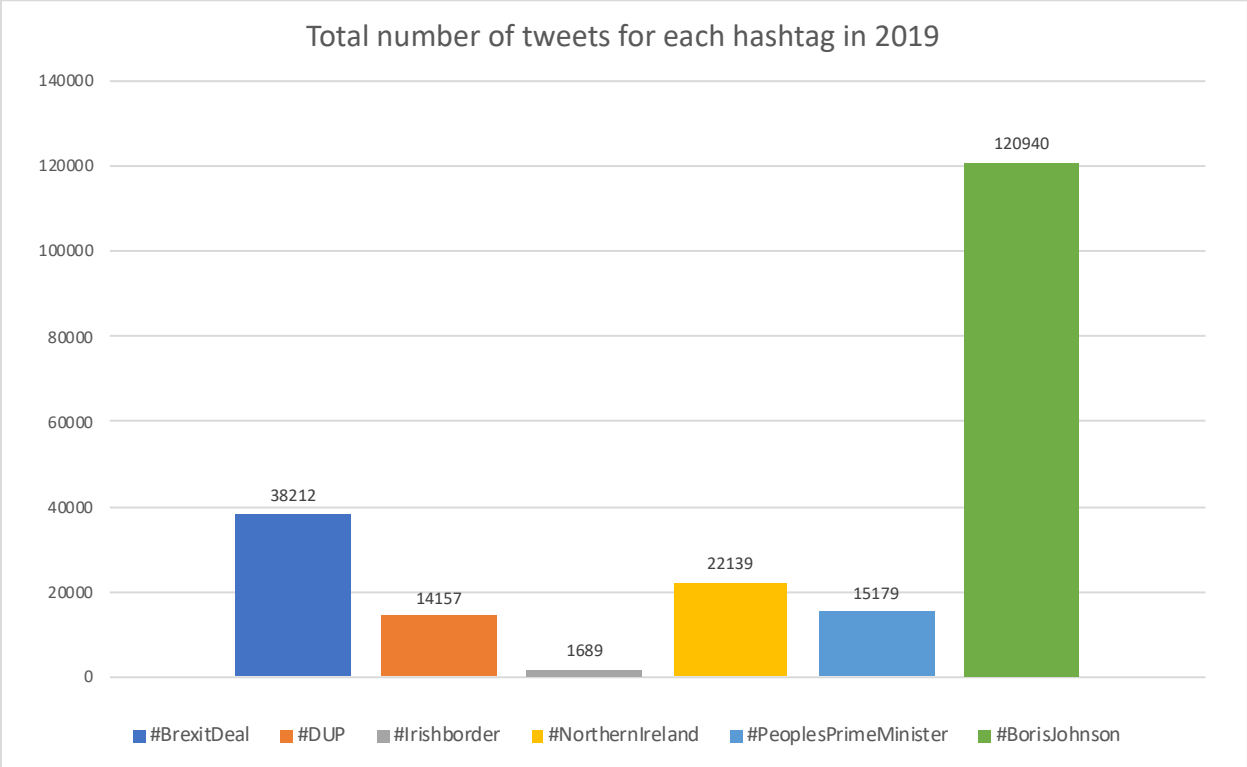


Table 1: Total number of each hashtag in 2019.

Table 1 illustrates which hashtags were used most often by Twitter users in 2019, with #BorisJohnson appearing most frequently and #NorthernIreland least frequently. The following list ranks the hashtags from most to least popular:

1. #BorisJohnson
2. #BrexitDeal
3. #NorthernIreland
4. #PeoplesPrimeMinister
5. #DUP
6. #Irishborder

This demonstrates that users were most concerned about discussing Prime Minister Boris Johnson, the Brexit deal, and Northern Ireland among the selected topics. It can be assumed that Twitter

users discuss Boris Johnson most frequently because of his role as prime minister, his key function in the Brexit negotiations, his associated prevalent media presence, and because of his polarizing politics. Johnson's decisions will determine the UK's future, which explains why Johnson is given increased social media attention.

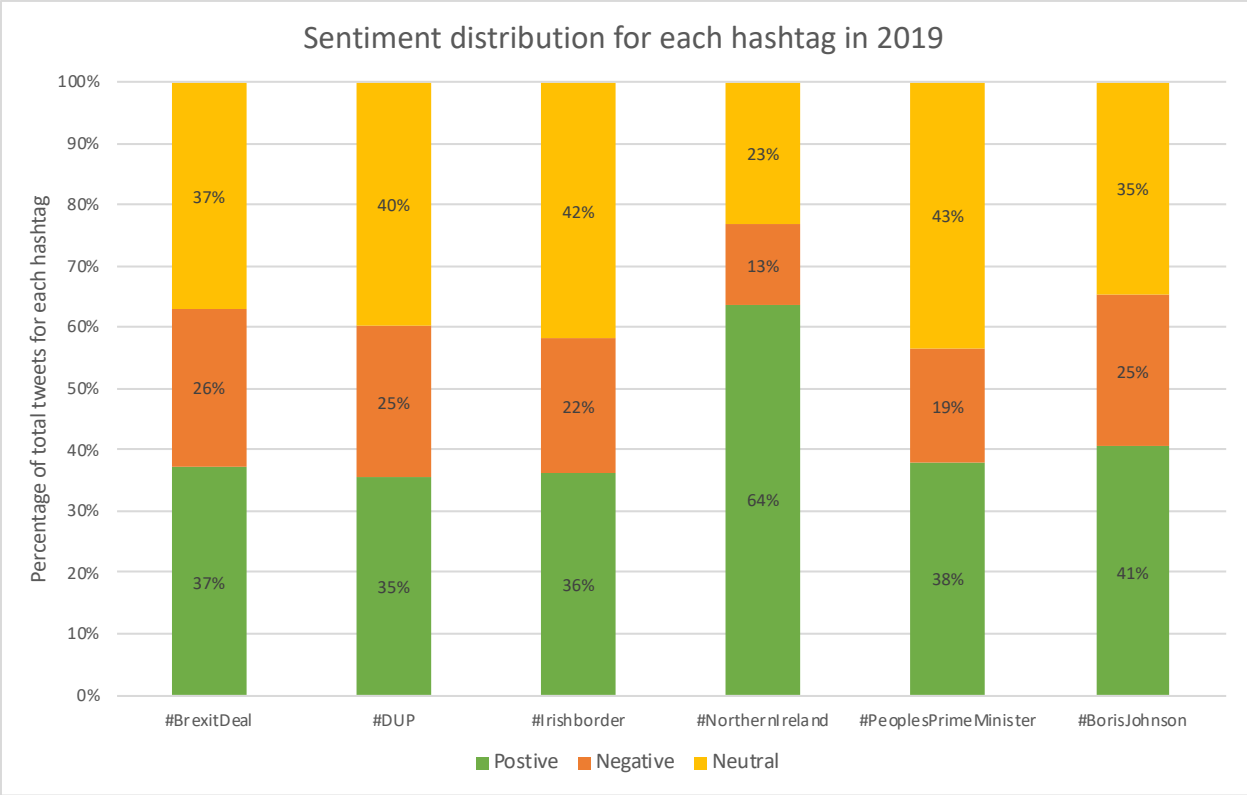


Table 2: Sentiment distribution for each hashtag in 2019.

Table 2 illustrates whether users feel positive, negative, or neutral about the selected topics. In general, it can be summarized that users felt mostly neutral and positive about the six selected topics, with a minority expressing negative sentiment. The following list further breaks down which hashtags received the highest percentage in positive, negative, and neutral response:

Most *neutral*: 1. #PeoplesPrimeMinister, 2. #Irishborder, 3. #DUP

Most *positive*: 1. #NorthernIreland, 2. #BorisJohnson, 3. #PeoplesPrimeMinister

Most *negative*: 1. #BrexitDeal, 2. #DUP/ #BorisJohnson, 3. #Irishborder

In sum, Twitter users felt mostly positive about Northern Ireland. #PeoplesPrimeMinster also received mostly positive and neutral sentiment, while #BorisJohnson ranked among the highest in both the positive and negative sentiment categories, illustrating Boris Johnson's polarizing politics and persona. While there are also cross-category overlaps in neutral and negative sentiment for #Irishborder and #DUP, the hashtag #BrexitDeal evidently received the most negative response in the tweets, visualizing that the Brexit deal is very controversial and charged with negative emotion among the public.

## Sentiment Analysis: Word Clouds

This section focuses on the words that were used most frequently in tweets, giving better insight into what feelings and words users commonly associated with the selected six topics. Words written in large letters in the word clouds were used more frequently in tweets than smaller words.


Image 2: Word cloud for #BrexitDeal.


Image 3: Word cloud for #DUP.


Image 4: World Cloud for #Irishborder.

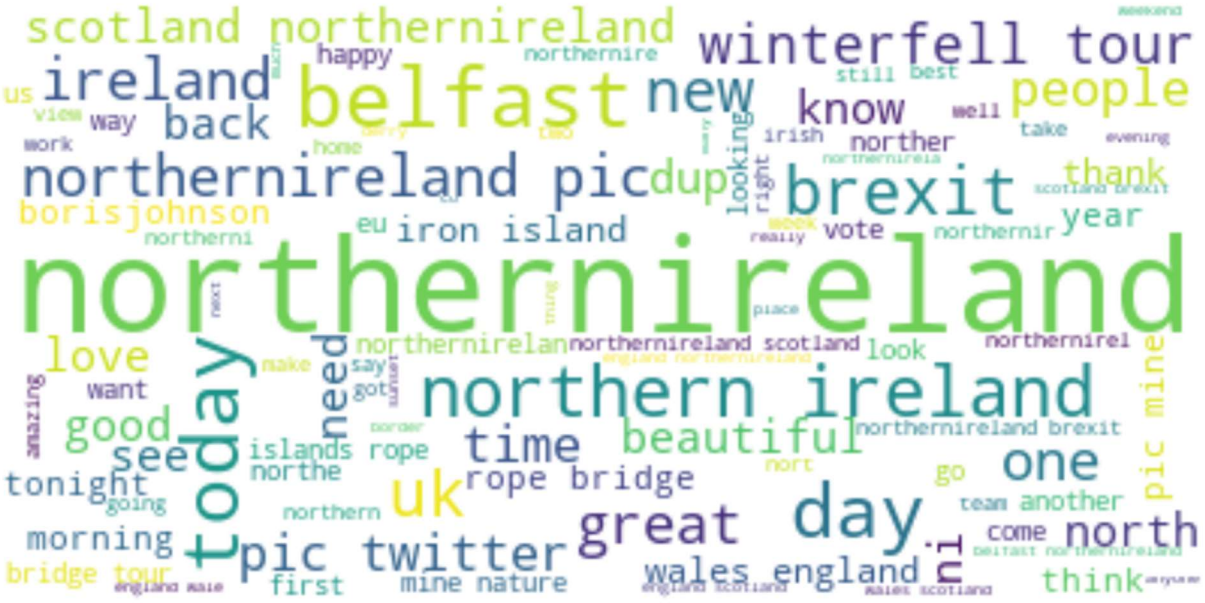


Image 5: World cloud #NorthernIreland.


Image 6: World cloud for #PeoplesPrimeMinister.


Image 7: World cloud for #BorisJohnson.

## Results Discussion: How the Public Perceives Boris Johnson, Brexit, and the Irish border issue

In order to structure and evaluate sentiment in the word clouds, Global Risk Intel created three sentiment categories, which are:

1. politics-focused words,
2. emotion, perception and action words, and
3. non-political and non-emotive words

We identified which politics-related issues Twitter users referred to most frequently through category 1, whereas category 2 words reveal how users in fact feel about the six selected topics. In order to structure category 2 key words, we identified words that were used in all six word clouds and differentiated them from words that were specific to each word cloud. Common category 2 words that appeared in each word cloud were *say* (and/or *said)*, *think* (and/or *thought*), *good*, *right*, *see*, *seem*, *well*. Extracting salient category 2 words that were unique to each cloud reveals what

sentiment exactly users associated with each hashtag. For this reason, common category 2 words that appeared in all six clouds were disregarded. Finally, category 3 words uncover additional issues discussed on Twitter. The combination of these three categories therefore provides further insight into public perception. They can explain why Twitter users express more positive, negative, or neutral sentiment in tweets with the selected six hashtags.

| Brexit Deal | DUP | Irish Border | Northern Ireland | People's Prime Minister | Boris Johnson |
|---|---|---|---|---|---|
| Boris Johnson | Brexit | Brexit | Brexit | Backboris | Brexit |
| Theresa May | Conservative | Boris Johnson | EU | Boris Johnson | Prime Minister |
| EU | Boris Johnson | Backstop | DUP | Democracy | EU |
| UK | Theresa May | EU | | Conservative | Trump |
| Extension | Election | Fail | | Go Boris | Britain |
| Labour | EU | Plan | | Remainer | Corbyn |
| MP | Backstop | Deal | | Leave | UK |
| Torie | Tory | New issue | | | Tory |
| DUP | Remain | Remain | | | Conservative |
| Voted | Labour | Leave | | | |
| Remain | Support Arlene Foster | Proposal | | | |
| | | Solution | | | |
| | | Hard border | | | |

Table 3: Salient category 1 (political) words in the word clouds.

| Brexit Deal | DUP | Irish Border | Northern Ireland | People's Prime Minister | Boris Johnson |
|---|---|---|---|---|---|
| Never | Support | Still | Love | Want | Want |
| Want | Agree | Fail | Need | Support | Need |
| Please | Need | Must | Amazing | Great | Vote |
| Support | Wonder | Need | Great | Love | |
| Still | Still | Clearly problem | Happy | Thank | |
| | Keep | Problem | Beautiful | Know | |
| | Vote | Understand | Vote | Stop | |
| | | Blatantly choose | | Vote | |

Table 4: Salient category 2 (emotive, perceptive, action) words in the word clouds.

| Brexit Deal | DUP | Irish Border | Northern Ireland | People's Prime Minister | Boris Johnson |
|---|---|---|---|---|---|
| Time | Bribe | Technology | Winterfell tour | Country | Time |
| Country | Money | | Rope bridge | | Country |
| | Power | | Iron island | | World |
| | | | Belfast | | |
| | | | Scotland | | |
| | | | Ireland | | |
| | | | Wales | | |
| | | | England | | |

Table 5: Salient category 3 (non-political, non-emotive) words in the word clouds.

Looking at #BorisJohnson and #PeoplesPrimeMinister, we detect positive and neutral sentiment from the public in table 2 and largely positive words (love, great, thank, support, etc.) in category 2 in the word clouds. This indicates that the public shows support for Prime Minister Johnson. By contrast, the Brexit deal received mixed feedback in category 2, displaying frustration (never, still) as well as anticipation and hope (want, support, please). Similarly, the DUP is also marked by mixed sentiment, including anticipation and support (support, agree, need, wonder) and category 3 words that can carry negative connotations (bribe, money, power). #Irishborder reveals that the

public is aware of the Brexit-related border issue and expresses frustration and anticipation (still, fail, need, clearly problem, understand, plan, must). Interestingly, tweets with #NorthernIreland contain the highest percentage of positive sentiment among the six selected topics. At the same time, #NorthernIreland tweets contained the largest pool of words from category 3, including tourist sightseeing spots and nature-related words. This correlation suggests that the public perceives Northern Ireland as very positive because Northern Ireland is not only associated with politics, elections, and conflict but also with travel, nature, and recreation. This, however, also shows that #NorthernIreland carries the least significance for this Irish border and Brexit-related analysis.

#BrexitDeal and #Irishborder are conflictual topics. Therefore, it may not surprise that tweets with these terms contained high negative or neutral feedback, as demonstrated in table 2. These two hashtags also received mixed or negative sentiment, as the emotive category 2 words in the word clouds show. This indicates relatively high uncertainty and frustration among the public about these political issues.

Interestingly, Boris Johnson received relatively high positive or neutral feedback in the tweets. While #PeoplesPrimeMinister produced predictably positive sentiment, one might expect the more neutral term #BorisJohnson to produce more mixed results. This finding is significant for the forthcoming general election. Our sentiment analysis results therefore overlap with election polls that predict the victory of the Conservative party.[12]

## Business and Trade Risks

Considering the significant positive sentiment towards Boris Johnson on Twitter and polling results for the general election on December 12, 2019, the main question now is how many seats the Conservative party will receive relative to the Labour party. While polls indicate that the

[12] **BMG (2019): *Latest BMG/Independent GE Polling Results, 24th November 2019*. Available at: https://www.bmgresearch.co.uk/bmg-independent-ge-polling-results-24th-november-2019-2/ (Accessed: December 1, 2019); ICM Unlimited (2019): *ICM Voting Intentions - General Election 2019: Poll 4*. Available at: https://www.icmunlimited.com/our-work/icm-voting-intentions-general-election-2019-poll-4/ (Accessed: December 1, 2019); YouGov & The Sunday Times (2019): *YouGov/The Sunday Times survey results, 28th-29th November 2019*. Available at: https://d25d2506sfb94s.cloudfront.net/cumulus_uploads/document/3e6ngxeco2/TheSundayTimes_VI_Results_191129_w.pdf (Accessed: December 1, 2019).**

Conservative party is in the lead, the gap between the Conservative party and the Labor party is narrowing, limiting Johnson's chances.[13] This would compel the prime minister to seek support from minority parties in the government for his Brexit deal. If he is successful in receiving approval from the parliament, new regulations could harm businesses trading between Britain, Northern Ireland, and the EU.

If businesses in Northern Ireland import goods from Britain, they will be charged EU tariff rates and receive a tariff refund once they have proven that Northern Ireland is the final destination of the imported products.[14] This regulation will become especially problematic in terms of administrative efficiency because Great Britain is Northern Ireland's most important trading partner. In 2017, Northern Ireland imported about twice as much from Great Britain as compared to Ireland and the rest of the world.[15] Goods and services worth £20.4 billion (65%) were imported from Great Britain, while only £2.6 billion (13%) came from Ireland and £4.6 billion (22%) from the EU and the rest of the world. Concerning goods alone, £10.5 billion (63%) were imported from Great Britain, £2.3bn (13%) from Ireland, and £4.0bn (24%) from the EU and the rest of the world.[16]

Therefore, maintaining efficient trade between Northern Ireland and Great Britain is crucial for businesses in Northern Ireland. A central risk to businesses will be the rules of origin, which prevents companies from countries with which the EU does not have free trade agreements (FTA) from exporting products tariff-free to the EU via a third country.[17] For instance, the EU charges tariffs on goods imported from countries with which it does not have an FTA, such as the US. Yet if the UK arranges FTAs with the EU and the US after Brexit, exporters from the US could circumvent EU tariffs

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**[13] Helm, T. and Savage, M. (2019): *Brexit: Johnson 'will have to call second referendum if he fails to win majority'*, The Guardian. Available at: https://www.theguardian.com/politics/2019/nov/30/boris-johnson-forced-second-referendum-no-majority-opinium (Accessed: December 3, 2019).**

**[14] Sampson, T. (2019): Boris Johnson's Brexit deal poses a rules-of-origin conundrum, *Financial Times*. Available at: https://www.ft.com/content/280a05ce-f6fe-11e9-bbe1-4db3476c5ff0 (Accessed: November 29, 2019).**

**[15] Northern Ireland Statistics and Research Agency (2019): *Overview of the NI Trade with GB*. Available at: https://www.nisra.gov.uk/sites/nisra.gov.uk/files/publications/NISRA_Overview_of_NI_Trade_with_GB_2017_0.pdf (Accessed: November 29, 2019).**

**[16] Ibid.**

**[17] Sampson, T. (2019): Boris Johnson's Brexit deal poses a rules-of-origin conundrum, *Financial Times*. Available at: https://www.ft.com/content/280a05ce-f6fe-11e9-bbe1-4db3476c5ff0 (Accessed: November 29, 2019).**

by sending their products to the UK tariff-free first and then once again tariff-free from the UK to the EU. In order to avoid such third-party trade, rules of origin were established, which compel businesses to prove the origin of their goods.[18] Therefore, companies in Great Britain would have to prove that their goods originated in Great Britain when they export them to Northern Ireland. Considering that supply chains are strongly globalized, however, determining the country of origin may become difficult. Companies would face complex administrative and investigative processes. Funding and other resources necessary to comply with these procedures would consequently increase business expenses and inhibit free trade within the UK. If Prime Minister Johnson's Brexit deal and his Irish border solution are accepted by the forthcoming parliament, businesses in Great Britain may have to manage this challenge or even decide to decrease or stop exports to Northern Ireland. This situation would pose risks to Northern Ireland's economic stability and resource procurement, particularly so since the final Brexit deal will have long-term effects on trade relations across the Irish Sea.

## Conclusion

Machine Learning can enhance our understanding of public opinion on important political, social, and economic issues. Social media platforms allow risk managers to analyze such issues and gain a deeper understanding of the social environment. In the case of the Irish border issue, sentiment towards Boris Johnson and the Brexit deal have provided insight into what the public is thinking and discussing. Sentiment analyses can therefore supplement election polls to predict election outcomes. Crucially, sentiment analysis offers a deeper insight into what the public is associating with certain issues than does a simple opinion poll, giving risk managers better information to work with.

Positive sentiment towards Boris Johnson correlates with election polls predicting that the Conservative party will receive the largest share of votes. Twitter users have expressed frustration and anticipation towards the Brexit deal and the Irish border issue. While this sentiment indicates how the public may receive future Brexit and border policies, what is even more important is

[18] **Sampson, T. (2019): Boris Johnson's Brexit deal poses a rules-of-origin conundrum, *Financial Times*. Available at: https://www.ft.com/content/280a05ce-f6fe-11e9-bbe1-4db3476c5ff0 (Accessed: November 29, 2019).**

understanding to what extent the public backs Boris Johnson and the Conservative party in the general election. Since the DUP will also play a significant role in Brexit negotiations in the British parliament, the status of their alliance with Johnson will be another important factor. Thus, understanding how the public perceives the DUP also plays a critical role in the context of the Irish border issue. A large share of the public sentiment towards the DUP was negative or neutral, suggesting frustrations and a potential lack of support by the public.

The results of the sentiment analysis imply that the Conservative party may win the election. Depending on the seat distribution and party alliances, Boris Johnson's Brexit deal could potentially be adopted by the parliament. If this is the case, businesses in Great Britain and Northern Ireland may face increased risks when trading across the Irish Sea. Such trade barriers and administrative difficulties have the potential to harm the Northern Irish economy. This could have long-term negative effects on trade between Northern Ireland and Great Britain. Alternatively, Boris Johnson could abandon the hybrid border arrangement in the Brexit deal, but it remains to be seen whether he is willing to take this step.


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