Examining the Cost of Living Crisis: Insights from E-Petitions and Constituency Groupings

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Abstract

Following the COVID-19 pandemic, the world has faced further challenges, including a war in Europe and a cost of living crisis. Governments around the world have attempted various initiatives to tackle the impact of these issues on their populations. For the cost of living, this has included subsidising energy costs, implementing spending cuts and raising interest rates. Politicians are interested in to what degree these initiatives are palatable to their electors, and one mechanism to gauge this is through e-petitions. In this chapter we identify those recent e-petitions hosted on the UK parliament's e-petition platform that are concerned with the cost of living. Topic models are used to identify the common issues amongst these e-petitions and the strength of support for each topic is quantified. A classification is carried out to establish groupings of constituencies who share similar concerns. The nature of these groupings, geographically, politically and socially is explored.

Keywords: Cost of Living; E-petitions; Topic Models; Classification; Political Support.

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Introduction

The 2020s have presented numerous challenges to governments and societies. The decade commenced with a global pandemic and further escalated into land wars in Europe and the Middle East, all accompanied by a cost of living crisis (Harari et al., 2022). In the United Kingdom (UK), this crisis was characterised by soaring prices for essential goods like food (Francis-Devine et al., 2022; Irvine et al., 2022), energy (Bolton & Stewart, 2023), transportation (Robinson & Mattioli, 2020; Sovacool et al., 2023), and housing (Wilson & Barton, 2022), along with stagnating wage growth (Cominetti et al., 2022). By the end of spring 2023, UK annual inflation had skyrocketed to 8.9%, far exceeding the target level of 2%. Inflation for specific expenditures, such as food, was even higher, as depicted in Figure 1 (Office for National Statistics, 2023).

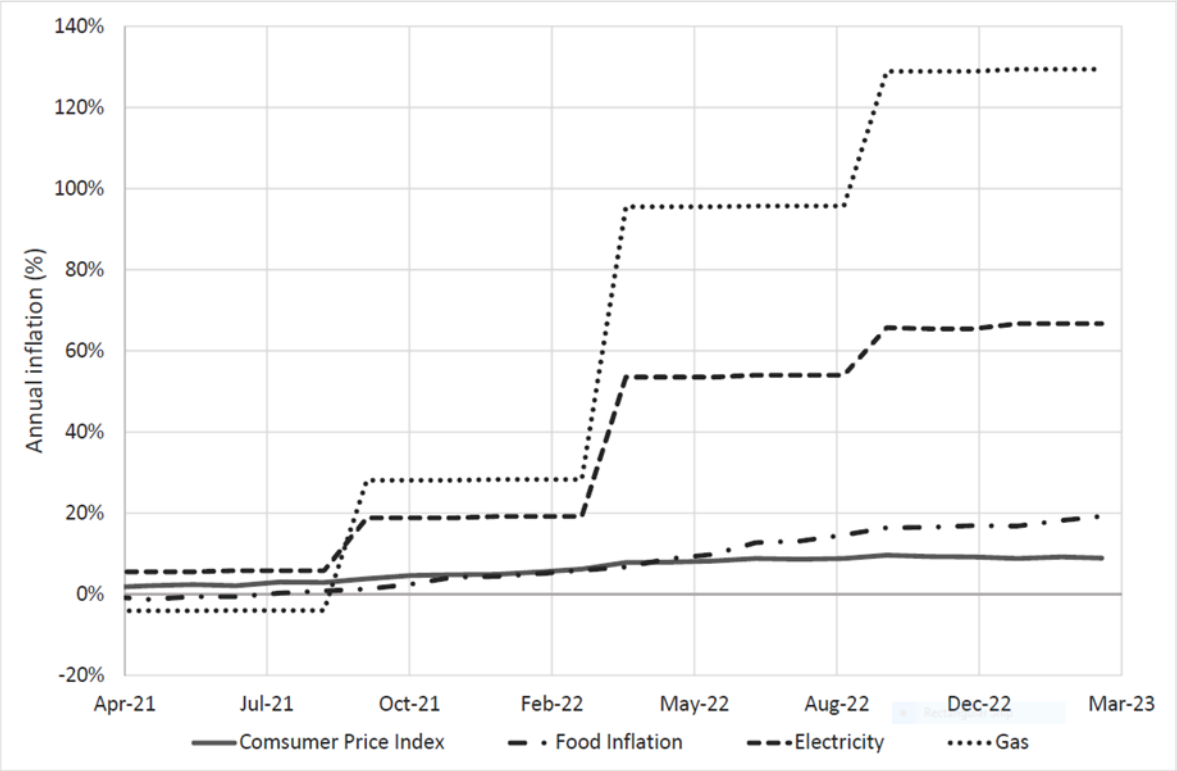

Figure 1 : Annual rates of inflation for all good, food, domestic gas and electricity

The combination of high living costs and stagnant wages has a significant impact on individuals' well-being and health, both physically and mentally (Broadbent et al., 2023; Khan, 2022), with children being particularly vulnerable (Iacobucci, 2023). This situation can also contribute to adverse health effects, such as obesity (Robinson, 2023). These negative consequences are often exacerbated by the widening inequality resulting from prolonged periods of high living costs and low wages. This is evident when examining regional and city-specific inflation measures, with

some locations experiencing a headline rate that can be as much as 3% higher than in other locations (Rodrigues & Quinio, 2022).

While citizens rely on their government for support during a crisis, they also desire to influence the nature of that support. Much of the policy response during times of crisis is necessarily reactive, so mechanisms for scrutiny, both during and after, are important for maintaining trust between citizens and decision makers. Policy response to the Covid-19 pandemic has been scrutinised and criticised for its non-targeted approach (Milne 2020) and unequal societal effects (Johnson 2020). Similarly, responses to the cost-of-living crisis have been criticised as lacking in nuance, with the most vulnerable being hardest hit (National Energy Action 2022, Centre for Social Justice 2022). Given that policy is politically, socially and economically motivated, having a strong view of public sentiment during and soon after periods of rapid decision making has the advantage of informing government about both the effectiveness and perception of those policies. This evidence base for assessing effectiveness is essential for improving decision making in the future, while understanding perceptions helps with political messaging and communication. It is also important to have a holistic view of the impacts that policy have in multiple domains, given criticism that government decision making is often undertaken in policy silos (Sasse and Thomas 2022). Understanding how policy impacts people's lives contributes to this multi-domain view.

One effective method for citizens to share their views is the creation and signing of e-petitions hosted on government platforms (Briassoulis, 2010), which provides a rich and current dataset for the assessment of sentiment. This chapter uses these e-petition data, with a focus on the period covering the latest cost of living crisis, to present a case study of the United Kingdom which will be of great interest to scholars examining e-petitions as an indicator of public opinion during times of upheaval worldwide. Drawing on established methods we seek to accomplish three things in this chapter. First, we identify the topics in the e-petition data that are related to the most recent cost of living crisis in the UK. Second, we determine the level of support for each topic within each constituency, which could be seen as a proxy for public sentiment during a time of crisis. Third, we group together parliamentary constituencies based on their support for the topics identified which allows us to better understand how voter priorities vary by political representation and other spatial identifiers (e.g. deprivation). We contend that e-petitions offer a valuable mechanism for comprehending public sentiment, thus serving as a means to enhance democracy and democratic institutions. The methods presented can be adapted and applied to other research questions or contexts where similar data are available. As such this chapter

provides a guide to researchers wishing to capitalise on the rich information present in e-petition data.

Petitions

Petitioning has a long-standing tradition in most countries, dating back to the Middle Ages in Europe (Almbjär, 2019) and England (Dodd, 2007). Petitions serve multiple purposes (Leston-Bandeira, 2019). They allow citizens to express their opinions on matters of concern, enable lobbying for policy changes, hold governments accountable for their actions or inaction, and provide feedback on policies, programs, and services. The introduction of electronic platforms for hosting and signing petitions has further enhanced these roles. The use of such platforms reduces the cost and effort required to create an e-petition, as the platform handles the tasks of establishing and collating signatures. Once created, these platforms facilitate mobilising collective action, which can be easily accomplished through electronic means to promote e-petitions. This enables organisations and individuals to reach a larger audience and potentially attract the attention of sympathetic media.

The UK Parliament established its own e-petitioning platform in 2015 (UK Government and Parliament, 2022). Any citizen or resident of the United Kingdom is entitled to submit an e-petition to the platform. The text of the e-petition undergoes a verification process, during which duplicates of existing petitions or those on matters unrelated to the UK Parliament are rejected (approximately two-thirds of e-petitions are rejected). Once deemed suitable, an e-petition remains open for signatures for six months or until the end of the current Parliament. UK citizens or residents can sign an e-petition by providing their name, home postcode, and email address. A link is then sent to the email address, which, when clicked, completes the signature process. There is no requirement to register with the platform, the signatories do not have their name published and they do not have an opportunity to leave a comment. E-petitions that accumulate more than 10,000 signatures are guaranteed a response from the Government, and those with 100,000 or more signatures are considered for debate in Parliament. Additionally, the Pensions Committee of the parliament can conduct its own inquiries in response to e-petitions that raise neglected concerns (Matthews, 2023). The Pension Committee provides real-time updates which are the three most popular e-petitions in the last hour, along with the current number of signatures for each petition in every Parliamentary constituency.

According to Bochel (2016), the available evidence on the effectiveness of e-petitions in influencing politicians and government policy is limited. Blumenau (2020) found that an MP's

likelihood of advocating for the subject matter of an e-petition was influenced by factors such as party loyalty or electoral competition, even if the petition received significant support from their constituencies. Leston-Bandeira (2017) suggests that e-petitions can raise awareness of issues among politicians and in the media, serving as a vehicle for expressing discontent or protest. An e-petition that garners widespread support is likely to receive coverage in both mainstream and social media, with overlaps between the two (Asher et al., 2019). However, Matthews (2021) reports that e-petitions can present a biased view, as immediate and popular concerns may be prioritised over other more important matters. This, along with unreasonable expectations, can lead to misunderstandings about the work of government and Parliament, resulting in frustration for both petition signatories and initiators (Wright, 2015). Moreover, there is an ongoing debate regarding the effectiveness of e-participation, often referred to as 'slacktivism' or 'clicktivism' (Christensen, 2011), and how this form of activism may displace or galvanise other forms of support (Heley et al., 2022; Skoric, 2012).

Numerous studies in the literature have utilised data from the e-petition platform to gain insights into its functioning (Hale et al., 2018; Taha Yasseri et al., 2013). They have identified the textual features of e-petitions that are likely to attract potential signers (Clark & Lomax, 2020), examined political outcomes through modeling (Clark et al., 2018), and characterised constituencies based on e-petition data (Anthony & Haworth, 2020; Clark et al., 2017). Moreover, there have been studies focusing on specific thematic e-petitions to monitor public concerns, such as the UK's energy sector (Kolosok et al., 2021), the promotion of animal welfare initiatives (Chaney et al., 2021), and the concerns of the British expatriate population (Clark & Lomax, 2022).

Data

In this chapter, e-petition data from the UK Parliament's e-petition platform, specifically focusing on petitions related to the cost of living, is utilised. The phrases used to identify whether an e-petition is concerned with the cost of living are presented in Table 1 (to be included later in the chapter). Regarding the timeframe of the e-petitions considered, only those opened between September 1, 2021, and February 27, 2023, are included. The choice of the earlier date is based on the suggestion by the Institute for Government (2022) that the UK has been facing a cost of living crisis since late 2021, triggered by prices rises, low income growth and world events. Since e-petitions close after 6 months, many of these e-petitions will have been closed and cannot gain any more signatures. However some e-petition will still be open and actively gaining signatures so a cut-off date of February 27, 2023, is applied, which allows sufficient time for an e-petition to realise its full potential by May 1, 2023. This May date is when

the number of signatures and text for each e-petition is captured for this study, which is exactly 63 days or 1,512 hours after February 27, 2023. According to Yasseri et al. (2017), it is estimated that an e-petition can expect to achieve at least 90% of its eventual support after 1,500 hours. Signature count data is collected for each of the 650 UK Parliamentary constituencies, along with the short title of the e-petition and the more extensive background text provided by the e-petition initiator.

Methods

In this chapter, we employ the methods described by Vidgen & Yasseri (2020) to accomplish several tasks. First, we use these methods to identify the topics present in the e-petitions related to the cost of living. Next, we determine the level of support for each topic within each constituency. Finally, we create groupings of constituencies that exhibit similar levels of support for the identified topics.

A latent Dirichlet allocation (LDA) topic model (Blei et al., 2003) is employed in this chapter to identify topics based on the assumption that each e-petition's text can be considered as a "bag of words" associated with various topics. The LDA model probabilistically estimates the proportion of each e-petition's text that is linked to each topic. Consequently, the model does not consider the order of words or the grammar of the text when identifying topics, and the number of topics needs to be specified externally (metrics such as Cao et al., 2009; Griffiths & Steyvers, 2004 can assist in making this choice). Once the topic proportions are determined for each e-petition, the number of signatures gained by each e-petition in each constituency can be re-allocated to each topic using these proportions. By summing across all e-petitions, the number of signatures for each topic can be calculated. Essentially, this process serves as a dimensionality reduction exercise, summarising the support for a smaller number of topics from the signatures received for hundreds of e-petitions.

The subsequent step involves determining whether there are any shared patterns of support for different topics among the constituencies. To achieve this, an unsupervised classification algorithm is employed to cluster the constituencies together (Everitt et al., 2001), utilising the Ward technique (Ward, 1963) to create hierarchical groupings. Once these groupings are established, the strength of the identified topics among the group members is described. Additionally, it is possible to generate maps illustrating these groupings and compare them with the political affiliation of the constituency's member of parliament (MP), as well as the level of deprivation in the constituency.

Results

From March 3, 2020 to May 1, 2023, a total of 10,880 e-petitions were hosted by the UK Parliament's e-petition platform. Among them, 9,711 e-petitions were closed, and 1,169 were open, accumulating a total of 51,010,140 signatures. For the purpose of this study, we focus on the e-petitions that were open between September 1, 2021 and February 27, 2023, resulting in 3,687 relevant e-petitions (34% of all e-petitions) with 11,962,029 signatures (24% of all signatures). Table 1 provides a list of the 16 base phrases used to identify cost of living e-petitions and indicates the number of signatures gained by such e-petitions. However, it should be noted that this text matching approach may include some e-petitions that are not directly related to the cost of living and are therefore irrelevant. Therefore, both authors independently identified and removed these false positives. Considering that multiple phrases can appear in the same e-petition, the total number of e-petitions included in this study is 482 (12% of all e-petitions between September 1, 2020 and February 27, 2023), with a combined total of 2,422,016 signatures (20% of all signatures).

Table 1: Cost of living phrases and their occurrence in e-petitions

	All	Remove false positives		
Phrases	e-petitions	e-petitions	signatures	signatures per e-petition
child care	35	30	301,508	10,050
cost of living	183	165	1,426,034	8,643
pensions	30	24	202,705	8,446
food price	13	12	97,786	8,149
energy companies	20	18	132,689	7,372
minimum wage	40	37	255,756	6,912
fuel price	34	34	234,072	6,884
poverty	48	40	240,430	6,011
inflation	90	84	252,940	3,011
interest rate	14	13	33,134	2,549
heating	31	27	68,480	2,536
salary	51	36	90,997	2,528
afford	163	127	271,839	2,141
energy bill	81	72	56,742	788
utility companies	6	5	1,715	343
economic crisis	8	8	1,095	137
Total	847	732	3,667,922	5,011
Total (excl. duplicate phrases)		482	2,422,016	5,025

Before establishing the topics within the 482 e-petitions, it is necessary to determine the number of topics. By modeling the Title, Background, and Additional text content of all e-petitions and

exploring a range of possible topics, it becomes possible to make an informed decision regarding the optimal number of topics. In this study, three metrics are utilised: maximum likelihood, maximum Griffiths, and minimum Cao. Figure 2 illustrates these metrics across a range of topic numbers. Based on the graph, the range of topics appears to be between 30 and 40, and ultimately, we have chosen the most parsimonious option of 30 topics.

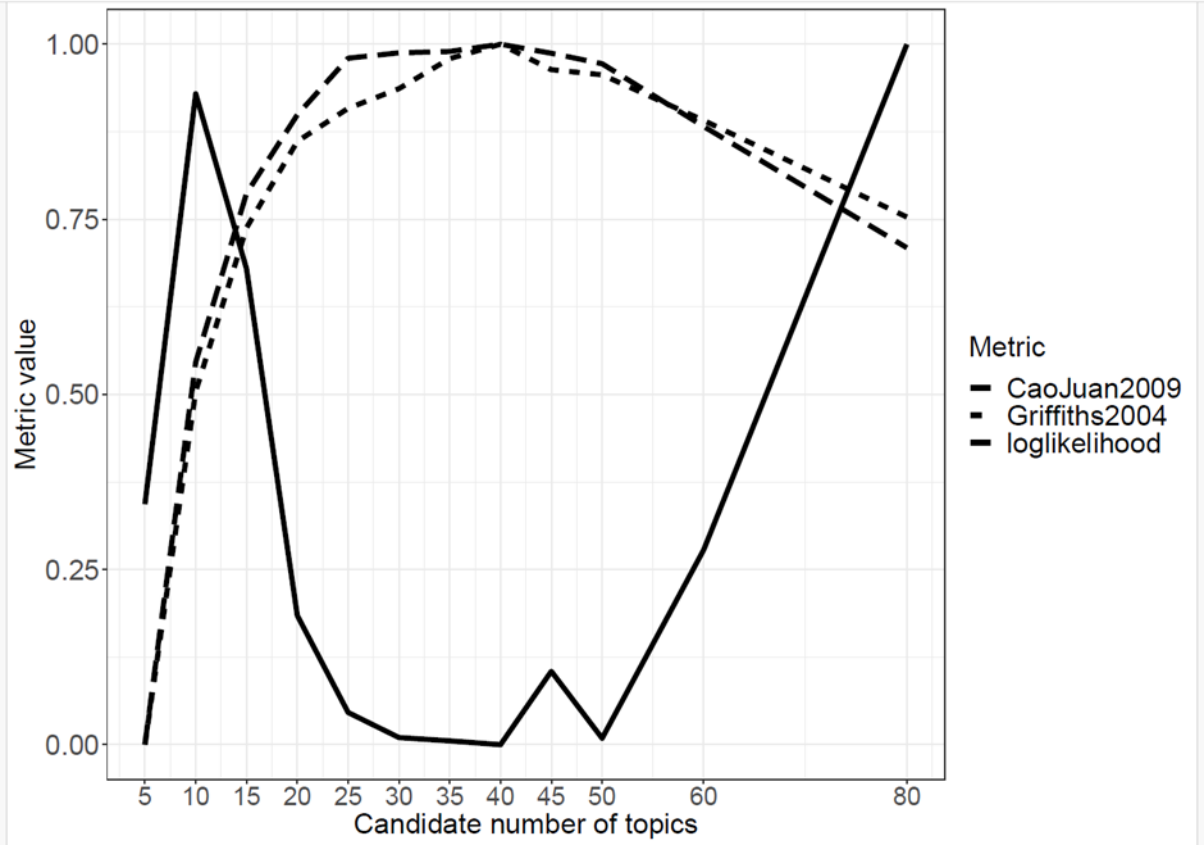

Figure 2 : Values of three suitability metrics for a range of topic numbers

Analysing the most common words found in each topic, along with the titles of e-petitions that predominantly feature those topics, enables the labelling of each topic. The frequent words and corresponding topic labels can be observed in Figure 3. Several noteworthy topics emerge, such as "period poverty" which pertains to the affordability and accessibility of sanitary products for women. Another topic relates to increasing the mileage allowance eligible for taxation deductions, while a separate topic focuses on the transition to more environmentally friendly energy sources. Additionally, there are seven "miscellaneous" outlying topics that are challenging to categorise distinctly (resembling the concept of incoherent topics discussed by Hagen et al., 2016).

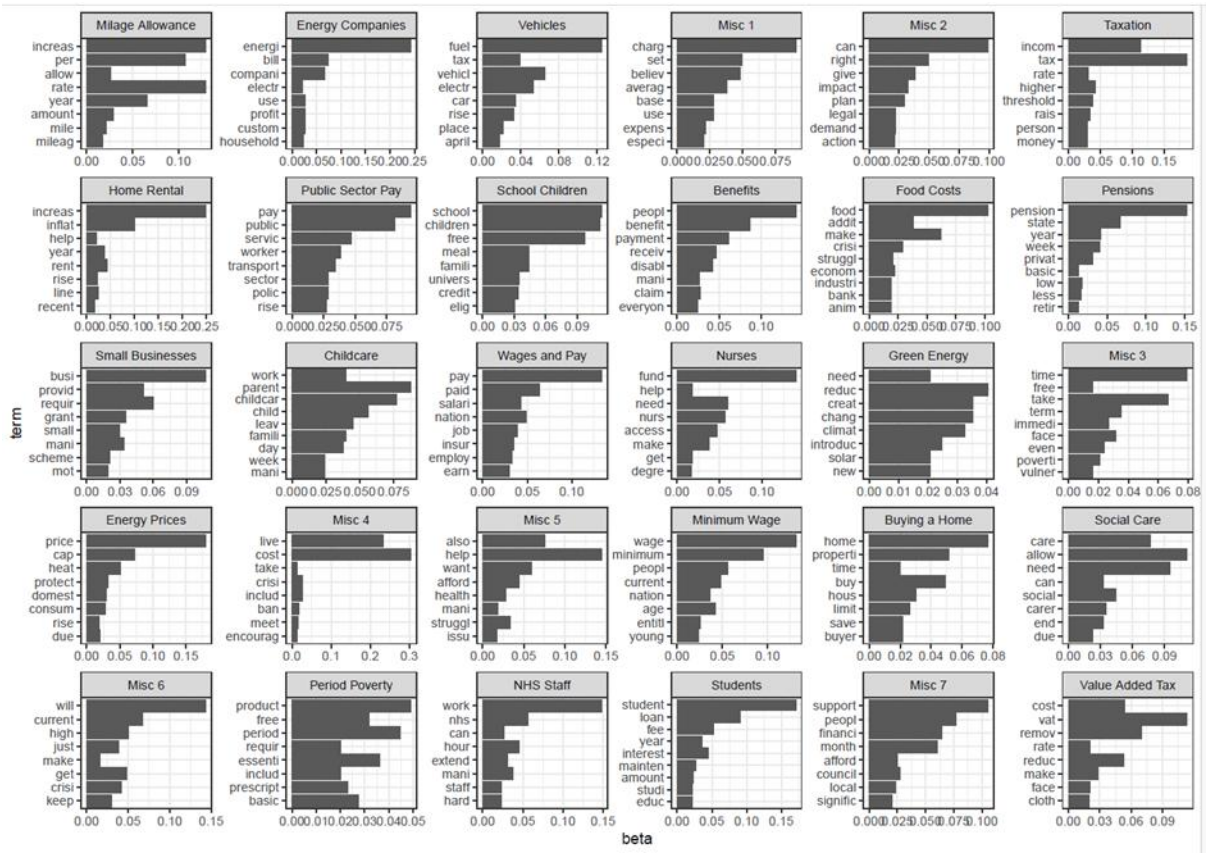

Figure 3 : Most frequent words with each topic and the labels given to these topics

By employing the methodologies detailed in Vidgen & Yasseri (2020), it becomes feasible to allocate the signatures of each e-petition to their respective topics within each constituency. Aggregating these allocations across all e-petitions provides an overview of the strength and distribution of support for each topic across the Parliamentary constituencies. The resulting analysis is depicted in Figure 4.

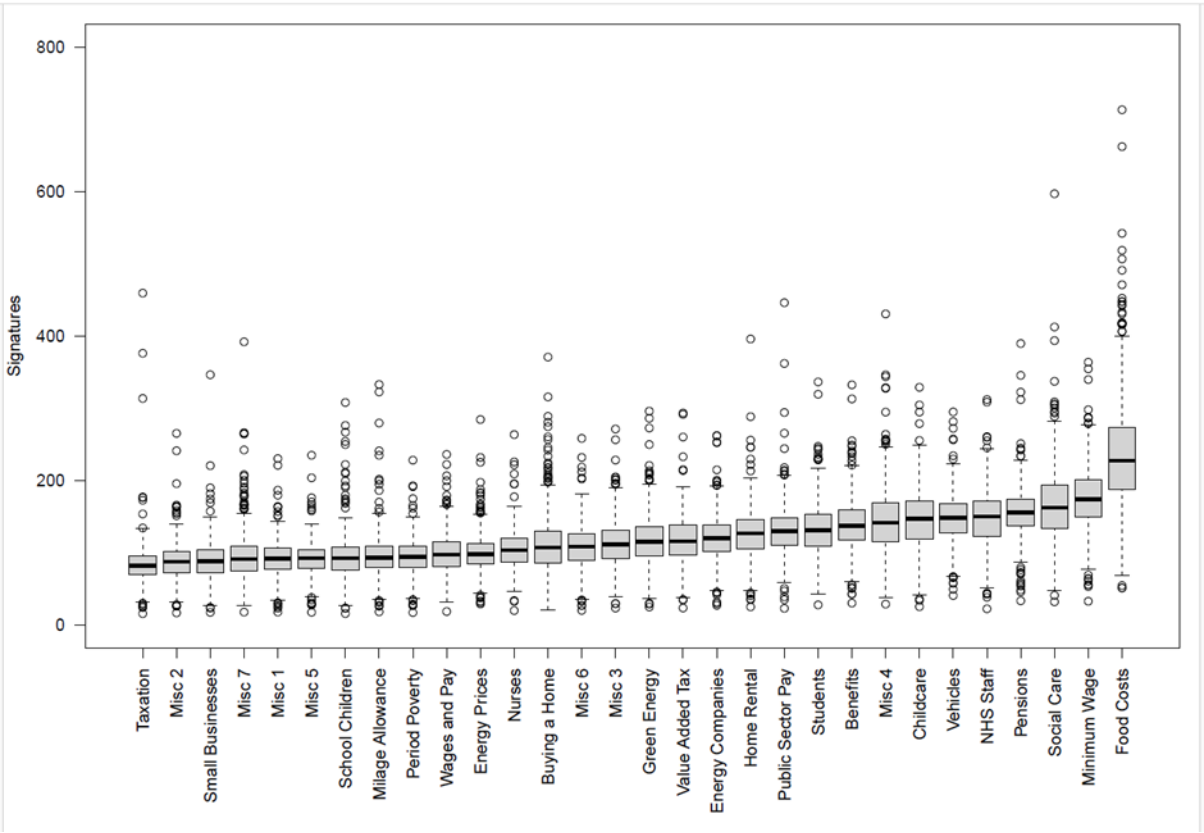

Figure 4 : Distribution of support for each topic amongst all constituencies

Topics related to the high price of food garner a substantial number of signatures across numerous constituencies. Following closely are topics concerning the minimum wage, which sets the foundation for people's expected earnings, and Social Care. In comparison, the miscellaneous topics tend to receive fewer signatures compared to the more cohesive topics.

To establish groups of constituencies, a Ward's D hierarchical classification is applied after standardisation (Murtagh & Legendre, 2014). The dendrogram illustrating this classification process is presented in Figure 5.

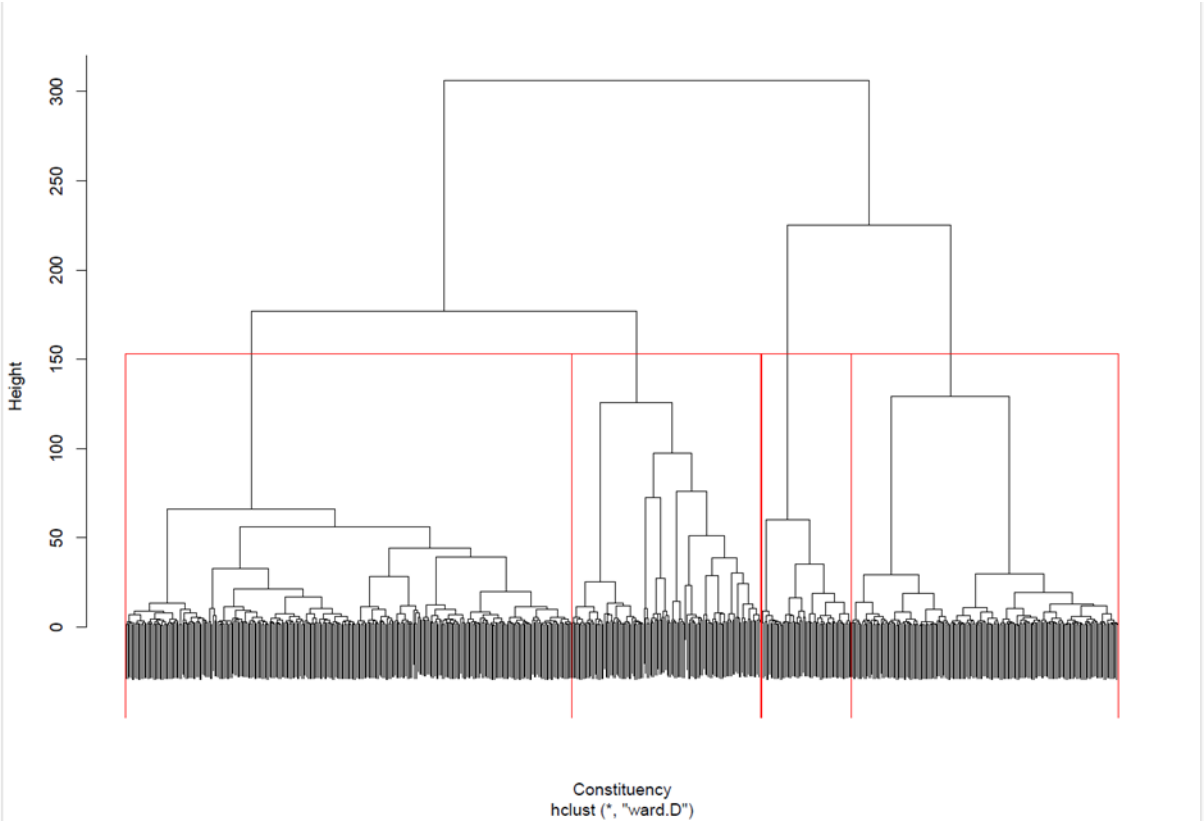

Figure 5 : Dendrogram on the formation of Groups of constituencies, with the Group of four illustrated.

The level of support for each topic within the four Groups is depicted by the average percentage of signatures allocated to each topic, as shown in Table 2. Group 1 exhibits significant support for NHS Staff, recognising and rewarding their contributions during the COVID-19 pandemic (Willan et al., 2020). Group 2 displays notably high support for the Cost of Food and various aspects of Social Care. In contrast, Group 3 does not demonstrate strong support for any specific topic; however, its geographic concentration in Scotland and Northern Ireland as illustrated in Figure 6. Lastly, Group 4 exhibits strong support for assistance with Buying a Home but shows limited support for Vehicle costs.

Table 2 : Percentage of signature support for each topic within each Group (unusual values boxed in **bold** grey)

Topic	Topic category	NHS	Social Costs and Care	Celtic Fringe	Housing
Energy Companies	Expenditure	3.3%	3.3%	3.3%	3.2%
Vehicles	Expenditure	4.2%	3.9%	4.4%	**3.5%**
Home Rental	Expenditure	3.5%	3.4%	3.6%	3.3%
Food Costs	Expenditure	5.9%	**7.3%**	6.1%	5.9%
Energy Prices	Expenditure	2.7%	2.5%	3.0%	2.8%
Buying a Home	Expenditure	2.8%	3.1%	2.8%	**4.2%**
Period Poverty	Expenditure	2.7%	2.5%	2.5%	2.7%
Value Added Tax	Expenditure	3.2%	3.3%	3.2%	3.3%
Mileage Allowance	Income	2.7%	2.4%	2.6%	2.5%
Taxation	Income	2.3%	2.2%	2.3%	2.4%
Public Sector Pay	Income	3.7%	3.2%	3.9%	3.6%
Benefits	Income	3.8%	4.0%	3.9%	3.4%
Pensions	Income	4.5%	4.0%	4.7%	4.0%
Wages and Pay	Income	2.6%	2.8%	2.6%	2.8%
Minimum Wage	Income	4.9%	4.8%	4.6%	4.6%
Small Businesses	Both	2.4%	2.4%	2.5%	2.5%
Students	Both	3.6%	3.9%	3.5%	3.3%
School Children	Care	2.6%	2.5%	2.6%	2.5%
Childcare	Care	4.1%	4.0%	3.7%	3.8%
Nurses	Care	2.9%	2.7%	3.0%	2.8%
Green Energy	Care	3.1%	3.3%	3.2%	3.1%
Social Care	Care	4.4%	**4.9%**	4.4%	4.1%
NHS Staff	Care	**4.3%**	3.8%	3.7%	3.8%
Misc 1	Miscellaneous	2.6%	2.4%	2.5%	2.6%
Misc 2	Miscellaneous	2.4%	2.3%	2.4%	2.7%
Misc 3	Miscellaneous	3.0%	3.2%	3.1%	2.8%
Misc 4	Miscellaneous	3.8%	4.1%	3.8%	4.3%
Misc 5	Miscellaneous	2.6%	2.4%	2.5%	2.5%
Misc 6	Miscellaneous	3.0%	3.0%	2.8%	3.2%
Misc 7	Miscellaneous	2.4%	2.4%	2.8%	**3.7%**
min		2.3%	2.2%	2.3%	2.4%
max		5.9%	7.3%	6.1%	5.9%
range		3.7%	5.1%	3.9%	3.5%
n		292	175	124	59

The location of these Groups can be visualised by mapping them according to their constituencies. Figure 6 displays this distribution as a geographic map on the left-hand side and as a cartogram on the right-hand side, where each constituency is represented by the same hexagon shape. By combining these geographic locations with the signature support results, we can begin to assign names to each Group. Group 3, referred to as the 'Celtic Fringe' Group, is predominantly represented in rural constituencies in Scotland and Northern Ireland. On the other hand, Group 4, named 'Housing', is primarily concentrated in the outer areas of Greater London. Group 1, known as the 'NHS' Group, and Group 2, labelled 'Social Costs and Care', derive their names from the strong support they exhibit for specific topics.

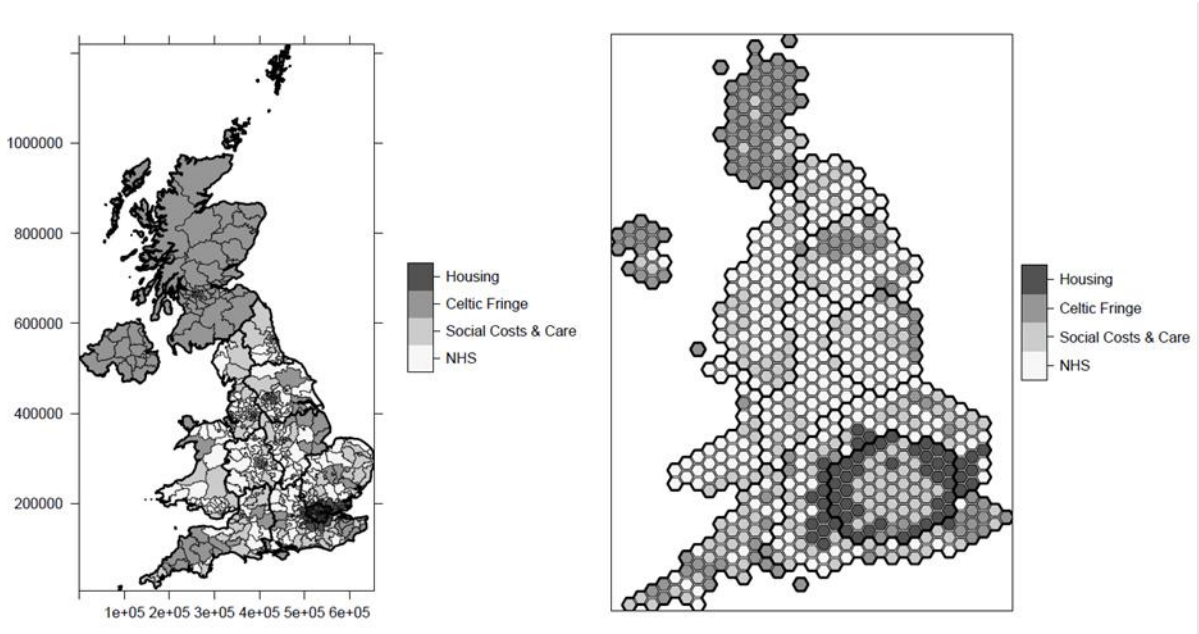

Figure 6 : Map of the location of Groups using a geographic map (lhs) and a cartogram (rhs)

The top section of Table 3 displays the electoral party for each constituency's MP in the current parliament, while the middle section presents the projected changes in party affiliation based on current predictions (source: Electoral Calculus, 2023). In the bottom section, the level of deprivation for each constituency in the Group is indicated by the Index of Multiple Deprivation (IMD), where a lower score signifies higher levels of deprivation (Francis-Devine, 2019). Nearly half of the constituencies in the NHS Group are currently represented by Conservative MPs, and these constituencies have, on average, higher levels of deprivation. However, according to predictions, the Conservative party is expected to lose most of its seats in the NHS Group. The Housing Group comprises the least deprived constituencies.

Table 3 : Party representation for each Group and the average ranked index of multiple deprivation

Group	NHS	Social Cost and Care	Celtic Fringe	Housing
Conservative	189	83	56	37
Labour	97	77	8	20
Nationalists†	2	7	43	0
Northern Ireland	2	2	14	0
Liberal Democrats, Greens & House Speaker	2	6	3	2
General Election 2019 to Prediction, May 2023				
Conservative Hold	61	45	36	27
Labour Hold	97	77	8	20
Labour gain from Conservative	127	39	31	9
Other	7	14	49	3
IMD	229.1	297.5	283.9	336.5

Note : †Scottish National Party and Plaid Cymru (Party of Wales)
§ Average of deprivation rank, 1 = most deprived, 650 = least deprived

Discussion

In this chapter, we have explored the significance of public petitioning to the UK Parliament and the role of the e-platform in facilitating this process. By utilising the data accessible through the platform, we have examined the public sentiment regarding the pressing issue of the cost of living crisis, as expressed in nearly 500 e-petitions.

Through our analysis, we have distilled these concerns into 23 meaningful topics, which can be broadly categorised into three main areas. Firstly, there are topics centred around the rising costs of essential items, particularly food and energy. Notably, one specific issue that emerges is the cost and accessibility of sanitary products for women, which is a vital and sensitive topic often overshadowed by the broader cost of living crisis (Astrup, 2017).

The second category encompasses topics related to income and household finances. Among these, a notable topic of interest is the tax allowance on mileage expenses, specifically in relation to work-related travel (Gascoyne-Richards, 2018). This particular topic garners significant attention, with numerous e-petitions calling for specific increases in the allowance.

The third substantial category involves topics related to societal care and the potential impact of the cost of living crisis on such provisions. One prominent aspect is the cost of childcare and how the government can provide financial support and additional resources to address this issue (Farquharson & Olorenshaw, 2022). This topic directly affects household incomes, as families struggle to afford childcare, and indirectly impacts parents' ability to participate in paid work.

By measuring the level of concern for each topic in each constituency, we have identified common patterns that have led to the formation of four distinct groups of constituencies. These groups also exhibit spatial clustering, with two noticeable geographic clusters. The first group encompasses constituencies in Scotland and Northern Ireland, referred to as the 'Celtic Fringe' Group. While this group does not display outstanding differences in concerns compared to other groups, it is worth noting that separate legislatures exist in Scotland, Wales, and Northern Ireland, which may address some of the specific concerns within their jurisdictions (Booth, 2015; Trench, 2007).

The second spatially clustered group comprises constituencies situated on the outskirts of Greater London, with a particular focus on housing-related issues. This area is characterised by a distinct housing market (Simmie, 2020), occupying a lower tier within the housing market

hierarchy (Webb et al., 2021). Interestingly, this group represents the least deprived constituencies on average.

The NHS Group, which predominantly consists of constituencies represented by Conservative members in the current Parliament, faces electoral consequences due to the cost of living crisis, as indicated in Table 3. Based on current predictions, they are projected to lose over one hundred seats, highlighting their vulnerability to the cost of living concerns in the NHS Group. Given the high regard for the NHS among the British public (Cream et al, 2018), the Conservative party may need to address these concerns strategically to mitigate potential losses. On the other hand, the Labour party is expected to maintain its seats and even gain additional seats in all Groups, albeit to a lesser extent in the affluent Housing Group. This underscores the importance of understanding the nuanced concerns of constituents for members of parliament in a political context.

Thankfully the UK Parliament's e-petition platform provides timely and geographically detailed data, which proves valuable for researchers and policy analysts. However, it is unfortunate that there is no archive of signatures, with hourly timestamps, as such data would allow for a retrospective view of the evolution of support for e-petitions and their associated topics.

While this chapter has focused on the cost of living crisis in the UK, similar methodological approaches can be applied to understand the concerns of any sub-group of the electorate in relation to a particular set of events and time-frame. For example, in previous work we utilise similar methods to understand the concerns of the UK's expatriate population (Clark and Lomax 2022), focusing on resident and citizen signatories with an address outside of the UK in the period 2017-2019. This was a period of intense negotiation between the UK and the EU about what a Brexit deal might look like, so topics of interest were focused on the domestic and international implications of this deal. In that paper we suggested that e-petitions offer an opportunity to monitor on-going concerns of the electorate. In a subsequent paper Clark and Lomax (2023) we did just that, focusing on public concerns during the Covid-19 pandemic. We revealed distinct topic groupings by Parliamentary Consistency: topics pertinent to equity of support (e.g. economic support for business) were typically important in constituencies with a Conservative MP, while Education and Funding concerns were typically important in areas of Labour support. The focus on the cost of living crisis in this chapter extends this the monitoring proposed in Clark and Lomax (2022) and with an eye on the future, the next UK General Election will be called sometime between time of writing (November 2023) and 17 December 2024. This key political event will offer another window during which similar analysis could be

undertaken to understand the priorities and sentiment of the electorate. Moreover, our methods could be applied in international contexts, where similar data are available. For example in Clark and Lomax (2020) we undertake a comparison of the linguistic and semantic factors that represent a successful e-petition in the United States of America (USA) versus the UK, adopting methods set out in (Hagen et al. 2016).

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