Regional Resources and Democratic Secessionism

Kai Gehring*
Stephan A. Schneider **

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Abstract:
We argue that region-specific resources are crucial politico-economic factors explaining the success of democratic secessionist movements. Exploiting oil discoveries off the Scottish coast as a natural experiment, we estimate the causal effect of regional resources in a difference-in-differences design with Wales as the counterfactual. Based on constituency-level election results from 1945 to 2001, we show that each additional giant oil discovery has a significant positive effect on the Scottish National Party’s vote share of about 2 percentage points. A triple-differences design using changes in world oil prices as additional exogenous variation supports the causal interpretation of this finding.

Keywords: Secession, Separatism, Size of nations, Resources, Nationalism, Economic voting
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* Kai Gehring, University of Zürich: mail@kai-gehring.net. Webpage: http://www.kai-gehring.net.
** Stephan A. Schneider, Heidelberg University: mail@schneiderst.de.
Introduction

Many regions around the world have experienced a surge in the vote share and success of secessionist parties, while others with comparable levels of cultural heterogeneity have not. This cannot be explained by the existing literature on the optimal size of nations, which has mostly focused on scale advantages like improved trade opportunities as the main benefits from larger states and preference heterogeneity as the most severe factor benefiting secession and smaller entities. Those factors are obviously important, but we argue that regional resources and their changing value are crucial to explain the success of secessionist parties. This relates to the literature on natural resource wealth and state stability in developing countries (see, e.g., Arezki & Brückner, 2012, 2011; Berman et al., 2017), where emerging distributional conflicts often culminate in armed conflicts and severe civil wars (e.g., Collier, 2010; Rosser, 2006; Ross, 2004a). In countries with a stable democratic system, this is fortunately less likely. Nevertheless, regional resources can instead boost the vote shares of democratic parties that advocate secession from a re-distributive nation state, because voters account for the associated resource revenues in their voting decision. While we know that natural resources affect a range of political factors (Ferraz & Monteiro, 2014), understanding secessionism is of central importance for the stability of nations today and in the foreseeable future.

To relate our argumentation to the extant literature, our simple probabilistic voting model builds on the potential advantages and disadvantages of a larger nation state, emphasized by authors like Alesina & Spolaore (1997), but augments them by integrating differences in resource endowment and their redistribution across regions. This relates our study to the literature on fiscal federalism and within-country transfers (e.g., Dixit & Londregan, 1998; Persson & Tabellini, 1996). We then use extensive anecdotal evidence to demonstrate that changes in resource value are decisive in influencing the rise and fall of secessionist movements around the world. Ranging from Flanders in Belgium to Québec in Canada, and Greenland in Denmark, the cases we describe document the widespread relevance of regional resources in explaining secessionism. Moreover, they demonstrate that regional resources should not narrowly be defined as containing only natural resources, but rather that regional differences in human capital, institutional quality or geography are also relevant. Based on Alesina & Spolaore (1997) and Persson & Tabellini (2002), we derive analytically that increases in the value of regional resources are related to a higher approval rate for secession, which should be visible, ceteris paribus, in a higher vote share for secessionist parties.

Based on the model, we identify the challenges and necessary prerequisites for identifying a causal effect of regional resources. While the qualitative examples underline the general importance and external validity...
of the hypothesized mechanism, they only provide anecdotal and correlational evidence how regional resources and changes in their value help to fuel secessionist movements. Ideally, we want to compare two regions that exhibit comparable trends with regard to those factors that we identified as influencing support for secession; for instance, preference heterogeneity from the majority in the country. Moreover, both regions must feature a comparable secessionist party and the vote share of these parties is required to follow a common trend in absence of the treatment. We identify such a case in the United Kingdom and make use of the fact that the bulk of the UK’s North Sea oil reserves was exclusively found off the Scottish coast to compare the performance of the two major secessionist parties in Scotland and Wales in a difference-in-differences (DiD) framework. This is feasible as extensive evidence supports the notion that the Scottish National Party (SNP) and the Welsh Plaid Cymru as well as both regions in general are sufficiently comparable for our purpose (see, e.g., Levy, 1995). Moreover, the first Scottish oil discoveries in 1970 were an unexpected and considerably large exogenous shock (MacKay & Mackay, 1975), which makes them salient to voters and allows a clear distinction between pre- and post-treatment period.

Our analysis, based on a panel dataset containing 1883 observations from UK general elections and by-elections on the constituency-level, which we assembled for the 1945 to 2001 period, exploits this natural experiment. While oil did not play an important role in the political calculus of secessionist parties in Scotland and Wales initially, the situation fundamentally changed for the Scots by the initial oil discoveries in ‘their’ maritime area. Hereafter, politicians from the SNP have tried to instrumentalize the large potential oil revenues as an argument for Scottish independence, and support for the party has increased sharply (McGuinness et al., 2012). The slogan “It’s Scotland’s oil”, invented in 1972 and often quoted even today (Harvie, 1995), reflects concisely how politically relevant the oil discoveries were and still are for the SNP (Collier & Hoeffler, 2006; MacKay & Mackay, 1975).

Our results show that voters are indeed receptive to these arguments: in elections after oil discoveries, the SNP’s vote share significantly increased by about 2 percentage points for each additional giant oil discovery. Based on some simple back-of-the-envelope calculations this might have boosted the initial rise of the SNP after 1970 by 12-16 percentage points. The result is robust to a large range of different specifications, different lag-structures, different proxies for the importance of oil, and is further supported in a triple-differences design exploiting the exogenous changes in world oil prices and by a placebo test. We use various strategies to rule out that the effect is driven by changes in SNP party leadership or other political factors. It varies to some degree with constituency characteristics capturing the relative advantages and

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1 Support for independence provisionally culminated in the referendum held on 18th September 2014, in which the Scottish people faced the choice of separating from the rest of the United Kingdom or staying unified. Even though a close majority of the Scottish people voted against independence, the fact that an independence referendum was held in a stable West-European country with a wealthy society is remarkable in itself. The official electoral outcome of the referendum is as follows: yes: 1,617,989 (44.5 percent); no: 2,001,926 (55.5 percent); turnout: 84.6 percent. The question asked on the ballot paper was: “Should Scotland be an independent country?” (see http://www.scotreferendum.com/information/, last accessed on 5th October 2017). But Scotland is no isolated case: in Québec, for instance, an independence referendum closely failed the majority in 1995 (Holitscher & Suter, 1999; Lynch, 2003).
disadvantages of independence. This augments the qualitative evidence that we collected for numerous other countries and highlights that regional resources are a crucial factor to better understand the success and failure of secessionist parties.

The paper is structured as follows: section 2 relates our contribution to the existing literature on secessionism in developing countries and the size of nations as well as presents our theoretical model. We demonstrate the importance of regional resources and the external validity of our findings with detailed anecdotal evidence from various secessionist parties around the world (3.1). Subsequently, we provide a brief overview of the historical and political background of the Scottish and Welsh independence movements (3.2), and develop the hypotheses tested in part 5. Sections 4.1 and 4.2 provide a comprehensive data description and details about the identification strategy. Section 5 then presents regression results and discusses the robustness of the estimates. Section 6 concludes.

2 Linking Resources and Secessionism

2.1 The Political Economy of Resources and Conflict

There is a large strand of literature which examines the positive and negative economic consequences of resource endowments and discoveries for economic development in the context of developing countries (for an overview see, e.g., Caselli et al., 2015; Ploeg, 2011; Rosser, 2006). Numerous studies focus specifically on political consequences and suggest that an abundance of natural resources leads to, among others, more corruption, lower political accountability (Ferraz & Monteiro, 2014), increases in violence and reduced electoral competition (Carreri & Dube, 2017), as well as civil war (see, e.g., Rosser, 2006). Secessionist civil wars represent a violent form of secessionism which often arises due to distributional conflicts about resources (see, e.g., Ross, 2004b; Collier & Hoeffler, 2004). Lei & Michaels (2014), for instance, show that the discovery of oil enhances the probability of internal armed conflicts by 5 to 8 percent within 4 to 8 years after the respective discovery.

In addition to grievances and oppression in the respective regions, various authors highlight the relevance of an economic calculus to explain the onset of a civil war. Lei & Michaels (2014) and Morelli & Rohner (2015) argue that the winner of a civil war gains control over the resource repositories in the contested area. If these expected revenues are sufficiently high and the expected costs sufficiently low, a secessionist conflict is likely to arise. Collier & Hoeffler (2004) support this so-called greed hypothesis: their results indicate that beyond ethnic differences, potential separatist movements in developing countries also need prospective economic gains from separation. A rebellion is more likely to be initiated when it is both

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2 Anecdotal evidence for this relationship is abundant: examples of civil wars related to resource wealth can be found in Angola, Colombia, Iraq, Sudan, Indonesia, Nigeria, or the Congo (Casertano, 2013; Lei & Michaels, 2014).
financially feasible and potentially rewarding (see also Collier & Hoeffler, 2006; Ross, 2004b).

Still, it appears as if it is neither only greed nor solely grievance which fuels secessionist conflicts. As we will argue in the context of democratic countries below, ethnic, cultural or linguistic differences are important factors that can affect the emergence of secessionist movements. However, the degree to which they effectively carry over into real actions is often depending on the economic circumstances revolving around resource distribution. This becomes apparent in the study by Morelli & Rohner (2015). When interacting resource and ethnicity concentration, they demonstrate that a civil war is more likely to occur when both factors are densely concentrated (see also Casertano, 2013; Collier & Hoeffler, 2006). More specifically, resources need to be geographically concentrated and the different groups within the country need to be distinct enough to enable group leaders to instrumentalize the unequal distribution for their purpose.

Economic arguments are often plausible mechanisms to explain separatist wars because they increase the perceived value of independence in the resource rich region (Ross, 2004a). Morelli & Rohner (2015) also show that a shift from full oil equality to full oil inequality, ceteris paribus, quadruples the baseline risk of civil war. Thus, we can learn from the developing country context that the distribution of region-specific resources in the respective state is a crucial factor causing secessionist wars. We argue that the framework applied to the context of the onset of civil war can be adapted to reflect the case of non-violent secessionism as well. This idea is supported by Collier & Hoeffler (2006), who already hint at the possibility to transfer the knowledge about secessionist wars to non-violent secessionist movements. They also qualitatively discuss the potential relationship between the Scottish independence movement and geographically concentrated oil discoveries off the Scottish coast as a prime example of democratic secessionism Collier & Hoeffler (2006).

2.2 Economic Voting and Secessionism

2.2.1 Benefits and Costs of a Union

In his book on the relationship between the economy and electoral outcomes, Tufte (1978, p. 65) appeals to the reader: “When you think economics, think elections; When you think elections, think economics.” On
average, economic changes explain about one third of the vote (Lewis-Beck & Stegmaier, 2000). Analyses that estimate the effect of economic indicators on the governing party’s chances to get re-elected (see, e.g., Brender & Drazen, 2008; Jordahl, 2006) reveal that voters especially react retrospectively to changes in macroeconomic indicators like the unemployment rate and inflation in the years prior to an election and thus tend to take a sociotropic perspective (Lewis-Beck & Stegmaier, 2000). When it comes to situations that alter the voter’s economic expectations about the future, for instance due to the discovery of resources or a change in their value and the expected benefits of its exploitation, it seems only natural to assume that voters also adopt a prospective view (see Kuklinski & West, 1981, p. 437). In one of the few cross-sectional analyses of secessionism, Sorens (2005) shows correlational evidence that voters do take cost-benefit-considerations into account when voting for a secessionist party.\footnote{Note that “secessionism is a [...] demand for formal withdrawal from a central political authority by a member unit or units on the basis of a claim to independent sovereign status” (Wood, 1981, p. 110). Parties advocating secession are also often referred to as regionalist, separatist or autonomist. In our definition, separatism is the pursuit of more independence from the central state which might but does not need to culminate in secession. We keep the differences in mind, but mostly use all terms interchangeably throughout the paper.}

From Alesina & Spolaore (1997) to recent contributions like Boffa et al. (2016), a large literature in economics has both theoretically and empirically evaluated the reasons behind regional integration and disintegration. In the initial seminal paper, Alesina & Spolaore (1997) argue that the equilibrium number of nations is a result of the trade-off between the costs and benefits of being a member of a larger political entity. Other important papers include Goyal & Staal (2004) who highlight the role of size, location and diversity within regions, and Buchanan & Faith (1987) who argue that the secession option places an upper limit on the tax burden that a ruling majority can impose on the minority. Bordignon & Brusco (2001) consider whether federal constitutions should allow peaceful secession options. In an alternative model, Bolton & Roland (1997) concentrate on the fact that people in different regions might exhibit different preferences on income redistribution within the chosen political entity. In contrast to their paper, we are mostly interested in differences in resource allocation and distribution amongst regions, though we also highlight the role of economic considerations. A simple model helps to understand how economic arguments about the distribution of regional resources can explain the electoral success (or failure) of secessionist parties.

Assume that the utility of the representative citizen of a region \( r \) in a union of \( R \) regions contains costs and benefits of integration in the union (nation state). The level of integration is indicated by \( I_r \in [0, 1] \), with 1 indicating full integration into the nation state and 0 indicating complete separation. As we are interested in secession, we focus on the cases where \( I_r = 0 \) and \( I_r = 1 \). Decentralization and more autonomy for the region that experiences an increase in its resource value is a potential alternative to secession. However, such adaptions within federal systems have been proven to be very slow and extremely hard to agree on,\footnote{The three indicators unemployment, growth, and inflation are generally deemed as the most important since they are among the few publicly recognized economic indicators (see, e.g., Lewis-Beck & Stegmaier, 2000, p. 114; Powell & Whitten, 1993, p. 395).}
especially if all regions are required to agree. Morelli & Rohner (2015), for instance, present a bargaining model with two regions and show how commitment problems can prevent reaching a stable equilibrium. The protests and tensions surrounding the autonomy process of the relatively rich region of Catalonia from the rest of Spain in fall 2017 show the difficulties of coming to a peaceful agreement on more autonomy, even in a democracy.\(^6\)

As in the framework of Alesina & Spolaore (1997), citizens bear heterogeneity costs \(C_r\) of integrating into larger units. These costs are defined as:

\[
C_r = h_r(I_r) \tag{1}
\]

Costs from heterogeneity exist due to a deviation from \(r\)'s preferences from the rest of the nation. The term refers to preference heterogeneity within the nation and can be expressed as the Euclidean norm:

\[
h_r = ||\phi_r - \phi_N|| \cdot I_r,
\]

where \(\phi_r\) is a vector representing the preferences and values of the average citizen in region \(r\). \(\phi_N\) can be understood as representing either the preferences of the majority in the nation, the pivotal region in bargaining processes or the median voter. Hence, heterogeneity costs increase with a larger difference between preferences in region \(r\) and the national majority (\(h_N\)). These costs are often forgotten in the political discussion because they are non-monetary and non-quantifiable as they relate to regional sentiments, common values, cultures, and norms (Alesina et al., 1995). Secession can provide the advantage of, for instance, the provision of public goods (Alesina & Spolaore, 1997) and redistribution (Bolton & Roland, 1997) more in line with regional preferences.

Citizens also derive benefits \(B_r\) from national integration from, e.g., trade, other economies of scale or enhanced public good provision. These benefits are defined as:

\[
B_r = b_r(I_r) + \sum_{i=1}^{R} V_i, \tag{2}
\]

with \(V_i = x_i \times p_i\) and \(b'(I_r) \geq 0\). Large jurisdictions generate economies of scale in shared public institutions and infrastructure, such as administration or national defence (Alesina et al., 1995). A large, diversified economy and its respective welfare state also offers better protection against economic shocks and a more efficient provision of public goods since, as for any non-rival public good, the per capita costs are lower (Alesina & Spolaore, 1997, pp. 1028-1029). Another relevant factor in the case of a secession is the potential loss of trade advantages which exist within large jurisdictions (Alesina & Spolaore, 1997).\(^6\)

\(^6\) A model of referendums on secession and their effect on bargaining about transfer payments is provided by Eerola et al. (2004). A question that we do not further consider in that regard are the fixed costs of seceding.
The value of regional resources \( V_i \) is simply modeled as the quantity of resources available \( x_i \) times the price of the resource \( p_i \). Note that there might be more than one resource in reality, but this would simply mean to instead take the sum of the respective resource values. Resources can be important for the secession decision in various ways. When we think of the costs of public good provision, resource revenues can enable regional governments to secure a similar or even higher level of public goods provision than in the case of remaining in the union. Another argument in the existing literature is that setting up and operating a complete state apparatus leads to huge direct monetary costs of uncertain extent, which might only be feasible if enough resources are available (Young, 2014; Lynch, 2003). Regarding the effect of differences in wealth levels, the political science literature has shown a correlation between the relative wealth of a region and separatist tendencies in democracies (Sorens, 2004; Van Houten, 2007). One cited reason is that wealthier regions are often the net-contributors in a union which subsidize other regions. We choose a simple option to integrate resources and surplus sharing in the model as there is not much additional analytical value from further complications for our purpose. It assumes that resource revenues are pooled and then evenly redistributed among all regions.\(^8\)

For a given level of integration, citizens optimize in terms of consumption, leisure, etc. The indirect utility for the representative citizen in region \( r \) is then given by:

\[
W_r = W_r(B_r, C_r) = W_r(b(I_r), V_r, \sum_{j \neq r} V_j, h_r).
\]

In case the region remains a part of the union or the nation state, the utility is:

\[
W^N_r = b(I_r) + \sum_{i=1}^R V_i - h_r(I_r) \quad (3)
\]

In the case of secession, the region can keep all the benefits derived from the resources. We focus on complete secession \( I_r = 0 \) with \( b(0) = 0 \) and \( h_r(0) = 0 \), so that we get

\[
W^S_r = V_r. \quad (4)
\]

\(^7\) In this respect, the European Union is important for secessionist movements in member states. The SNP and Plaid Cymru actively aim at making use of the political and economic advantages of the EU, which would primarily provide them with external economic security in case of a secession (Nagel, 2004). Alex Salmond, a former SNP leader, stated: “the whole debate on independence has been changed by a single idea, [...] and that’s the European Union” (see Washington Post following the link http://www.washingtonpost.com/archive/politics/2000/12/12/eus-potential-lifts-scots-hope-of-independence/f5c65ca8-3c3d-417c-bffd-620c32225337/, last accessed on 5th October 2017). In contrast to the general EU scepticism in England, Scotland and Wales today run their own representations in Brussels to promote their national self-interests (Paquin, 2002). Gehring & Schneider (forthcoming) show that minor European states can achieve significant economic gains by making targeted use of EU key positions.

\(^8\) One straightforward extension would be to integrate the usage of the resources and assume that they are spent on a public good. In the case of a true public good, there might be benefits from pooling resources at the national level. Still, due to the differences in preferences captured by \( h_r \), the level of the public good would deviate from the optimal level of region \( r \). Another extension for a more complex model would be to consider the impact of resource wealth on the bargaining power regarding within-country redistribution. This could augment the existing literature like Dixit & Londregan (1998) and Persson & Tabellini (1996). Our model can also be understood as assuming certain secession probability and fixed sharing arrangements. A related model is from Perez-Sebastian & Raveh (2016), who indicate that resource booms would cause more centralization due to risk-sharing preferences of the regions, but do not take regional distribution into account.
2.2.2 Support for Secession

Assume citizens can vote to either stay in the nation-state \( I_r = 1 \) and get \( W_r^S \) or vote for secession which means choosing \( I_r = 0 \) and getting \( W_r^N \). A citizen from region \( r \) will agree to secede and choose \( I_r = 0 \) if

\[
W_r^S > W_r^N + \sigma_{i,r} \iff \sigma_{i,r} < W_r^S - W_r^N
\]

where \( W_r^S \) indicates the indirect utility for the representative citizen in region \( R \). \( \sigma_{i,r} \) is the citizens’ idiosyncratic strength of regional identity and follows a uniform distribution on \(-\lambda_r/\gamma\) and \((1 - \lambda_r)/\gamma\), with \( 0 < \gamma \leq 1 \) (for details on the probabilistic voting model, see Persson & Tabellini, 2002). The parameter \( \lambda_r \in (0, 1) \) can be understood as a baseline approval for secession and affects the position and width of the distribution. In each region there is a threshold value \( \sigma_r = W_r^S - W_r^N \) for which citizens are indifferent between secession and the status quo. Plugging (3) and (4) into the equation, we get

\[
\sigma_r = W_r^S - W_r^N = V_r - b_r(I_r) - \frac{\sum_{i=1}^R V_i}{R} + h_r(I_r)
\]

\[
\iff W_r^S - W_r^N = R - 1 \frac{R}{R} - \frac{\sum_{i \neq r} V_i}{R} - b_r(I_r)
\]

The share of people \( \pi \) who support the secessionist party in region \( r \) is then given by \( \pi_r = Pr[\sigma_{i,r} < W_r^S - W_r^N] \). This yields

\[
\pi_r = \lambda_r + \gamma[\frac{R - 1}{R} V_r + h_r(I_r) - \frac{\sum_{i \neq r} V_i}{R} - b_r(I_r)]
\]

We can now use comparative statics to derive the influence of regional resources and the other main factors that drive secessionism. This also helps to establish which prerequisites need to be met to find a suitable treatment and counterfactual group. A higher value for \( \lambda_r \) shifts the distribution of \( \sigma_{i,r} \) to the left and increases baseline approval for secession. \( \lambda_r \) can be considered the region specific strength of regionalism (see Dehdari & Gehring, 2016). Regions’ costs from preference heterogeneity can also differ strongly based, for instance, on the length of common history with the other regions and the extent and salience of factors that distinguish it from the rest. Hence, one of the main empirical challenges is to find a treatment and counterfactual which are sufficiently comparable in these respects to enable us to isolate the effect of regional resources.

It is straightforward to see that \( \frac{d\pi_r}{dV_r} > 0 \). If the value of resources in region \( r \) increases, secession becomes the more attractive option for a larger share of people. The decisive question is whether changes in regional resource value really help to explain the emergence and success of secessionist parties. The assumption we make in transitioning from the model to the empirical application is that higher support for secession translates into higher vote shares for secessionist parties. This is supported by Jolly (2014) and Sorens (2005).
3 Empirical Relevance

3.1 Anecdotal Evidence from Around the World

Secessionist movements naturally depend on a combination of multiple factors such as high group identification and the ability to solve collective action problems to be successful (Hechter, 1992, p. 269). In addition to having a geographically concentrated culturally homogeneous social group (Wood, 1981, p. 112), rational economic arguments can be pivotal. Authors like Casertano (2013), Collier & Hoeffler (2006), and Sorens (2005) even argue that group identification is sometimes only artificially created: “ethnic identity can provide a sense of separateness, but voters consider this separateness relevant only when it can be mobilized to achieve political and economic goals that are important to them” (Sorens, 2005, p. 307). In a cross-sectional analysis, Sorens (2005) shows that identity variables like a region-specific minority language or a recent history of independence matter, but that economic variables account for the larger part of secessionist party support and particularly for its variation.

This section provides an overview over various cases of regions where increases in regional resources or their respective value relate to secessionist movements. The main purpose of this section is to highlight the relevance of regional resources, before we proceed with our causally identified main estimation. It also demonstrates that the mechanisms are relevant for various kinds of regional resources, including human capital and land endowments (Appendix A provides further details and sources). Democratic secessionist movements that we observe around the world can be broadly grouped into three categories. First, there are of course movements where economic arguments do not play a role or at least only a very minor one. For instance, while several parties and organizations promote independence in Kashmir in India, it is ethnic motives and protest against suppression that seem to be driving these movements, which also tend to be more violent in nature. While cases falling in this category are rather infrequent in democratic countries, it is important to remember that this is in line with our model: secessionist tendencies can arise in the absence of any regional resource differences.

The second category contains regions where economic arguments play a major role for the separatist discourse and are widely used in party campaigns, but where the value of regional resources does not vary enough over time to clearly distinguish their influence from other factors. Useful examples include Northern Italy, Silesia in Poland, and Istria in Croatia. Consider the main separatist (formerly secessionist) party in Italy, the *Lega Nord* (*LN*). One of its central political goals is more autonomy (and even independence until 2006) for the North of Italy, which possesses higher human and physical capital compared to other regions in Italy. Accordingly, it is the most developed and productive area in Italy. The tax revenues generated by superior regional resources are redistributed within Italy via a system of transfer payments.
Protests against these transfers were a major reason for the call for a secession referendum in the 1990s.\textsuperscript{9} Another interesting fact is that the movement “is not based in an area that has historic claims to nationhood. Instead, the LN has attempted to invent an ethnicity for the North of Italy in order to justify its political claims for the protection of the economic interests of the region” (Cento Bull & Gilbert, 2001, p. 446).

Another example is Silesia in Poland. The \textit{Silesian Autonomy Movement} exploits the fact that the region possesses extensive coal and lignite deposits and is rich in zinc, lead, and iron. The movement’s homepage states that the revenues from these regional resources should “[...] remain at our disposal. The inhabitants of the land will decide on the distribution of these funds.”\textsuperscript{10} In Croatia, the region Istria is endowed with beautiful beaches as well a flourishing processing and shipping industry. The \textit{Istrian Democratic Assembly} and the separatist \textit{Istrian Democratic Forum} instrumentalize the redistribution of the money generated from these resources to foster their electoral success. Observers agree that “Istrian regionalism was not motivated primarily by ethnic or national belonging. Such movements [...] are driven more by economic concerns than by cultural or ethnic criteria” (Ashbrook & Ashbrook, 2008, p. 151). Other cases where economic arguments clearly contributed to secessionist parties’ behavior are the \textit{Pro Santa Cruz Committee} in the Santa Cruz region in Bolivia which possesses the second largest natural gas deposit in South America, and the \textit{Republika Srpska Movement} in Bosnia-Herzegovina, which is rich in minerals reaching from bauxite, to marble, and silica sand. People in the region Baluchistan in Pakistan complain that their resources “including coal as well as gas, have been exploited by the central government without adequate compensation to the province.”\textsuperscript{11}

These examples highlight the importance of economic concerns for democratic secessionism and suggest that the relevant type of resources does not only comprise of natural resources. The third category of regions feature more variation in regional resource value over time. In line with our theory, these regions exhibit a positive correlation between secessionist party success and the value of regional resources. Consider New Caledonia first: the former colony is a part of France, but since the 1980s it features several parties like the \textit{Kanak and Socialist National Liberation Front} which promote independence. The rising popularity of these parties has developed along with the rise of New Caledonia, which holds roughly a quarter of the world’s nickel reserves, ranking 5th among the nickel-producing countries worldwide. A joint venture with a Canadian multinational to exploit more of their resources is regarded by many Kanak as making separation more feasible and economically attractive. In particular, the \textit{Koniambo Project}, a nickel mine in which the company invested $6 billion, has further instilled hopes for independence in the

\textsuperscript{9} See, e.g., \textit{The Economist} from 27th May 1997 at \url{http://www.economist.com/node/150513}, last accessed 5th October 2017.

\textsuperscript{10} See the FAQ section on the webpage of the Silesian Autonomy Movement at \url{http://www.autonomia.pl/faq/}, last accessed 5th October 2017.

local population. As one observer puts it “resource sovereignty in New Caledonia has come to be seen by independence leaders as a path to political independence” (Horowitz, 2004, p. 287).

The French-speaking Canadian region Québec clearly differs from the rest of Canada linguistically and also to some degree culturally. It features the Parti Québécois and the Bloc Québécois which represent separatist interests on the national and state level. It is an interesting case, as the cultural differences are mostly constant over time, whereas the parties’ success varies strongly. Historically, Québec was rich in natural resources like gold, iron, copper, and wood. Accordingly, a central party claim revolved around the fact that the Québécois transfer more than C$53 billion per year to the federal redistributive system. The electoral success of the separatist parties diminished over the years, however, as Québec’s economy only managed to grow significantly less than the rest of Canada. Simultaneously, we observe a decline in the parties’ shares in the national (from 13.5 percent to 4.7 percent) and the regional parliament (from 49.3 percent to 19.3 percent) over the 1993 to 2015 period (see Appendix A, Figure 2).

Other cases also provide plausible exogenous within-country variation. Greenland enjoys far-reaching autonomy but remains a part of Denmark in several respects including justice, defense, and foreign affairs. In Greenland’s parliament, the Inuit Ataqatigiit and the Forward Party represent the struggle for more autonomy or full independence from Denmark. As Greenland’s mostly fishing-based economy was stagnant for a long time period and almost half of public spending was financed by grants from Denmark, their electoral success was limited. The discovery of oil and the fact that, due to the melting of the Arctic ice, larger areas become feasible for mining (rare metals and radioactive substances), the secessionist parties gained support at the expense of the largely Danish Democrat Party in the 2009 elections. In 2008, a non-binding referendum on more self-governance won in a landslide with 21,355 votes to 6,663. However, the drastic collapse in crude oil prices since 2015 has made most Arctic oil unprofitable to exploit and led “Greenland to put off plans to split from Denmark.”

All cases in this second category indicate a positive relationship using variation over time within the same country. Ideally, however, we would find a suitable counterfactual region within the same country. Two examples that partly fulfill the criteria are Galicia and Catalonia in Spain, and Flanders and Wallonia in Belgium. Galicia and Catalonia both feature separatist and secessionist parties: the Galician Nationalist Bloc and Compromiso por Galicia in Galicia, and the Republican Left of Catalonia, the Democratic Convergence of Catalonia, as well as the Popular Unity Candidacy in Catalonia. Both regions’ preferences differ significantly

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from the rest of Spain as they possess, for instance, a distinct history and a language which linguists describe as unintelligible to Castilian Spanish (Lewis et al., 2009). However, the success of secessionist parties differs drastically between the two regions. While newspapers are filled with articles covering secessionist party success in Catalonia, the Galician regionalist parties jointly receive not more than 20 percent of the votes. The most obvious difference between Catalonia and Galicia is that Catalonia has the highest regional GDP in Spain, based on a strong industrial base and superior human capital endowment, exemplified by its leading position in high-tech exports. According to the Democratic Convergence of Catalonia’s manifesto, Catalonia contributed 19.5 percent to the total resources of the central state, but received only 14 percent of the spending. The manifesto of the Republican Left complains about the usage of Catalan resources to finance public goods like high-speed trains, airports, and defense, and highlights the potential benefits of being able to manage and keep Catalonia’s resources to themselves. As the Financial Times reports, a majority of Catalans feels that “Madrid takes too much of local income to redistribute elsewhere.”

The Belgian case comes closer to our ideal scenario. Basically, Belgium comprises two ethnically and culturally distinct regions: a French speaking part, Wallonia, and a Flemish (Dutch) speaking part, Flanders. There is extensive variation in the relative value of their respective regional resources over time, which we can observe along with the strength of secessionism and secessionist parties. Up to the 1960s, Wallonia was one of the richest regions in Europe due to natural resources like coal and a comparative advantage in the leading sectors at that time (such as coal mining, steel making, and related activities; see Mnookin & Verbeke, 2009). While there were Flemish independence movements building on the suppression of the Flemish language and the political dominance of the smaller French part since the foundation of Belgium in 1830, support for secessionism never really took off until the economic situation reversed. Declining demand for coal and steel on the one side, and modernization and the increased value of possessing the important port of Antwerp on the other side made Flanders’ regional resources relatively more valuable compared to Wallonia’s. As our model would predict, this reversal of fortunes correlates strongly with the increasing vote share for secessionist parties and general support for secession in Flanders. In 2012, the secessionist New Flemish Alliance even became the largest party in the Belgian federal elections. It argues that “wealthy Flanders should not be subsidizing poorer Wallonia, whose regional government is alleged to be wasting money. Flemish nationalists feel strongly that their region is not receiving its fair share of the revenues that it contributes to the national economy.”

The abundance of anecdotal, correlational evidence further convinces us in our assessment that economic considerations indeed play an important role in explaining the success of democratic secessionism, and that regional resources in various categories and the distribution of the associated revenues are the key economic

15 See the Financial Times from 26th September 2012 at https://www.ft.com/content/bad90798-07f4-11e2-9df2-00144feadb00, last accessed on 5th October 2017.
EMPIRICAL RELEVANCE

factors. The listed cases show that richer regions feature stronger secessionist parties, that changes in resource value over time correlate with the success of these parties, and, as Spain and Belgium demonstrate, that comparable regions exhibit drastically different support for secessionism based on the value of regional resources. We now turn to Wales and Scotland in the United Kingdom to quantitatively evaluate whether this relationship can be shown to be causal.

3.2 Scottish Versus Welsh Independence and the Discovery of North Sea Oil

The Scottish “nationalist discourse traditionally has had a weak cultural dimension. Instead, nationalist claims are based on rather practical arguments about institutions, policy and accountability” (Holitscher & Suter, 1999, p. 272). Out of economic and political weakness, Scotland opted for the union with England in 1707 in order to belong to (what was) the strongest and most influential nation in the world at that time (Bryant, 2006, p. 80). Although the majority of the Scots have not dominantly developed strong 'British' national sentiments since then (Bryant, 2006, p. 5), there was no need to pursue a secessionist strategy due to the economic and military strength of the Empire (Bryant, 2006, p. 62-65; Gourevitch, 1979). The SNP, established in the 1930s, had little political relevance before and in the first years after the Second World War. Similarly in Wales, the Plaid Cymru, founded in 1925, has self-government and secession on its political agenda, but failed to gain much ground beyond narrowly defined supporter groups.

Things began to change in the 1960s. Owing to the peaceful political developments in Europe and the decline of the British economy, safety issues were increasingly replaced by economic concerns (Holitscher & Suter, 1999; Paquin, 2002). Neither the unloved Tories nor the Labour governments from 1964 onwards managed to improve the economic situation (Gourevitch, 1979; Paquin, 2002). As a consequence, the SNP and similarly Plaid Cymru in Wales gained their first small electoral successes in by-elections by the end of the 1960s.

It was around that time when the first oil was discovered in the North Sea. After the Geneva Convention (1958) confirmed the nations’ coastal rights, and offshore gas was discovered by the Netherlands in the early 1960s, “[t]he hunt was on for North Sea oil” (MacKay & Mackay, 1975, p. 184). After several years of unsuccessful exploratory drillings in the British Sector, “oil companies were becoming disillusioned with the prospects of finding oil in the North Sea” and commonly gave up (Whaley, 2010, p. 77). Against this background, the discovery of the Forties oil field off the Scottish coast appears even more like an

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17 For details on the historical and cultural background, see Bryant (2006), McCrone (1992), and Paquin (2002). Wales has already been in the union with England by annexation since the 16th century (Bryant, 2006).

18 As Scotland and England both have a significant amount of natural gas (about 50 percent of the UK gas are in Scottish waters; see Kemp & Stephen, 2000, pp. 9-12) and the value of oil is by far higher (Brocklehurst, 2013), the discussions and campaigns have always explicitly been about the oil on which we will also concentrate in our analysis.
exogenous shock, upon which further giant discoveries would follow.\textsuperscript{19} A summary table containing all (giant) discoveries in the Scottish sector is provided in Appendix B.

To calculate the Scottish share of British oil, a maritime border which is equidistant in all points to the Scottish and English coast, being also used to define Scottish fishery grounds, is generally applied (UK Statistics Authority, 2013, pp. 6-7, see also Figure 1).\textsuperscript{20}

There is no doubt that an independent Scotland would own the mineral rights for the mentioned sector

\textsuperscript{19} See, e.g., The Guardian following the link \url{http://www.theguardian.com/business/2014/oct/12/forties-oil-field-50-north-sea-uk-offshore-bp}, last accessed on 5th October 2017: “BP discovered gas in the North Sea in 1964, but it was not until 1970 that it […] had found signs of hydrocarbons more than 3,000 metres below the seabed around 110 miles from Aberdeen.”

\textsuperscript{20} Other plausible alternative borders would presumably not change the results much as “there are just a handful of fields, and not very important ones now” between the imaginable lines (Brocklehurst, 2013). However, our choice is the most conservative as the alternative would additionally localize further southern oil fields in the Scottish sector. More details are provided in Appendix F.
Building on this foundation, the hypothetical share of oil production in Scottish waters has generally exceeded 90 percent of the total UK oil production (see Kemp & Stephen, 2000, and figures in Appendix F). A document by the UK Statistics Authority (2013, p. 31) reveals that the UK Treasury’s tax revenues from the Scottish oil sector have been “as high as £27 billion in 1984/85.” These locally concentrated oil resources helped the SNP to create a picture of an independent Scotland being among the richest nations in the world (Jolly, 2007, p. 123), as the Scots’ per capita oil revenues “would rise ten-fold if the other 45 million people were excluded” (Collier & Hoeffler, 2006, p. 7).

The monetary revenue of North Sea oil is mainly represented by government tax receipts, which make up about 75 percent of the gross revenue (Kemp et al., 1983, pp. 120-125). “In the early 1980’s when oil prices peaked the share exceeded 98 percent” (Kemp & Stephen, 2000, p. 8). The known remaining oil reserves are estimated with a current monetary value of around £120 billion (UK Statistics Authority, 2013, p. 32). In recent years, oil revenues would represent 10-20 percent of the total tax revenue in an independent Scotland (UK Statistics Authority, 2013, p. 31).

For the most part, the direct economic impact of the oil sector was concentrated in Scotland (Scott, 2004, p. 339). It is estimated that up to 90,000 new jobs were created (Lee, 1995; MacKay & Mackay, 1975, p. 136), particularly in the rural areas of Grampian and Highlands as well as Aberdeen (Lee, 1995). The country profits from a large amount of money invested in the oil sector and its multiplier effects (Kemp & Stephen, 2000, p. 1), which lead to increased income and GDP. Due to the high amount of oil-related exports, an independent Scotland is supposed to have a strong balance of payments (Kemp et al., 1983; MacKay & Mackay, 1975, p. 173).

The SNP had been very successful in making political capital out of the situation in the early 1970s. Their distinctive “It’s Scotland’s oil” campaign, their bold and simple per capita calculations of oil revenue (Lee, 1976, pp. 307-314), and the claims the Westminster politicians would sell out ‘Scottish oil’ (Lee, 1976, p. 312) by exploiting the fields too rapidly (MacKay & Mackay, 1975, pp. 24-30) struck a nerve in Scotland. Consequentially, the party’s rise has often been related to the oil: Most prominently, Gordon Brown, the later British Prime Minister suggested in an essay in 1975 that “the rise of modern Scottish nationalism is
less an assertion of Scotland’s permanence as a nation than a response to Scotland’s uneven development [...] and their (oil-fired) expectations at a Scottish level” (Brown, 1975). Indeed, it is tenable to assume that the locally concentrated oil discoveries help the SNP to create a picture of an independent Scotland being among the richest nations in the world (Collier & Hoeffler, 2006; Jolly, 2007). Hence, the main hypothesis to be tested in our analysis is whether the electorate would increasingly vote for the national party after oil fields have been discovered. Lynch (2003, p. 6) concludes that “for the SNP, nothing has ever replaced oil in its economic case for independence.”

The nature of resource discoveries possibly could have strengthened the SNP’s momentum even more:

“[Natural resources] are usually ‘discovered’ at a particular moment, [...] perhaps being a gold rush. [T]he prices of natural resources are volatile, with periodic spikes, so that there are precise moments when the economic value of a particular resource becomes dramatically valuable.” Collier & Hoeffler (2006, p. 5)

Led by this argument, we also expect a stronger influence of oil discoveries on nationalist party support when the oil price – and simultaneously the current value of the discovered oil reserves – is higher. Before testing the hypotheses in section 5, we describe the dataset used for analysis in the subsequent section, starting with the panel structure of the data.

## 4 Data and Empirical Strategy

### 4.1 Data

We analyze the electoral outcomes for 72 Scottish and 40 Welsh constituencies in British general elections (GEs) over the 1945-2001 period. There are several reasons for choosing this time period. First, we are able to rely on such a long period since we managed to collect election results on the constituency level for both Scotland and Wales back to 1945. This helps us to reliably establish whether the parallel trends assumption is indeed justified. Second, the long period is informative as the respective nationalist parties in both countries – SNP and Plaid Cymru – were clearly the most prominent organized groups supporting independence during the whole period and did not experience unifications or split-ups. In addition, both have in common that they played only a minor role in Westminster politics until the 1960s (Paquin, 2002). Third, we did not include election results after the 2001 GE because – as a consequence of the implementation of further local government competencies – the number of constituencies changed and Scotland lost

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24 There are also few authors like Miller et al. (1977, p. 226) and Miller (1981) who rate the influence of oil not so high and deem it rather as a supportive factor than the trigger for the party’s success, arguing that the SNP’s electoral success began with a by-election in 1967 (Mitchell et al., 2012, p. 61).

25 We do not use local elections: massive changes in local government organization in the early 1970s make the pre- and post-treatment period unreliable comparisons. Generally, both SNP and Plaid Cymru have always performed better in local elections (see McGuinness et al., 2012; Sorens, 2004) where other factors dominate election campaigns than in GEs (Sorens, 2005).
13 of its previous 72 seats in the House of Commons (McGuinness et al., 2012, p. 11). Our panel design is only identical to a DiD approach, and enables us to draw causal inferences, with the consistent inclusion of time and unit fixed effects. Note that the period from 2001 onwards coincides with both rising oil prices and increases in the vote share of the SNP; including it would thus most likely strengthen our results.26 Constituency boundaries have also been changed several times within our sample period.27 From 1945 to 2001, the amendments of five redistribution rounds have come into force: in 1947, 1954, 1969, 1983, and 1995. As a result, the number of constituencies ranges between 71 and 72 for Scotland and 35 and 40 for Wales. We resolve this issue by projecting the election results to the constituency boundaries in the 2001 GE, on which we draw on for our estimations. The detailed algorithm used to match the constituencies and results is described in Appendix D.

The final dataset comprises data on 16 GEs held in the UK since 1945, which were collected from Brancati (2015) and Outlaw (2012).28 We also include 91 by-elections which were held in either Scottish or Welsh constituencies when an incumbent had to be replaced (e.g., due to death or resignation).29 The dependent variable Nationalist vote share is defined as the percentage share of votes received by the SNP or Plaid Cymru in UK GEs and by-elections in a constituency i at time t. If no nationalist candidate stands for election, Nationalist vote share is coded as 0.30

Figure 2 displays the shares of Plaid Cymru (in light red) and the SNP (in dark blue). Both parties received only a small share of votes in the first years of the observation period. Single by-election victories in 1966 (Plaid Cymru) and 1967 (SNP) marked the beginning of the parties’ ascent. Subsequently, the SNP was more successful, receiving more than 30 percent of the Scottish vote in October 1974; Plaid Cymru’s culmination point was 14.3 percent in the 2001 GE (McGuinness et al., 2012). The time interval in our study is biannual, but some of the control or treatment variables are only available at a yearly frequency. Note that if only one by-election was held in a particular half-year, this observation is fully captured by the biannual-FE.

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26 Political Scientists also argue that voting patterns changed after 2001 as the increase in competencies for the regional governments decreased the relative importance of British GEs (Jones & Scully, 2006, p. 129). If this would affect Scotland differently than Wales (as a time varying variable which is not orthogonal to the treatment), it could contaminate our results.

27 Constituency boundaries are reviewed by Boundary Commissions in each of the four UK regions (see http://www.parliament.uk/about/how/elections-and-voting/constituencies/, last accessed on 5th October 2017). These commissions publish reports on the constituencies and recommend changes to the parliament, if deemed necessary. In order to maintain continuity of constituencies as well as equal parliamentary representation in terms of population, the commissions are supposed to recommend changes only if unequal population distribution exceeds a certain threshold. For details about the redistribution process, see http://aceproject.org/ace-en/topics/bd/bdy/bdy_gb, last accessed on 5th October 2017.


29 Data for by-election results are provided by Pippa Norris following the link https://sites.google.com/site/pippanorris3/research/data, last accessed on 5th October 2017. For the importance of by-elections see, e.g., Miller et al. (1977); McGuinness et al. (2012); Harvie (1995); Mitchell et al. (2012).

30 Miller et al. (1977) show that independence is the main criterion to vote for the nationalist parties. Hence, the share of votes for a nationalist party is commonly taken as a proxy for the public support for independence (Sorens, 2005). Brand et al. (1994) notes that the amount of protest voters can be neglected.
We collected data on oil discoveries mainly from UK government websites.\footnote{A main data source for the oil discoveries was \url{https://www.gov.uk/guidance/oil-and-gas-uk-field-data#uk-oil-and-gas-reserves-and-resources}, last accessed on 5th October 2017.} We used GIS software as well as various other sources to verify the size and date of each individual discovery, which was reported there. Sources are listed in Appendix B. With regards to oil discoveries, we distinguish between giant oil fields, which include all fields above 500 million stock tank barrels (MMstb.), and all oil fields, which include all fields above 50 MMstb. Discoveries (giant) and Discoveries (all) indicate the number of giant/all oil fields that have been discovered in the year of and the year before an election. An oil field is classified as ‘giant’ if it contains estimated ultimate recoveries of 500 million barrels of oil or more before extraction begins (Ivanhoe & Leckie, 1993).\footnote{Worldwide ‘giants’ are estimated to account for 74 percent of the estimated global oil reserves although less than 1 percent of all oil fields are ‘giants’ (Ivanhoe & Leckie, 1993). As we only know the year and not the exact month of each discovery, we consider discoveries in the year of and the year before the election in our baseline specification.}

Giant oil fields in contrast to small oil discoveries signal “significant increases in production possibilities in the future” and massive windfall profits Lei & Michaels (2014). They are also “arguably exogenous and unexpected due to the uncertainty surrounding oil and gas exploration” (Arezki et al., forthcoming). Nevertheless, we demonstrate that all our results hold when using all discoveries, and the amount of discovered reserves as well. Figure 3 shows the distribution of oil discoveries over time. While many discoveries occurred in the 1970s, it is apparent that there were both small and large discoveries over the whole sample period. Appendix B lists all included individual discoveries and their size. In addition to the number of

![Figure 2: Election Results](image)

Share of votes received by SNP/Plaid Cymru in GEs and Westminster by-elections. The graphic displays constituency results and the total average vote share of the two parties in GEs.
discoveries, we also collected and coded the amount of oil discovered within a year \( t \) (Amount of new reserves). The variable Oil price is the real price of Brent crude oil in constant 2001-US$, which is the major benchmark for oil produced in the North Sea. Oil price is coded as the annual average of the Brent price.\(^\text{33}\)

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**Figure 3: Distribution of Oil Discoveries over Time**

Giant oil discoveries include all fields above 500 million stock tank barrels (MMstb.), and oil discoveries all fields above 50 MMstb. The main data source is the government of the United Kingdom, but we verified each discovery, its discovery data and size using various sources. Details about individual discoveries and all sources are specified in Appendix B.

In most specifications, we also control for the most important macro developments for which regional data are available, as deviating non-linear trends between Scotland and Wales could affect our estimates. Unemployment rate indicates the rate of registered unemployed (“Claimant Count”) for Scotland and Wales, respectively, as a yearly average.\(^\text{34}\) In opinion polls, voters regularly mention unemployment as the most important economic issue influencing their voting decision (Zirakzadeh, 1989). Following Scott (2004), we can also interpret it as a rough proxy for public welfare, as it correlates with other indicators like “incomes, the quality of jobs available, the proportion of lone-parent families, crime, health and housing conditions” (Scott, 2004, p. 333). In a similar vein, Regional GDP per capita, which measures the Scottish/Welsh GDP per capita as a percentage share of the UK average, proved to be an important factor as well (see section

\(^\text{33}\) The oil price is taken from Baumeister & Peersman (2013) who provide a monthly series for Brent, dating back to 1957. For previous years, the Brent price is projected using the price for the sort WTI. These data are provided by the Federal Reserve Bank of St. Louis (https://research.stlouisfed.org/fred2/series/OILPRICE/, last accessed on 5th October 2017.). Details on the coding of the variables are provided in Appendix E.

\(^\text{34}\) Data for Unemployment rate are retrieved from Mitchell (1988), for all years prior to 1965, and the Office for National Statistics (ONS) following the link http://www.ons.gov.uk/ons/rel/lms/labour-market-statistics/june-2015/dataset--labour-market-statistics.html, last accessed on 5th October 2017, for the subsequent years.
Relative government expenditure, which might also be relevant, is only accessible for the period after 1979 (see Heald, 1994).

Table 1: Descriptive Statistics

<table>
<thead>
<tr>
<th></th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationalist vote share</td>
<td>1883</td>
<td>10.25</td>
<td>11.89</td>
<td>0</td>
<td>67.05</td>
</tr>
<tr>
<td>Discoveries (giant)</td>
<td>1883</td>
<td>0.62</td>
<td>1.31</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Discoveries (all)</td>
<td>1883</td>
<td>1.40</td>
<td>2.26</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>Amount of new reserves</td>
<td>1883</td>
<td>1.49</td>
<td>2.65</td>
<td>0</td>
<td>8.90</td>
</tr>
<tr>
<td>Scotland</td>
<td>1883</td>
<td>0.65</td>
<td>0.48</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Oil price</td>
<td>1883</td>
<td>25.83</td>
<td>19.10</td>
<td>7.62</td>
<td>81.39</td>
</tr>
<tr>
<td>Unemployment rate</td>
<td>1883</td>
<td>4.95</td>
<td>3.11</td>
<td>1.80</td>
<td>13.10</td>
</tr>
<tr>
<td>GDP per capita</td>
<td>1883</td>
<td>90.58</td>
<td>5.21</td>
<td>78.50</td>
<td>102.40</td>
</tr>
<tr>
<td>Near border (50)</td>
<td>1883</td>
<td>0.25</td>
<td>0.43</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Near border (75)</td>
<td>1883</td>
<td>0.40</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Near border (100)</td>
<td>1883</td>
<td>0.58</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Coastal access</td>
<td>1883</td>
<td>0.57</td>
<td>0.49</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Distance to Aberdeen</td>
<td>1883</td>
<td>311.11</td>
<td>207.57</td>
<td>3.19</td>
<td>641.06</td>
</tr>
<tr>
<td>Avg. soil suitability</td>
<td>1883</td>
<td>3.76</td>
<td>1.26</td>
<td>0.17</td>
<td>5.32</td>
</tr>
<tr>
<td>Ruggedness index</td>
<td>1883</td>
<td>53.37</td>
<td>36.72</td>
<td>1.93</td>
<td>170.47</td>
</tr>
</tbody>
</table>

The table shows descriptive statistics for all variables used in the analysis over the 1945-2001 period. N = number of observations, Mean = arithmetic mean, SD = standard deviation, Min = minimum value, Max = maximum value. Amount of new reserves is measured in million stock tank barrels (MMstb.) in period \( t \) and \( t-1 \). Discoveries (giant/all) denotes the number of giant/all oil fields discovered in \( t \) and \( t-1 \). Distances are in kilometers. For details on the other variables see Appendix E.

Adding below-national level covariates should mostly result in more efficient estimation. Note that our results do not depend on including control variables; if anything, adding controls seems to lead to smaller, more conservative coefficient estimates. We also compute further variables to test for heterogeneous effects, which are described in section 5.2. Descriptive statistics for all variables are provided in Table 1.

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36 Lee (1995, p. 140) remarks that “it is clearly not possible to compute an exact net surplus or loss” for the regions. Yet, estimates suggest that, even after the introduction of the so-called Barnett-Formula in 1978 – a determined mechanism that was supposed to yield cohesion of central government expenditure and was installed in order to prevent internal disputes on this topic (Bryant, 2006, p. 54) – Scotland still receives more expenditure than other regions (Heald, 1994, p. 157). See Bryant (2006, pp. 54-55) and Heald (1994) for details about the impact and amendments of the Barnett-Formula. However, the literature does not suggest that the complex topic of fiscal redistribution is dominating campaigns in Scotland and Wales directly. Lynch (2003) states that these issues are “too obscure for the public to understand or become particularly concerned with. [...] Basing a campaign for independence around abstract fiscal issues at a time of growing public spending is not a strategy likely to succeed in the short-term”.

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4.2 Empirical Strategy

We use a difference-in-differences (DiD) approach with Scotland as the treated group and Wales as the control group to estimate the causal effect of oil discoveries on the vote share of nationalist parties. This is inspired by Collier & Hoeffler (2006), who briefly discuss that Wales would form a suitable counterfactual. The need to rely on DiD arises from potential omitted variable bias when using only over-time variation within Scotland, as the treatment can obviously coincide with other time-specific events. DiD enables a causal estimation based on the assumption of common trends between treated units and counterfactuals, and is – as we argue – well applicable to this case.

First, prior to the earliest discoveries, oil played as little a role for the SNP as for the Welsh Plaid Cymru. This is supported by historical evidence which shows that nobody expected large discoveries prior to 1969 (Bamberg, 2000). The oil exploration process was conducted by private companies (including BP, Shell, Amoseas, and Guld) based on periodic licensing by the responsible central UK ministry (Bamberg, 2000). Neither the SNP nor Plaid Cymru were responsible for these decisions. Both foreign and domestic companies could apply and oil import tariffs protecting British companies had to end when the UK entered the European Free Trade Association (EFTA) in 1964. After some initial drillings, there were no signs of significant upcoming discoveries. “By mid 1968 exploration in the British sector of the North sea had slumped” (Bamberg, 2000, p. 202). Myles Bowen from Shell is quoted as saying: “in May 1969 the view was that all the worthwhile gas fields in the Southern North Sea had been found, while the search for oil in the north was doomed to failure” (Whaley, 2010, p. 77). Accordingly, the date of the first major discovery, the so-called Forties field by BP, was a surprise even for industry experts, and all the more for voters and both parties. As described in more detail above, almost all relevant discoveries in the following years have been exclusively in the Scottish maritime sector.

We do not only rely on the binary distinction between the pre- and post discovery period, but use the number and extent of discoveries over time in a panel framework. While the probability of finding a new oil field could correlate with previous finds in nearby areas (Lei & Michaels, 2014; MacKay & Mackay, 1975), the degree of uncertainty is high, which is why the individual discovery year and its size are regarded as exogenous in the literature (Arezki et al., forthcoming; Lei & Michaels, 2014).

A second reason why this particular natural experiment can well be examined with a DiD strategy is that both countries feature independence movements manifested in nationalist parties (Jolly, 2007, p. 121). Thus, an observable and comparable dependent variable Nationalist vote share can be coded for both regions. SNP and Plaid Cymru are also sufficiently alike to regard them as a treatment and control group.

---

facing – to a large extent – similar success in elections in absence of the treatment. More specifically, the common trend assumption requires that the nationalist party’s electoral performance in Scotland would not differ from the Welsh nationalist party’s counterfactual trend in absence of the treatment. To examine this assumption, Figure 4 shows the constituency level electoral results prior to the first oil discovery in 1970, as well as their average trend separately for Wales (light red) and Scotland (dark blue). We observe nearly indistinguishable linear parallel trends. If anything, the trend of Plaid Cymru is a little more positive, which would bias against finding a significant positive effect for the SNP after the oil discoveries following 1970. Regressing a Scotland-specific linear time trend on Nationalist vote share prior to 1970 yields an insignificant coefficient (p-value = 0.699). Note that the DiD estimation with multiple time periods also assumes that the treatment “has the same effect in every year” (Wooldridge, 2010, p. 151).

Figure 4: Linear Pre-Trends

The graphic shows the share of votes received by the SNP/Plaid Cymru in elections before 1970. The dashed lines indicate the linear trends of the two parties in the period prior to the first oil discoveries. The unconditional linear trend of Plaid Cymru’s vote results is stronger than the trend of the SNP.

Besides these technical arguments, it is also reassuring that, based on a qualitative comparison, the two parties exhibit many similarities, particularly with regards to their motivation and goals. Both movements emphasize the fact that Britain is not a homogeneous nation, and that their regions have cultural identities distinct from England (Fusaro, 1979). Both SNP and Plaid Cymru are geographically limited parties, which are the biggest movements promoting their regional interest and full independence for their respective region (Fusaro, 1979). The SNP and Plaid Cymru can be classified as nationalist left-of-centre parties (Mitchell et al., 2012; Levy, 1995), usually strongly opposing what they call “English Tory government” (Levy, 1995, p. 296). Both parties promise, for instance, to strengthen the social welfare system and aim
for more social equality. With regards to their regions’ connection to England, they build up a picture of ‘internal colonialism’ (Fusaro, 1979; Nagel, 2004). The notion that the two parties can be treated as belonging to the same kindred group is not far-fetched: after the 1974 GE, the Plaid Cymru leader Gwynfor Evans stated in Westminster that there would now be “more nationalists in the House than Liberals” (Fusaro, 1979, p. 365).

Based on the model in section 2.2, we would assume that prior to the resource discoveries the strength of regional identity (proxying for preference heterogeneity) was the main driver of secessionist party success. The pre-trends in Figure 4 suggest that there were no systematically differing trends in Scottish or Welsh identity prior to the first discovery. It is still possible that, due to unobserved time-specific factors, Scottish identity increased simultaneously to the beginning of the oil discoveries. While there is no time-varying measure that allows us to control for regional identity in the regression itself, we can make use of survey data from the Scottish and Welsh election study in 1979 to compute Scottish and Welsh regional identity about 9 years after the first large discoveries. Table 2 shows that almost a decade after the first discoveries, regional identity was still stronger in Wales. Compared to Scotland, a larger share of people consider themselves to be Welsh, and the share of people stating a regional instead of British identity is also higher in Wales.38

<table>
<thead>
<tr>
<th>Table 2: Regional Versus National Identity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage share of regional identity 1979</td>
</tr>
<tr>
<td>Scotland</td>
</tr>
<tr>
<td>Wales</td>
</tr>
</tbody>
</table>

Based on the Scottish and Welsh election study in 1979. The exact survey question we use was: “Do you consider yourself to be British or Scottish or English or Irish or something else? [If you had to choose one, which would you say you were?]”. In the case of Scotland (Wales), we coded the people answering “Scottish” (“Welsh”) and set them in relation to those answering “British”.

This is plausible as Welsh nationalism also relates to preserving Welsh culture and language (Fusaro, 1979; Lee, 1995). In contrast to the unusual Gaelic in Scotland, which is only spoken by about 1 percent of the population (Sorens, 2005, p. 306), Welsh is the dominating spoken language in significant parts of the region.39 The fact that in 1979 Welsh regional identity was still stronger nine years after the first discovery is reassuring evidence that there were no problematic unobserved trends in regional identity that bias our results. There is no reason for assuming that Welsh voters or the Plaid Cymru would react to oil discoveries off the Welsh coast in a different way than the Scottish did.

38 Data were unfortunately only collected in 1979 and 1997, and not prior to the treatment period. It is possible that as an effect of becoming a resource-rich region, Scottish identity might have become stronger in the long run.

39 This is among the only significant differences between the nationalist tendencies in the two countries as the political positions and aims of the parties are quite similar (Bryant, 2006, p. 291). The cultural uniqueness of Scotland can instead be spotted in the greater conservation of original Scottish institutions, e.g., an education system differing from the rest of the UK (Fusaro, 1979).
Two anecdotal examples underline this. Firstly, Plaid Cymru also (unsuccessfully) attempted to run election campaigns on the issue of natural resources. Proclaiming the slogan ‘Hands off Welsh water’, it decried the overexploitation of Welsh springs to supply English cities (Collier & Hoeffler, 2006, p. 7) and also protested against rising water charges in Wales (Levy, 1995). Secondly, in the 1970s the already quoted Plaid Cymru leader Gwynfor Evans “constantly affirm[ed] that oil lies under the Celtic Sea, as if trying to wish it and Welsh independence into existence” (Lee, 1976, p. 307). This demonstrates that Plaid Cymru recognized the potential electoral gains from arguments based on regional resources that voters in their respective region could claim for themselves.

Based on this evidence supporting the validity of the identifying assumptions, our main estimation equation is as follows:

\[
\text{Nationalist vote share}_{i,c,t} = \delta \times \text{Discoveries (giant)}_t \times \text{Scotland}_c + X'_{i,c,t} \gamma + \lambda_{c/i} + \theta_t + \epsilon_{i,t},
\]

with Nationalist vote share being the vote share of the respective nationalist party in constituency i in country \( c \in \{\text{Scotland; Wales}\} \) at time \( t \). The treatment effect is measured as \( \delta \), the coefficient of the interaction term of Discoveries (giant) and Scotland (the binary indicator for Scotland). The main effect of Discoveries (giant) is fully captured by biannual-FE \( \theta \). Depending on the specification, the main effect of Scotland is either captured directly by a binary variable \( \lambda_c \) or by fixed effects \( \lambda_i \) for each constituency. Using \( \lambda_i \) in the panel DiD-setting mainly serves to increase efficiency, but would also pick up any constituency-specific characteristics that are time-invariant, e.g., a specific culture or the degree of urbanity. The same holds for the two time-variant controls. \( X' \) is the vector containing the control variables and \( \gamma \) the respective coefficient vector. \( \epsilon \) is the error term.

We will also show results from equations of the form:

\[
\text{Nationalist Vote Share}_{i,c,t} = \delta \times \text{Discoveries (giant)}_t \times \text{Scotland}_c + X'_{i,c,t} \gamma + \lambda_i + \theta_t + \tau_{i/c} T + \epsilon_{i,t},
\]

where \( T \) is a linear trend variable, and \( \tau_{i/c} \) is a country- or constituency-specific trend coefficient. As our treatment is “randomly” switched on and off when oil is discovered, we cannot as easily test for pre- and post-treatment effects as in more simple settings. Allowing for country-specific trends relaxes the common trend assumption as they allow linear country-specific deviations from the trend.40

Our approach differs from simple two-period DiD in including multiple time periods and having a non-binary treatment variable Discoveries (giant) (Wooldridge, 2010). This assumes a linear effect of discoveries, while it is possible that each additional discovery has a diminishing effect. Note that this would again bias against finding a significant treatment effect compared to using a simple dummy variable. We opt for this choice as it contains more information which we use to interpret the results. \( \delta \) is thus the average

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40 Technically, including treatment-specific trends relaxes the common trend assumption, which refers to the change, i.e. the first derivative of the dependent variable. Instead, we only need to assume parallel growth between treated and untreated units, i.e. the same second derivative, while the first derivative is allowed to differ. Note as well that all our results hold in a balanced panel excluding by-elections (see Appendix H, Table 8).
treatment effect on the treated (ATT); the additional vote share of the SNP caused by one additional oil discovery compared to the counterfactual trend indicated by the performance of Plaid Cymru. Standard errors (two-way clustered, using the implementation by Baum et al., 2010) allow for arbitrary correlation both within constituencies and across units at one point in time. The results are robust to alternative clustering choices, as we discuss in detail later. The data cover the 1945-2001 period and include a maximum of 1883 constituency-half-year observations.

5 Results

5.1 Main Results

We start by looking at the simple fixed effects regression of the SNP vote share on the number of giant oil discoveries in the year of and the year before the election, focusing on within-Scotland variation only. This estimation includes time-fixed effects and the two time-varying control variables Unemployment rate and GDP per capita. Constituency-fixed effects pick up any time-invariant omitted variables, but the estimates could still be biased by time-varying omitted factors. The conditional correlation is clearly positive. It indicates a treatment effect for Discoveries (giant) of 4.494, which is significant at the 1-percent level. One additional giant oil discovery would thus be linked to an increase of about 4.5 percentage points for the SNP. This treatment effect estimate might obviously be biased, as there could be omitted variables which are correlated with oil discoveries and affect the vote share of the SNP.

Hence, we turn to the first DiD estimation in column 2. This specification includes Welsh constituencies, as well as time-fixed effects, a binary variable that takes on the value of 1 for all constituencies within Scotland, and the interaction of this variable and the oil discoveries (Discoveries (giant) \times Scotland). We focus on this interaction term, which is our treatment variable in the DiD setting. The DiD treatment effect \( \delta \) slightly decreases from 4.494 to 3.262, but remains significant at the 1-percent level. Column 3 relaxes the common trend assumption to some extent by adding a treatment-specific time trend which would capture any linear deviation from the common trend assumption. The coefficient decreases only slightly to 2.862 and remains significant at the 1-percent level. Column 4 adds the country-specific control variables and constituency-fixed effects. Note that as any potential bias affecting the treatment effect would have to occur at the country level, constituency-fixed effects mainly serve to increase the efficiency of the estimations. Including constituency-fixed effects and control variables is related to a smaller treatment effect estimate of 1.923, which is significant at the 5-percent level. If our assumptions hold, inserting constituency-specific time trends in column 5 should also not affect the coefficient, as these would only capture the treatment specific trend more precisely. Indeed, the coefficient remains almost identical.
### Table 3: Regression Results

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Scotland × Discoveries (giant)</em></td>
<td>-</td>
<td>3.261</td>
<td>2.862</td>
<td>1.923</td>
<td>1.926</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.799]</td>
<td>[0.744]</td>
<td>[0.882]</td>
<td>[0.898]</td>
</tr>
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<td><em>Scotland</em></td>
<td>-</td>
<td>2.263</td>
<td>-3.500</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[1.762]</td>
<td>[1.439]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Discoveries (giant)</em></td>
<td>4.494</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.253]</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Unemployment rate</em></td>
<td>0.977</td>
<td>-</td>
<td>-</td>
<td>1.737</td>
<td>1.754</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[0.099]</td>
<td></td>
<td>[1.097]</td>
<td>[1.206]</td>
</tr>
<tr>
<td><em>GDP per capita</em></td>
<td>1.185</td>
<td>-</td>
<td>-</td>
<td>0.725</td>
<td>0.721</td>
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<td></td>
<td></td>
<td>[0.093]</td>
<td></td>
<td>[0.214]</td>
<td>[0.231]</td>
</tr>
<tr>
<td>p-value: <em>Scotland × Discoveries (giant)</em></td>
<td>-</td>
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<td>0.000</td>
<td>0.029</td>
<td>0.032</td>
</tr>
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<td>Biannual fixed effects</td>
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<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Constituency-fixed effects</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Linear time trend <em>Scotland</em></td>
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<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Constituency-specific time trends</td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.58</td>
<td>0.50</td>
<td>0.52</td>
<td>0.74</td>
<td>0.83</td>
</tr>
<tr>
<td>Number of observations</td>
<td>1216</td>
<td>1883</td>
<td>1883</td>
<td>1883</td>
<td>1883</td>
</tr>
</tbody>
</table>

The table displays regression coefficients with standard errors in brackets. Standard errors are two-way-clustered on the constituency level and biannual level using the `ivreg2` command in Stata. *Discoveries (giant)* denotes the number of giant oil fields discovered in $t$ and $t-1$. The unit of analysis is the constituency-half-year level and the sample covers the 1945-2001 period.

Giant oil discoveries thus lead to an increase in the vote share of nationalist parties of about 2 percentage points. To take a conservative approach, we choose column 4, which yields the smallest treatment effect estimate, as our preferred specification for all further tests. In order to get a first naïve idea about the economic impact of discoveries, we can consider the pre-election period directly after the first discovery. There were 8 giant discoveries in the 1971-1974 period, so that a back-of-the-envelope calculation suggests that the initial rise of the SNP might have been fostered by as much as 16 percentage points using our most conservative estimate. Using a simple post-1970 dummy and interacting it with the Scotland dummy yields a point estimate of 10.523 and a p-value of 0.000.

Conceptually, an increase of Scotland’s resource wealth could also make it relatively less attractive for Welsh voters to support secession and *Plaid Cymru*. Accordingly, and in line with our model, the coefficient measures the effect of a change in relative, not absolute resource wealth. At the same time, this distinction might not be decisive, as the proportionate revenues of constituencies in Wales from the distribution of oil-based revenues are much smaller than the potential gain for Scotland in case of independence, as the revenues are currently distributed across all all English constituencies.\[41\]

\[41\] This could be interpreted as the average effect of all oil discoveries, but it might not be a consistent estimate due to the fact that Scotland is subject to multiple treatments during the sample period. The results are displayed in Appendix H, Table 12, column 1.
This supports our hypothesis that nationalist parties can exploit the discoveries as a signal about the potential benefits of secession, which they try to communicate to voters and instrumentalize in their campaigns. It seems likely that voters also take the other years prior to the election into account when making their electoral choices. We examine this in two ways. First, we code variables that count the number of giant discoveries over the last 2, 3, and 4 years prior to the election in year $t$. A priori, we would expect that the effect is decreasing the longer the time period over which they accumulate. Voters most likely only incompletely remember all past events, so that a certain share will not take them into account in their optimization decision any more as time passes by. This is exactly what we observe: the treatment effect decreases from 1.923 in column 1 to 1.309 in column 4 (but the standard errors decrease even more). We interpret this as a sign that the salience of the discovery is important for its effect.

While this prior test shows a decreasing coefficient for cumulative discoveries, we are interested in knowing whether voters react stronger if the number of additional discoveries per year is stable over the course of several years. A steady series of oil discoveries affirms voters that there are real potential benefits of secession. Row 2 in Table 4 shows the coefficients of the individual regressions. The treatment effect increases from 3.487 for average discoveries in the election year and the year prior to election, to 6.545 if the number of discoveries per years is confirmed over the four years prior to an election. This is to some degree mechanical and what we would expect: compared to considering the average discoveries over the last two years, an increase by one unit in average discoveries over the course of four years means that there were twice as many additional discoveries in total. It is also plausible that voters react more cautiously to single discoveries until further finds reduce the uncertainty about the long-term economic benefits of these regional resources which the SNP claims in their campaigns. Using another rough calculation, this suggests that the initial rise of the SNP was fostered by 6.545 times the 1.8 discoveries per year on average in the 1971-1974 period, equalling about 12 percentage points. A graphical illustration of these results is presented in Figure 5.

Rows 3 and 4 in Table 4 serve as a robustness tests using the number of all discoveries ($\text{Discoveries (all)} \times \text{Scotland}$ in row 3, and $\text{Discoveries per year (all)} \times \text{Scotland}$, row 4). While it is common in the literature to use giant oil discoveries which are more likely to be noticed (see, e.g., Lei & Michaels, 2014), it would increase our confidence in the results if they hold for a larger sample of discoveries as well. We use all discoveries above 50 MMstb., as smaller ones are unlikely to have any economic significance. As expected, row 3 and 4 show lower coefficients compared to row 1 and 2. Anything else would have been surprising: as the average discovery is now much smaller in size, the additional effect of an additional discovery on Nationalist vote share should be smaller in a linear regression framework. However, all coefficients are significant at the 1-percent level. Moreover, they further support the pattern we observed before, with larger coefficients for a steady flow of discoveries over several years (columns 2-4).
The table displays coefficients of 16 individual regressions with standard errors in brackets. All estimations also include constituency-fixed effects, biannual time-fixed effects, a linear time trend for Scotland as well as the control variables GDP per capita and Unemployment rate (as in Table 3, column 4). Standard errors are two-way-clustered on the constituency level and biannual level using the `ivreg2` command in Stata. \( t = \{ -x, 0 \} \) denotes the sum/average number of (giant) oil discoveries in \( t \) and the \( x \) years prior to \( t \). The sample covers the 1945-2001 period and the number of observations is 1883 at the constituency-half-year level.

It seems intuitive that voters react to the number of discoveries, and more so to giant discoveries which cross a certain threshold to make it into the news regardless of being instrumentalized by the nationalist party or not. Still, it is also informative whether voters also react to the amount of oil that is discovered. This is less obvious than it seems: while more oil is related to higher benefits of secession, it is unlikely that voters gather detailed information about the exact extent of the oil resources. The effect might thus not be linear in Amount of new reserves, or at least it is a less precise measure of the signal that the voters actually receive.

The table displays coefficients of 8 individual regressions with standard errors in brackets. All estimations include constituency-fixed effects, biannual time-fixed effects, a linear time trend for Scotland as well as the control variables GDP per capita and Unemployment rate (as in Table 3, column 4). Standard errors are two-way-clustered on the constituency level and biannual level using the `ivreg2` command in Stata. \( t = \{ -x, 0 \} \) denotes the sum/average amount of new discovered oil reserves in \( t \) and the \( x \) years prior to \( t \). The sample covers the 1945-2001 period and the number of observations is 1883 at the constituency-half-year level.

Table 5 shows the results focusing again first on the cumulative amount of oil discovered (row 1), in all discovered oil fields, and then on the average amount of oil discovered per year (row 2). The coefficients remain positive throughout in both cases. They become statistically significant at the 1-percent level when
Figure 5: **Effect of the Sum of Giant Discoveries and Giant Discoveries per Year**

The upper graph shows the estimated coefficients and the respective 95-percent confidence interval from the first row in Table 4. The lower graph displays the estimates from the second row reported in Table 4.

The amount of oil discovered is confirmed over a course of at least three years. Again, the results are in line with the hypothesis that voters react more strongly when the signals are confirmed over a longer period of time. Exploring the coefficients and standard errors also indicates that the exact amount of oil discovered is a much noisier measure of what voters actually perceive. This is again in line with Lei & Michaels (2014) who argue that it is best to use the number of discoveries as a proxy. Discovering an additional 1000 MMstb. of oil per year over the previous four year period leads to an increase in the SNP’s vote share of about 2.5 percentage points. In terms of economic significance, a simple back-of-the-envelope calculation suggests that average discoveries of 4000 MMstb. (within the scope of discoveries in the early 1970s) contributed around 10 percentage points to the SNP’s increasing vote shares.
To sum up the findings and their interpretations so far; there is a strong positive correlation between Discoveries (giant) and the vote share of the nationalist SNP party in a standard FE regression. The causal average treatment effect on the treated from the DiD design, using Wales as a control group, yields a slightly lower, but still highly significant coefficient. One additional giant oil discovery in the year of or the year prior to an election leads to an increase in Nationalist vote share of about 2 percentage points. We interpret this as the voters’ reaction to the change in the benefits of separation. Further tests, taking into account several years prior to an election, support the robustness of our results and show that the effect becomes stronger if there is a steady series of discoveries over a longer course of time.

5.2 Heterogeneous Effects

This section examines whether there are heterogeneous effects across constituencies within Scotland. Table 6 assesses which voters are more receptive to secessionist claims based on regional resources. We consider three dimensions on which heterogeneous effects could be based on to learn more about voter behavior: differences in other benefits from a larger union, the salience of regional resources, and economic geography. Note that this goes beyond what our theoretical model captures, which assumes that factors like benefits from trade or preference heterogeneity are constant within regions.

If constituencies differ within regions, this could moderate the effect of increased regional resource value. Within a certain distance, commuting to work in England is feasible for people in Scotland or Wales and there will be more direct short-distance trade. Those voters are then involved in different discussions at work, get partly different media outlets, and are less exposed to SNP campaigns. To test this hypothesis, we coded whether a constituency was within 50, 75 or 100 km of the English border, and interacted these dummy variables with the treatment effect. Columns 1-3 show the results. The coefficient of the interaction term is about -1.5 for both the 50 and 75 km buffer, with standard errors around 0.5. In line with our expectations, the effect becomes smaller when our binary indicator also includes those within 75 to 100 km distance; it decreases to -0.456 and becomes statistically insignificant. Taking into account the main effect, the marginal effect is close to zero for those living in constituencies with close proximity to England. We take this as an indication for the importance of information acquisition and media exposure.

Secondly, we want to examine whether voters who are more directly affected by oil processing and whose jobs are potentially tied to the oil industry react differently with regards to nationalist party support. Column 4 shows the interaction of the treatment effect with a binary variable indicating coastal access of a constituency. This broadly captures whether there is a port from which ships could leave to the oil rigs and whether there are jobs related to the oil industry.
Table 6: Regression Results

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
<th>Nationalist vote share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scotland × Discoveries (giant)</td>
<td>1.634</td>
<td>2.313</td>
<td>2.104</td>
<td>0.831</td>
<td>5.718</td>
<td>2.508</td>
<td>2.339</td>
</tr>
<tr>
<td></td>
<td>[0.870]</td>
<td>[0.848]</td>
<td>[0.947]</td>
<td>[1.098]</td>
<td>[1.076]</td>
<td>[1.186]</td>
<td>[0.846]</td>
</tr>
<tr>
<td>Scotland × Discoveries (giant) × Near border (50)</td>
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<td>−1.417</td>
<td>−1.417</td>
<td>−1.417</td>
<td>−1.417</td>
<td>−1.417</td>
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<tr>
<td></td>
<td>[0.577]</td>
<td>[0.423]</td>
<td>[0.686]</td>
<td>[0.686]</td>
<td>[0.686]</td>
<td>[0.686]</td>
<td>[0.686]</td>
</tr>
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<td>Scotland × Discoveries (giant) × Near border (75)</td>
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<td>−1.498</td>
<td>−1.498</td>
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<td>[0.686]</td>
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<td>[0.686]</td>
<td>[0.686]</td>
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</tr>
<tr>
<td>Scotland × Discoveries (giant) × Near border (100)</td>
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<td>−0.456</td>
<td>−0.456</td>
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<td>[0.686]</td>
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<td>[0.686]</td>
<td>[0.686]</td>
</tr>
<tr>
<td>Scotland × Discoveries (giant) × Coastal access</td>
<td>1.716</td>
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<td>1.716</td>
<td>1.716</td>
<td>1.716</td>
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<td>[0.615]</td>
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<tr>
<td>Scotland × Discoveries (giant) × Distance to Aberdeen</td>
<td>−0.009</td>
<td>−0.009</td>
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<td>[0.004]</td>
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<tr>
<td>Scotland × Discoveries (giant) × Avg. soil suitability</td>
<td>−0.201</td>
<td>−0.201</td>
<td>−0.201</td>
<td>−0.201</td>
<td>−0.201</td>
<td>−0.201</td>
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<td></td>
<td>[0.291]</td>
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<td>[0.291]</td>
<td>[0.291]</td>
</tr>
<tr>
<td>Scotland × Discoveries (giant) × Ruggedness index</td>
<td>−0.006</td>
<td>−0.006</td>
<td>−0.006</td>
<td>−0.006</td>
<td>−0.006</td>
<td>−0.006</td>
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</table>

The table displays regression coefficients with standard errors in brackets. All estimations include constituency-fixed effects, biannual time-fixed effects, a linear time trend for Scotland as well as the control variables GDP per capita and Unemployment rate (as in Table 3, column 4). Standard errors are two-way-clustered on the constituency level and biannual level using the `ivreg2` command in Stata. The main effects of the variables capturing potential heterogeneity are captured by the constituency-fixed effects. Discoveries (giant) denotes the number of giant oil fields discovered in $t$ and $t-1$. The unit of analysis is the constituency-half-year and the sample covers the 1945-2001 period.
While the main treatment effect remains positive, the positive interaction term with a point estimate of 1.716 and a standard error of 0.615 indicates that the effect of an oil discovery is higher if a constituency possesses coastal access. The simple binary measure still exhibits quite a bit of measurement error, e.g., as the Western coast of Scotland is not directly affected by oil regardless of its coastal access. Therefore, we also computed the distance to Aberdeen as a more precise measure and interact it in the same manner. Aberdeen is the main port serving offshore oil rigs and is often called the *Oil Capital of Europe*,\(^{42}\) with about half a million jobs being estimated to depend on the energy sector.

The interaction term is negative with a point estimate of 0.009 and statistically highly significant. Hence, the closer to Aberdeen a constituency is, the stronger the effect of additional oil discoveries. There are two potential explanations for this difference. The first is that workers or entrepreneurs in the oil industry expect that they could influence an independent Scottish government to a higher degree than the UK government, so that the oil industry would receive more support or that (for instance environmental) regulations would be relaxed. Accordingly, those in Scotland directly attached to the oil industry could profit relatively more from independence. A second explanation, based on the political science literature, could be the issue salience hypothesis. Parties have issue reputations, i.e., in our context, when people think of North Sea Oil, the SNP is perceived as the party with the highest competence to handle this issue. The effect of an issue reputation on voter behavior is moderated by the attention and perceived importance of the respective issue (Bélanger & Meguid, 2008). For voters with coastal access and those closer to Aberdeen the issue of oil revenues and their distribution is potentially more salient. If that is the case, the positive effect of each discovery on secessionist party support should be relatively more pronounced.

Thirdly, we test whether the economic geography of constituencies affects our treatment effect. For that matter, we compute how suitable a district is to produce one of three main agricultural crops (potato, wheat, barley) and how rugged and therefore difficult to access and travel the constituency is. It seems possible that districts which are very suitable for agriculture would care less about revenues from other resources, and more rugged districts could be differentially affected for various reasons. In both cases, the interaction terms do not suggest that this influences the treatment effect. Both terms are negative, but far from conventional levels of significance. Thus, the effect of oil discoveries is not significantly altered by these considerations. Across the whole table, the main treatment effect always remains positive.

### 5.3 Robustness Tests and Additional Exogenous Variation

This final section considers potential remaining concerns regarding the causal interpretation of our results. Recall that the relationship between treatment and outcome is already graphically clearly detectable, and varies with individual oil discoveries, not only by pre- and post-treatment period. The effect is identified

using both a specification that assumes a common trend in the outcome between the treated and the control region and including a treatment-specific time trend, where the effect is identified only from variation deviating from potentially diverging linear trends. The result remains significant when using only giant oil discoveries, which are scarcer but also more credibly exogenous, or instead with all discoveries which are more frequent. There are two potential concerns that an interested reader might additionally raise, which we want to treat in detail here: different options to estimate the standard errors and a potential overlap of oil discoveries with other events that influenced the relative success of the two parties.

Appendix G shows and explains that our main results in Table 3 are robust to all potential choices of clustering for the standard errors. This includes clustering at the region-times-decade level and using a wild-cluster bootstrap approach. Simulation evidence indicates that this approach yields consistent estimates even for few clusters (Cameron & Miller, 2015). For completeness and transparency reasons, we also run specifications that cluster solely on the constituency or time level, and we use panel-corrected standard errors which model auto-correlation more specifically. In all specifications, the null hypothesis of the coefficient of the variable of interest being zero is rejected with p-values of at least 0.05 or less and with p-values between 0.066 and 0.100 for the wild-cluster simulations (see Appendix G, Tables 2-7).

Second, the distribution of the oil discoveries is somehow skewed over time, with more discoveries in the 1970s than in later decades. Moreover, the relatively better development of the SNP and the oil discoveries since 1970 could coincide with a change to a better party leadership. To alleviate these potential concerns, we code decade dummies in a way that one of the decades ends in 1969, just before the first major discovery in Scotland. One nice feature of this is the large overlap with leader tenures in the SNP in the period most interesting to us (see Appendix C). We then include treatment-times-decade-fixed effects, so that the treatment effect is only identified based on variation within decades. Our treatment effect increases to 2.751 in this specification, with a p-value of 0.018 (Appendix H, Table 11, column 2). Although these estimates are not necessarily unbiased, it is interesting to see that the coefficients and p-values of the fixed effects suggest no significant trend differences in prior decades relative to the first decade with relevant oil discoveries (1970-1979). Similarly, controlling for the electoral term of Margaret Thatcher, who was a particularly disliked figure in the politically more left-leaning Scotland, does also not affect our results (Appendix H, Table 11, column 3).

To further confirm that the effect we measure is really driven by economic concerns about independence and not other events that are Scotland-specific, we make use of another plausibly exogenous variation. If the signal on which voters react is measuring the benefits of secession, as we hypothesized, the monetary

43 Note that our main results on the effects of an oil discovery even hold when excluding the 1970s period completely. The results are also unaffected when we exclude the years 1997 to 2001, after Scotland already gained additional political competences in the devolution process (Appendix H, Table 11, column 4). Moreover, our results are also robust to another specification: when including a lead-effect measuring discoveries in the (future) next election period, the lead-effect is insignificant and our main effect remains significant (Appendix H, Table 12, column 2). This approach goes beyond the necessary DiD assumptions, but it is reassuring that the main effect remains comparable in size and significance.
value of the discovered oil should also be positively related to Nationalist vote share. We use the interaction between the average yearly world market price for oil and the amount of discovered oil times the Scotland dummy to test this hypothesis.\footnote{We choose the price for Brent Crude which is suitable for North Sea oil. Brent trades at a higher price than the other major classification West Texas Intermediate (WTI), but as both are close substitutes, the prices are strongly correlated. Even if one assumes that the oil price is endogenous, we can interpret the interaction between an exogenous variable and an endogenous variable as causal under relatively mild assumptions (c.f., Dreher et al., 2016).}

We follow the bulk of the existing literature and treat changes in the world market oil price as exogenous (Arezki & Brückner, 2012, 2011), which seems a plausible assumption in our case. One potential concern would be that both supply and demand in Scotland are related to both the oil price and secessionist party success. This is a valid concern for large producers like the Arab countries, or countries that represent a sizeable share of world demand like the US (Kilian & Park, 2009), but the effect of variations in Scottish oil production and demand on the world oil price are widely estimated to be negligible. If regional resource value is driving nationalist party success, oil discoveries should matter more when the oil price is higher, i.e., when their net value as a potential benefit of secession is larger. The regression equation now becomes:

\[
\text{Nationalist Vote Share}_{i,c,t} = \delta \text{Discoveries}_t \times \text{Scotland}_c + \theta \text{Scotland}_c \times \text{Price}_t + \eta \text{Discoveries}_t \times \text{Scotland}_c \times \text{Price}_t + X'_i \gamma + \lambda_i + \tau_c T + \epsilon_{i,t},
\]

and we focus on the triple interaction coefficient $\eta$. We show results for the interaction with all the different proxies for the positive oil shocks that we have used so far (Discoveries (all), Discoveries (giant), Amount of new reserves (all), and Amount of new reserves (giant) in the year of and the year before the election). This ensures that the effect is not due to the choice of the proxy variable.

\begin{table}[h]
\centering
\begin{tabular}{lcccc}
\hline
Dependent variable: & Discoveries (all) & Discoveries (giant) & Amount of new reserves (all) & Amount of new reserves (giant) \\
Nationalist vote share & & & & \\
\hline
$X \times \text{Scotland} \times \text{Oil price}$ & 0.078 & 0.174 & 0.045 & 0.047 \\
& [0.021] & [0.064] & [0.013] & [0.014] \\
\hline
p-value: $X \times \text{Scotland} \times \text{Oil price}$ & 0.000 & 0.007 & 0.000 & 0.001 \\
\hline
\end{tabular}
\caption{Regression Results – Triple-Differences with World Oil Price}
\end{table}

The table displays coefficients of 8 individual regressions with standard errors in brackets. $X$ refers to the proxy for discoveries that is used in the respective column. All estimations include constituency-fixed effects, biannual time-fixed effects, a linear time trend for Scotland as well as the control variables GDP per capita and Unemployment rate (as in Table 3, column 4), and all main effects. Appendix H, Table 9 shows the full table. The price is for Brent Crude oil in 2001 constant US$. Standard errors are two-way-clustered on the constituency level and biannual level using the \texttt{ivreg2} command in Stata. The sample covers the 1945-2001 period and the number of observations is 1883 at the constituency-half-year level.

Table 7 shows the results of these triple-differences specifications. Column 1 displays the effect for Discoveries (all) and column 2 for Discoveries (giant) in the year of and the year before the election. The effect of an additional oil discovery is 0.078 percentage points higher if the oil price is $1 higher, and the effect of an additional giant oil discovery 0.174 percentage points higher. This is a sizable difference. It would mean...
that the positive effect of one additional giant discovery is about 10 percentage points higher if the oil price is $100 instead of $40.

We find the same positive relationship when considering the interaction with the amount of discovered oil, no matter whether we include all discovered oil or only the amount in giant oil fields. All triple-interaction effects are statistically significant with p-values all below or equal to 0.007. The results supports our prior DiD results that regional resource value fuels secessionism. Voters react more strongly when the “price” they receive for secession at the moment of voting is more lucrative. This is in line with the literature on the nexus between development aid or natural resources and conflict, where an increased “price” is linked to more separatist conflicts (e.g., Morelli & Rohner, 2015). As we hypothesized, it seems that very similar mechanisms are at play within democratic systems which have been overlooked so far. Appendix H, Table 10 shows that the results also holds when considering the amount of oil and the different time horizons used in Table 5.45

The triple-differences design offers another advantage. We can make use of it to implement a placebo test which also implicitly tests the DiD assumptions. If the differences between Scotland and Wales are really caused by an increase in the value of regional resources and not by some unobserved other factor, we would expect that the oil price has a positive effect after the first discovery. On the contrary, we should observe no effect before the first oil was discovered. Table 8 shows the results of two models: the first column includes all observations before the discovery of the first oil field in 1970; the second column covers all observations from 1970 onwards.

<table>
<thead>
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<tbody>
<tr>
<td>Oil price × Scotland</td>
<td>−0.268 [0.251]</td>
<td>0.125 [0.045]</td>
</tr>
<tr>
<td>p-value: Oil price × Scotland</td>
<td>0.286</td>
<td>0.005</td>
</tr>
<tr>
<td>Adj. R-squared</td>
<td>0.54</td>
<td>0.81</td>
</tr>
<tr>
<td>Number of observations</td>
<td>841</td>
<td>1042</td>
</tr>
</tbody>
</table>

The table displays regression coefficients with standard errors in brackets. The first (giant) oil discoveries were in 1970. Both estimations include constituency-fixed effects, biannual time-fixed effects, a linear time trend for Scotland as well as the control variables GDP per capita and Unemployment rate (as in Table 3, column 4). Standard errors are two-way-clustered on the constituency level and biannual level using the \texttt{ivreg2} command in Stata. The unit of analysis is the constituency-half-year level.

Note that, in accordance with our prior approach, we use new discoveries instead of the stock of discovered oil. We find it more plausible that voters react to changes in the value of newly discovered oil. Remembering or estimating the cumulative amount of discovered oil and subtracting already exploited oil imposes higher search and information costs on the voters. We also compute the amount of discovered and unexploited oil for each point in time. It shows only little variation over much of the sample period, as oil production is relatively small most of the time compared to the stock of oil. Even with this limited variation in the treatment variable, the interaction with the indicator for Scotland and the oil price is positive in the whole sample and becomes significant at the 5-percent level when we use the standard specification without the additional Scotland-specific time trend.
The results are very reassuring. Before 1970, there is no significant positive effect of the oil price for Scotland. In fact the coefficient is negative, but far from any conventional level of significance. At the same time, the coefficient is positive and highly significant in the period after the first discovery. This further confirms our confidence in the causal interpretation of our main results. The post-1970 results suggest that an oil price of $40 instead of $100 alone would lead to a drop in SNP electoral support of 7.5 percentage points. Relating to the unsuccessful Scottish independence referendum in 2014, in which the “no-option” gained 55.3 percent of the votes, the low oil price might have played a crucial role.

Overall, across a wide range of specifications and proxy variables, we reject the notion that resource wealth only matters in the context of developing countries where it leads to secessionist conflicts (see, e.g., Collier, 2010; Ross, 2004a). It also contributes to the success of secessionist parties in established democracies.

6 Conclusions

Our paper augments the existing literature on the size of nations and sheds light on the factors that determine the success of secessionist parties. The main argument is that citizens take the value of regional resources into account when deciding whether to support secession or not. Secessionist parties can successfully exploit regional resources to increase their vote share. Based on a simple theoretical model, we demonstrate with numerous cases that there clearly exists such a positive correlation in various countries and regions. Importantly, we employ a broader definition of resources, which does not only comprise natural resources, but also the value of geographically concentrated human capital, land suitability, and other factor endowments. Building on these cases, we turned to the United Kingdom to test whether we can establish a causal relationship between resource value and secessionist party vote share.

As we argue, Scotland and Wales are suitable counterfactuals, so that we can use the discoveries of North Sea oil as a natural experiment. Our constituency level analysis covering all UK elections over the 1945-2001 period shows that Scottish voters react in a significant way to oil discoveries which increase the perceived benefits of secession. In a DiD setting with Plaid Cymru in Wales as the counterfactual, the vote share of the Scottish National Party, the main advocate of a secession of Scotland from the UK, significantly increased by about 2 percentage points after the discovery of giant oil fields off the Scottish coast. Based on a myriad of robustness tests and alternative specifications, we rule out the possibility that this effect is driven by a coincidental change in party leadership or other events unrelated to oil discoveries. Accordingly, this is to the best of our knowledge the first causal evidence of an effect of regional resource distribution on the strength of Democratic secessionist movements.

This finding adds an important dimension to the literature on democratic secessionism and the size of nations. It also connects the literature relating resources and violent conflict in the developing country
context with studies on economic factors influencing political outcomes and stability in established democracies. The causal effect of a change in regional resource wealth on separatist party support demonstrates that (democratic) secessionism is not only driven by ethnic or cultural differences. Cultural factors like language and the weak dynamics of ethnic group affiliation may define a certain baseline support (Sorens, 2005 and Van Houten, 2007), but do not seem to account for the larger part of the variation in support for Scottish independence. Brand et al. (1994, p. 629) put this in a nutshell: “if the SNP were to emphasize its Scottishness over its concern for the prosperity of the country, it would lose the vast majority of its voters, members, and probably most of its leaders.” This notion is mirrored by our simple back-of-the-envelope calculation, suggesting that oil discoveries fostered the initial rise of the SNP after 1970 by 12-16 percentage points. To assess external validity, we described numerous anecdotal examples where (partly exogenous) changes in regional resource value correlate with secessionist party success. This highlights that this mechanism is relevant for a large number of countries and settings.

Of course, certain requirements have to be met for regional resources to play a decisive role. First, the resource value must be so significant that it alters the costs and benefits of secession in a sizeable way. Second, resources must be geographically concentrated in a region that regards itself as a group with some kind of pre-existing common group identity on which a campaign can be built. Third, the economic gains from the respective regional resource are currently to some extent redistributed within the country. Exploring these questions in more detail, and also evaluating on the choice between secession or decentralization, should provide a fruitful area for future research.

Within Scotland, the failed referendum in 2015 indicates that in times of low oil prices the mere cultural differences are not enough to convince voters of the benefits of secession. The future will show whether a potential second attempt will prove more successful for the Scots. Ironically, there might be another dynamic developing in such a case. As some Westminster politicians like to argue, the Shetland Islands could subsequently aim at a secession from mainland Scotland motivated by the fact that large parts of the oil resources actually lie within their theoretical maritime borders. Hence, regional resources and their distribution will continue to matter in the near and distant future. In light of these potentially turbulent future secession dynamics, we revisit and continue the initial quotation from the *The Parable of the Wise and Foolish Virgins*:

“Therefore keep watch, because you do not know the day or the hour.” – Matthew 25, 13
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