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Federal Tax Policies, Congressional Voting, and Natural Resources*

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Abstract

Can abundance of natural resources affect legislators' voting behavior over federal tax policies? We construct a political economy model of a federalized economy with district heterogeneity in natural resource abundance. The model shows that representatives of natural resource rich districts are more (less) willing to vote in favor of federal tax increases (decreases). This occurs because resource rich districts are less responsive to federal tax changes due to the immobile nature of their natural resources. We test the model's predictions using data on roll-call votes in the U.S. House of Representatives over the major federal tax bills initiated during the period of 1945-2003, in conjunction with the presence of active giant oil fields in U.S. Congressional districts. Our identification strategy rests on plausibly exogenous giant oil field discoveries and exploitation, and narrative-based aggregate federal tax shocks that are exogenous to individual Congressional districts and legislators. We find that: i) resource rich Congressional districts are less responsive to changes in federal taxes; ii) representatives of resource rich Congressional districts are more (less) supportive of federal tax increases (decreases), controlling for legislator, Congressional district, and state indicators. Our results indicate that resource richness is approximately half as dominant as the main determinant, namely party affiliation, in driving legislators' voting behavior over federal tax policies.

JEL classifications: Q32, D72, H77

Keywords: Federal tax changes, natural resources, voting behavior, federalism

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1 Introduction

The question of how legislators vote over federal tax policies is central to understanding the political underpinnings of federalized economies. One may, for instance, point at party discipline. The standard opposing views of Liberal and Conservative parties over this are oftentimes put at the forefront of their political campaigns, and represent some of their core political agendas. The theoretical and empirical literature on the voting behavior of elected officials points at additional potential determinants, ranging from legislators' ideology to voter preferences, with mixed evidence on the relative importance of each.¹ In this paper we examine the role of a new potential determinant: natural resources. In particular, we ask: can abundance of natural resources affect legislators' voting behavior over federal tax policies? Focusing on the case of the U.S., we provide evidence that point at an affirmative answer.

One of the main fiscal challenges of a federal government is coping with regional heterogeneity.² The latter suggests that a federal fiscal shock, while being uniform across the nation, yields heterogeneous effects across regions and states, as observed in various recent studies.³ Assuming that elected officials represent the preferences of their electorate, at least to some extent, implies that this may translate to the intra-federal political arena. Albeit being central to some of the core issues in fiscal federalism, the role of regional heterogeneity in the political economy of fiscal federalism received surprisingly little attention in the literature. We seek to fill this gap by focusing on one particular heterogeneity, namely natural resource abundance.

Natural resources make a potentially important source of heterogeneity in the context of federal tax policies because of their inherent, geographically entrenched immobility. Distortionary taxes contract the tax base (e.g. Romer and Romer (2010), henceforth RR). However, economies that are largely dependent on an immobile factor (i.e. abundant in natural resources) are expected to be less responsive to changes in them because of the relative immobility of their firms. For instance, facing tax increases, firms that operate in the oil and gas sectors face relatively greater relocation constraints as extraction is location-specific. This, in turn, suggests that changes in federal taxes may have differential effects on natural resource rich and poor regions, potentially affecting the way that their representatives vote over them.

We construct a political economy model of a federalized economy with district heterogeneity in natural resource abundance, representing an immobile source of income. Due to the latter, firms

¹See, e.g., Levitt (1996). Bender and Lott (1996), and Poole and Rosenthal (1997) provide a synthesis of the literature, reviewed in more detail in the following section.

²Fiscal equalization, and its interaction with regional heterogeneity, is a first-order issue in fiscal federalism, as discussed repeatedly in the literature (see, e.g., Boadway and Shah (2009), and Martinez-Vazquez and Searle (2007)).

³**See, e.g., Albouy (2009), and Albouy (2012). The next section provides a more detailed review of this literature.

that operate in districts that are rich in the immobile factor are less responsive to changes in federal taxation. As a result, federal tax increases are relatively beneficial for them, as their net fiscal benefits are relatively high; i.e. they get back more relative to what they pay, due to the inelastic response. The opposite is then true when federal taxes decrease. Assuming that elected officials act on behalf of the median voter, the model indicates that party affiliation, legislator ideology, and the income level in the represented district affect the voting behavior of representatives; in addition, it also highlights the role of natural resources. The main prediction of the model is that representatives of natural resource rich districts will tend to be more (less) supportive of federal tax increases (decreases).

We test the model’s predictions using a panel of the final votes taken in the U.S. Congress over the major federal tax changes examined in RR. The sample period is 1945-2003, covering 50 economically impactful federal tax changes.⁴ We focus on RR’s sample of federal tax changes due to two main reasons. First, using narrative sources RR calculated the present value of the change in the federal tax revenues resulting from each tax change, thus providing a measure of the sign and magnitude of them. Second, their sample covers all the federal tax changes which received more than incidental reference in their narrative sources, hence effectively covering all the main federal-tax related Congressional votes occurring during the given period. Given that the U.S. House of Representatives initiates federal tax changes, highlighting its relatively dominant constitutional role in revenue-related bills, our primary focus is on the votes taken there.⁵ We elaborate on the relevant details of the House of Representatives in a separate section. Importantly, its members represent Congressional districts, confining the main analysis to that level.

Our main treatment effect provides plausibly exogenous cross-sectional and time variation in resource abundance at the U.S. Congressional district level. In particular, we employ data from Horn (2011) on the location and timing of giant oil field discoveries.⁶ Horn (2011) defines a giant oil field to be one for which the estimate of ultimately recoverable oil is at least 500 million bbl of oil or gas equivalent. As such, these oil fields provide extraordinarily large potential profits. Based on that, in addition to the uncertainty surrounding oil exploration, we follow Arezki, Ramey, and Sheng (2017), Lei and Michaels (2014), and Perez-Sebastian and Raveh (2016b) and regard their discovery, development, and exploitation to be plausibly exogenous. We match their location to U.S. Congressional districts using GIS shape-files for each Congress (the boundaries of Congressional districts may change by Congress, as we note below). Assuming the activity of a giant oil field

⁴These are described in the empirical part, and are listed, together with their relevant details, in Table A1.

⁵Nonetheless, we show that similar patterns are observed when examining the equivalent votes in the U.S. Senate.

⁶Horn (2011) provides data on the geolocation and timing of all giant oil field discoveries from the 19th century and throughout our sample period.

spans, on average, over 50 years, we regard a Congressional district to be resource rich if it has at least one active giant oil field in its territory.⁷ Hence, this measure provides variation in resource abundance across space and time. The analysis, in addition, includes a multitude of controls at the Congressional district and legislator levels, and accounts for state indicators via state by time fixed effects. We outline further characteristics of the measures included in the analysis in the empirical part.

The empirical design examines the impact of the interaction between the present value of the changes in the federal revenues resulting from the tax change voted on and the resource abundance indicator on an outcome variable. Initially, this outcome variable is the income level at the Congressional district level. This initial analysis tests the model’s underlying conjecture that federal tax shocks yield heterogeneous effects across resource abundance levels. Thereafter, in the main analysis the outcome variable is the legislator-level vote over each of our federal tax changes, testing the main hypothesis. The identification strategy rests on the plausible exogeneity of the treatment effect, and the exogeneity of the federal tax shocks to individual Congressional districts and legislators, given their aggregate nature.⁸

An example for the differential voting patterns is presented in Figure 1, which maps the voting results of two votes: #42 of the 82nd Congress on the ‘Revenue Act of 1951’, and #49 of the 83rd Congress on the ‘Expiration of Excess Profits Tax’. The former raised the capital gains tax, the tax on corporate profits, and some excise taxes, having a present value change in federal tax revenues of 5.42\$ billion. The latter lowered taxes on individual and corporate income, having a present value change in federal tax revenues of -5\$ billion. The votes were taken in a similar period (two consecutive Congresses), and yielded similar changes in federal tax revenues in absolute value. In the first (second) case the ‘Yea’ vote share was 54% (75%) over all Congressional Districts, and 65% (64%) when focusing on the sub-sample of Representatives coming from the resource rich Congressional districts – implying that within the latter sub-group there is relatively stronger (weaker) support for federal tax increases (decreases). Of course, this example may simply reflect the outcome of party discipline, legislator ideology, or other economic and political indicators. We show, however, that this pattern is observed under a more general setting, and is remarkably robust.

The results of the initial analysis indicate that federal tax changes have a weaker impact on resource abundant Congressional districts, as pointed by the analytical setting. The results of the main analysis illustrate that this translates to voting patterns. Specifically, we find that representa-

⁷Albeit we also show for robustness that results are maintained in case we assume this measure is time invariant.

⁸Notably, we control for the option of bill sponsorship, show that results are robust to the exclusion of Congress members who sponsored the bill voted on, and also illustrate that results hold if only the sign of the tax change is considered (rather than its magnitude), addressing concerns related to the measurement and usage of the present value measure.

tives of resource rich Congressional districts tend to be more (less) in favour of federal tax increases (decreases), controlling for their party affiliation, ideology, and other characteristics, in addition to further Congressional district and state level indicators. Importantly, we find that this result is robust to a large set of tests, including different resource measures, estimation techniques, specifications and controls, time periods, placebo tests, and sample restrictions. In addition, different classifications of the tax changes indicate that the main effects are driven primarily by tax changes that have a long term perspective, as well as by those that affect capital.

Testing additional potential mechanisms, and in particular those suggested by the model, we find that in addition to the main result, representatives that: (i) are Republican members; (ii) have relatively conservative ideologies; (iii) are relatively less senior; (iv) are not politically aligned with the state governor and legislature; (v) have not sponsored the federal tax changes voted on; (vi) are in an election year; (vii) represent Congressional districts with relatively higher income – tend to be less supportive of federal tax increases. In terms of relative magnitudes, we find that resource richness is approximately half as dominant as the main determinant, namely party affiliation, in driving legislators’ voting patterns.

The paper is structured as follows. Section 2 reviews the related literature and places the current contribution within it. Section 3 presents the model and theoretical analysis. Section 4 undertakes the empirical analysis. Section 5 concludes.

2 Related literature

The paper contributes to various strands of literature. First is the literature on the voting behavior of Congress members. This vast literature identifies three main determinants of voting patterns. Several studies point at the importance of party affiliation; these include Besley and Case (2003), Cox and Poole (2002), Washington (2008), Lee, Moretti, and Butler (2004), Poole and Rosenthal (1984), and Snyder and Groseclose (2000). An additional group of studies emphasizes the role of legislators’ personal ideology, including Ansolabehere, Snyder, and Stewart (2001), Levitt (1996), and Strattman (1995). Last is a set of studies that highlights the role of the median voter and voter preferences, reflected via economic conditions including Gerber and Lewis (2004), Goff and Grier (1993), and Peltzman (1985).⁹ Interestingly, none of these studies focused on voting patterns related to federal tax policies. Focusing on the latter, this paper also illustrates the significant role of these determinants. However, in addition it provides theoretical motivation and empirical evidence for

⁹Notably, the importance of this channel may also be manifested via the other two as suggested by related studies on the effects of party affiliation and legislator ideology on fiscal outcomes (Beland and Oloomi (2017), Hill and Jones (2017), and Potrafke (2017)).

a new determinant, namely regional heterogeneity in natural resource abundance, supporting the potential central role of the median voter and voter preferences in determining legislators' voting behavior over federal tax policies.

Also related is the literature on the political economy of fiscal federalism. Regional heterogeneity stands at the heart of the intra-federal politics related to tax collections and redistribution. For instance, several studies stress the role of intra-federal distributive politics, and their potential link to incentives of state-level officials. These include Bracco, Lockwood, Porcelli, and Redoano (2015), Brollo and Nannicini (2012), Brollo, Nannicini, Perotti, and Tabellini (2013), Dahlberg and Johansson (2002), Dixit and Londregan (1998), Persson and Tabellini (1996a), and Persson and Tabellini (1996b). In addition, a related emerging strand of literature highlights the heterogeneous impacts of federal fiscal policies, including Albouy (2009), Chodorow-Reich, Feiveson, Liscow, and Woolston (2012), Clemens and Miran (2012), Hayo and Uhl (2015), Nakamura and Steinsson (2014), Perez-Sebastian, Raveh, and Reingewertz (2016), and Suarez Serrato and Wingender (2014). This paper studies political economy aspects of fiscal federalism related to regional heterogeneity that hitherto have been overlooked, namely differences in natural resource abundance. Specifically, we show that heterogeneity in natural endowments yields differential effects of federal tax policies which translate to voting patterns over federal tax policies.

Last is the literature on the effects of resource booms on development and economic growth. Economists have long noticed that natural resource abundance can be a blessing as well as a curse. This literature is surveyed by van der Ploeg (2011), Venables (2016), and more recently by Van der Ploeg and Poelhekke (2016) who focus on the local effects. Various studies point at fiscal policy as a potential underlying channel (Bornhorst, Gupta, and Thornton (2009), and Gylfason (2001), among others). A recently emerging literature studies the intra-federal fiscal effects of natural resources, including Caselli and Michaels (2013), James (2014), Papyrakis and Raveh (2014), Perez-Sebastian and Raveh (2016a), and Raveh (2013). To our best knowledge, the current effort is the first to examine aspects of the intra-federal political implications of this nexus between natural resources and fiscal policies, shedding light on the more general consequences of natural riches.

3 The model

In this section we lay out a simple analytical framework to shed light on the determinants of the voting behavior of district representatives over federal tax policies. Among these determinants, we will pay special attention to the possible importance of the lack of mobility of natural resources. The model predictions will help us guide the empirical analysis.

We consider a federalized country composed of D districts, with D being relatively large. There

are two perfectly competitive sectors of activity in each district: one is natural-resource based (NRB), denoted by z ; and the other one is non-natural-resource based (NNR), denoted by m . Each firm in NRB employs, as inputs, capital (k), natural resources (n), and one unit of labor supplied by the firm's owner; whereas each enterprise in NNR only uses capital and one unit of labor. We suppose that, in each district, there is a population mass of size L_i , and natural resources are equally distributed among individuals that operate in the NRB sector. In particular, if district i has a natural endowment equal to N_i and L_{zi} inhabitants become entrepreneurs in the z industry, each firm in that sector employs an amount $n_i = N_i/L_{zi}$ of the natural input in production. We treat sector m as the numeraire.

Capital is perfectly mobile across districts and countries and, as a consequence, the return to capital r^* is taken as given from the rest of the world. People can also move, but we suppose that they have a preference for staying in the district where they are located as long as the amount of net profits that can be obtained is equal to or above a reservation value π^* .¹⁰ If they decide to migrate out of their district, migrants are allocated randomly among districts or foreign countries that guarantee achieving at least π^* performing a business activity. Natural resources are fully immobile.

The federal government imposes a corporate-tax rate τ on the profits obtained by firms in order to provide an equal amount G of the public good to each district.¹¹ Let r_i and π_{xi} be the interest rate and profits net of taxes in sector x and district i , respectively. Openness in capital markets and free movement of people imply that in equilibrium returns net of taxes must obey: $r_i = r^*$ and $\pi_i \geq \pi_i^*/(1 - \tau)$.

Each entrepreneur in the NRB industry produces output with the following technology:

$$y_{zi} = A_{zi}k_{zi}^\alpha n_i^{1-\alpha}, \quad (1)$$

where y_{zi} is the sector z 's production level in district i ; A_{zi} is a district- and sector-specific productivity parameter; and $\alpha \in (0, 1)$. The return to the natural input is kept as profits by the entrepreneur. In turn, industry m is formed by a set of heterogeneous firms. More specifically, firm

¹⁰This is consistent with the assumption made by Mansoorian and Myers (1993) that individuals derive a non-pecuniary benefit from living in a certain place; for example, individuals have a preference for a particular district due to cultural or nationalistic reasons.

¹¹This is a simplifying feature, supported by the patterns reported in Perez-Sebastian and Raveh (2016c) who show that per capita federal expenditure levels across resource rich and poor U.S. states are similar. Importantly, this feature suggests that there is an implicit (transfer-based) equalizing mechanism operating (which is the case in the vast majority of federations, including the U.S. (Albouy (2009))). It implicitly assumes that changes in federal tax rates are not systematically associated with the distribution of transfer payments across districts' levels of resource abundance.

j in sector m produces output, $y_{mi}(j)$, using capital according to the following function:

$$y_{mi}(j) = A_{mi}q(j)^{1-\alpha}k_{mi}(j)^\alpha; \quad (2)$$

where $q(j)$ is a labor-augmenting entrepreneur-specific productivity parameter uniformly distributed between 0 and q^H among the L_i inhabitants of the district; as above, A_{mi} represents sector- and district-specific productivity. The parameters A_{zi} and A_{mi} may vary across districts due, for example, to agglomeration externalities.

All markets are perfectly competitive. Firms are profit maximizers that need to decide, first, whether or not to emigrate to other location, second, which sector to enter, and third, the amount of the capital input to be used in production. Working backwards, the first order conditions that determine the optimal amount of capital equalizes the interest rate to the marginal productivity of capital and obtain:

$$k_{zi} = \left(\frac{\alpha}{r^*} A_{zi} \right)^{\frac{1}{1-\alpha}} n_i; \quad (3)$$

and

$$k_{mi}(j) = \left(\frac{\alpha}{r^*} A_{mi} \right)^{\frac{1}{1-\alpha}} q(j). \quad (4)$$

As expected, the amount of capital demanded declines with the interest rate and increases with productivity.

Substituting equations (3) and (4) back into (1) and (2), we can get expressions for the firm's profits net of taxes depending on the sector where it operates:

$$\pi_{zi} = (1 - \tau)(1 - \alpha) \left[\left(\frac{\alpha}{r^*} \right)^\alpha A_{zi} \right]^{\frac{1}{1-\alpha}} n_i; \quad (5)$$

and

$$\pi_{mi}(j) = (1 - \tau)(1 - \alpha) \left[\left(\frac{\alpha}{r^*} \right)^\alpha A_{mi} \right]^{\frac{1}{1-\alpha}} q(j). \quad (6)$$

The decision of which market to enter will depend on the profits offered by each of them. Since individuals are heterogeneous in terms of their abilities, there will be a value of q – call it q^N – such that if $q > q^N$ the entrepreneur enters the m sector, choosing the z -sector otherwise. This value of q^N will be the one that equalizes profits in both industries. Taking into account that q follows a uniform distribution in the population, which therefore means that $L_{zi} = L_i q^N / q^H$, we obtain that

$$q_i^N = \left[\left(\frac{A_{zi}}{A_{mi}} \right)^{1/(1-\alpha)} \frac{N_i}{L_i} q^H \right]^{1/2}. \quad (7)$$

The threshold level q_i^N that allocates firms between the two sectors neither depends on taxes nor

on the interest rate; it is a function of the relative sectoral productivity and the stock of natural resources per inhabitant. A larger N or a higher relative productivity in the NRB sector will raise the value of q_i^N and then L_{zi} .

Finally, once the entrepreneur knows the sector and the amount of profits that can be achieved, she needs to decide whether to migrate or stay in the district. As mentioned previously, reservation profits equal π^* . Hence, staying requires that $\pi_{zi} \geq \pi^*$ and $\pi_{mi}(j) \geq \pi^*$. It is easy to prove that operating the NRB sector will always be profitable for a non-empty subset of individuals. Notice that

$$\pi_{zi} \geq \pi^* \Rightarrow (1 - \tau)(1 - \alpha) \left[\left(\frac{\alpha}{r^*} \right)^\alpha A_{zi} \right]^{\frac{1}{1-\alpha}} \frac{N_i}{L_{zi}} \geq \pi^*. \quad (8)$$

Since N is immobile, as L_{zi} goes to *zero*, π_{zi} will go to infinity, and therefore, a strictly positive number of people will always be willing to enter sector z .

Whether firms enter sector m , on the other hand, will depend on productivity. The inequality $\pi_{mi}(j) \geq \pi^*$ implies that only entrepreneurs with q equal to or larger than q_i^π will want to produce in the NNR sector in district i ; where

$$q_i^\pi = \frac{\pi^*}{(1 - \tau)(1 - \alpha)} \left[\left(\frac{r^*}{\alpha} \right)^\alpha \frac{1}{A_{mi}} \right]^{\frac{1}{1-\alpha}}. \quad (9)$$

If $q_i^\pi \leq q_i^N$, entrepreneurs who do not choose the NNR sector will move to the NRB industry and no firm will move to other locations. However, if $q_i^\pi > q_i^N$, entrepreneurs with intermediate productivity for whom neither sector offers a return sufficiently large will move to other districts or countries. In particular, an amount $L_i(q_i^N - q_i^\pi)/q_i^H$ of firms and people will relocate.

Combining expressions (1) to (4) and taking into account that there are L_{zi} firms in the NRB industry, gross value added (GVA) in district i (denoted Y_i below) will equal:

$$Y_i = \left[\frac{\alpha(1 - \tau)}{r^*} \right]^{\frac{\alpha}{1-\alpha}} \left\{ A_{zi}^{\frac{1}{1-\alpha}} N_i + A_{mi}^{\frac{1}{1-\alpha}} \int_{\max\{q^\pi, q^N\}}^{q^H} q \, dq \right\}. \quad (10)$$

Inside the curly brackets, we can see two summands. The first one comes from the NRB sector. Importantly, its value is a function of the district's natural resource endowment N_i , and is fixed because natural resources are immobile. The second summand depends on the levels of the entrepreneur-specific productivity parameter across firms that operate in the NNR activity. When NNR-sector firms leave the district – realizing that the ones that leave are always the ones with lower qs – the value of this second summand falls, thus reducing the district's GVA.

Let us now offer an example, illustrated in Figure 2, to understand more clearly how the

allocation of entrepreneurs between the two industries is carried out, and how a change in the tax rate affects the outcome. The two panels represent a double-entry chart, with the profits of NRB and NNR in the left and right vertical axes, respectively. The horizontal axes, in turn, show the range of values of the parameter q , which is uniformly distributed between *zero* and q^H among entrepreneurs. By identity (5), a firm's level of profits in the NRB sector is an inverse function of the number of NRB entrepreneurs (L_{zi}). Given that the relatively less productive individuals are located in the NRB activity, we can represent π_{zi} as a decreasing function of q . Conversely, from (6), profits for a firm in the NNR sector (π_{mi}) increase with q . The locus of q^N is pinned down by the intersection of the two lines $\pi_{zi}(L_{zi})$ and $\pi_{mi}(q)$, and the level of q^π is given by the value of q that equalizes $\pi_{mi}(q)$ to π^* .

The equilibrium allocation of entrepreneurs to the two activities will depend on whether q^N is larger, equal to, or smaller than q^π . The left panel shows the scenario in which $q^N = q^\pi$ (notably, the outcome would be qualitatively the same as long as $q_i^N \geq q_i^\pi$). It represents a district that enjoys relatively high profits in the m or in the z sectors, due to relatively large sector-specific productivity or natural-resource endowment. Since $q_i^N \geq q_i^\pi$, the allocation of entrepreneurs is determined by the intersection between the two profit lines π_{zi} and π_{mi} . Individuals with q in the intervals $(0, q^N)$ and $[q^N, q^H]$ operate in sectors z and m , respectively. Thus, the whole population is absorbed by the two industries inside the district.

The other relevant scenario occurs when $q_i^N < q_i^\pi$. This is depicted in the right panel of Figure 2. In this case there is a set of entrepreneurs that are not able to obtain their reservation profits π^* and leave the district. In the NNR sector, it is clear that those firms will be the ones related to lower values of q . In the NRB activity, any entrepreneur could, in principle, leave until the equilibrium is restored; however, we assume, without loss of generality, that those with the largest q are the ones that are not part of L_{zi} . As a consequence, the range of entrepreneurs who choose not to operate in the district are the ones whose productivity parameter is between q^z and q^π in the panel.

Next, think about the impact of an increase in the federal tax rate. When τ rises, the two lines $\pi_{zi}(L_{zi})$ and $\pi_{mi}(q)$ in Figure 2 shift down – profits net of taxes fall at each level of L_{zi} and q , respectively. If $q_i^N \geq q_i^\pi$ before and after the tax-rate change, all individuals will stay in the district, and expressions (7) and (10) imply that neither q_i^N (because L_i remains the same) nor GVA will be affected.

The outcome is different if $q_i^N < q_i^\pi$ after the tax-rate variation. We can deduce this using again the two panels in Figure 2, by considering that the left panel provides the equilibrium before the tax change and the right panel provides the outcome after the variation. Then, before the change,

$q_i^N = q_i^\pi$ and the equilibrium level of profits for each NRB firm equals the reservation one π^* ; for NNR establishments, profits are equal to or larger than π^* . When τ rises, lines $\pi_{zi}(L_{zi})$ and $\pi_{mi}(q)$ shift down, and q_i^N becomes smaller than q_i^π . This implies that people in the z sector and in the m sector whose productivity parameter is between q^z and q^π will migrate to other districts or abroad. Consequently, this also means that L_i , L_{zi} , and Y_i will fall.¹²

Our next task is studying the problem faced by a district representative in Congress when voting on a federal tax change. We suppose that the politician votes so that τ gets as close as possible to the rate that solves the following optimization problem:

$$\max_{\{\tau\}} \left\{ [(1 - \tau)Y_i]^\phi + \gamma_i G^\beta \right\} \quad (11)$$

subject to

$$G = \tau(1 - \alpha)\bar{Y}, \quad (12)$$

and Y_i is given by (10);

where G is the amount of public goods supplied by the federal government, \bar{Y} represents the average GVA across districts, $\gamma_i > 0$, and $\phi, \beta \in (0, 1)$.

The objective function (11) assumes that politicians prefer bigger communities in terms of production capacity and population size (because increasing production requires more entrepreneurs).¹³ The relative weight of the public good is given by the parameter γ_i . This parameter is a compound proxy of both the preferences of the median voter in district i and the personal ideology of the elected legislator of that district;¹⁴ we suppose that districts with similar γ_i belong to the same political party.

Looking now at the constraints, Equation (12) says that each district receives an amount of the public good equal to the average revenues obtained by the federal government; notice that $(1 - \alpha)\bar{Y}$ gives average profits at the district level, where $\bar{Y} = (1/D) \sum_{j=1}^D Y_j$. Since D is a relatively high number, we suppose that \bar{Y} is taken as given.

¹²The function (7) indicates that the fall in L_i increases q^N . In principle this could potentially offset the increase in q^π so that $q^\pi \leq q^N$. Notice, however, that this will not be the case because L_i declines only if q^π becomes larger than q^N .

¹³As Tiebout (1956) writes: “The case of the city that is too large and tries to get rid of residents is ... difficult to imagine. No alderman in his right political mind would ever admit that the city is too big.”

¹⁴We, hence, implicitly assume that any potential discrepancies between the preferences of the legislator and the median voter, coming for instance from voters with potentially greater influence on the legislator (e.g. campaign contributors and interest groups) and with specific agendas regarding federal taxation, do not show systematic differences across districts’ level of resource abundance. We address some empirical aspects of this assumption in the empirical analysis.

The first order condition to the above maximization problem implies that

$$\gamma_i \beta \frac{[(1-\alpha)\bar{Y}]^\beta}{\tau^{1-\beta}} = \phi \left[\frac{Y_i^\phi}{(1-\tau)^{1-\phi}} + (1-\tau)^\phi \frac{(-\partial Y_i/\partial \tau)}{Y_i^{1-\phi}} \right]; \quad (13)$$

where $\partial Y_i/\partial \tau = 0$ if $q_i^N > q_i^\pi$, and $\partial Y_i/\partial \tau < 0$ otherwise. The left-hand side (LHS) of expression (13) gives the marginal benefit of additional taxation, that is, the gains for the district derived from the increase in the supply of public goods. The right-hand side (RHS), in turn, reflects the marginal cost due to the reduction in GVA net of taxes at the district level when τ rises. Looking in detail, the RHS captures two distinct effects: the first term in the squared brackets is a consequence of the direct increase in the tax rate (let us call it the *net-of-taxes effect*), whereas the second term is related to the induced reduction in Y_i (the *GVA effect*).

We can rewrite expression (13) as:

$$\frac{\beta \gamma_i}{\phi} [(1-\alpha)\bar{Y}]^\beta \frac{(1-\tau)^{1-\phi}}{\tau^{1-\beta}} = Y_i^\phi + (1-\tau) \frac{(-\partial Y_i/\partial \tau)}{Y_i^{1-\phi}}. \quad (14)$$

The LHS falls with τ . In order to figure out how the RHS varies with τ , however, we need to do some additional algebra. Equations (10) and (9) imply that if $q_i^N \leq q_i^\pi$ and then $\max\{q^\pi, q^N\} = q^\pi$:

$$(1-\tau) \frac{(-\partial Y_i/\partial \tau)}{Y_i^{1-\phi}} = \frac{\left[\frac{\pi^*}{(1-\tau)(1-\alpha)} \left(\frac{r^*}{\alpha} \right)^{\frac{\alpha}{1-\alpha}} \right]^2 \frac{\pi^*}{A_{mi}^{1/(1-\alpha)}}}{\left(A_{zi}^{\frac{1}{1-\alpha}} N_i + \frac{1}{2} A_{mi}^{\frac{1}{1-\alpha}} \left[(q^H)^2 - \left\{ \frac{\pi^*}{(1-\tau)(1-\alpha)} \left[\left(\frac{r^*}{\alpha} \right)^\alpha \frac{1}{A_{mi}} \right]^{\frac{1}{1-\alpha}} \right\}^2 \right] \right)^{1-\phi}}; \quad (15)$$

thus, implying that the RHS in (14) rises with τ .

Therefore, a stronger preference for public goods (representing either personal ideology, or party agenda) – i.e., a higher γ_i – implies that the representative prefers a larger federal tax rate. Interestingly, an increase in income, Y_i , produces a decline in the optimal τ due to the net-of-taxes effect (captured by the first summand in the RHS of (14)). This occurs because a larger GVA induces a higher loss in net income when the tax rate increases, thus making the desired τ smaller. In addition, when $q_i^N \leq q_i^\pi$, the derivative $\partial Y_i/\partial \tau$ is different from *zero*, that is, the *GVA effect* matters. More specifically, equality (15) says that an increase in the stock of natural resources N_i reduces the negative impact of the increase of τ on GVA, and consequently, raises the optimal value of τ from district i 's point of view; the immobility of the natural input serves to diminish the relative importance of the exit of firms.¹⁵

¹⁵Notably, this also suggests that the opposite is expected under a federal tax decrease. i.e., an increase in the stock of natural resources reduces the positive impact of a decrease in the federal tax rate on GVA, hence decreasing the optimal value of the federal tax rate from the district's perspective.

We can conclude that representatives from sufficiently rich districts, which are not menaced by an exit of firms, will prefer lower federal tax rates. Preferences in other districts will depend on the relative importance of the net-of-taxes and the GVA effects. If the former one dominates, richer communities will tend to vote for lower tax rates; whereas if the latter one dominates, representatives of richer economies will prefer a higher τ . Importantly, because the level of income Y_i *per se* fully captures the net-of-taxes impact, whereas the GVA effect is a compound of income and its derivative, our conjecture is that in the econometric analysis Y_i should better capture the former, and immobile inputs such as the stock of natural resources should better control for the latter.

4 Empirical Analysis

The above model explains how natural resource rich regions may be less responsive to federal tax changes, and how this may translate to voting patterns over federal tax policies. In this section we provide empirical evidence in support of these properties. We do so by undertaking an analysis of the U.S. economy that exploits cross-district variation in resource abundance to estimate the heterogeneous effects of federal tax changes on the economies of Congressional districts and the voting patterns of their representatives in the U.S. Congress. We first briefly discuss the relevant institutional details pertaining to the U.S. political system. Thereafter, we describe the data, methodology, and identification strategy. Last, we present the empirical analysis and results.

4.1 Background

We adopt the case of the U.S. for several reasons. First, the U.S. is a democratic federation, with a federal tax system that affects the nation uniformly. Second, the U.S. economy provides ample cross-sectional and time variation in resource abundance across its districts and states, as we illustrate below. Third, the scope of the available U.S. based data enables testing the main hypotheses using a rich data set that covers a prolonged period.

Voting over federal tax policies takes place in the U.S. Congress. The latter is divided into two chambers, the Senate (Upper House) and the House of Representatives (Lower House). The former is composed of two members from each state, who are voted for a 6-year period. The latter is composed of 435 members who are voted for a 2-year period, each representing a Congressional district. The number of such districts in each state is based on relative population sizes, and is determined approximately every ten years; state governments may also determine their districts' boundaries continuously during the said period, so that essentially the boundaries may differ across Congresses (every two years), a feature which we account for in the empirical analysis.

The two houses differ in various dimensions, ranging from power to prestige, with one key difference affecting our empirical strategy: the House of Representatives has exclusive power to initiate tax-imposing bills. This makes the Lower House more relevant for studying the politics of tax-changing bills. Based on this, our focus in the main analysis is on votes taken in the Lower House, although we show for robustness that results hold as well in the equivalent votes taken in the Senate. Indeed, once initiated and passed in the Lower House, the bills require a majority of votes in the Senate, prior to being signed by the U.S. president.

4.2 Data

Focusing on the House of Representatives, our main hypothesis is that representatives of resource rich Congressional districts tend to be more (less) supportive of federal tax increases (decreases), due to the relatively inelastic response of their economies to changes in federal taxes. To test this hypothesis we need exogenous variation in resource abundance across Congressional districts, a sample of federal tax changes and their expected impact (in terms of sign and magnitude) and the voting records over them in the Lower House, as well as additional indicators at the legislator and Congressional district levels. Next, we discuss each of these components in more detail. Further details are provided in the data Appendix; descriptive statistics are presented in Table A2.

4.2.1 Federal tax changes and voting data

We focus on the federal tax changes outlined in RR. In an attempt to understand the effects of tax changes on the macro economy, the latter looked into 50 *significant* federal tax changes in the period of 1945-2003.¹⁶ Using narrative sources, they calculated the present value of the change in the federal tax revenues resulting out of the tax change, reporting it at the year in which the bill was passed.¹⁷ These two features make the focus on their sample of tax changes particularly appealing for our purposes. Specifically, their present value derivations provide a measure of the expected impact (sign and magnitude) of the federal tax policy at the time of the vote. Importantly, this

¹⁶RR consider a federal tax change as 'significant' if it received more than incidental reference in their narrative sources, and if it actually changed tax liabilities (as opposed to merely extending existing taxes). These rules capture the economically meaningful actions throughout the given period.

¹⁷Our sample is different from theirs in two ways: i) The federal tax change they titled as 'Reform of Depreciation Rules' is excluded as it was an administrative change, and hence was not voted on; ii) The federal tax change they titled as 'Taxpayer Relief Act of 1997 and Balanced Budget Act of 1997' was split to two acts, given it was based on two separate votes. Hence, our sample also includes 50 federal tax changes, albeit excluding the abovementioned one. The present value measure we use is different from theirs in two ways as well: i) In cases where two measures were calculated by RR (two of the tax changes), we use their sum; using each separately does not alter results; ii) The case of the 'Taxpayer Relief Act of 1997 and Balanced Budget Act of 1997', which we split to two acts in our sample, had two present value measures; we assign the negative (positive) one to the Taxpayer Relief (Balanced Budget) Act based on their descriptions, outlined in RR. Further details are provided in Table A1.

measure is plausibly exogenous to any specific Congressional district or legislator, given its aggregate (federal-level) nature.¹⁸ In addition, their sample includes all the major federal tax changes that occurred during the said period, mitigating selection related concerns. We exploit these features in the empirical analysis. Last, the focus on RR’s sample yields a clearer link to the existing related literature, in which several studies similarly focused on this set of federal tax changes, including Mertens and Ravn (2012), Mertens and Ravn (2013), Perez-Sebastian, Raveh, and Reingewertz (2016), and Reingewertz (2018).

The details of each tax change, including the year it was enacted, its categorization, and the present value of the change in federal revenues it created, are outlined in Table A1; further details on each of the tax changes, including their background and purpose, are provided by RR. Figure 3 presents the annual (present value) change in federal revenues. As can be seen, they provide ample variation over time which we exploit in the empirical analysis. Specifically, as indicated in Table A2, the present value measure can range from $-126\$$ billion to around $41\$$ billion, with a mean of $-6\$$ billion and a standard deviation of approximately $25\$$ billion, emphasizing the variation across bills. From the 50 federal tax changes that we study, 58% represent tax increases.¹⁹

To that end, we examine the final votes in the U.S. House of Representatives over these tax changes. These include 50 votes within the 79th to 108th Congresses (1945-2003), with one vote corresponding to each tax change. Table A1 lists the number and Congress of these votes in detail. Data for the votes are retrieved from GovTrack.²⁰ These data identify the Congress member together with his/her state and Congressional district affiliation, party affiliation, and vote. Figure 1 provides an example of how some of the raw data are presented for two specific votes. These voting-related dimensions play a key part in the analysis. Party affiliation can be either Democratic, Republican, or Independent. A vote can be either *Yea*, *Nay*, *Present*, or *Not Voting*. The first two options provide a direct meaning for the vote (in favor or against the bill). The latter two describe abstention; *Present* means that the Congress member is present at the chamber but decides not to vote, whereas *Not Voting* means that the Congress member is not present at the chamber.

Due to the physical absenteeism, the case of *Not Voting* does not provide a direct indication for legislators’ votes; therefore, we exclude this option from the main sample. Notably, the fraction

¹⁸In effect, we assume that each Congressional district (legislator), on its (his/her) own, is too small to alter the nature of federal taxation. Nonetheless, each tax bill is sponsored by a specific Congress member. We account for this in the empirical analysis, illustrating that results are robust to controlling for a sponsorship effect or to excluding the sponsoring legislatures from the sample. In addition, we show that the main results are primarily dependent on the sign of the tax shock, rather than its magnitude.

¹⁹We show for robustness that results are maintained when we either focus solely on the sign of the change (rather than the size of the present value), or exclude the votes over the bills that have extreme *PV* values. This indicates that the size of RR’s computed present values are not critical for the results.

²⁰Available at: <https://www.govtrack.us/>

of *Not Voting* cases is marginal (approximately 3% of total votes); in addition, their inclusion does not alter the qualitative and quantitative insights of the empirical analysis.

4.2.2 Giant oil fields

Moving to the main resource measure, we employ data provided by Horn (2011) on the discovery of giant oil fields. These data provide the geolocation of all discovered giant oil fields from the mid 19th century to recent years. Similar to Arezki, Ramey, and Sheng (2017) and Lei and Michaels (2014), we assume that the timing of a discovery is plausibly exogenous, due to the uncertainty surrounding oil exploration. The latter is considered uncertain because of the relatively limited (ex-ante) knowledge of geological features of exploration locations. In addition, following Perez-Sebastian and Raveh (2016b) we assume that once discovered, their development and exploitation are plausibly exogenous to the institutional and economic environment. The latter assumption is based on the definition of a giant oil field. Specifically, Horn (2011) defines a giant oil field to be one for which the estimate of ultimately recoverable oil is at least 500 million bbl of oil or gas equivalent. This makes the potential profits from giant oil fields particularly significant, thus incentivizing their continuous operation irrespective of the particular institutional and economic setting. These features stand at the heart of our identification strategy.

Using the geographic coordinates of the oil fields, we map the location of recently discovered, or still active, on-shore giant oil fields across U.S. Congressional districts for each Congress in our sample period. We do so by employing GIS shape-files of the Congressional districts of each Congress, derived from Lewis, DeVine, Pitcher, and Martis (2013). Figure 4 maps all the on-shore giant oil fields relevant to our period of interest across U.S. Congressional districts using the 2003 division (108th Congress), emphasizing the cross-sectional variation in giant oil fields. Assuming that fields are active for approximately 50 years on average (as reported by Horn (2011)), this measure also provides variation across time.²¹ To that end, we consider a Congressional district to be resource rich if it has at least one active giant oil field located in its territory.

4.2.3 Congressional district indicators

Due to our focus on votes in the House of Representatives, Congressional districts play a central role in the analysis as they represent the regions from which representatives are elected. Therefore, the data we examine include various indicators at the Congressional district level; namely, the median family income, total population, the share of persons aged at least 65 (population composition), the

²¹Nonetheless, we also show that the main results hold under a simple difference-in-differences approach in which this measure is assumed to be time invariant throughout our sample period. This is further discussed in the robustness tests sub-section.

share of persons enrolled in elementary and high schools (education), and their size in square miles. These measures are available for our sample period (1945-2003; the 79th to 108th Congresses) with the exception of the median family income and population composition that are available from the 83rd Congress (1953). These data are retrieved from Adler (2002) and the U.S. Census Bureau.

4.2.4 Legislator indicators

Votes are undertaken by Congress members who differ along various dimensions. Consequently, the analysis also includes a multitude of controls at the legislator level, on top of those related to their district, state, and party affiliations provided by the voting data. First, legislator ideology. In addition to including legislator fixed effects in the analysis, we follow Levitt (1996) and proxy time-varying ideology via the annual ADA scores of each voter, which controls for year-specific behavior. The ADA scores are constructed by the Americans for Democratic Actions (ADA) Organization starting in 1947,²² and were adjusted by Anderson and Habel (2009) for score-inflation following the methodology of Groseclose, Levitt, and Snyder (1999). We use the adjusted scores in the analysis.²³

Second, demographic information. This includes the gender, age (at the beginning of Congress), education level (attended college or not), and occupation of the Congress member. The latter records the Congress member's last occupation prior to service in Congress, classified into seven occupational groups that are outlined in the data Appendix. These data are retrieved from ICPSR and McKibbin (1997) and the Biographical Directory of the U.S. Congress.

Third, political indicators. These include the seniority of the Congress member, which we proxy via the cumulative years of service in Congress (at the beginning of Congress), retrieved from the Biographical Directory of the U.S. Congress; the margin of victory of the Congress member, which we proxy via the share of votes that the representative received in the precedent election in the district, retrieved from Pettigrew, Owen, and Wanless (2016) (available from the 83rd Congress); whether the Congress member sponsored the bill voted on, as indicated by the Library of the U.S. Congress; and whether the Congress member is affiliated with the same party as the one that controls the state governorship and two chambers of the state legislature, as provided by Marty and Grossman (2016).

²²The ADA constructs the ADA scores as follows: each year, ADA's Legislative Committee selects 20 votes it considers the most important during that session. ADA's National Board and/or National Executive Committee approves those votes. Each member receives 5 points if he/she voted with ADA, and does not receive 5 points if he/she voted against ADA or was absent. The total possible score is 100, where lower scores represent more conservative ideologies.

²³Nonetheless, results are robust to using the nominal ADA scores, taken directly from the ADA organization.

4.3 Methodology

Our main hypotheses refer to the heterogeneous economic and political effects of changes in federal taxation. Hence, we seek to estimate the effects of the interaction of our two measures of interest, namely the (extent and sign of) federal tax changes and the resource abundance indicator, on voting and economic outcomes, which we do in the separate sub-sections below. Our identification strategy rests on the plausible exogeneity of the giant oil field discoveries and exploitation, and the usage of aggregate changes in federal taxation that are exogenous to specific Congressional districts or legislators. Hence, the analysis employs a panel fixed-effects framework. Notably, its general structure is maintained across the different sections of the analysis; however, the definition of some of its variables is case-specific and thus discussed separately in each case, as we further note below.

In effect, we estimate various versions of the following basic model:

$$O_{i,t} = \alpha_0 + \alpha_1(R)_{i,t} + \alpha_2(PV)_t + \alpha_3[(R)_{i,t} * (PV)_t] + \alpha_4(\mathbf{X})_{i,t} + \delta_i + \nu_s + \eta_t * \nu_s + \varepsilon_{i,t}, \quad (16)$$

where O is the outcome variable, R is the outlined resource proxy, PV is the present value measure (which is noted in Equation (16) for completeness, but is in fact absorbed by η_t), \mathbf{X} is a vector of controls, i is the cross-sectional dimension, t is the time dimension, and s denotes the state. Therefore, δ_i , and η_t are the fixed effects of the cross-sectional and time dimensions, and ν_s are state fixed effects. Hence, $\eta_t * \nu_s$ are state by time fixed effects that capture essential time variant state measures that range from GSP and population to federal transfers and state fiscal policy. Standard errors are clustered at the Congressional district level.²⁴

Importantly, the details and context of O , i , and t , as well as the variables included in \mathbf{X} and the type of fixed effects employed, switch between the main sections in the analysis presented below, due to the different outcome variables examined. Hence, they are outlined separately in each case. Due to our objective of estimating the effects of federal tax changes across districts' level of resource abundance, our focus throughout the analysis is on the sign, magnitude, and significance of the coefficient on our interaction term of interest, namely α_3 .

4.4 Initial analysis: federal taxes, oil, and income

As a first step, we seek to test the model's main underlying conjecture, namely that federal tax shocks affect resource rich and poor districts differentially, such that tax increases (decreases) are more (less) beneficial for the former. Importantly, state-level evidence for the heterogeneous impact of federal taxation across resource abundance levels are provided in a concurrent study by Perez-

²⁴Nonetheless, we show in the robustness section that results are maintained under different clustering levels.

Sebastian, Raveh, and Reingewertz (2016).²⁵ The latter find that federal tax changes have a weaker impact on the firms, capital stock, and growth of resource abundant states. Next, we test this at the Congressional district level via an examination of income levels. To do so, we employ a panel of the U.S. Congressional districts (i) across the 83rd to 108th Congresses (t), to estimate variations of the following version of Equation (16):

$$INC_{i,t} = \alpha_0 + \alpha_1(R)_{i,t-1} + \alpha_2(PV)_{t-1} + \alpha_3[(R)_{i,t-1} * (PV)_{t-1}] + \alpha_4(\mathbf{X})_{i,t-1} + \delta_i + \nu_s * \eta_t + \varepsilon_{i,t}. \quad (17)$$

In this case, the outcome variable (INC) is the median family income in a Congressional district. \mathbf{X} includes the Congressional district controls outlined previously, namely population (level and composition) and education levels, in addition to a lagged value of the dependent variable. δ_i and $\nu_s * \eta_t$ are district and state by Congress fixed effects.²⁶ As noted, the latter control for time-varying state measures, such as federal transfers to state governments, among others; in addition, they absorb PV , which is nonetheless outlined in (17) to facilitate exposition. The remaining notation is similar to that described in Equation (16). Consistent with related studies (e.g. RR), we examine the treatment with a lag. As noted, our focus is on α_3 , which in this case provides an estimate for the heterogeneous effects of federal taxation on income, across districts' level of resource abundance.

Results appear in Table 1. In Column 1 we examine initially the effect of PV . Hence, we exclude the resource measure, its interaction, the control vector, and the Congress related fixed effects (which absorb PV). The estimated α_2 is consistent, in sign and magnitude, with the one estimated by RR. Specifically, lagged federal tax shocks are contractionary. In terms of magnitude, accounting for the average U.S. GDP and Congressional districts' median income during our sample period, the estimated α_2 suggests that a 1% increase in GDP share of federal taxes decreases the income in the average Congressional district by approximately 1.2% (controlling for federal transfers, as noted). In Column 2 we add the resource abundance measure together with $\nu_s * \eta_t$. Evidently, resource richness does not produce a significant impact on districts' income.²⁷

In Column 3 we add the interaction of PV and R . Interestingly, α_3 is positive and statistically significant, suggesting that federal tax changes have a weaker impact on resource abundant districts,

²⁵More specifically, Perez-Sebastian, Raveh, and Reingewertz (2016) examine the heterogeneous state fiscal reactions to changes in federal taxation and their implications for cross-state capital movements and growth effects. In contrast to the current effort, they undertake a state-level analysis, and do not consider any political aspects.

²⁶The Congressional district fixed effects absorb the time-invariant state effects; hence, state fixed effects are excluded from this specification.

²⁷To the best of our knowledge, previous U.S.-based studies on the local impacts of resource booms did not examine the case of Congressional districts. Similarly, however, the evidence these studies provide at the county and state levels are jointly inconclusive (see, e.g., Allcott and Keniston (2018), and Papyrakis and Gerlagh (2007), among others).

as conjectured.²⁸ The magnitude of this effect is quite substantial. Specifically, it suggests that the contractionary effects of federal taxation are weaker by almost 30% in resource rich districts.²⁹ Notably, adding the control vector (\mathbf{X}) in Column 4 yields a similar outcome. These patterns support the market based implications of the model. Next, in the main analysis, we examine its political implications.

4.5 Main analysis: baseline results

Moving to the main analysis, we examine the determinants of voting behavior over federal tax policies, with a special emphasis on the role of natural resource abundance. To do so, we employ the main panel, which at the cross-section is composed of legislators in the U.S. House of Representatives (i), and across time covers the above mentioned 50 federal tax changes (t). As noted, an observation in this panel is a vote taken by each of the legislators, over each of the federal tax policies. In effect, we estimate various versions of the following variant of Equation (16):

$$Yea_{i,t} = \alpha_0 + \alpha_1(R)_{i,t} + \alpha_2(PV)_t + \alpha_3[(R)_{i,t} * (PV)_t] + \alpha_4(\mathbf{X})_{i,t} + \delta_i + \nu_s + \eta_t * \nu_s + \varepsilon_{i,t}, \quad (18)$$

where Yea is a 'Yea' vote by legislator i on federal tax policy t . The vector \mathbf{X} includes the previously outlined Congressional district and legislator indicators, namely districts' income, population (level and composition), and education levels, and legislators' party affiliation, age, education level, occupation, gender, seniority level, political alignment with the state governor, victory margin, vote sponsorship status, and ADA score. δ_i , ν_s , and $\eta_t * \nu_s$ are legislator, state, and state by vote fixed effects;³⁰ as noted, the latter control for essential (time-varying) state indicators such as federal redistribution to states, state output, and others.³¹ The remaining notation follows that described under Equation (16). As noted, the coefficient of interest is α_3 . A positive outcome would suggest that representatives of resource rich Congressional districts are more (less) supportive of federal tax increases (decreases).³²

The baseline results appear in Table 2. Column 1 estimates the basic version of Equation (18), without \mathbf{X} . This enables covering the complete sample period, namely Congresses 79th to 108th.

²⁸The sign of α_3 suggests that a federal tax increase (positive PV) has a lower negative impact on income, whereas a federal tax decrease (negative PV) has a lower positive impact on income.

²⁹We note that this is a lower-bound estimate. The average median income is substantially lower in resource rich Congressional districts (around 40% lower than the national average). Accounting for this yields a larger estimate on the differential impact of federal taxation.

³⁰Notice that legislators are district-specific, and votes are year-specific. These fixed effects, therefore, leave little identifying variation to its district and year equivalents.

³¹For instance, federal grants to states may affect voting behavior through vote-purchasing as suggested by Dahlberg and Johansson (2002).

³²Note that in the case of a federal tax decrease the present value measure is negative, hence a positive α_3 implies weaker support by representatives of resource rich districts.

In Column 2 \mathbf{X} is included, limiting the sample period to Congresses 83rd to 108th. In effect, both cases estimate a linear probability model. Given the nature of the outcome variable, Columns 3 and 4 estimate similar specifications under the conditional (fixed-effects) logistic model.

Interestingly, in all cases α_3 is positive and statistically significant, supporting the main prediction of the model. Additional tests undertaken in the following sections will indicate that this result is remarkably robust. To interpret the magnitude of the effect we examine the baseline case of Column 1. The magnitude of α_3 suggests that a one standard deviation increase in the present value of federal tax changes increases the probability that a representative of a resource rich Congressional district will support the tax change by about 2.3%. The latter represents approximately 3.5% of the average support for federal tax changes in our sample. An examination of the role of additional potential determinants, undertaken next, reveals that this magnitude is substantial in relative terms. As will be evident, it is approximately half that of the key determinant, namely party affiliation.

4.6 Mechanisms

The baseline analysis indicated that natural resources affect representatives' voting behavior over federal tax policies. Nonetheless, the literature, and theoretical analysis, point at additional potential determinants, which we consider in this sub-section. Specifically, we examine their role in driving the voting patterns, and compare each to our key underlying channel, namely natural resources. To do so, we undertake a heterogeneity analysis by estimating the following variant of Equation (18) for each examined determinant:

$$Yea_{i,t} = \alpha_0 + \alpha_1(R)_{i,t} + \alpha_2(PV)_t + \alpha_3[(R)_{i,t} * (PV)_t] + \alpha_4(\mathbf{X})_{i,t} + \alpha_5(Z)_{i,t} + \alpha_6[(Z)_{i,t} * (PV)_t] + \delta_i + \nu_s + \eta_t * \nu_s + \varepsilon_{i,t}, \quad (19)$$

where Z is the inspected determinant. Our focus in the following estimations is on α_3 and α_6 . The potential underlying channels we look into pertain to either indicators related to the elected representatives, or indicators related to the Congressional districts represented. Next, we describe the determinants, and main results, in each group.

4.6.1 Heterogeneity analysis: legislators

We undertake a heterogeneity analysis using each of our (previously outlined) legislator indicators. Specifically, we test the following legislator characteristics, mentioning in parenthesis how each is measured via Z in the estimated model: party affiliation (indicator for affiliation with the Republican Party); ideology (ADA score); gender (indicator for being male); education (indicator for

having college education); occupation (indicator for having a recognized occupation prior to serving in Congress); seniority (cumulative time in Congress); age (age at the beginning of the Congress); election year (indicator for election year); margin of victory (the share of votes received in the precedent election); political alignment (indicator for affiliation with the same party as the state governor and legislature); and sponsorship (indicator for sponsoring the tax change voted on).

Results appear in Table 3. The first 11 columns represent estimations with each of the above mentioned determinants, respectively; Column 12 tests a specification in which all of these determinants, and their interactions, are jointly included. The key results are as follows. First, α_3 maintains its sign, precision, and magnitude in all cases. The main result is, therefore, robust to the inclusion of these additional determinants, and their interaction with the federal tax shocks.

Second, party affiliation, ideology, seniority, election year, political alignment, and sponsorship, represent viable underlying channels. Specifically, the results indicate that representatives that: (i) are Republican members; (ii) have relatively conservative ideologies; (iii) are relatively less senior; (iv) are not politically aligned with the state governor and legislature; (v) have not sponsored the federal tax changes voted on; (vi) are in an election year – tend to be less supportive of federal tax increases. These results are consistent with the model, as well as with the literature.³³

Last, interpreting magnitudes, party affiliation represents the most dominant determinant.³⁴ The magnitude of α_6 in Column 1 indicates that a one standard deviation increase in the present value of federal tax changes decreases the probability that a representative of the Republican Party will support the tax change by approximately 6.3%. This represents almost 10% of the average support for federal tax changes in our sample. Comparing this to the baseline results, the extent of the party affiliation effect is approximately twice that of natural resource abundance.

4.6.2 Heterogeneity analysis: districts

We undertake a similar heterogeneity analysis with the (previously outlined) Congressional district indicators. Hence, we test the following district characteristics, mentioning in parenthesis how each is measured via Z in the estimated model: income (median family income); education (share

³³Consistent with the literature reviewed in Section 2, party affiliation and legislator ideology explain voting patterns. However, the results relate to findings of additional studies. For instance, Kraus, Lewis, and Douglas (2013) find that divided governments operate under more conservative fiscal policies, Kousser and Phillips (2012) indicate that political experience yields greater political bargaining power, and Drazen (2001) summarizes the evidence supporting the hypothesis that politicians manipulate fiscal policies for electoral purposes (referred to as the Political Budget Cycle). The roles of political alignment, seniority, and elections years, suggested by the heterogeneity analysis, are consistent with these patterns.

³⁴As reviewed in Section 2, the literature is quite conclusive about the importance of party affiliation for explaining voting behavior; however, it remains inconclusive about the magnitude and relative importance of it. In contrast to these studies, we focus strictly on votes pertaining to changes in federal taxation, suggesting that party affiliation takes a larger role in issues pertaining to federal fiscal policies.

of persons enrolled in elementary and high schools); population (total population); population composition (share of persons aged at least 65); and size (size in square miles).

Results appear in Table 4. The first five columns in the table represent an estimation using each of the above mentioned district indicators, respectively; Column 6 estimates the case in which all of these indicators, and their interaction terms, are jointly included. Similar to the results in the previous analysis, we notice that α_3 maintains its stability, in terms of sign, magnitude, and statistical significance, in all cases. Natural resource abundance remains an applicable determinant irrespective of the additional channels considered. In addition, the estimated α_6 s indicate that income is the key district indicator explaining voting patterns.³⁵ Specifically, representatives of relatively richer Congressional districts are less supportive of federal tax increases, consistent with the theoretical analysis.³⁶

4.7 Different measures

In this sub-section we test variations of each of the two central explanatory variables: the present value measure, and the resource abundance proxy. Testing these additional variables serves as initial robustness tests, but also contributes to addressing various additional econometric concerns. Table 5 presents the results of this analysis.

4.7.1 Sign of change

Starting with the present value, to this point we used a continuous measure constructed by RR through evaluation of narrative sources. While the sign (an increase or decrease) is a fixed characteristic of the tax change, the magnitude may be open to more subjective interpretation and hence can be potentially plagued by measurement errors or lead to an endogeneity bias, despite the tax-classification. In addition, results using the continuous measure may potentially be driven by extreme values.³⁷ To address that, we employ a dummy that captures the sign of the tax change, and use it in lieu of PV in Equation (18).

Results using this binary measure of federal tax revenue changes are presented in Columns 1-2 of Table 5, which follow the benchmark specifications of Columns 1-2 of Table 2, respectively. Notably, both cases yield a precisely estimated and positive α_3 , similar to the benchmark cases. Interestingly, the magnitude of the effect increases substantially compared to the baseline estimates,

³⁵Notably, Column 6 points at additional potential determinants; however, as the results in the previous columns indicate, these patterns are not robust.

³⁶Notably, this result is also consistent with the patterns evaluated in Albouy (2009), indicating how the observed link between net fiscal benefits and income may translate to corresponding voting patterns over federal tax policies.

³⁷In a later section we directly test for the exclusion of such extreme values of present value measures, concluding results are not affected by this exclusion.

suggesting that the main result is primarily dependent on the sign of the federal tax change, rather than on its size.

4.7.2 All oil fields

Moving to the resource abundance measure, our focus in the main analysis is on oil fields categorized as giant. These, however, represent a specific sub-sample of all oil fields operated in the U.S. during our sample period. To test the robustness of the main result to the usage of this sub-sample, we examine the complete sample of oil fields. To do so, we exploit data on the geolocation of all active oil fields (i.e. giant, and none-giant) derived from the Peace Research Institute Oslo (data outlined in Paivi, Rod, and Thieme (2007)), to construct a resource richness indicator using the same methodology used in the main analysis.

Therefore, as before, oil fields from this data set were matched to the corresponding Congressional district using GIS shape-files of Congressional districts of each Congress, derived from Lewis, DeVine, Pitcher, and Martis (2013). Adopting an activity span of 50 years, a Congressional district is classified as resource rich if it has an active oil field in its territory.

Results appear in Columns 3-4 of Table 5, which follow the specifications of Columns 1-2 of the same table, respectively, using the said resource abundance measure in lieu of R in Equation (18). Both cases yield a α_3 that is similar in its sign, magnitude, and precision to the one estimated in the benchmark cases. Hence, albeit the adoption of giant oil fields is motivated by econometric concerns, the main result remains applicable under a more general measure that provides greater cross-sectional and time variation.

4.8 Federal tax divisions

The sample of federal tax changes covered in the main analysis includes tax policies of various types. In this sub-section we look into two main divisions of the complete sample. The first pertains to the type of tax base primarily affected by the tax change, namely capital or other tax bases. The second relates the time perspective adopted by the tax change, namely long or short. We discuss each case separately. The results of this analysis appear in Table 6.

4.8.1 Capital division

We divide the various federal tax changes in our sample into two groups, based on their capital-related purpose: if a tax change relates to capital (via investment, capital gains, or corporations) directly, it is categorized as a capital-related tax change; conversely, if it is not aimed to affect the capital tax base directly, it is categorized as a non-capital-related tax change. Note that the former

group may include tax changes that affect other tax bases (i.e. labor) as well, as long as capital is affected. In effect, this division methodology follows that employed in Reingewertz (2018). From the 50 tax changes studied, (32) 18 tax changes are classified as (non-)capital-related. Table A1 outlines the type of each tax change. To further clarify exposition, Figure 5 graphs the present value of the change in federal revenues occurring from the tax changes classified as capital-related.

We estimate the baseline specification (as per Column 1 of Table 2) under this division. Results appear in Column 1 (capital-related group) and Column 2 (non-capital-related group) of Table 6. The estimated α_3 s indicate that the main effect is primarily triggered by capital-related tax changes, which yield a stronger effect compared to the baseline cases. Conversely, in the non-capital-related group, the magnitude drops and α_3 loses statistical significance. This dichotomous pattern is consistent with the capital-oriented focus of the analytical framework.

4.8.2 Time perspective

We examine the role of the time perspective reflected in the tax changes. To do so, we exploit a feature of RR’s analysis in which they classify the federal tax changes to those representing a long term perspective and those induced by short term motives. Notably, RR regarded the former (latter) group of tax changes as being exogenous (endogenous) to the state of the macro economy at the time of enactment.³⁸ Out of the 50, 28 tax changes were categorized as imposing a long term perspective, with the balance being classified as having a short term view.³⁹ These classifications are outlined in Table A1. Figure 6 graphs the present value of the change in federal revenues occurring from the tax changes classified as having a long term perspective (exogenous).

We estimate the baseline specification (as per Column 1 of Table 2) under this division, in Columns 3 (long term tax changes) and 4 (short term tax changes) of Table 6. The results indicate that the main effect is driven by the tax changes classified as having a long term perspective. These patterns suggest that district indicators (voter preferences) take a relatively larger role in the voting decisions of legislators when considering tax policies driven by long term motives.

4.9 Robustness tests

Next, we take several robustness tests. Results appear in Table 7. All specifications follow the baseline one (as per Column 1 of Table 2). First, we test the specificity of our results to federal

³⁸The motivation-categories included changes classified as: spending driven (e.g. the case of a war), countercyclical-action driven (e.g. addressing a recession), deficit driven (e.g. addressing an inherited deficit from a previous administration), and long-term-growth driven (e.g. a forward looking, growth-developing, policy). Viewing the latter two motivations as representing longer term perspectives, tax changes classified under those two were categorized as exogenous, with the remaining ones being referred to as endogenous.

³⁹Two tax changes were classified as being both endogenous and exogenous; these are outlined in Table A1.

tax policies by undertaking placebo tests using the votes that were undertaken immediately after and before the ones examined in the main panel. As an example, our first main vote in the panel is #83 of the 79th Congress (final vote over the ‘Revenue Act of 1945’). The equivalent placebo votes are then the subsequent and precedent ones, namely #84 and #82 of the 79th Congress. Doing the same for all the votes of the main panel yields a sample of 100 placebo votes. Examining these placebo votes is appealing for our purposes as on one hand they effectively control for potential timing effects (given they are the ones voted on immediately after or before the ones examined in the main analysis), yet on the other hand none are related to federal taxation.⁴⁰ Column 1 (2) presents the estimated α_3 using the post (pre) placebo sample, indicating that there are no apparent differential voting patterns across districts’ level of resource abundance within this sample. These results suggest that the main patterns observed are specific to federal tax policies.

Second, we exclude two groups of tax changes, and one group of states, to test their effect on the main result. First, the tax changes that pertain to oil, gas, and gasoline. Second, the tax changes that are associated with extreme present values of changes in tax revenues. Third, the group of states that have had a relatively small number of oil discoveries (including none). Starting with the first, several of the tax changes in the sample pertain directly to oil, gas, and gasoline. One example is the ‘Crude Oil Windfall Profit Act of 1980’, which proposed an additional excise tax on domestic crude oil. These tax changes may lead to systematically different voting behaviors across districts’ level of resource abundance almost by construction. Hence, including these tax changes may bias our main result. Altogether, six tax changes belong to this group (see Table A1). Column 3 undertakes the baseline estimation under their exclusion. The estimated α_3 indicates that the main result holds using the restricted sample.

Moving to the second case, namely policies with extreme *PV* values, some of the tax changes lead to large changes in revenues (in either direction), as was described above and observed in Figure 3. Since we focus on the interaction with the present value of the change, the observations with the extreme present values may potentially trigger our main result. We partially addressed that through the usage of a dummy for the sign of revenue change, which neutralized the magnitude of it. Nonetheless, to further address this issue, we next exclude from the sample the three tax changes where the present value measure is more than two standard deviations above or below the mean. The results reported in Column 4 indicate that the main result is maintained in sign and significance under this exclusion.

⁴⁰Notably, they cover a wide array of topics that range from federal aid for the development public airports (vote #83 of the 79th Congress) and authority to loan to the IMF (vote #138 of the 87th Congress), to authorize pay increases to the armed services (vote #70 of the 88th Congress) and pass amendments related to the Clean Rivers Restoration Act (vote #354 of the 89th Congress).

The third case focuses on the relatively oil rich states. Such a focus enables controlling for unobserved heterogeneity more efficiently. Hence, we restrict the sample in this case to the eight states with the highest number of oil discoveries per capita during our sample period.⁴¹ The results that appear in Column 5 indicate that the main result is robust to this restriction.

Third, to better identify the role of natural resources in the proposed mechanism, we next test the effect of changes in the oil price. The model establishes the positive relationship between the level of resource abundance and the strength of support in federal tax changes. Examining variations in the real price of oil can provide both a counterfactual and evidence for the positive relationship, since when it decreases (increases) it contracts (expands) the resource sector, and the change itself is plausibly exogenous given that the price is determined in international markets.

An appealing time period for testing the above is 1970-1990, divided in 1980; this period is the only one in our sample in which the price of oil experienced a significant increase, followed by a significant drop. In the first half, 1970-1980, the real price of crude oil started at about 11\$ per barrel, and increased to 104\$ in 1980, representing a steep increase. In the following years, the price dropped down to 24\$ in 1990, representing a steep decrease. The first sub-period can, hence, test whether support in federal tax increases intensifies with increased oil price, whereas the second one may act as a counterfactual, testing whether voting patterns differentials are still observed when differences in resource abundance are decreased. Results for the two cases appear in Columns 6 and 7. The first for the period of 1970-1980, and the second for 1980-1990. As can be seen, the first case shows that the coefficient of interest is positive and significant. Indeed, it appears that when resource abundance differences increase, the support for federal tax hikes increases as well. On the other hand, in the latter sub-period the coefficient on the interaction term loses its statistical significance, and its magnitude drops.

Fourth, we test the robustness of the main result to the usage of a time-invariant treatment. In the main analysis the resource abundance measure has both cross-sectional and time variation under the assumption that giant oil fields are active for approximately 50 years. To examine the sensitivity of the results to this assumption, we eliminate the variation over time by classifying a Congressional district to be resource rich if it had an active giant oil field at any point during the period documented by Horn (2011) (i.e. starting in the late 19th century). The results under this classification, reported in Column 8, indicate that the main result remains to hold, suggesting that it is not dependent on the time variation.

Fifth, we examine the pre-discovery periods to test whether legislators were not already voting differently even before the discovery of giant oil fields. To do so, we construct an indicator that

⁴¹These states include Alaska, Colorado, Louisiana, North Dakota, New Mexico, Oklahoma, Texas, and Wyoming.

captures the years prior to a discovery and interact it with the present value of the federal tax changes proposed before the discovery. Notably, the first year is left as default category (and hence is not captured by this indicator), to avoid collinearity. We then add this measure together with its interaction, in addition to the R and $R * PV$ measures, to the main specification. The results in Column 9 suggest that there are no systematic differential voting patterns in the pre-discovery periods; however, in the post-discovery periods they remain to be clearly observed.

Sixth, we re-examine the role of bill sponsors. As noted, each of the tax bills were sponsored by specific Congress members. The main analysis accounted for that by controlling for this directly, and by examining interactions with the federal tax shocks. Nonetheless, we also examine the case in which the sponsoring members are altogether excluded from the sample. The results in Column 10 indicate that their exclusion does not affect the main results.

Seventh, following Lei and Michaels (2014), we consider the potential role of oil exploration. The latter may raise endogeneity concerns in case discoveries are an outcome of exploration efforts at the Congressional district level. Notably, however, oil exploration is regulated by the federal and state land departments, which have an exclusive mandate over issuance of exploration permits (via, for instance, the Mineral Leasing Act of 1920), and hence are largely independent of district-level efforts. Nonetheless, we account for this more directly within the analysis. Specifically, we examine the role of state-level exploration efforts, proxied via the number of active drilling rigs in each state. The latter is observed via the Baker Hughes Rig Count measure, available from 1987.⁴² The state-level perspective is adopted given the said institutional context. In Column 11 we add this measure, together with its interaction with PV . Albeit imposing a significant restriction on the sample size, the main result remains applicable, with the estimate on the additional interaction term suggesting that exploration does not represent a key underlying channel.

Eighth, we test the possibility of potential systematic differences in the extent of rural population and conservative views across districts' levels of resource abundance. A rural-conservatism nexus (see, e.g., McKee (2008)) may trigger the observed patterns to the extent that resource rich districts are indeed rural. Notably, however, data from the U.S. Census Bureau indicate that oil rich Congressional districts are only marginally more rural, mitigating this concern. Specifically, the average share of urban population across the districts and years in our sample (from the 83rd Congress) is 0.761, whereas that in the districts with oil discoveries is 0.758,⁴³ representing a difference of one tenth of a standard deviation. An operating oil field in the district does not preclude district residents from residing in nearby urban areas.⁴⁴

⁴²This measure is available at Baker Hughes' homepage (www.bkge.com).

⁴³This share is not significantly different in pre-discovery years, standing at 0.751.

⁴⁴A prominent example is Texas 26th Congressional district which had an operating giant oil field throughout our

This marginal difference extends to more direct comparisons regarding conservative views. Employing the standard legislator-level Poole-Rosenthal DW-Nominate score (Lewis, Poole, Rosenthal, and Boche (2017)) as a proxy for the extent of conservatism, we notice that the average of its geometric mean probability estimate across the districts and years in our sample is 0.746, whereas that in the districts with oil discoveries is 0.722;⁴⁵ this points at a marginal difference, which is less than a quarter of a standard deviation. To test the role of this more formally, in Column 12 we add this measure together with its interaction with *PV*. The results on the additional interaction term are similar to those observed under the former ADA case. Importantly, however, we in addition notice that the main result is robust to this addition, suggesting that it is not driven by this potential channel.

Last, we take two additional final robustness tests. In the first test we examine different fixed effects and clustering options. The results are presented in a separate table in the appendix. Specifically, we test the cases in which the state by vote fixed effects are excluded, vote, state, and district fixed effects are added separately, and vote and state fixed effects are added concurrently to the main specification; in addition, we examine the cases of clustering the standard errors in the baseline specification at the legislator, state, and vote levels, as well as district and vote and state and vote (two-way clustering) levels. The results of these cases appear in Columns 1-10 of Table A3, respectively. Evidently, the main effect is robust to these alternative specifications. In the second test we examine the case of the U.S. Senate. In this case we focus on the equivalent votes taken in the U.S. Senate. We relegate the details of this analysis to the appendix. The results, discussed in Appendix B and presented in Table A4, suggest that the main patterns observed are not specific to the House of Representatives, but are also a feature of the Upper House.

5 Conclusion

How do elected officials vote on federal tax policies? This question stands at the heart of the political economy of federations, and is becoming increasingly important with the global trend to fiscally decentralize. The literature on legislators' voting behavior emphasized the roles of party affiliation, personal ideology, and voter preferences. Examining the case of federal tax changes in the U.S., this paper presented a new determinant: natural resource abundance. A political economy model of a federalized economy indicated that federal tax policies may have differential effects across districts' resource abundance levels, and that this may translate to voting patterns over them, in addition to the standard channels of party affiliation, legislators' ideology, and regional income levels. The

sample period, and yet more than 90% of its population is reported to be urban in recent years.

⁴⁵Here as well this share is not significantly different in pre-discovery years, standing at 0.74.

main prediction of the model was that representatives of resource rich districts are relatively more (less) supportive of federal tax increases (decreases).

In the empirical part we initially provided supportive evidence for the differential effects of federal taxation across regions' resource abundance levels. Thereafter, in the main analysis we analyzed the final votes in the U.S. House of Representatives over the major federal tax changes outlined in RR. Examining the heterogeneous voting patterns, the analysis showed that controlling for legislator, Congressional district, and state indicators, representatives of resource rich Congressional districts favor federal tax increases (decreases) more (less) strongly. Moreover, we showed that this result is robust to various resource abundance measures, placebo tests, estimation techniques, vote divisions, restricted samples, and time periods. In addition, evaluating potential mechanisms, we observed that representatives that: (i) are Republican members; (ii) have more conservative ideologies; (iii) are relatively less senior; (iv) are not politically aligned with the state governor and legislature; (v) have not sponsored the tax changes voted on; (vi) are in an election year; (vii) represent Congressional districts with relatively higher income – tend to be less supportive of federal tax increases. Our estimates indicate that resource richness is approximately half as dominant as the main determinant, namely party affiliation, in driving legislators' voting patterns over federal tax policies.

The results suggested, therefore, that contrary to conventional wisdom legislators' voting decisions over tax policies may not be primarily driven by party discipline; conversely, they emphasized the role of voter preferences in the voting decisions of legislators. More generally, these results shed light on the political economy of federalized and fiscally decentralized economies, and highlight new perspectives related to federal equalization and its potential role within the intra-federal political arena. We note, however, that our results are confined to the specific sample examined within the U.S.; future research may test further tax changes in different federations, as data on these become available.

Appendix

A Data

The main panel consists of the final roll-call votes (those in which the bill passed; post-amendments, in case there were any) of each legislator in the U.S. House of Representatives over the major post WW-II federal tax changes outlined in RR; hence, the period covered is 1945-2003 (Congresses 79th to 108th), unless stated otherwise in specific cases. The sample corresponds to that of RR with two differences: i) The federal tax change they titled as ‘Reform of Depreciation Rules’ is excluded as it was an administrative change, and hence was not voted on; ii) The federal tax change they titled as ‘Taxpayer Relief Act of 1997 and Balanced Budget Act of 1997’ was split to two acts, given it was based on two separate votes. The list of federal tax changes included in the sample, their characteristics (namely, classifications and the present value of the change in federal revenues each yields), and corresponding vote number are outlined in Table A1. Further details over each of the federal tax changes examined can be found in RR. Descriptive statistics are presented in Table A2.

Variable definitions

Votes: voting of ‘Yea’ by a Congress member (Source: Congressional Votes Database, GovTrack.us, available at: <https://www.govtrack.us/>), over the votes outlined above; cases in which there was a voice vote (outlined in Table A1) are not included.

Present value: The present value of the change in federal revenues (in billion \$) from a change in the federal tax bill over it, recorded in the year the bill passed (Source: RR). In the two cases that two different measures were calculated we use their sum; in the case of ‘Taxpayer Relief Act of 1997 and Balanced Budget Act of 1997’ (that we split to two separate acts) which had two measures, we assign the negative (positive) one to the Taxpayer Relief Act (Balanced Budget Act) based on their descriptions, outlined in RR.

Sign of change: A dummy variable that receives a ‘1’/‘-1’/‘0’ if the federal bill change led to a federal tax increase/decrease/no-change (Source: RR).

Giant oil fields: A dummy variable that receives a ‘1’ if there is an active on-shore giant oil field (assuming activity spans over 50 years) in the Congressional district (Source: Horn (2011)). A giant oil field is an oil field for which the estimate of ultimately recoverable oil is at least 500 million bbl of oil or gas equivalent. Giant oil fields were matched to the corresponding Congressional district using GIS shape-files of Congressional districts of each Congress (i.e. updated approximately every two years) derived from Lewis, DeVine, Pitcher, and Martis (2013).

All oil fields: A dummy variable that receives a ‘1’ if there is an active on-shore oil field (assuming activity spans over 50 years) in the Congressional district (Source: The Peace Research Institute Oslo (PRIO); data outlined in Paivi, Rod, and Thieme (2007)). Oil fields were matched to the corresponding Congressional district using GIS shape-files of Congressional districts of each Congress (i.e. updated approximately every two years) derived from Lewis, DeVine, Pitcher, and Martis (2013).

Median family income (Congressional district): The median family income in a Congressional district, available from the 83rd Congress (Sources: Adler (2002) and U.S. Census Bureau).

Population (Congressional district): Total population in a Congressional district (Source: Adler (2002) and U.S. Census).

Education (Congressional district): The share of persons enrolled in elementary and high schools in the Congressional district (Source: Adler (2002) and U.S. Census Bureau).

Population composition (Congressional district): The share of persons aged at least 65 in the Congressional district, available from the 83rd Congress (Source: Adler (2002) and U.S. Census Bureau).

Size (Congressional district): The size of the Congressional district in square miles (Source: Adler (2002) and U.S. Census Bureau).

ADA score (legislator): The Adjusted ADA scores, by Congress member and year. ADA scores are provided annually (starting in 1947) by the Americans for Democratic Action (ADA) organization, and are determined as follows: each year, ADA’s Legislative Committee selects 20 votes it considers the most important during that session. ADA’s National Board and/or National Executive Committee approves those votes. Each member receives 5 points if he/she voted with ADA, and does not receive 5 points if he/she voted against ADA or was absent. The total possible is 100, where a lower score represents more conservative ideologies. These scores were then adjusted for score-inflation following the methodology of Groseclose, Levitt, and Snyder (1999) (Source: Anderson and Habel (2009)).

DW-Nominate score (legislator): The Poole-Rosenthal DW-Nominate geometric mean probability estimate (Source: Lewis, Poole, Rosenthal, and Boche (2017)).

Gender (legislator): An indicator that takes the value '1' if the Congress member is male (Source: Biographical Directory of the U.S. Congress).

Party affiliation (legislator): An indicator that takes the value '0/1/2' if the Congress member is independent/Republican/Democratic, respectively (Source: Biographical Directory of the U.S. Congress).

Education (legislator): A dummy variable that receives a '1' if the Congress member has college education (Source: Biographical Directory of the U.S. Congress).

Occupation (legislator): An indicator that takes the value '0/1/2/3/4/5/6' if prior to service the Congress member’s occupation was in one of the following categories: unknown, retired, or no occupation / education / lawyer / professional / business / agriculture / miscellaneous, respectively. For further details regarding the occupations included in each category see ICPSR and McKibbin (1997) (Source: ICPSR and McKibbin (1997) and the Biographical Directory of the U.S. Congress).

Seniority (legislator): The cumulative years of service in Congress, at the beginning of Congress (Source: Biographical Directory of the U.S. Congress).

Age (legislator): The age of the Congress member at the beginning of the Congress (Source: Biographical Directory of the U.S. Congress).

Election year (legislator): A dummy variable that receives a '1' if it is an election year for the U.S. House of Representatives (even-numbered years).

Margin of victory (legislator): The share of votes that the legislator received in the precedent election in the district (Source: Pettigrew, Owen, and Wanless (2016)), starting in the 83rd Congress.

Political alignment with state governor and legislature (legislator): A dummy variable that receives a '1' if the Congress member is affiliated with the same party as the one that controls the state governorship and two chambers of the state legislature (Biographical Directory of the U.S. Congress and Marty and Grossman (2016)).

Sponsor (legislator): A dummy variable that receives a '1' if the Congress member sponsored the tax change voted on (Source: The Library of the U.S. Congress).

State income share of severance taxes: State severance tax income as share of total state tax income (Source: U.S. Census Bureau).

Rig count (state): The Baker Hughes Rig Count measure (Source: Baker Hughes at BHGE.com).

B The case of the U.S. Senate

The main analysis focused on votes held in the U.S. House of Representatives, given that it is where reforms over federal tax changes are initiated. For robustness, we next move our focus to the U.S. Senate, to study the voting patterns of the equivalent available votes held there, over the same tax changes. As in the case of the Lower House, the votes considered here are as well the final ones

(taken prior to the approval of the U.S. President). Altogether, in this case we have 47 votes in the sample.⁴⁶ Table A1 lists the number and Congress of these votes. Descriptive statistics are presented in Table A5.

We estimate Equation (18), for legislator i in the U.S. Senate, federal tax policy t , and state s . As before, the state by vote fixed effects control for time-varying state indicators, which are central to this analysis given the state-level perspective taken. Standard errors are clustered by legislator and vote. Results appear in Table A4. Column 1 replicates Column 1 of Table 2; the resource measure, R , is the same, only aggregated to the state-level, given that legislators in this analysis represent states, rather than districts. Column 2 replicates Column 3 of Table 2 via the adoption of the conditional (fixed-effects) logistic model. Column 3 tests a different, continuous state-level resource measure, namely states' income share from severance taxes.⁴⁷ Column 4 estimates a version of Column 1 under a different clustering level in which standard errors are clustered by state. Interestingly, in all cases α_3 is positive, significant, and with a magnitude similar to that estimated under the baseline cases. These results suggest that the patterns observed are not specific to the Lower House, but are also a feature of the Upper House.

⁴⁶As outlined in Table A1, out of the 50 votes, 3 were done via a 'voice vote' under which the names of Senators and tally of votes are not recorded.

⁴⁷Severance tax is a form of state tax levied on the exploitation of natural resources.

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Table 1: Federal tax changes and income -- resource rich VS. resource poor Congressional districts, Congresses 83rd to 108th

	(1)	(2)	(3)	(4)
Dependent variable: The median family income in the district	Taxes	Resources	Baseline	Controls
Present value (<i>t-1</i>)	-57.57* (31.4)			
Resource abundance (<i>t-1</i>)		-31.81 (31.2)	-27.46 (20.6)	-24.01 (24.6)
Resource abundance X Present value (<i>t-1</i>)			4.1** (1.4)	4.15** (1.5)
Congressional district fixed effects	Yes	Yes	Yes	Yes
State X Congress fixed effects	No	Yes	Yes	Yes
R-squared	0.95	0.95	0.95	0.95
Observations	9340	9340	9340	9340

Notes: Standard errors are robust, clustered by Congressional district, and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the U.S. Congressional districts within Congresses 83rd to 108th. The dependent variable is the change, from the previous Congress (*t-1* to *t*), in the median family income in the Congressional district (Source: Adler (2002) and U.S. Census Bureau). 'Resource abundance' is a dummy variable that captures whether there is an active giant oil field in the district (Source: Horn (2011)). 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). 'Controls' (Column 4) include district population, population composition, and education level (Source: Adler (2002) and U.S. Census Bureau). All regressions include an intercept, and the lagged value of the dependent variable in levels. All controls are in *t-1*. For further information on variables see data Appendix.

Table 2: Congressional voting in the U.S. House of Representatives, baseline results

	Linear estimations		Logit estimations	
	(1)	(2)	(3)	(4)
Dependent variable: A vote of 'Yea'	Baseline	Controls	Baseline	Controls
Resource abundance X Present value	0.0017*** (0.0006)	0.0016*** (0.0006)	0.0029*** (0.001)	0.0031*** (0.001)
Legislator fixed effects	Yes	Yes	Yes	Yes
State / State-by-Vote fixed effects	Yes	Yes	Yes	Yes
R-squared	0.25	0.28	0.2	0.22
Observations	20942	18028	20942	18028

Notes: Standard errors are robust, clustered by Congressional district, and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the available final roll-call votes of Congressmen in the U.S. House of Representatives over the federal bill changes analyzed in Romer and Romer (2010); sample period is Congresses 79th-108th (83rd -108th) in Columns 1 and 3 (2 and 4). All regressions include an intercept, and the separate components of the interaction term. 'Resource abundance' is a dummy variable that captures whether there is an active giant oil field in the district (Source: Horn (2011)). 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). 'Controls' (Columns 2 and 4) include i) district measures, including the population, population composition, median income, and education level in the district (Sources: Adler (2002) and U.S. Census Bureau); ii) legislator measures, including their party affiliation, age, education, occupation, gender, cumulative time in Congress, victory margin, political alignment with the governor and legislature, and ADA scores (Sources: Anderson and Habel (2009), Biographical Directory of the U.S. Congress, ICPSR and McKibbin (1997), Marty and Grossman (2016), and Pettigrew et al. (2016)). Regressions 1-2 (3-4) use OLS (Logit; reporting marginal effects). For further information on variables see data Appendix.

Table 3: Congressional voting in the U.S. House of Representatives, heterogeneity analysis (legislator)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable: A vote of 'Yea'	Party	ADA	Gender	Education	Occupation	Seniority	Age	Election	Margin	Alignment	Sponsor	All
Resource abundance X Present value	0.0019*** (0.0006)	0.0015*** (0.0005)	0.0017*** (0.0006)	0.0017*** (0.0006)	0.0017*** (0.0006)	0.0016*** (0.0006)	0.0017*** (0.0006)	0.0017*** (0.0006)	0.0016*** (0.0006)	0.0019*** (0.0006)	0.0019*** (0.0006)	0.0015** (0.0006)
Republican X Present value	-0.0029*** (0.001)											-0.002*** (0.0006)
ADA X Present value		0.0004*** (0.00001)										0.0002** (0.000001)
Gender X Present value			0.0001 (0.0009)									0.0006 (0.0007)
Education X Present value				0.0006 (0.0005)								-0.0002 (0.0005)
Occupation X Present value					0.0003 (0.0004)							0.0004 (0.0004)
Seniority X Present value						0.0001** (0.00003)						0.00007** (0.00003)
Age X Present value							-0.00001 (0.00002)					0.00003 (0.00002)
Election X Present value								-0.0004*** (0.0001)				-0.0006*** (0.0001)
Margin X Present value									0.002 (0.002)			-0.0002 (0.002)
Alignment X Present value										0.0002** (0.0001)		0.004 (0.04)
Sponsor X Present value											0.0002*** (0.0001)	-0.005 (0.004)
Legislator fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State / State-by-Vote fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.26	0.27	0.25	0.25	0.25	0.25	0.25	0.25	0.27	0.26	0.25	0.29
Observations	20942	20072	20942	20942	20942	20942	20942	20942	18028	20942	20942	18028

Notes: Standard errors are robust, clustered by Congressional district, and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the available final roll-call votes of Congressmen in the U.S. House of Representatives over the federal bill changes analyzed in Romer and Romer (2010); sample period is Congresses 79th-108th (Columns 1, 3-8, and 10-11), Congresses 80th-108th (Column 2), or Congresses 83rd-108th (Columns 9 and 12). All regressions include an intercept, and the separate components of the interaction terms. 'Resource abundance' is a dummy variable that captures whether there is an active giant oil field in the district (Source: Horn (2011)). 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). 'Republican' is an indicator for affiliation with the Republican Party; 'ADA' is the ADA score of the Congress member; 'Gender' is the gender of the Congress member; 'Education' is an indicator for whether the Congress member has college education; 'Occupation' is an indicator for whether the Congress member had a recognized occupation prior to serving in Congress; 'Seniority' is the cumulative time of the Congress member in Congress (at the beginning of Congress); 'Age' is the age of the Congress member at the beginning of the Congress; 'Election' is an indicator for an election year; 'Margin' is the share of votes that the legislator received in the precedent election in the district; 'Alignment' is an indicator for whether the Congress member is affiliated with the same party as the state governor and the one that controls the state legislature; 'Sponsor' is an indicator for whether the Congress member sponsored the tax change voted on (Sources: Anderson and Habel (2009), Biographical Directory of the U.S. Congress, ICPSR and McKibbin (1997), Library of the U.S. Congress, Marty and Grossman (2016), and Pettigrew et al. (2016)). For further information on variables see data Appendix.

Table 4: Congressional voting in the U.S. House of Representatives, heterogeneity analysis (Congressional district)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable: A vote of 'Yea'	Income	Education	Population	Composition	Size	All
Resource abundance X Present value	0.0014** (0.0006)	0.0017*** (0.0006)	0.0016*** (0.0006)	0.0016*** (0.0006)	0.0017*** (0.0006)	0.0013** (0.0006)
Income X Present value	-0.00009** (0.00004)					-0.0002*** (0.00006)
Education X Present value		-0.004 (0.02)				-0.06 (0.04)
Population X Present value			-0.002 (0.002)			-0.004 (0.003)
Composition X Present value				-0.0002 (0.005)		0.002 (0.005)
Size X Present value					-0.00001 (0.0005)	0.00001** (0.00007)
Legislator fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
State / State-by-Vote fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.27	0.25	0.25	0.27	0.25	0.27
Observations	18028	20942	20942	18028	20942	18028

Notes: Standard errors are robust, clustered by Congressional district, and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the available final roll-call votes of Congressmen in the U.S. House of Representatives over the federal bill changes analyzed in Romer and Romer (2010); sample period covers Congresses 79th-108th (Columns 2, 3, and 5), or Congresses 83rd-108th (Columns 1, 4, and 6). All regressions include an intercept, and the separate components of the interaction terms. 'Resource abundance' is a dummy variable that captures whether there is an active giant oil field in the district (Source: Horn (2011)). 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). 'Income' is the median family income in the Congressional district; 'Education' is the share of persons enrolled in elementary and high schools in the Congressional district; 'Population' is total population in the Congressional district; 'Composition' is the share of persons aged at least 65 in the Congressional district; 'Size' is the size of the Congressional district in square miles (Sources: Adler (2002) and U.S. Census Bureau). For further information on variables see data Appendix.

Table 5: Congressional voting in the U.S. House of Representatives, different measures

	Sign of change		All oil fields	
	(1)	(2)	(3)	(4)
Dependent variable: A vote of 'Yea'	Baseline	Controls	Baseline	Controls
Resource abundance X Present value	0.037** (0.018)	0.05** (0.02)	0.002*** (0.0006)	0.002*** (0.0006)
Legislator fixed effects	Yes	Yes	Yes	Yes
State / State-by-Vote fixed effects	Yes	Yes	Yes	Yes
R-squared	0.25	0.28	0.25	0.28
Observations	20942	18028	20942	18028

Notes: Standard errors are robust, clustered by Congressional district, and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the available final roll-call votes of Congressmen in the U.S. House of Representatives over the federal bill changes analyzed in Romer and Romer (2010); sample period covers Congresses 79th-108th (Columns 1, and 3), or Congresses 83rd-108th (Columns 2, and 4). All regressions include an intercept, and the separate components of the interaction term. 'Resource abundance' is either a dummy variable that captures whether there is an active oil or gas field in the district (Columns 3-4) [Source: Paivi et al. (2007)], or a giant oil field (Columns 1-2) [Source: Horn (2011)]. 'Present value' is either a dummy variable that takes the value 1/-1/0 if the federal tax change represents a tax increase/decrease/no-change (Columns 1-2), or the present value of the change in the federal revenues (Columns 3-4) [Source: Romer and Romer (2010)]. 'Controls' (Columns 2 and 4) include i) district measures, including the population, population composition, median income, and education level in the district (Sources: Adler (2002) and U.S. Census Bureau); ii) legislator measures, including their party affiliation, age, education, occupation, gender, cumulative time in Congress, victory margin, political alignment with the governor and legislature, and ADA scores (Sources: Anderson and Habel (2009), Biographical Directory of the U.S. Congress, ICPSR and McKibbin (1997), Marty and Grossman (2016), and Pettigrew et al. (2016)). For further information on variables see data Appendix.

Table 6: Congressional voting in the U.S. House of Representatives, tax divisions

	Capital-division		Time perspective	
	(1)	(2)	(3)	(4)
Dependent variable: A vote of 'Yea'	Capital-related	Non-capital-related	Long term	Short term
Resource abundance X Present value	0.004*** (0.001)	0.002 (0.002)	0.002** (0.0006)	0.003 (0.003)
Legislator fixed effects	Yes	Yes	Yes	Yes
State / State-by-Vote fixed effects	Yes	Yes	Yes	Yes
R-squared	0.2	0.26	0.27	0.31
Observations	7213	13560	11734	9623

Notes: Standard errors are robust, clustered by Congressional district, and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the available final roll-call votes of Congressmen in the U.S. House of Representatives over the federal bill changes analyzed in Romer and Romer (2010); sample period is 1945-2003 (Congresses 79th-108th). All regressions include an intercept, and the separate components of the interaction term. 'Resource abundance' is a dummy variable that captures whether there is an active giant oil field in the district (Source: Horn (2011)). 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). Division to 'capital-' (Column 1) and 'non-capital-' (Column 2) related tax changes are based on the description of the tax change. If it includes changes related to capital, investment, and/or corporations, it is included in the former group; otherwise, it belongs to the latter. 'Long (short) term' (Column 3(4)) refers to the federal tax policies Romer and Romer (2010) categorized as exogenous (endogenous). As noted in Table A1, two tax changes belong to both groups. For further information on variables see data Appendix.

Table 7: Congressional voting in the U.S. House of Representatives, robustness tests

	Placebo tests		Sample restrictions			Oil price		Additional tests				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Dependent variable: A vote of 'Yea'	Following votes	Precedent votes	Oil rules excluded	Outliers excluded	Resource rich states	Testing 1970-1980	Testing 1980-1990	Time-invariant resources	Pre-trends	Sponsors excluded	Exploration	DW-Nominate
Resource abundance X Present value	0.0005 (0.001)	0.0008 (0.001)	0.0015** (0.0007)	0.0017** (0.0007)	0.0017*** (0.0007)	0.007** (0.003)	0.001 (0.001)	0.0018*** (0.0006)	0.0017*** (0.0006)	0.0017*** (0.0006)	0.002* (0.001)	0.0014** (0.0006)
Pre-discovery X Present value									0.0006 (0.001)			
Rig X Present value											0.00001 (0.00001)	
DW X Present value												-0.02*** (0.003)
Legislator fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State / State-by-Vote fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R-squared	0.31	0.22	0.26	0.23	0.29	0.2	0.08	0.25	0.25	0.25	0.4	0.26
Observations	20942	20942	17917	19685	2224	4237	2538	20942	20942	20892	3197	20942

Notes: Standard errors are robust, clustered by Congressional district and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. The general sample includes the available final roll-call votes of Congressmen in the U.S. House of Representatives over the federal bill changes analyzed in Romer and Romer (2010) and sample period is 1945-2003 (Congress 79th-108th). In Column 3 oil-related votes are excluded; in Column 4 votes involving extreme values of tax revenue changes are excluded; in Column 5 the sample is restricted to the 8 states with the highest number of oil discoveries per capita (namely, AK, CO, LA, ND, NM, OK, TX, and WY); in Column 6 (7) the sample is restricted to 1970-1980 (1980-1990); in Column 10 votes of sponsoring representatives are excluded (Source: Library of the U.S. Congress); in Column 1 (2) the sample includes the votes that were the next (prior) voted on after (before) the ones examined in the main sample; in Column 9 'Pre-discovery' is a dummy variable that captures the periods prior to the discovery, with the exception of the initial year. All regressions include an intercept, and the separate components of the interaction term. 'Resource abundance' is a dummy variable that captures whether there is an active giant oil field in the district (Columns 1-7, and 9-12), or whether there was an active giant oil field in the district throughout the sample period (Column 8) [Source: Horn (2011)]. 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). 'Rig' is the Baker Hughes Rig Count (Source: Baker Hughes at BHGE.com). 'DW' is the Poole-Rosenthal DW-Nominate Index (Source: Lewis et al. (2017)). For further information on variables see data Appendix.

Table A1-A: Federal tax Changes and Congressional Voting

Title	Present Value	Exogenous (EX) /Endogenous (EN)	Capital-related (CR) / Non-capital-related (NCR)	Related directly to oil and gas	House of Representatives Voting		Senate Voting	
					Year (Congress)	Vote number	Year (Congress)	Vote number
Revenue Act of 1945	-5.89	EN	CR		1945 (79)	83	1945 (79)	86
Social Security Amendments of 1947	0.74	EX	NCR		1948 (80)	111	1948 (80)	177
Revenue Act of 1948	-5.01	EX	NCR		1948 (80)	89	1948 (80)	164
Social Security Amendments of 1950	1.54	EN	NCR		1949 (81)	112	1950 (81)	358
Revenue Act of 1950	4.69	EN	CR		1950 (81)	203	1950 (81)	435
Excess Profits Tax Act of 1950	3.52	EN	CR		1950 (81)	266	1950 (81)	Voice vote
Revenue Act of 1951	5.42	EN	CR		1951 (82)	42	1951 (82)	184
Expiration of Excess Profits Tax and of Temporary Income Tax Increases	-5	EN	CR		1953 (82)	49	1953 (83)	64
Excise Tax Reduction Act of 1954	1	EN	NCR		1954 (83)	81	1954 (83)	121
Internal Revenue Code of 1954	-1.41	EX	CR		1954 (83)	83	1954 (83)	180
Social Security Amendments of 1954	0.5	EN	CR		1954 (83)	101	1954 (83)	Voice vote
Federal-Aid Highway Act of 1956	0.6	EN	NCR	Yes	1956 (84)	95	1956 (84)	171
Social Security Amendments of 1956	0.89	EN	NCR		1955 (84)	63	1956 (84)	196
Tax Rate Extension Act of 1958	-0.5	EX	NCR	Yes	1958 (85)	150	1958 (85)	216
Social Security Amendments of 1958	2.9	EN	NCR		1958 (85)	167	1958 (85)	283
Federal-Aid Highway Act of 1959	0.59	EX	NCR	Yes	1959 (86)	77	1958 (86)	197
Social Security Amendments of 1961	2.28	EN	NCR		1961 (87)	20	1961 (87)	82
Changes in Depreciation Guidelines and Revenue Act of 1962	-1.7	EX	CR		1962 (87)	137	1962 (87)	375
Revenue Act of 1964	-12.72	EX	CR		1963 (88)	69	1963 (88)	264
Excise Tax Reduction Act of 1965	-3.43	EX	NCR		1965 (89)	61	1965 (89)	116
Social Security Amendments of 1965	2.79	EN	NCR		1965 (89)	35	1965 (89)	151
Tax Adjustment Act of 1966 Public Law 89-800	0.89	EX	NCR		1966 (89)	212	1966 (89)	279
(Suspension of Investment Tax Credit)	1.5	EN	CR		1966 (89)	353	1966 (89)	494
Public Law 90-26 (Restoration of the Investment Tax Credit)	-1.63	EX	CR		1967 (90)	23	1967 (90)	84
Social Security Amendments of 1967	7.89	EN	NCR		1967 (90)	114	1967 (90)	275

Notes: The table lists the 50 major federal tax changes, 1945-2003, from Romer and Romer (2010), with two modifications: i) The federal tax change they titled as ‘Reform of Depreciation Rules’ is excluded as it was an administrative change, and hence was not voted on; ii) The federal tax change they titled as ‘Taxpayer Relief Act of 1997 and Balanced Budget Act of 1997’ was split to two acts, given it was based on two separate votes. ‘Present value’ refers to the present value (recorded in the year in which the bill was enacted) of the change in federal revenues resulting from the federal tax act (in billion \$), calculated by Romer and Romer (2010); in the two cases that two different measures were calculated we use their sum; in the case of ‘Taxpayer Relief Act of 1997 and Balanced Budget Act of 1997’ which had two measures, we assign the endogenous-negative (exogenous-positive) one to the Taxpayer Relief Act (Balanced Budget Act) based on their descriptions, outlined in Romer and Romer (2010). ‘Exogenous/Endogenous’ refers to the type of classification the federal tax change was given by Romer and Romer (2010). ‘Capital-related/Non-capital-related’ refers to whether the federal tax change is related to capital or not. In case the tax change directly affects capital, investment, and/or corporations it is classified as capital-related; otherwise, it is categorized as non-capital-related. ‘Related directly to oil and gas’ refers to whether the tax change is directly related to taxing oil, gas, or gasoline. The votes included in the sample are the final votes of each House (those in which the bill passed; post-amendments, in case there were any) over each of the bills. Votes recorded as ‘Voice vote’ are excluded from the sample as they do not record the names of Senators and tally of votes. For further information on these federal tax changes see Romer and Romer (2010).

Table A1-B: Federal tax Changes and Congressional Voting

Title	Present Value	Exogenous (EX) /Endogenous (EN)	Capital-related (CR) / Non-capital-related (NCR)	Related directly to oil and gas	House of Representatives Voting		Senate Voting	
					Year (Congress)	Vote number	Year (Congress)	Vote number
Revenue and Expenditure Control Act of 1968	10.25	EN	CR		1968 (90)	357	1968 (90)	386
Tax Reform Act of 1969	-13.48	EN and EX	CR		1969 (91)	73	1969 (91)	200
1971 Changes to Social Security	2.95	EN	NCR		1971 (92)	9	1971 (92)	17
Revenue Act of 1971	-7.98	EX	CR		1971 (92)	306	1971 (92)	358
1972 Changes to Social Security	11.84	EN	NCR		1971 (92)	100	1972 (92)	923
1973 Changes to Social Security	4.05	EN	NCR		1973 (93)	37	1973 (93)	524
Tax Reduction Act of 1975	-13.32	EN	NCR		1975 (94)	23	1975 (94)	112
Tax Reform Act of 1976	1.61	EX	NCR		1975 (94)	552	1976 (94)	1117
Tax Reduction and Simplification Act of 1977	-7.1	EX	NCR		1977 (95)	46	1977 (95)	128
Social Security Amendments of 1977	24.34	EX	NCR		1977 (95)	649	1977 (95)	631
Revenue Act of 1978	-18.5	EX	CR		1978 (95)	1308	1978 (95)	1109
Crude Oil Windfall Profit Tax Act of 1980	15.48	EX	NCR	Yes	1979 (96)	278	1979 (96)	495
Economic Recovery Tax Act of 1981	-125.9	EX	CR		1981 (97)	179	1981 (97)	251
Tax Equity and Fiscal Responsibility Act of 1982	24.85	EX	NCR		1982 (97)	642	1982 (97)	754
Social Security Amendments of 1983	37.3	EX	NCR		1983 (98)	23	1983 (98)	53
Deficit Reduction Act of 1984	8	EX	NCR		1984 (98)	569	1984 (98)	472
Tax Reform Act of 1986	-10.12	EX	CR		1985 (99)	428	1986 (99)	529
Omnibus Budget Reconciliation Act of 1987	10.59	EX	NCR		1987 (100)	372	1987 (100)	Voice vote
Omnibus Budget Reconciliation Act of 1990	34.55	EX	NCR	Yes	1990 (101)	475	1990 (101)	292
Omnibus Budget Reconciliation Act of 1993	41.64	EX	NCR	Yes	1993 (103)	199	1993 (103)	190
Balanced Budget Act of 1997	1.93	EX	NCR		1997 (105)	241	1997 (105)	130
Taxpayer Relief Act of 1997	-20.3	EN	NCR		1997 (105)	245	1997 (105)	160
Economic Growth and Tax Relief Reconciliation Act of 2001	-82.77	EN and EX	NCR		2001 (107)	118	2001 (107)	165
Job Creation and Worker Assistance Act of 2002	-37.23	EN	CR		2002 (107)	52	2002 (107)	44
Jobs and Growth Tax Relief Reconciliation Act of 2003	-60.64	EX	CR		2003 (108)	182	2003 (108)	179

Notes: see notes of Table A1-A.

Table A2: Descriptive Statistics, votes of House of Representatives and Congressional districts

	Mean	Std. Dev.	Min.	Max.
Aye Vote	0.70	0.46	0	1
Resource abundance	0.06	0.24	0	1
Present value (Billion \$)	-6.96	25.83	-125.9	41.64
Median family income (Congressional district)	11710.77	11750.08	881	64199
Population (Congressional district)	426345.60	142696.8	155343	7700000
Education (Congressional district)	0.19	0.04	0.039	0.3
Population composition (Congressional district)	0.11	0.04	0.008	0.44
Size (Congressional district)	11071.69	10870.72	30	64199.02
Sign of change	0.2	0.98	-1	1
Republican (legislator)	0.43	0.49	0	1
ADA score (legislator)	44.41	34.42	0	100
Gender (legislator)	0.96	0.19	0	1
Education (legislator)	0.94	0.25	0	1
Occupation (legislator)	2.52	1.31	0	6
Seniority (legislator)	8.36	7.14	0	51.17
Age (legislator)	51.73	9.62	26	88
Margin of victory (legislator)	0.75	0.13	0.17	1
Political alignment with state governor (legislator)	0.4	0.49	0	1
Rig count	36.66	94.09	0	462
DW-Nominate score	0.75	0.08	0.29	0.96

Notes: For detailed description of variables see Appendix.

Table A3: Congressional voting in the U.S. House of Representatives, different specifications

	Different fixed effects					Different clustering				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Dependent variable: A vote of 'Yea'	Legislator	District	State	Vote	State-vote	Legislator	State	Vote	District-vote	State-vote
Resource abundance X Present value	0.0028*** (0.0007)	0.0026*** (0.0007)	0.0026*** (0.0007)	0.0021*** (0.0007)	0.0021*** (0.0006)	0.0017** (0.0008)	0.0017** (0.0007)	0.0017*** (0.0004)	0.0017*** (0.0006)	0.0017** (0.0007)
Legislator fixed effects	Yes	No	No	No	No	Yes	Yes	Yes	Yes	Yes
State / State-by-Vote fixed effects	No	No	No	No	No	Yes	Yes	Yes	Yes	Yes
Vote fixed effects	No	No	No	Yes	Yes	No	No	No	No	No
District fixed effects	No	Yes	No	No	No	No	No	No	No	No
State fixed effects	No	No	Yes	No	Yes	No	No	No	No	No
R-squared	0.13	0.21	0.02	0.12	0.13	0.25	0.25	0.25	0.25	0.25
Observations	20942	20942	20942	20942	20942	20942	20942	20942	20942	20942

Notes: Standard errors are robust, clustered by Congressional district (Columns 1-5), legislator (Column 6), state (Column 7), vote (Column 8), district and vote (Column 9), and state and vote (Column 10) and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the available final roll-call votes of Congressmen in the U.S. House of Representatives over the federal bill changes analyzed in Romer and Romer (2010); sample period is Congresses 79th-108th. All regressions include an intercept, and the separate components of the interaction term. 'Resource abundance' is a dummy variable that captures whether there is an active giant oil field in the district (Source: Horn (2011)). 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). For further information on variables see data Appendix.

Table A4: Congressional voting in the U.S. Senate

	(1)	(2)	(3)	(4)
Dependent variable: A vote of 'Yea'	Baseline	Logit	Continuous measure	State-level clustering
Resource abundance X Present value	0.0021*** (0.0008)	0.001** (0.0006)	0.0036** (0.002)	0.002** (0.001)
Legislator fixed effects	Yes	Yes	Yes	Yes
State X Vote fixed effects	Yes	Yes	Yes	Yes
R-squared	0.13	0.11	0.13	0.13
Observations	4618	4618	4618	4618

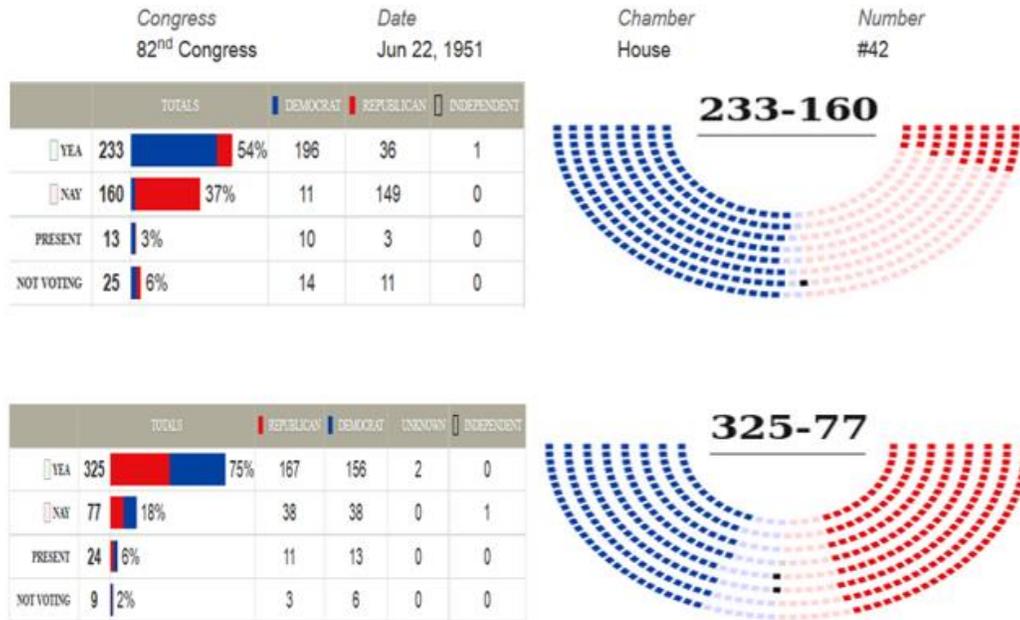
Notes: Standard errors are robust, clustered by legislator and vote (by state in Column 4), and appear in parentheses for independent variables. Superscripts *, **, *** correspond to a 10, 5 and 1% level of significance. Sample includes the available final roll-call votes of Congressmen in the U.S. Senate over the federal bill changes analyzed in Romer and Romer (2010); sample period is 1945-2003 (Congresses 79th-108th). All regressions include an intercept, and the separate components of the interaction term. 'Resource abundance' is either a dummy variable that captures whether there is an active giant oil field in the state (Columns 1, 2, 4) [Source: Horn (2011)], or the income share of severance taxes (Column 3) [Source: U.S. Census]. 'Present value' is the present value of the change in the federal revenues (Source: Romer and Romer (2010)). All regressions use OLS, with the exception of Column 2 that uses Logit (reporting marginal effects). For further information on variables see data Appendix.

Table A5: Descriptive Statistics, votes of Senate

	Mean	Std. Dev.	Min.	Max.
Aye Vote	0.65	0.48	0	1
Present value	-3.56	27.13	-125.9	41.64
Resource abundance	0.25	0.43	0	1
Income share of severance taxes	0.03	0.08	0	0.75

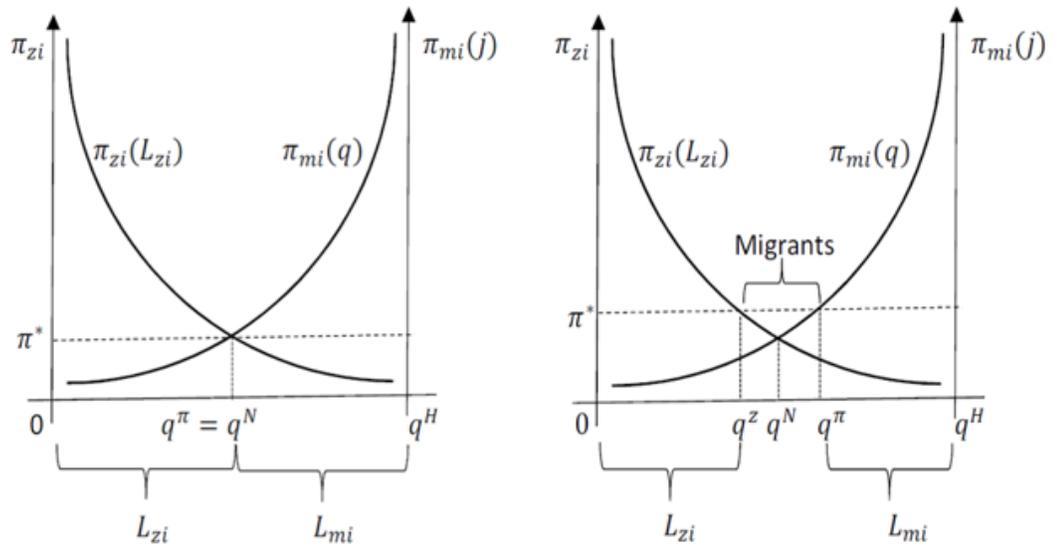
Notes: For detailed description of variables see Appendix.

Figure 1: House vote #42 (82nd Congress) VS. House vote #49 (83rd Congress), illustration



Notes: Figure presents voting results of House of Representatives' votes #42 of the 82nd (Revenue Act, 1951) Congress and #49 of the 83rd Congress (Expiration of Excess Profits Tax, 1953); [Source: Congressional Votes Database, GovTrack.us]. The former, with a present value change in federal revenues of 5.42 (billion \$), had 'Yea' vote shares of 54% over all Congressional Districts and of 65% within those with an active giant oil field. The latter, with a present value change in federal revenues of -5 (billion \$), had 'Yea' vote shares of 75% over all Congressional Districts and of 64% within those with an active giant oil field. Source of present value figures: Romer and Romer 2010).

Figure 2: Equilibrium allocations



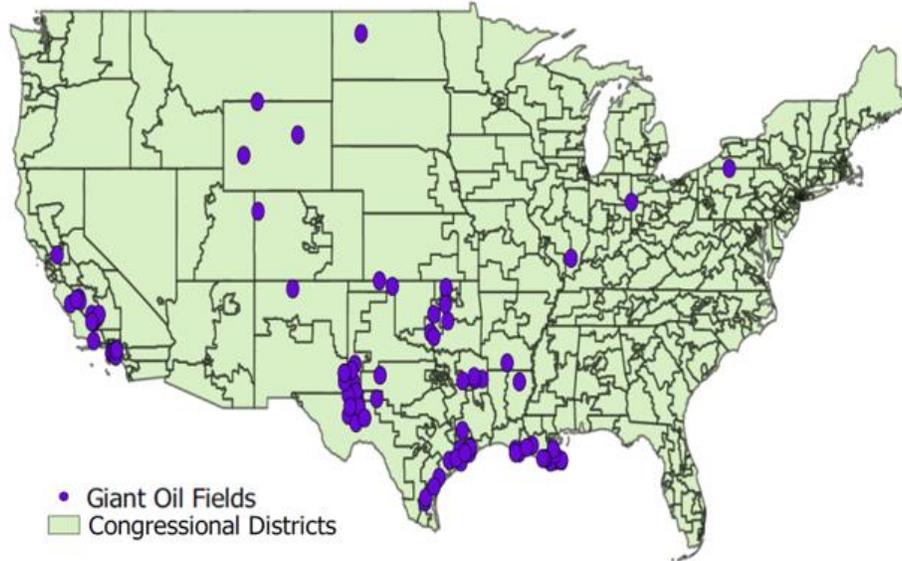
Notes: Figure presents a graphical illustration of the example outlined in the theoretical analysis.

Figure 3: Present value of the change in federal revenues, 1945-2003 (all tax changes)



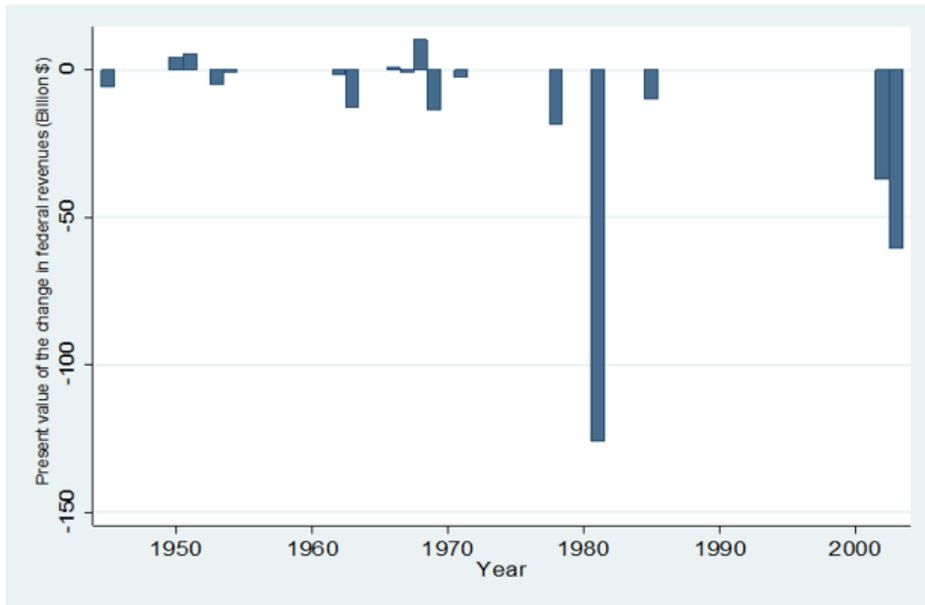
Notes: Figure presents the present value of the change in federal revenues (annual-based) resulting from each of the tax changes in the sample, 1945-2003 (Source: Romer and Romer (2010)).

Figure 4: Oil fields across U.S. Congressional Districts, 2003



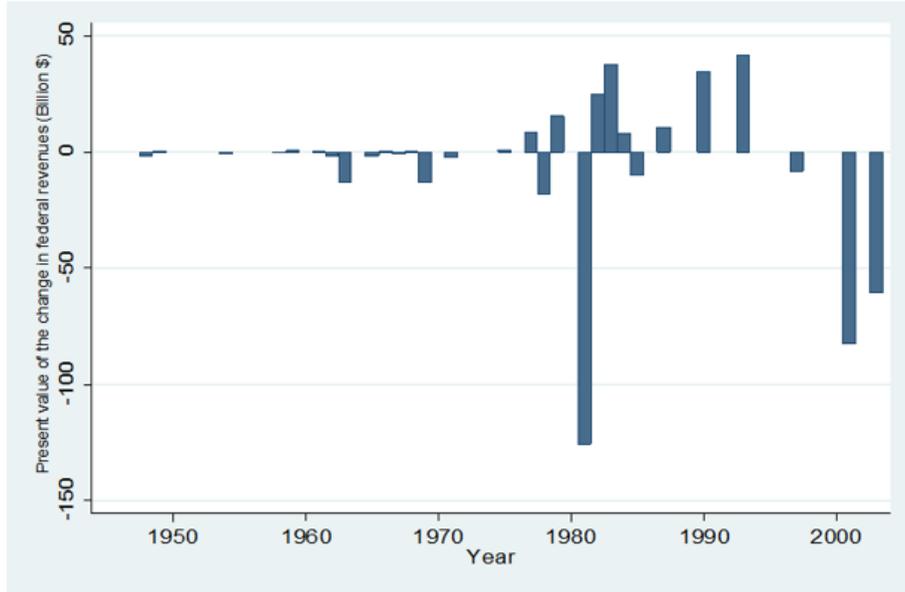
Notes: Figure presents the on-shore giant oil fields that appear in the sample, which include those that were discovered after 1894 (assuming activity spans over 50 years), across U.S. Congressional Districts (based on 2003 division) in the 48 contiguous states.

Figure 5: Present value of the change in federal revenues, 1945-2003 (capital-related tax changes)



Notes: Figure presents the present value of the change in federal revenues (annual-based) resulting from each of the tax changes in the sample categorized as capital-related, 1945-2003 (Source: Romer and Romer (2010)).

Figure 6: Present value of the change in federal revenues, 1945-2003 (long term (exogenous) tax changes)



Notes: Figure presents the present value of the change in federal revenues (annual-based) resulting from each of the tax changes in the sample categorized as having a long term perspective (exogenous), 1945-2003 (Source: Romer and Romer (2010)).



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