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**EXPLORING VARIATION IN
INFORMATIONAL FREEDOM AMONG AUTOCRACIES**

by

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Abstract

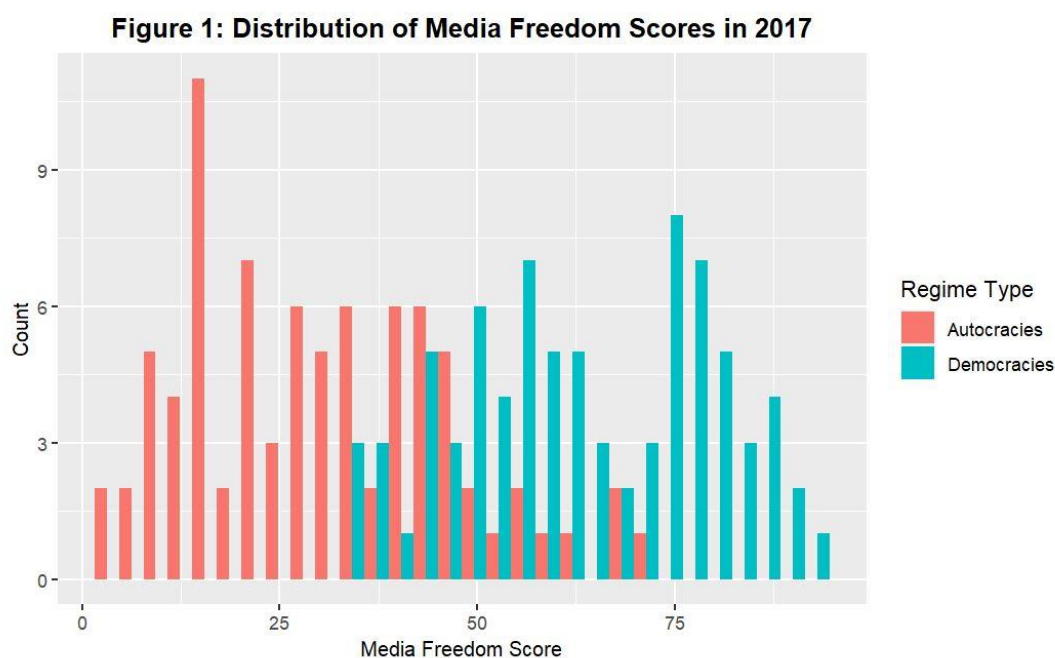
How do we explain variations in informational freedom among autocracies? What use is the information generated by the press, or perhaps the internet, to a dictator? This paper builds off the work of Egorov, Guriev, and Sonin (2009), who establish an empirical relationship between oil abundance and media repression. I first explore whether this relationship is generalizable to other types of “rents” to a regime. Using panel data from 1992 to 2017, I demonstrate that other types of natural resource rents exert the same negative effect on media freedom, but more volatile rents such as foreign aid do not. I also consider the theoretical differences between traditional news media and the internet, and the value of the informational signals these sources provide to a dictator. I demonstrate that the rise of social media since 2008 has not substantially changed the role of traditional media with respect to dictators’ decision-making; resource abundance still negatively affects media freedom. Furthermore, I show that internet freedom, as measured by censorship and internet shutdowns, also exhibits a relationship with resource abundance. However, as my theoretical analysis predicts, I find that internet freedom has a weaker relationship with quality of governance compared than does traditional media freedom.

Introduction

Freedom of the press is a hallmark of democracy. A free press helps citizens form political preferences by collecting and disseminating information about key economic and social issues. Citizens in turn hold governments accountable by expressing those political preferences in competitive elections. That free press plays this important role is known widely to both supporters and opponents of democracy. One might expect, then, that the absence of free press is

characteristic of dictatorship. Instead, we find that the extent to which press is repressed varies widely among non-democratic regimes.

Until 2017, Freedom House published a media freedom index which measured the extent to which a country's political, economic, and legal environments enabled a free press to operate. For clarity, I will hereafter call this variable "media freedom" or "media freedom score," and the concept it measures "traditional media freedom," as it reflects the extent to which press can freely disseminate information through traditional forms of media such as print, radio, and television. Under Freedom House's aggregation strategy, countries received a media freedom score between 0 and 100, with 0 being the least free and 100 being the most free.¹ Defining autocracies as countries falling below the median democracy level of a given year,² we see in Figure 1 that in 2017 autocracies received media freedom scores ranging from 2 to 72. This



¹ Note that in the original publication, 0 actually corresponded with the most media freedom; the score increased with more repression. I invert the score because I think it is more straightforward to talk about higher scores being more free and lower scores being less free.

² Democracy level is measured using polity score from the Polity dataset; this measure is frequently used in comparative literature. Further justification for this operationalization is provided in the evidence section.

means that autocracies spanned all three categories of “not free,” “partly free,” and “free” media environments, and that some relatively more autocratic countries had greater traditional media freedom than some democracies.

Why wouldn't all dictators choose to completely stifle the press, knowing that it acts as a check on their power? Egorov, Guriev, and Sonin (2009), hereafter EGS, offer an answer to this question. Just as a free press offers information to citizens about the performance of government, it also offers feedback to a dictator about the behavior of bureaucrats. Such feedback would otherwise be hard for a dictator to observe. In this way, a free press can enable a dictator to induce good governance from her bureaucrats, and by doing so protect her political survival. Natural resource abundance, however, makes good governance less important, as it allows dictators to rely more on the profits of extractive industries than on the productivity of a well-regulated modern sector for government revenue. EGS therefore argue that natural resource abundance, by making good governance less important, makes a dictator less inclined to tolerate a free press. They present evidence that differences in the amount of oil present in a country can help explain some of the variation in media freedom scores among autocracies.

EGS make an argument about natural resources in general, but their empirical analysis uses oil alone as a proxy. The authors do not consider whether there is something unique about oil markets that differentiate it from other natural resources such that other natural resources would not demonstrate the same relationship with traditional media freedom. This is an important question for several reasons. First, the number of countries with a substantial amount of oil is limited. According to World Bank estimates for 2020, oil rents account for 2% or more of GDP in 35 countries. Using a broader conceptualization of natural resources allows us to learn about more of the world; coal, mineral, and/or forestry rents account for 2% or more of GDP in

an additional 40 countries. Second, there are in fact unique characteristics of oil, such as the extent to which oil industries are nationalized and the sheer size of the global oil market. It is worth considering how such characteristics factor into a dictator's decision whether to censor the press, and if these characteristics are so important that other natural resources will not matter in the same way in respect to traditional media freedom.

Therefore, the first original contribution of this paper is to ask whether all natural resources negatively affect traditional media freedom. I consider the unique characteristics of oil, but ultimately conclude that the attenuating effect of natural resource abundance on traditional media freedom extends beyond oil. To test this idea, I regress media freedom score on total natural resource rents and demonstrate that total rents are a better predictor than oil rents alone.

Second, the rise of the internet, particularly social media, has changed the information environment for citizens of both democracies and dictatorships in ways that EGS could not have imagined at the time their paper was published. For example, a 2022 survey of Russian citizens by the independent research organization Levada Center found that 39% of respondents most often got their local and international news from social media. Television remained the most popular source of news, but the share of respondents who reported they most often got their news from television had declined significantly since 2013. With many countries seeing similar trends, it is worth asking whether traditional media plays the same role as it did in the pre-internet world. To answer this, I extend EGS's dataset from when their paper was written in 2009 to 2017, when Freedom House stopped publishing their media freedom index, and show that the same relationship exists between oil abundance and traditional media freedom before and after the rise of social media. This result suggests that, despite the growing popularity of social media,

traditional media still plays an important role in sharing information about the performance of government.

It is also important to ask, if the internet does not change the role of traditional media, are dictators then subject to the same tradeoffs when deciding whether to censor the internet as they are when deciding whether to censor traditional media? Consequently, can the same relationship be established between natural resources and internet freedom as between natural resources and traditional media freedom? I argue that because the internet provides weaker information signals and increases the threat of collective action (i.e. fewer upsides and greater risks), both resource-rich and resource-poor dictators will have greater incentives to censor it. Thus, there should not be a clear relationship between internet freedom and natural resource abundance. By analyzing data from VDEM's Digital Society Survey, I demonstrate that while resource abundance is in fact negatively correlated with internet freedom, the difference in internet freedom between high- and low-resource autocracies is smaller than the difference in traditional media freedom between high- and low-resource autocracies. Additionally, using the World Bank's governance indicators, I show that the relationship between internet freedom and quality of governance is less clear than that between traditional media freedom and quality of governance.

Related Literature

Two separate but related branches of literature provide a background for this paper: theories of mass political action and models of the behavior of dictatorships. An initial difficulty in modelling the behavior of dictatorships arises from the understanding of dictatorship (in the literature, synonymous with autocracy and authoritarianism) as a category for all regimes failing to meet a certain standard of democracy. Because it is defined only by what it is not, the

institutions, actors, and outcomes of dictatorship are highly diverse. Accordingly, there is no singular canonical model of dictatorship, and the body of literature reflects a variety of intellectual approaches. For example, Geddes (1999) finds that whether a regime is military, single-party or personalist changes the incentives of dictatorial elites and can therefore help explain patterns of behavior and power transitions (for example, democratization). Olson (1993) develops the theory of the “stationary bandit” to explain why dictators often act in the economic interests of their polity. He argues that when a rational actor with unchecked coercive power has an encompassing interest over a long time horizon, she will act in ways to preserve the wealth of the society from which she steals. Bueno de Mesquita, et. al (2003) advance a theory in which the difference between the size of the “selectorate” (a subset of the polity who express their preferences for leadership and by doing so may influence the outcome) and the size of the winning coalition constrains a leader’s behavior. This approach can explain variation in outcomes such as taxation, public benefits, poverty, and corruption.

In a comprehensive review Gehlbach, Sonin, and Svolik (2016) identify two important themes found in game-theoretical models of dictatorship: asymmetrical information and commitment issues. The theme of asymmetrical information can find intellectual roots in the seminal work of Wintrobe (1998), which defines the “dictator’s dilemma”: that dictators cannot know whether their polity supports the regime because they genuinely approve of it or because the regime commands their support. Therefore, the dictator must engage in political exchange wherein she offers individuals and interest groups public services and patronage in return for political loyalty. Of course, the dictator can also use repression to exert power over her polity, and thus must optimize her use of these two resources subject to a budget constraint. Wintrobe’s model predicts that a dictator who only cares to exercise the minimum power necessary to stay in

office and diverts the rest of government revenue to her personal consumption (a tin-pot) will respond differently to changes in economic performance compared to a dictator who takes utility from maximizing her exercise of power (a totalitarian).

Islam and Winer (2004), however, show that only some of the predictions of Wintrobe's theory hold up to empirical testing. Still, the fundamental insight of Wintrobe's "dictator's dilemma" is extremely important, as it contextualizes a great amount of the behavior of dictators as a means of compelling loyalty or a means of gathering information. For example, Lorentzen (2013) explains the Chinese Communist Party's (CCP) tolerance of small-scale, isolated economic protests as a tool for gathering information about public resentment and bureaucratic performance. Such information would otherwise be difficult to learn in the absence of competitive elections, civil society, and free media.

Theories of mass political action also illustrate the informational asymmetries inherent to authoritarian politics. Kuran (1989, 1991) provides support to the idea of the "dictator's dilemma" through a theory of mass political action. In this theory, a status quo regime is replaced by an alternative when public opposition exceeds a critical level, but the cost of openly expressing opposition to the regime depends on the size of the existing opposition movement. Because individuals have heterogeneous intrinsic values for reporting their true preferences (i.e. different propensities for "preference falsification"), small protests of highly motivated citizens may or may not cascade and eventually lead to broader protests. Relating this to Wintrobe's theory, the model demonstrates that individuals will have an incentive to lie by publicly supporting the regime while they privately oppose it until observable public opposition crosses some threshold level. Lohmann (1994) advances a similar but slightly more complicated model of "information cascades," in which citizens are only partially informed about the state of the world at an

individual level, but well-informed in aggregate. She shows that individuals' decisions to participate or abstain from a protest movement depend on changes in aggregate protest turnout over time because people extract cost-benefit information (discern the true competence or incompetence of the regime) from turnout numbers.

A model comprehensively synthesizing the dictator's optimization problem, as presented by Wintrobe, with the citizens' dynamic collective action problem, as presented by Kuran and Lohmann, is unfortunately absent.³ Still, for the purposes of this paper, the literature discussed so far provides an adequate picture of salient principles. A dictator can use both repression and policy change (provision of goods and services, distribution of rents, level of expropriation, personal freedoms, etc.) as tools to stay in office, but their use is subject to certain tradeoffs. Incomplete information about the loyalty of citizens and the competence of bureaucrats complicates the calculus of dictators. Citizens can overthrow the regime and replace it with an alternative if they so desire but face a complex collective action problem: some individuals have a higher affinity for the incumbent regime, but these heterogeneous affinities are not readily observable. The probability of political action being worthwhile therefore depends on how many others act, and a miscalculated decision to express opposition could have dire consequences.

This provides a sufficient theoretical background for the area of focus for this paper, the role of media freedom in dictatorships. Traditional media is highly relevant to both dictators and the citizens of dictatorships in securing preferred outcomes. For citizens, independent media

³ A best alternative is DeNardo's (1985) model of mass mobilization as the result of a strategic interaction between a regime and its opponents. Individuals choose to join a mass movement if the difference between the movement's demand and the policies of the incumbent regime exceeds a critical level. While the regime can control the size of a protest movement by implementing political reforms toward the movement's preferences, there is a revolutionary threshold past which the regime collapses. The extended model analyzing the use of repression by the regime shows contradictory effects on participation incentives; on one hand, it increases the cost of political action, but on the other hand, it may produce political backlash that mobilizes more citizens against the regime. In this version, the model shows how varying the cost of political action affects turnout over time, but it otherwise does not capture dynamic elements of Kuran (1989) and Lohmann's models.

reveals information about the competence or incompetence of the regime.⁴ It therefore signals to citizens whether it is in their interest to protest for regime change, and if so, facilitates coordination between protesters. For the dictator, independent media provides important information about government performance and public opinion, making it easier to know what combination of repression and policy change is appropriate to stay in power. However, the advantage independent media provides to citizens is a disadvantage to the dictator, who wants to keep her nature (if incompetent) hidden and make coordinated opposition against the regime difficult.

Existing literature explores methods of media repression and their uses to the dictator, such as nationalization/co-optation, dissemination of misinformation, plain censorship and/or intimidation. Edmond (2005) shows that the dictator can use co-opted or state-owned media to disseminate propaganda and misinformation that exploits the heterogeneous beliefs of the polity to engender more support. Gehlbach and Sonin (2014) find that when an advertising market is sufficiently large, the cost of lost viewership from introducing too much bias into the news is so great that a ruler may prefer to nationalize the industry instead. Lorentzen (2014) discusses the usefulness of *refraining* from censorship, finding that in China, permitting limited investigative journalism allows the CCP to keep local, low-level officials in check, as long as underlying social tension is not too high.

But the overall question remains, when will dictators tolerate relatively more traditional media freedom? As previously discussed, EGS find a negative correlation between oil rents and media freedom score and advance a formal model to show that this arises from a central tradeoff between incentivizing good bureaucratic performance and minimizing the risk of collective anti-

⁴ I use competence to mean, broadly, the ability of a regime to make correct policy choices, to implement those policy choices, and to control and correct for factors that might detract from the ongoing operation of policy (e.g., corruption, nepotism, lack of transparency, and overregulation).

regime action. In resource-rich countries, because resource rents can make up for the lost income of a would-be well governed modern sector, a dictator has less need to incentivize high effort from the bureaucracy. Because the value of free press to a dictator is to provide a reliable account of bureaucratic performance on which their incomes can be conditioned, a dictator who enjoys high rents has less need for traditional media freedom. However, whether this relationship is unique to oil rents remains to be seen.

And what about the internet? Do dictators face the same strategic considerations when deciding how much internet freedom to allow? Subsequently, should we expect it to be censored in the same ways as traditional media? Existing literature primarily focuses on how citizens of dictatorship interact with the internet, in the vein of the mass political action literature discussed earlier. For example, Stein (2017) finds that the diffusion of information and communication technologies does increase the likelihood of anti-government protest, but this alone does not predict whether political liberalization will take place. Similarly, Chen and Yang (2019) conduct a field experiment in China to show that uncensored internet access alone does not significantly increase the acquisition of politically sensitive information because persistent censorship causes individuals to underestimate the informational value of outside information sources, even when those individuals know that censorship takes place.

King, Pan, and Roberts (2013, 2017) consider the other side of the equation, that is, how do dictators interact with these new technologies? Their work uses the CCP's massive censorship program as a case study of how dictators strategically manipulate online information in unexpected ways. They find that internet censorship in China does not aim to prevent all political speech and government criticism online, but to prevent any potential collective action. Similarly, government-fabricated social media posts are not aimed to argue against online critics but to

divert public attention from actual or potential collective action on the ground with “cheerleading” posts (inspirational quotes, patriotism, cultural references, etc.). These findings are illustrative of some of the central informational problems discussed in theoretical models of dictatorship, but still fall short of explaining why some dictators allow more internet freedom than others.

I situate my research here, adapting the framework of EGS to broader conceptualizations to test the robustness of the authors’ proffered relationship between economic rents, bureaucratic performance, and informational freedom. Beyond oil revenues, is there a generalizable relationship between economic rents and traditional media freedom? Do all types of natural resource rent affect a dictator’s calculus of whether to censor traditional media in a uniform way, and what about a non-resource form of economic rent, such as foreign aid? Does the same relationship exist between resource abundance and internet freedom as does between resource abundance and traditional media freedom? Or is the internet treated as a different informational tool, or perhaps seen as a different political threat, than traditional media?

Theory

This paper builds off the central argument of EGS, that natural resource abundance makes a dictator more likely to repress the media because it makes the performance of her bureaucracy less important to her ability to collect rents. First, I will clarify some key terms and explain the mechanics of EGS’s argument in greater depth. I will then argue that abundance in any natural resource, rather than just oil abundance, which is the empirical focus of EGS’s paper, will have a negative effect on traditional media freedom. Foreign aid, on the other hand, despite being another form of income to the regime that is independent of the performance of the domestic economy, will not have a clear effect on traditional media freedom. Finally, I will argue that the internet is a less useful tool for dictators in observing bureaucratic performance than

traditional media because it creates uncertainty around whether a political signal will actually be perceived, and if it is perceived whether it is believable. Furthermore, I argue that the dynamics of information dissemination in online social networks are such that internet freedom poses a heightened threat to regime stability compared to traditional media freedom. Thus, I expect that resource-rich and resource-poor dictators alike have few incentives to permit internet freedom, and consequently that oil rents should not be a strong predictor of internet suppression.

Key Terms

I use the term traditional media freedom to describe the extent to which, in theory and in practice, press entities can disseminate information through traditional forms of news media, such as print, radio, television, etc., without interference by political actors. This is synonymous with press freedom. While the extent to which major outlets cover a wide range of political perspectives and provide critical coverage of government performance does not define whether media is free, such measures are usually good indicators of whether the political, legal, and economic environments in which outlets exist and operate are conducive to traditional media freedom. Conversely, practices such as the intimidation/harassment of journalists, official censorship, monopolistic ownership structures and/or state ownership, and the targeted allocation of advertising/subsidies would indicate less traditional media freedom.

I use the term internet freedom to describe the extent to which the internet functions as a public platform for the dissemination of information, free from political constraints such as discriminatory provision of access, censorship of content and/or online platforms, and violations of the privacy rights of users. This definition is admittedly vague but it is sufficient to illustrate that while press entities may increasingly use the internet as a medium through which to publish

content, traditional media freedom and internet freedom are substantively different. Each captures different elements of a broader concept of freedom of information.

Review: Oil and Media Freedom

EGS use the following theoretical framework for understanding traditional media freedom under dictatorship. When choosing whether to censor media, all dictators face a tradeoff between maintaining political control and providing proper incentives to bureaucrats to govern well. In democracies, fair and regular elections provide feedback on the performance of government officials, but dictatorships by nature lack such a mechanism.⁵ Party-based dictatorships may have internal mechanisms to monitor the competence of low-tier officials, such as the Central Discipline Inspection Commission in China. But under such systems the extent to which poor performance is actually reported to the dictator is often subject to the discretion of other members of the political elite, who may have incentives not to provide truthful reports. Thus, the value of free media to a dictator is that it either directly reports on the competence or incompetence of government officials, or indirectly reveals this by providing discerning coverage of policy outcomes. A dictator can then induce a high level of effort from her bureaucrats by conditioning their income on the media's report of their success or failure. Such a dictator pursues policies that she believes will improve the productivity of the domestic economy and therefore boost the income she can collect as tax revenue. Higher effort from bureaucrats is essential because it increases the likelihood that those policy outcomes are actually realized. This describes one half of the dictator's tradeoff, that traditional media allows the dictator to provide a bureaucratic incentive scheme that promotes good governance.

⁵ Multiparty elections do exist under some autocracies, but the quality of information they provide about support for the regime is questionable. Such elections are undermined by the efforts of the incumbent regime to suppress or co-opt opposition, as well as by the direct manipulation of election results.

However, the free flow of information is also a threat to the political survival of a dictator. Citizens of both democracies and dictatorships continuously decide whether to support an incumbent regime. If citizens observe a report of a failed policy outcome from a free media, they may infer that the incumbent regime is incompetent or corrupt, even if the responsibility for this failure falls on a few low-level officials. Furthermore, in a free-information environment, citizens can ask each other if they've seen the same report and use those interactions to estimate how widespread the information in question is. If citizens conclude that a negative report is widespread, then incompetence of the regime and the dissatisfaction of the populace can become common knowledge. In a democracy, such a development might lead to incumbents being voted out of office. In a dictatorship, however, this common knowledge may allow citizens to overcome the coordination problem associated with revolution, as discussed in theories of mass political action, and force regime change. Thus, the free flow of information is an inherent threat to a dictator, and presents her with the prospect of losing the rents associated with power (or worse, her life). This describes the other half of the dictator's tradeoff, that traditional media freedom undermines political control and thereby threatens her political survival.

According to EGS, resource abundance factors into a dictator's calculus by changing the extent to which promoting good governance is important to her. In a resource-rich country, a dictator can rely primarily on the profits of extractive industries for government revenue and is less dependent on the productivity of the modern sector. In other words, for the resource-rich dictator, failed policy outcomes that reduce the size of the domestic tax base are offset by resource rents. Thus, such a dictator is less concerned about motivating bureaucrats to achieve her policy outcomes and consequently less interested in the information that a free press could provide. At the same time, the higher she perceives the rents she can siphon from extractive

industries to be, the higher are her expected losses from leaving power. Therefore, with heightened concern for her political survival, she has even greater incentives to repress traditional media.

Note that motivating economic performance is not the only possible story for why good governance might be less important to a resource rich dictator. For example, Corden and Neary (1982) explain that when a country discovers a new resource, the resulting influx of foreign currency may appreciate the domestic currency such that other export industries are made less competitive (a phenomenon known as Dutch Disease). In such a case, having nothing profitable but the resource left to tax, government oversight of the economy in general may be less important to the regime. Alternatively, it could be that the role of media to a dictator is to subject bureaucrats to adequate scrutiny such that the government is effective enough to actually collect taxes. But evaluating which of these stories is most compelling is not the primary concern of this paper, and therefore will not factor into how I approach my empirical analysis.

Expanding the Concept of Resource Endowment

EGS advance a theory that speaks to the effect of resource abundance, in general, on traditional media freedom. However, they choose oil as a proxy for this larger concept without considering whether there is something unique about oil such that other natural resources might not have the same relationship with traditional media freedom.⁶ Two main characteristics of oil markets that differentiate oil from other natural resources are nationalization and overall size. Natural resource industries have historically seen waves of nationalization and privatization

⁶ Their justification for this operationalization is that oil is the most important natural resource in terms of global market size, and that oil data is more accessible and reliable than data on other natural resources. Furthermore, world market price shocks produce differential reactions to analyze. While these points are true, they do not demonstrate that the authors gave substantial thought to whether the unique characteristics of oil markets might differentiate it from other natural resources in terms of a potential effect on media freedom.

related to price shocks in the corresponding commodity (Chang, Hevia, and Loayza, 2017). But the oil industry, in particular, has been consistently dominated by national oil companies. Additionally, the sheer size of the global oil market sets it apart from other natural resources. Crude oil is the world's most traded product; in 2016, with an estimated value of 1,720 billion USD, the global oil market was bigger than all metal markets combined.

Despite these two factors, I argue that non-oil resources will actually have the same effect on traditional media freedom. Nationalization of a natural resource industry or government ownership of the land containing the resource may at first seem to be a necessary condition for the resource endowment to be consequential for government finance. But governments that have not nationalized a resource can still collect rents from it by taxing the private firm extracting it. Resource industries, in particular, face huge potential rewards to investment, making new extraction projects attractive to private firms even when subject to steep tax or royalty systems. Furthermore, once a firm has incurred the high sunk costs involved in discovering a resource and installing the infrastructure to extract it, the firm has little choice but to continue production so long as revenues cover variable costs. The firm's production after investment is thus fairly insensitive to changes in the tax regime (Daniel, Keen, and McPherson, 2010). The key point here is that whether a natural resource industry is nationalized should not substantially hamper a dictator's capacity to siphon rents from it. Consequently, we should not expect a resource-rich dictator's decision to repress media to be conditional on nationalization of the resource.

Additionally, the size of the global industry for each natural resource should not matter in its relationship to traditional media freedom. Instead, the size of the resource rent relative to the total size of a country's economy may determine the extent to which it influences a dictator's decision to repress the media. For example, we might say that copper rents matter less to

governments than oil rents because copper production is a smaller global industry with fewer revenues. But if we have two hypothetical countries, one with copper rents as 5% of GDP and no other natural resources, and one with oil rents as 5% of GDP and no other natural resources, then we should expect the same prediction for traditional media freedom. This is because in both countries, the importance of the resource rent relative to the modern sector is the same. Thus, the key factor is not the size of the industry worldwide, but the country's dependence on the industry. A measure that captures the value of a resource present in some country relative to the total size of the country's economy should see the same correlation to traditional media freedom regardless of the type of resource being analyzed.

As I discussed above, high relative rent size may reflect a number of things. It could indicate an endogenous choice made by the regime to neglect modern sector development, or that the resource industry generated such high revenues that the contributions of a productive modern sector to total economic output were still relatively small. Dutch Disease is another possibility; if the success of the resource sector came at the expense of other sectors, then the resource sector will naturally comprise a relatively high portion of GDP. In any case, the quality of governance provided by bureaucrats and the performance of the domestic economy become less important to a dictator, so the expected effect on media freedom should be the same. To summarize this section, despite the unique characteristics of oil markets, I expect that non-oil natural resources will have the same negative effect on traditional media freedom.

Why Not Foreign Aid?

Second, I consider the potential relationship between foreign aid and traditional media freedom. Like natural resource rents, foreign aid is a source of revenue to the regime that does

not depend on the success of the domestic economy. The performance of bureaucrats and regulators should have no effect on the rents a dictator receives from foreign aid. Thus, one might expect that if a regime received a very high amount of foreign aid, that the dictator would choose to stifle the press, just as she would if her country had abundant natural resources, since she no longer needs to prioritize good governance. However, I argue that unlike natural resource abundance, foreign aid will actually have no affect on traditional media freedom, because it is difficult for dictators to gauge the value of future foreign aid rents.

The allocation of aid reflects the perceived needs and merit of recipient countries as well as the changing interests of donors. Thus, foreign aid may be a more volatile form of income to the incumbent regime than natural resource rents. In a resource-rich country, while the profits of extractive industries (and with them the rents that governments can draw) are subject to price fluctuations in global resource markets, the regime knows even in times of relative losses that it can count on the resource as a form of long-run revenue (that is, until the resource is depleted, or there is no longer a reliable demand for it). The same is not necessarily true for foreign aid. If an aid-dependent regime permits bureaucratic incompetence and modern sector underdevelopment, then the dictator may face a crisis wherein aid is suddenly reduced or conditioned on certain policies that she is not prepared to provide. In this scenario, government revenue may be insufficient to maintain the spending habits that keep the dictator in power, for example the provision of public goods, patronage, or buying off political opposition.

Even if the dictator suddenly halts media repression and the press begins to provide critical coverage of political outcomes, a high-powered bureaucracy and thriving modern sector will not just spring forth to provide a domestic tax base. Individuals' incomes will generally stay low in the short run while media reports signal regime incompetence, making anti-regime

collective action likely. Knowing this, a dictator might choose a “suboptimal” plan wherein she allows free media and induces high bureaucratic effort even while receiving high rents from foreign aid, because she believes the aid is transitory and that her future payoffs will depend on a productive modern sector. So, we should not expect to see a consistent relationship between foreign aid and media repression. This reasoning advances a broader argument that EGS’s theory is not generalizable to any and every type of economic rent, but only to those whose future value the dictator can predict with relative certainty.

Internet Freedom

Turning now to the dependent variable, I argue that resource rents will affect internet freedom differently than they do traditional media freedom. First, I argue that the internet provides relatively weaker information signals. By this I mean that there is less certainty that politically relevant signals will be perceived when they are published online compared to through a traditional media outlet, and even when a politically relevant signal is perceived, it may be less credible. As a result, the internet does not provide consistent and actionable information signals about bureaucratic performance in the same way that traditional media does. It is therefore less useful even to the dictator who is trying to provide a bureaucratic incentive scheme to motivate good governance. Second, I argue that the structure of online communication networks heightens the risk of inciting mass mobilization, making dictators, regardless of their ability to extract resource rents, more likely to censor it. I explain each part of this argument in further detail in the following paragraphs.

First, consider how a political signal, by which I mean a report of some policy outcome or of some government official’s performance, is received and processed when disseminated by a

news organization in a free traditional media environment, according to EGS's theoretical framework. Assume that the news organization is considered reasonably reputable and is economically viable, i.e., its content regularly reaches news consumers. We expect, then, that when this news organization reports a political signal, the signal will be perceived by a sizable audience, with members of the incumbent regime's political elite likely being a part of that audience. Given that the news organization is reasonably reputable, those who perceive the political signal will believe it to be entirely true or will contextualize the signal with information they have about the news organization's potential bias. Either way, they will make judgments about the incumbent regime accordingly. The regime, in turn, will respond to the political signal by punishing or replacing lower level officials if appropriate. Even if the news organization has a frequent bias in its reporting, so long as the direction of the bias is predictable, viewers including incumbent regime members can still interpret and act on a political signal.

Contrast this with how a similar political signal might be received and processed when disseminated by an individual online, say through a blog or social media post. The individual publishing the signal does not need a regular audience to make their project economically viable, as it costs them virtually nothing to produce. Therefore, the assumption that the signal will reach a sizable audience is no longer a given. Similarly, given the enormous volume and diversity of online content, the signal could easily be crowded out by "noise" and fail to reach even those internet users who are highly interested in such political content. In other words, the higher noise-to-signal ratio online versus in a traditional media environment alters the extent to which a citizen's ability to access uncensored information actually leads them to observe a relevant political signal. This is consistent with the literature discussed earlier; Chen and Yang emphasize that access alone does not guarantee the consumption of critical information, and King, et al.

(2017) show that “cheerleading” posts distract users away from politically charged content. Furthermore, if such a signal does not gain traction among citizens it is unlikely that members of the incumbent political elite will see it. In that instance, from the dictator’s perspective, permitting the free dissemination of information online does not actually lead to the observation of feedback on the performance of bureaucrats.

Consider also that those who do see the political signal will not necessarily know whether to trust it. Every internet user can both consume and create online content, and author anonymity and/or identity fabrication is both possible and frequent. This may mean that citizens are more likely to report their true preferences online, because anonymity lowers the risk of consequences. However, it may also mean that citizens unintentionally or intentionally report and spread false information online if it aligns with their preferences. Governments might strategically do the same, both domestically and in foreign countries. Citizens who are aware of this are rightfully less certain about how reliable a given piece of information being disseminated online is. An incumbent regime, likewise, is unlikely to act on an online political signal with an unfamiliar source. We can contrast this with a traditional media environment, in which there are a limited number of content creators sharing information to a larger number of consumers, and the identity of the reporting individual, be it a journalist, news anchor, radio show host, etc., or at least the identity of press entity disseminating the information, is usually known. In such an environment, even when confronting biased reporting from competing news organizations, consumers can contextualize information by adjusting for the typical bias of the source and thereby estimate the truth. On the internet, however, because the sources of information being analyzed are so numerous and disjoint and because the direction of bias is not uniform or predictable (unlike with propaganda and state-owned media), it may be harder for citizens to contextualize bias and

identify misinformation. So, even when the internet is relatively uncensored, citizens and governments may be more skeptical of information signals they observe online. From a dictator's perspective, this means that allowing the free flow of information on the internet, and furthermore observing political content disseminated by individual internet users, does not necessarily mean observing a clear and useful signal about the performance of bureaucrats and the success or failure of policy outcomes. In short, for the dictator, allowing internet freedom has fewer potential benefits than allowing traditional media freedom.

If this line of reasoning is correct, then we can conclude that a free internet does not reliably provide information to a dictator about the quality of bureaucratic performance and is therefore not a useful tool for incentivizing high effort from government officials. Consequently, internet freedom should not be correlated with quality of governance. Even resource-poor dictators will therefore not consider internet freedom a tool for promoting the development of a strong domestic economy. Therefore, we expect the decision of whether to allow internet freedom to be unrelated to natural resource abundance.

Additionally, the risk of inciting mass political action may be higher when allowing internet freedom than when allowing traditional press freedom. Some authors have argued that the internet facilitates collective anti-regime action in autocracies by reducing the informational uncertainty of potential protestors. But a free press, too, threatens to create common knowledge of disruptive political information since it transmits to a predictable audience. Instead, the heightened risk to political stability stems from the sheer volume of content disseminated online and the potential for seemingly small, random signals to spread through the population.⁷ This

⁷ In network theory, assortative networks (in which highly-connected nodes are more likely to be connected to other highly-connected nodes) demonstrate a lower "epidemiological threshold" or tipping point than disassortative networks. While the initial spread of a signal is slower in such networks, they are overall more prone to system-wide spread (Agostino, et al., 2012). Social media networks and other online communication technologies seem to be

presents the possibility for political signals that might normally fly under the radar of large media outlets, for example an individual's interaction with a low-level government official, to unpredictably gain traction and have destabilizing effects. This may make dictators, regardless of their level of rent, less willing to tolerate internet freedom.

Hypotheses

Following these arguments, I present six hypotheses adapted from the central hypothesis of EGS— that media freedom is decreasing with rents. The first two speak to the main independent variable, economic rents, and its effect on traditional media freedom:

H1: Countries with higher “rents” are likely to have less traditional media freedom when the rents being measured are from natural resource abundance.

H2: Size of rents and traditional media freedom will not have the same relationship when the source of rents is foreign aid.

The second two hypotheses speak to a new dependent variable, internet freedom, and how it compares to traditional media freedom with respect to its relationship with economic rents. I also consider the possibility that the introduction of the internet as a popular form of media changes the importance of traditional media to a dictator, and thus alters any preexisting relationship with resource rents:

H3: Unlike with traditional media freedom, the relationship between internet freedom and resource rents will be indeterminate, because the logic of the dictator's choice is unclear.

organized in this way; users with a high number of “friends” or “followers” are more likely to be friends with other users with a high number of friends. If a signal starts at the “edges” of a network, such as when content is created and disseminated by a user with a low number of friends, it will spread slowly at first. Most likely, it's spread will stagnate after a short period of time. But it is also possible that such a signal would happen to spread to a highly-connected user in this initial slow period, leading to a cascade effect wherein many highly-connected users end up spreading the signal extensively throughout the network.

H4: When new data from after the rise of social media is introduced, the relationship between resource rents and traditional media freedom will also become indeterminate.

Finally, two supplementary hypotheses advanced by EGS are that the relationship between rents and traditional media freedom will be stronger in less democratic countries, and that countries with more traditional media freedom will have better-performing bureaucracies. Consistent with my earlier arguments, I do not think the former prediction should change with the type of natural resource rent being considered. The latter prediction, however, may be different when internet freedom is introduced as an explanatory variable. As previously discussed, both the dictator's and the citizen's interpretation of information signals may be different when they are observed online versus through a traditional media source. Because both parties are less able to make judgments about the success or failure of policy outcomes and the quality of bureaucratic performance, bureaucrats will be only weakly constrained by an uncensored internet compared to an uncensored media. I summarize these points in my final two hypotheses:

H5: The relationship between natural resource rents and traditional media freedom will be stronger in less democratic regimes.

H6: Countries with more traditional media freedom are likely to have a higher quality of governance, but quality of governance will have a weaker relationship with internet freedom.

Empirical Analysis

EGS explore the empirical relationship between oil rents and traditional media freedom. Their primary measure of oil rents is proven oil reserves in billions of barrels, from BP's Statistical Review of World Energy. Proven reserves are those "anticipated to be commercially

recoverable” under prevailing economic conditions. EGS argue that proven reserves are an appropriate proxy for the dictator’s expected value of future resource rents and will be subject to exogenous price shocks over relatively short time periods to induce changes in the dependent variable. EGS also test regressions with alternative measures of oil abundance, including oil reserves valued at that year’s global price, oil production in thousands of barrels daily and oil production valued at the global price, and find that their central result holds. EGS use a one-year lag of the Media Freedom index from Freedom House, which has detailed data starting in 1993, to proxy media freedom in their primary panel regressions (hence their data runs from 1992 to 2007).

EGS differentiate their argument from the theory that natural resource abundance allows a dictator to “buy off” citizens who would otherwise demand a free press. To ensure that any effect found in their empirical analysis speaks directly to natural resource abundance and is not being driven by the total resources available to the dictator or the extent to which the dictator distributes resources to her citizens, EGS include controls for GDP per capita and government expenditure as a portion of GDP. EGS also control for a country’s population, arguing that the number of people may influence the importance of media as a coordination tool. These three control variables all use data from the World Bank. All regressions also include country and year fixed effects to control for global price fluctuations and time-invariant country-specific characteristics.

To avoid conflating the effects of natural resource abundance with the effects of overall democracy level, as the literature has repeatedly demonstrated a negative correlation between the two and both would be related to traditional media freedom, EGS account for democracy level,

proxied by Polity2 score from the Polity dataset,⁸ using two primary strategies. First, in whole panel regressions, they include Polity score as a control variable, as well as an interaction term between oil reserves/oil production and Polity score to see whether the effect of oil on media freedom is stronger in less democratic countries. Second, they create subsets of more and less democratic countries based on Polity score and run identical regressions on each subset. Specifically, they base the subsets on a country's Polity score at the first year of the dataset, in 1992.

My analysis builds off this empirical strategy. I replicate the dataset of EGS, but extend it horizontally, by adding new dependent and independent variables as discussed above, and vertically, by adding new years of data. However, BP, World Bank, and Polity periodically revise historical data, meaning that data on all the main variables discussed above could have been subject to change since EGS published their paper. Therefore, before exploring new variables, I want to check first whether the results of EGS hold using updated data for 1992 to 2007, and second whether the results of EGS hold beyond 2007. EGS incidentally published their paper around the same time that social media started gaining traction. Therefore, if introducing new years of data causes the relationship between resource rents and traditional media freedom to disappear, it would suggest that the rise of the internet has not only introduced a new medium for dictators to consider but has also changed the role of traditional media (see H4). After exploring this, I will turn to new variations in economic rents as an independent variable, and finally to internet freedom as an alternative dependent variable. Finally, I will

⁸ Polity score is constructed by subtracting a country's institutionalized autocracy score from its institutionalized democracy score, with a resulting scale ranging from +10 (strongly democratic) to -10 (strongly autocratic). These scores measure key qualities of executive recruitment, constraints on executive authority, and political competition. Thus, Polity score is a particularly appropriate proxy of democracy level as it does not directly measure freedom of the press. Polity2 score is a modified version of the same variable that converts special cases to conventional polity scores to facilitate time-series analyses. EGS specifically use Polity2 score, and I adopt the same strategy, so for the sake of simplicity I will hereafter refer to Polity2 score as just "Polity score."

examine the relationship between internet freedom and quality of governance and compare it to the relationship that EGS found between traditional media freedom and quality of governance.

Replicating the Main Finding

In Table 1, I start by replicating EGS's original finding using updated data. In column 1, I regress media freedom score on log of oil production, including a control for Polity score and an interaction term between Polity score and oil production, as well control variables for log of GDP per capita and log of total population,⁹ using the original dataset of EGS, which they sent me. Some observations are intentionally omitted because of large discrepancies between the data EGS has for them and the data available now.¹⁰ Therefore the coefficients reported here are not

Table 1: Fixed Effects Regressions for Media Freedom on Oil Production, 1992 to 2007

	Media Freedom			
	EGS, All Countries	Updated Data, All Countries	EGS, Autocracies (Polity < 6)	Updated Data, Autocracies (Polity < 6)
	(1)	(2)	(3)	(4)
Log oil production	-1.459** (0.635)	-0.724*** (0.130)	-1.163*** (0.260)	-0.898 (0.610)
Log oil production x Polity	0.093*** (0.020)	0.066*** (0.013)		
Polity	0.690*** (0.068)	2.123*** (0.063)		
Log GDP per capita, PPP	2.623** (1.126)	5.159*** (0.294)	1.414* (0.721)	0.072 (1.314)
Log population	-10.955*** (2.571)	-1.703*** (0.219)	1.045** (0.433)	1.204 (4.125)
Observations	2,156	2,323	1,029	1,238
R ²	0.116	0.641	0.026	0.002
Adjusted R ²	0.041	0.621	-0.072	-0.083
F Statistic	51.935*** (df = 5; 1987) (p = 0.000)	784.502*** (df = 5; 2201) (p = 0.000)	8.446*** (df = 3; 934) (p = 0.00002)	0.892 (df = 3; 1140) (p = 0.445)
Significance levels				p<0.1; p<0.05; p<0.01

⁹ Log of government expenditure is excluded here, even though it is included in the equivalent regression of EGS's original paper. This is because there is a relatively low correlation coefficient between EGS and the updated data for this variable, indicating that it has been subject to significant revision since 2008. Including it skews the coefficients on control variables away from EGS's values and is generally unhelpful in demonstrating my replication of their data. Note that a table of the correlations coefficients for each variable can be found in the appendix as Table 1a.

¹⁰ I removed Venezuela 2002 to 2007, United Arab Emirates 2004 to 2007, Argentina 2001 to 2007, Syria 2002 and 2003, and Qatar 2000 to 2007 because of large discrepancies between EGS's original and my updated data on oil production for those years. Additionally, I removed East Timor and Cameroon because these countries had oil production data in EGS dataset that is no longer publicly available through BP.

exactly what was published by EGS, but this is not due to any error in specifying the regressions (running their unmodified data set with my code yields the exact coefficients from EGS's Table 1 column 4). Note that I reproduce their results with oil production rather than oil reserves, even though reserves are the preferred measure for EGS, because historical oil reserve data has been subject to more change over time than oil production data.¹¹

Column 2 is the same regression but uses the data I compiled. Both columns demonstrate that after controlling for GDP per capita, population, and democracy level, media freedom score is negatively correlated with oil reserves. Additionally, in both columns the interaction term between democracy and oil production returns a positive and statistically significant coefficient, suggesting that the negative correlation between oil and traditional media freedom is stronger in less democratic countries. The size of the coefficient on log oil production differs between the regression on EGS's data and my data: EGS's data suggests that for a 10% increase in oil production there is a 0.14 point decrease in media freedom score, whereas my data suggests a 0.07 point decrease. This suggests that updating the data has made EGS's results weaker in the sense that the effect of oil on traditional media freedom is smaller. However, because the coefficients of my regressions on updated data are still significantly different than zero with the expected signs, we can conclude that the central finding of the EGS's paper holds for the 1992 to 2007 period.

Columns 3 (EGS data) and 4 (my data) apply the same regression to a subset of "autocratic" countries, testing the direct effect of oil on traditional media freedom by removing Polity score as a control variable and its interaction term. Countries with a Polity score less than or equal to 5 (the sample median) are included in this subset. Note that to replicate the empirical

¹¹ The correlation between my and EGS's data for oil reserves (before log transformation) was 0.939, compared to 0.999 for oil production.

strategy of EGS, countries are not sorted based on their Polity scores in each year, but instead their scores at the start of the dataset in 1992. Both regressions give coefficients on log oil production that are negative and statistically significant, again demonstrating the central finding that oil negatively affects traditional media freedom in autocracies.¹² But again, the size of the coefficient differs between the two regressions, although less so than before: EGS's data suggests that, among autocracies, for every 10% increase in oil production there is a 0.11 point decrease media freedom score, whereas my data suggests a 0.09 point decrease. This is due to revisions to the data sources, as I discussed earlier, rather than coding errors. The difference may also reflect that certain countries were missing data at the time of EGS's publication (note the smaller number of observations in the regressions on their data).

In Table 2, to test if EGS's findings are generalizable beyond the specific years included in their study, I estimate the same regressions for the periods 1992 to 2007 and 2008 to 2017 and compare the results.¹³ Columns 1 and 4 include all countries and return similar coefficients on all variables; log oil production is negative, Polity score is positive, and their interaction term is positive. This suggests that in both periods, oil production negatively affected traditional media freedom, and this effect was more pronounced in less democratic countries. This confirms the relationship that EGS find holds beyond 2007. Furthermore, it provides evidence to reject H4 by demonstrating that the rise of social media (which coincides roughly with end of EGS's dataset in 2007) did not substantially alter the role of traditional media, at least in the calculations of dictators. Note that column 1 is not exactly the same as column 2 in Table 1, because I

¹² Note that the coefficient on log of oil production is smaller in the regression including just autocracies than in the regression including all countries. This result is somewhat contrary to the argument that oil abundance will have a stronger negative effect on media freedom in less democratic countries. EGS have the same result in their paper (the coefficient for all countries is -2.13, and -1.67 for autocracies), but do not discuss it, as their focus is oil reserves not oil production. I am not concerned about this, as Table 2 demonstrates that creating subsets for democracies and autocracies with a different method makes this result go away.

¹³ The data ends in 2017 because it's the last year that Freedom House published their media freedom index.

Table 2: Fixed Effects Regressions for Media Freedom on Oil Production in Two Periods

	Media Freedom					
	All Countries 1992-2007 (1)	Autocracies 1992-2007 (Polity < 7) (2)	Democracies 1992-2007 (3)	All Countries 2008-2017 (4)	Autocracies 2008-2017 (Polity < 7) (5)	Democracies 2008-2017 (6)
Log oil production	-0.899*** (0.141)	-2.535*** (0.234)	-0.564*** (0.146)	-1.081*** (0.166)	-2.079*** (0.270)	-0.634*** (0.227)
Log oil production x Polity	0.073*** (0.013)			0.036** (0.017)		
Polity	1.899*** (0.068)			2.067*** (0.092)		
Log GDP per capita, PPP	5.492*** (0.348)	2.538*** (0.638)	7.019*** (0.491)	7.024*** (0.413)	1.873*** (0.708)	8.027*** (0.554)
Log population	-1.137*** (0.242)	1.105** (0.487)	-0.836*** (0.303)	-0.135 (0.281)	0.840 (0.549)	-0.344 (0.389)
Log of gov. exp/GDP	4.177*** (0.676)	2.611*** (1.002)	8.260*** (1.166)	5.228*** (1.000)	1.887 (1.577)	7.199*** (1.603)
Observations	2,125	1,114	973	1,149	525	604
R ²	0.612	0.133	0.338	0.678	0.151	0.358
Adjusted R ²	0.588	0.066	0.288	0.651	0.045	0.290
F Statistic	526.402*** (df = 6; 2002) (p = 0.000)	39.773*** (df = 4; 1033) (p = 0.000)	115.279*** (df = 4; 905) (p = 0.000)	371.079*** (df = 6; 1059) (p = 0.000)	20.687*** (df = 4; 466) (p = 0.000)	76.096*** (df = 4; 545) (p = 0.000)
Significance levels	<i>p</i> < 0.1; <i>p</i> < 0.05; <i>p</i> < 0.01					

reintroduce government expenditure as a portion of GDP as a control variable.¹⁴

In columns 2 and 5, I again use a subset of “autocratic” countries to test the effect of oil production on traditional media freedom directly, omitting Polity score as a control variable. In this set of regressions, I include countries with Polity score less than or equal to 6 in the autocracies group, whereas before it was less than or equal to 5, because the sample median is higher in the 2008 to 2017 period. Columns 3 and 6 are therefore the remaining “democratic” countries. Note that this time, rather than use the EGS strategy of creating subsets based on Polity score in the first year of data, I subset based on each year’s Polity scores.¹⁵ Thus, countries may have observations distributed into both the autocracies and democracies subsets if their

¹⁴ I also reintroduce the countries that I previously dropped due to discrepancies in oil production figures between my data and EGS, as the goal of this table is no longer to reproduce the EGS results, and include East Timor and Cameroon (see footnote 1).

¹⁵ EGS do not provide justification for their choice to create subsets on 1992 polity scores. I expect that the authors wanted to ensure each subset contained a balanced panel. However, I think that this empirical strategy does not reflect the fact that countries can experience significant changes to their political institutions in relatively short time periods. Additionally, some of my other regressions use data from 1992 to 2017; because I am looking at a longer period of time, it is even more important that countries are able to move between subsets to reflect movement towards or away from the democratic ideal.

Polity score crosses the cutoff during the dataset. The results hold: in both subsets of both time periods, oil production has a negative and significant effect on traditional media freedom. Additionally, using this method for creating subsets, we see higher coefficients on log of oil production in the autocracy group than in the democracy group for both periods. From 1992 to 2007 for every 10% increase in oil production there was, on average, a .05 point decrease in media freedom score among democracies and a 0.24 point decrease among autocracies. Similarly, from 2008 to 2017 for every 10% increase in oil production there was, on average, a .06 point decrease in media freedom score among democracies and a 0.2 point decrease among autocracies. This reinforces EGS's argument that the negative effect of oil on traditional media freedom is more pronounced in more autocratic countries. I recreate this table using oil reserves instead of oil production (see appendix Table 2a) and find the same results.

Variations in Economic Rents

Having established that the results of EGS hold using updated data for 1992 to 2007 and also hold beyond 2007, I now turn to alternative operationalizations of the main independent variable: total natural resource rents and foreign aid rents. The World Bank provides measures of oil, natural gas, coal, forestry, and mineral rents, as well as a sum measure of total natural resource rents. For each type of resource, rents are calculated as the difference between the estimated market price for one unit of the commodity and the estimated production cost of one unit, multiplied by the physical quantity of the commodity that a country produces. This value is then reported as a percent of GDP. The advantage of using this measure is that it controls for the total size of the economy, and that it allows for comparison between natural resource rents and foreign aid rents. The World Bank also provides data on the total official development assistance

received by a country, which can be easily converted to a percent GDP measure.

In Table 3, I explore the relationship between total natural resource rents and traditional media freedom and compare this to the relationship between total oil rents and traditional media freedom. All regressions in this table are performed on a subset of “autocracies,” or countries with a Polity score less than or equal to 6. Column 1 demonstrates that after controlling for GDP per capita, population, and government expenditure, log of oil rents as a percent of GDP negatively and significantly affects traditional media freedom. Interpreting the size of the coefficient is difficult since the primary regressor is a log transformation of a percent measure. Essentially, for every percentual change in oil rents as a percent of GDP, there is, on average, a 0.03 point decrease in media freedom score.¹⁶ Column 2 similarly demonstrates that log of total natural resource rents as a percent of GDP has a negative and significant effect on traditional media freedom; for every percentual change in total natural resource rents as a percent of GDP, there is on average a 0.04 point decrease in media freedom score.

Table 3: Fixed Effects Regressions for Media Freedom on Oil Rents and Natural Resource Rents in Autocracies (Polity < 7), from 1992 to 2017

	Media Freedom		
	Oil Rents (1)	Total Natural Resource Rents (2)	Separated Oil and Non-Oil Rents (3)
Log Oil rents % GDP	-3.401*** (0.386)		-2.709*** (0.393)
Log total natural resource rents % GDP		-4.146*** (0.341)	
Log total non-oil resource rents % of GDP			-3.331*** (0.472)
Log GDP per cap, PPP	0.332 (0.443)	-1.188*** (0.358)	-0.940** (0.472)
Log population	-2.571*** (0.303)	-2.794*** (0.298)	-2.628*** (0.298)
Log of gov. exp/GDP	0.449 (0.757)	1.881** (0.739)	1.148 (0.752)
Observations	1,687	1,688	1,687
R ²	0.112	0.152	0.140
Adjusted R ²	0.050	0.093	0.079
F Statistic	49.856*** (df = 4; 1576) (p = 0.000)	70.831*** (df = 4; 1577) (p = 0.000)	51.086*** (df = 5; 1575) (p = 0.000)
Significance levels			p < 0.1; p < 0.05; p < 0.01

¹⁶ This effect seems small, but it is important to keep in mind the meaning of a percentual change in oil rents as a percent of GDP. For example, a country that goes from having 3% to 4% of GDP comprised by oil rents undergoes a 33% change, not a 1% change. Realizing this, we see that the effects on media freedom are more substantial than initial interpretation suggests.

To check that the coefficient on total natural resource rents is not being driven by the contribution of oil rents to the measure, I run a third regression where I separate the effects of oil and non-oil natural resource rents. To calculate non-oil rents as a percent of GDP, I simply subtract oil rents from total natural resource rents, and take the log of this value. Column 3 shows that even after controlling for oil rents, non-oil natural resource rents have a negative and statistically significant effect on traditional media freedom. Similarly, we see that the regression using total natural resource rents as an independent variable yields a higher R-squared value than the regression using oil rents alone, meaning more of the variation in media freedom score is explained. This supports H1 by showing that countries with higher natural resource rents overall, not just those with higher oil rents, are more likely to have less traditional media freedom.

In Table 4, I examine the extent to which foreign aid rents act as a predictor of traditional media freedom. Note that for the measure I use, net official development assistance and official aid received, the World Bank codes donor countries as NAs rather than report their donations as negative outflows or code those countries as zeros. Consequently, there is no way to distinguish donor countries from those countries which may have received aid but are missing data. The

Table 4: Fixed Effects Regressions for Media Freedom on Foreign Aid as % of GDP, from 1992 to 2017

	Media Freedom		
	All Countries (1)	Autocracies (Polity < 6) (2)	Democracies (3)
Aid % GDP	0.064 [*] (0.034)	0.088 (0.054)	0.161 (0.102)
Aid % GDP x Polity	-0.007 (0.005)		
Polity	1.308 ^{***} (0.063)		
Log GDP per capita, PPP	4.303 ^{***} (1.004)	-2.444 ^{***} (0.458)	2.315 ^{***} (0.726)
Log population	4.634 ^{**} (2.209)	-0.959 ^{***} (0.363)	-2.159 ^{***} (0.357)
Log of gov. exp/GDP	0.779 (0.621)	2.638 ^{***} (0.774)	2.521 [*] (1.348)
Observations	2,548	1,361	1,187
R ²	0.190	0.059	0.070
Adjusted R ²	0.137	-0.013	-0.016
F Statistic	93.594 ^{***} (df = 6; 2390) (p = 0.000)	19.894 ^{***} (df = 4; 1263) (p = 0.000)	20.503 ^{***} (df = 4; 1085) (p = 0.000)
Significance levels			p<0.1; p<0.05; p<0.01

regressions therefore contain only countries that receive aid, which shifts the sample median for Polity score downwards and excludes many wealthy western democracies. In column 1, I regress media freedom on net official development assistance and official aid received as a percent of GDP for all countries with data and find a small positive correlation significant at an $\alpha = 0.10$ level. This would suggest that, among countries that receive aid, those with aid as a higher portion of GDP are likely to have relatively freer traditional media. The coefficient on the interaction term between aid and Polity score is negative, which would suggest that the positive effect of aid on traditional media freedom is weaker in more democratic countries.

However, consider the following interpretation of our coefficient on aid: for a 1% increase in the proportion of GDP accounted for by foreign aid, the true increase in media freedom score is between 0.008 and 0.12 points, with 90% certainty. Given that almost all countries have foreign aid as a portion of their GDP falling between zero and one percent, and that media freedom scores range from 0 to 100, the size of this effect, if it does in fact exist, is essentially negligible. Furthermore, columns 2 and 3 do not provide convincing support that foreign aid significantly impacts traditional media freedom. Column 2 shows the same regression on a subset of “autocracies,” this time meaning countries with a Polity score less than or equal to five, and Column 3 on the remaining “democracies.” The subset cutoff I use here shifts down compared to earlier tables, where it was Polity score less than or equal to 6, because, as previously mentioned, the sample mean shifted. In both columns, the coefficient on aid as a percent of GDP is not significantly different from zero. Overall, this table supports H2 by showing that unlike with natural resource rents, there is no evidence of a clear relationship between foreign aid and traditional media freedom.

Internet Freedom

I now turn to my new variation of the dependent variable, internet freedom. I first considered using Freedom House's "Freedom on the Net" index as a measure of internet freedom, because it is compiled with the same methodology and scaling as their media freedom index, so the results could be compared to my previous regressions. However, I found that early years of the data for this index include very few countries, and that there are not many years of data available to start with. Instead, I opted to use data from V-DEM's Digital Society Survey (hereafter DSS). The DSS has more years and countries of data available, and reports the scores for individual questionnaire items, allowing the user to explore specific facets of online repression. The DSS also uses a more statistically legitimate aggregation strategy; for each questionnaire item, the responses of multiple country experts are combined with a Bayesian factor analysis model with the resulting scores following a normal distribution. More negative scores indicate higher repression (as is relevant to the individual question), and more positive scores indicate more freedom.¹⁷

The DSS surveys country experts about many facets of internet repression, such as coordinated misinformation operations, user privacy, and online harassment. However, I choose to focus only on questions related to the ability of users to create and access content that may contain political information, as this is the role of the internet that my theoretical argument centers around. Specifically, I construct two composite indices that measure censorship and internet shutdowns, respectively. I measure censorship by averaging the scores of three survey items on government internet filtering in practice (V-DEM codebook 6.2.2), government social

¹⁷ For example, for the question "how often do the government...use social media to disseminate misleading viewpoints or false information," a strong negative score would indicate that the government disseminates false information very often on all key political issues, whereas a strong positive score would indicate that the government almost never disseminates false information.

media monitoring (6.2.7) and government social media censorship in practice (6.2.8). I measure shutdowns by averaging two survey items on government internet shutdowns in practice (6.2.4) and government social media shutdowns in practice (6.2.5). The exact wording of these questions is given in the appendix.

In Table 5, I regress these two factors on total natural resource rents as a percent of GDP, with country and year fixed effects and control variables. Columns 1 and 2 contain a subset of democracies (countries with a Polity score ≥ 7) and columns 3 and 4 a subset of autocracies (with a Polity score ≤ 6), and Polity is dropped as a control variable. As in Table 2, the sorting of observations is based on a country's Polity score for each year of data, rather than on the Polity score in the year that the dataset began. However, because Polity's data is only available through 2018, I use each country's 2018 Polity score to fill in its scores for 2019 and 2020, so that these two years of data are not dropped in the process of creating subsets. As before, countries may have observations distributed across both subsets if their Polity score crosses the cutoff during the dataset. We see that in democracies, censorship and shutdowns are both positively correlated with resource rents, whereas in autocracies both measures are negatively correlated with resource rents (all at an $\alpha = 0.01$ significance level). In other words, in relatively more autocratic countries,

Table 5: Fixed Effects Regressions for Internet Freedom on Total Natural Resource Rents, 2000 to 2020

	Internet Freedom			
	censorship Democracies (1)	shutdowns Democracies (2)	censorship Autocracies (3)	shutdowns Autocracies (4)
Total natural resource rents % GDP	0.014*** (0.004)	0.007** (0.003)	-0.011*** (0.002)	-0.030*** (0.002)
Log GDP per capita, PPP	0.317*** (0.023)	0.332*** (0.018)	-0.309*** (0.023)	-0.031 (0.026)
Log population	-0.119*** (0.013)	-0.046*** (0.010)	-0.059*** (0.021)	-0.130*** (0.023)
Log of gov. exp/GDP	0.295*** (0.067)	0.034 (0.052)	0.149** (0.059)	-0.025 (0.066)
Observations	1,516	1,516	1,401	1,401
R ²	0.193	0.218	0.176	0.166
Adjusted R ²	0.136	0.163	0.113	0.103
F Statistic	84.448*** (df = 4; 1416) (p = 0.000)	98.500*** (df = 4; 1416) (p = 0.000)	69.423*** (df = 4; 1301) (p = 0.000)	64.943*** (df = 4; 1301) (p = 0.000)
Significance levels				p<0.1; p<0.05; p<0.01

having natural resource rents account for a higher portion of GDP increases the likelihood that a country will censor and shut down social media platforms and the internet. For robustness, I recreate these regressions using oil production and oil reserves and find the same results; these are included in the appendix as Table 3a and 4a.

However, interpreting the size of these coefficients is not straightforward because of V-DEM's aggregation method for the DSS items. For example, we could interpret column 3 as saying that a 1% increase in the portion of GDP accounted for by total natural resource rents leads to, on average, a decrease in internet freedom equivalent to moving 0.011 left along a standard normal distribution. But this doesn't really give a concrete meaning of the size of the effect, nor does it allow us to make comparisons with the effect of oil production on traditional media freedom. Instead, to make such a comparison, I take country averages for media freedom score, internet censorship score, and natural resource rents as a percent of GDP,¹⁸ then compare the distribution of scores between groups of autocracies with low and high resource levels. Autocracies with a "low" resource level are those whose average annual value of natural resource rents as a percent of GDP is below the global median of 3.4247%, and autocracies with a "high" resource level are those falling above the median.¹⁹

The resulting distributions are displayed in Figure 2. We see that the difference in median traditional media freedom score between low and high resource countries is large (with the median score among high resource countries being much lower, as is consistent with the rest my findings). The third quartile of the high resource group is about the same as the median of the low resource group. In contrast, the difference in median censorship score between low and high

¹⁸ For media freedom each country's data is averaged over 1992 to 2017. For internet freedom, data is averaged over 2000 to 2020 and for natural resource rents as a percent of GDP, 1992 to 2020.

¹⁹ Note the global median I use as a cutoff is computed from all countries, not just autocracies, and as a result there are not an even number of countries in the low and high resource level groups.

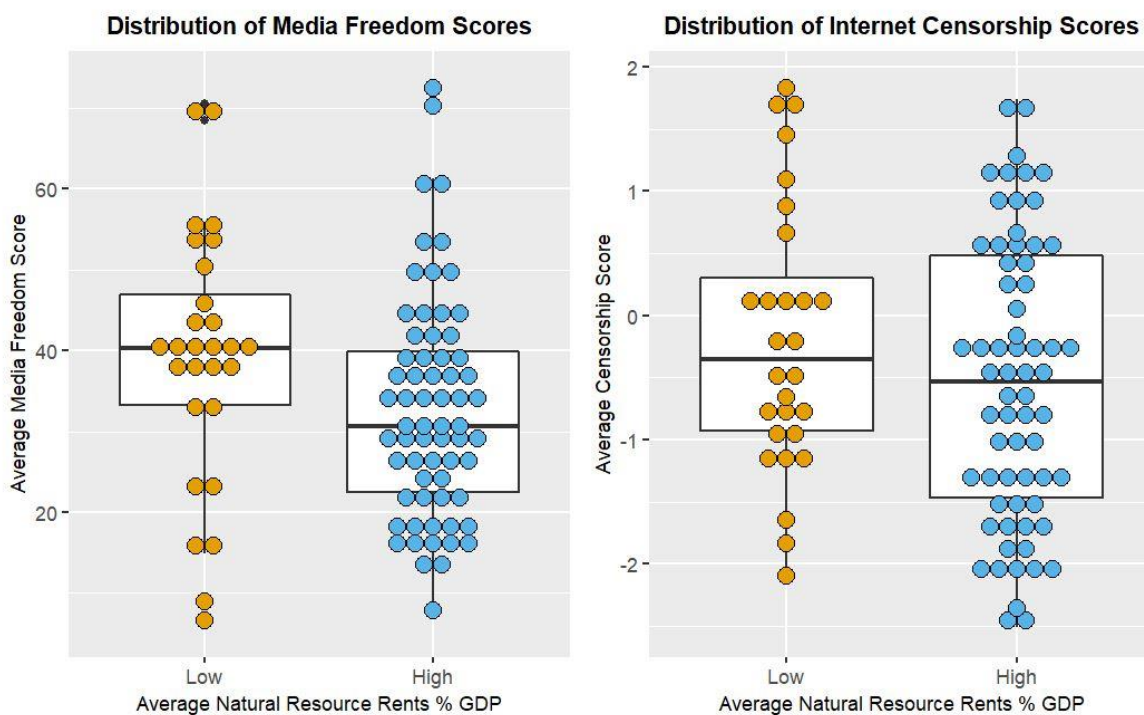


Figure 2: Difference in Median Scores Between High and Low Resource Autocracies for Traditional Media Freedom and Internet Freedom

resource countries is much smaller relative to the total range of scores, and the third quartile of the high resource group is actually higher than that of the low resource group. This demonstrates that while natural resource rents have a negative effect on both traditional media freedom and internet freedom in autocracies, the effect is bigger for traditional media freedom. Combined with the findings in Table 5, this analysis does not clearly support or reject H3.

Quality of Governance

EGS provide additional support for the causal argument they advance by using two of the World Bank's "Worldwide Governance Indicators," specifically government effectiveness and regulatory quality, to demonstrate that traditional media freedom does improve the quality of bureaucracy. I perform the same analysis on a longer dataset, then repeat it using internet

freedom rather than traditional media freedom as an independent variable, and I also include a third governance indicator, control of corruption, as an additional dependent variable.

The World Bank draws from 30 data sources, including survey institutes, think tanks, NGOs, international organizations, and private sector experts, to compile aggregate indicators using an unobserved components model. Similar to V-DEM's methodology, the combined scores end up following a standard normal distribution running from approximately -2.5 to 2.5, with higher values indicating better governance in terms of the relevant indicator. The government effectiveness indicator attempts to capture the quality of public services, of the civil service, and of policy formulation and implementation. In practice, the individual variables used to construct it measure things like the provision of infrastructure, the availability of basic services like health and education, the quality of budgetary and financial management, and the ability of the government to manage emergencies. The regulatory quality indicator attempts to capture "the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development," and reflects factors such as discriminatory taxes/tariffs, ease of starting a business, and state subsidies/unfair competitive practices. Finally, I also include the control of corruption indicator, which attempts to capture "the extent to which public power is exercised for private gain." This indicator includes variables such as the probability that firms will face bribery while carrying out business, the frequency of irregular payments in several key sectors, and the public's trust of politicians.

EGS find that even after controlling for oil production, democracy level, GDP, population, and government expenditure, and including country and year fixed effects, there is a significant and positive correlation between traditional media freedom and government effectiveness and between traditional media freedom and regulatory quality. In Table 6, I

Table 6: Fixed Effects Regressions for Quality of Governance Indicators on Traditional Media Freedom vs. Internet Freedom, All Countries 2000 to 2017

	Quality of Governance					
	Regulatory Quality	Government Effectiveness	Control of Corruption	Regulatory Quality	Government Effectiveness	Control of Corruption
	(1)	(2)	(3)	(4)	(5)	(6)
Media freedom/100	0.491 ^{***} (0.088)	0.134 (0.088)	0.465 ^{***} (0.083)			
Censorship scaled				0.169 ^{**} (0.083)	-0.163 ^{**} (0.083)	0.118 (0.078)
Log oil production	0.010 (0.021)	-0.059 ^{***} (0.021)	-0.022 (0.020)	0.031 (0.021)	-0.030 (0.021)	-0.011 (0.020)
Polity	-0.004 (0.002)	-0.0004 (0.002)	0.003 (0.002)	0.0003 (0.002)	0.003 (0.002)	0.007 ^{***} (0.002)
Log GDP per capita, PPP	0.516 ^{***} (0.035)	0.497 ^{***} (0.035)	0.446 ^{***} (0.033)	0.494 ^{***} (0.034)	0.444 ^{***} (0.034)	0.452 ^{***} (0.032)
Log population	0.201 ^{***} (0.058)	0.274 ^{***} (0.058)	0.167 ^{***} (0.055)	0.186 ^{***} (0.056)	0.208 ^{***} (0.056)	0.154 ^{***} (0.053)
Log of gov. exp/GDP	0.127 ^{***} (0.023)	0.029 (0.023)	0.094 ^{***} (0.021)	0.136 ^{***} (0.022)	0.039 [*] (0.022)	0.094 ^{***} (0.021)
Observations	2,125	2,125	2,125	2,270	2,270	2,270
R ²	0.127	0.095	0.112	0.110	0.090	0.105
Adjusted R ²	0.052	0.016	0.035	0.038	0.016	0.032
F Statistic	47.504 ^{***} (df = 6; 1955) (p = 0.000)	34.094 ^{***} (df = 6; 1955) (p = 0.000)	41.111 ^{***} (df = 6; 1955) (p = 0.000)	43.261 ^{***} (df = 6; 2099) (p = 0.000)	34.407 ^{***} (df = 6; 2099) (p = 0.000)	41.031 ^{***} (df = 6; 2099) (p = 0.000)
Significance levels	<i>p</i> < 0.1; <i>p</i> < 0.05; <i>p</i> < 0.01					

reproduce these results with updated data for 1992 to 2017. Column 1 regresses regulatory quality on media freedom score and returns a positive and statistically significant coefficient. Similarly, column 2 finds a positive correlation between media freedom score and government effectiveness.²⁰ Additionally, in column 3, I demonstrate a positive and statistically significant relationship between media freedom score and control of corruption, an indicator that EGS did not consider. Together, these findings suggest that having greater traditional media freedom improves a country's overall quality of governance on three key indicators.²¹

However, the data shows that the relationship between internet freedom and quality of

²⁰ The p-value of this coefficient, not reported in the table, is 0.12. So, at an $\alpha = 0.1$ level it just fails to be statistically significant. I still discuss the direction of the coefficient and the relationship it implies.

²¹ Like with V-DEM's DSS variables, World Bank's aggregation method for these indices makes interpreting the sizes of the coefficients very difficult. Instead, I focus on their direction and statistical significance.

governance is not as clear. In column 4, I regress regulatory quality on my internet censorship indicator and find a positive correlation significant at the $\alpha = 0.05$ level.²² Similarly, in column 6, I regress control of corruption on censorship and find a positive although not statistically significant correlation. In other words, having less internet censorship will, on average, improve a country's regulatory quality, and may also improve its control of corruption. However, in column 5, I regress government effectiveness on censorship and find a negative correlation significant at the $\alpha = 0.05$ level, meaning that on average having less censorship corresponds to lower government effectiveness. I thought maybe this coefficient was inflated by China, since the country has extremely high censorship and reasonably high government effectiveness. But removing China actually increases the size of the coefficient to -0.165 with approximately the same standard error. I recreate these regressions controlling for oil reserves rather than oil production in Table 5a of the appendix and find that my results are robust. These findings support H6 by showing that quality of governance has a weaker relationship with internet freedom than with traditional media freedom.

Discussion

This paper builds off EGS's insight that oil abundance negatively influences traditional media freedom and explores the broader relationship between economic rents and informational freedom. First, I asked whether oil is unique, and concluded that, at least in regard to affecting traditional media freedom, it is not substantially different from other natural resources. I therefore hypothesized that total natural resource rents would influence traditional media freedom in the same way as oil rents, and that they may be an even stronger predictor of media

²² Recall that V-DEM codes its DSS items such that lower scores represent higher repression, so an increase in the variable "censorship" would actually indicate greater internet freedom.

freedom score. Analysis of panel data from 1992 to 2017 supported this hypothesis by demonstrating that total natural resource rents had a negative impact on traditional media freedom and explained more of the variation in media freedom score than oil rents alone (H1 and H3). Furthermore, this affect was stronger in less democratic countries (H5).

Second, I asked whether foreign aid would influence traditional media freedom in the same way as natural resource rents. I hypothesized that it would not, because foreign aid is a more volatile form of income to a regime than resource rents (H2). After running three regressions, one on all countries, one on only autocracies, and one on only democracies, there was no clear and significant pattern for how foreign aid affected traditional media freedom. This analysis supports the broader idea that EGS's theory is applicable only to types of economic rents whose future value a dictator can predict with relative certainty.

Finally, I considered the internet, both in terms of the tradeoffs dictators face when choosing whether to censor it and whether the rise of social media might have changed the role of traditional media. Extending EGS's analysis (which cuts off around the time that social media began its rise) into new years of data, I demonstrated that the relationship between resource rents and traditional media still holds today. This runs counter to the popular idea that the growing use of social media as a source of information has made traditional media inconsequential (H4). Instead, it seems that traditional media still plays an important role in creating information about the performance of governments.

I also asked whether internet freedom provided the same information to dictatorships as traditional media freedom by exploring its relationship to both resource rents and quality of governance. I hypothesized that internet freedom would not be as strongly related to quality of governance as media freedom because of the variable quality of the information signals the

internet provides compared to traditional news media (H6). Following this logic, I also hypothesized that in contrast to traditional media freedom, internet freedom would not have a clear relationship with resource abundance (H3). Using data from V-DEM's Digital Society Survey for 2000 to 2020, I demonstrated that total natural resource rents are negatively correlated with internet freedom, but that the difference in the distribution of internet freedom scores between resource rich and resource poor countries is smaller than the difference in the distributions of media freedom scores. Using data on the World Bank's Worldwide Governance Indicators, I also demonstrated that internet freedom does not have a consistently positive effect on all measures of quality of governance.

Even with new evidence I present, I realize that this story about natural resources is only part of the explanation for why some dictators repress information more than others. For example, it does not help to explain a regime like China, which has achieved tremendous economic growth not through resource extraction but by mobilizing its enormous population to work, all while maintaining one of the world's most repressive media environments. Going forward, studying outliers like this could provide answers about what sorts of political institutions allow dictators to adequately collect information about the performance of their bureaucrats in the absence of free media. Additionally, this paper only touches on forms of internet repression related to the ability of users to access politically relevant information: censorship and shutdowns. Other mechanisms such as trolling, using state-controlled social media alternatives, and collecting user data are likely not subject to the same tradeoff between political control and bureaucratic incentives. Future research should explore what kind of benefits and costs a dictator faces when considering these strategies and identify factors that make their use more likely.

Finally, just as EGS could not have predicted how governments would adapt to the age of social media when they published their paper 14 years ago, it is difficult for us now to imagine life in a post-oil future. As climate change looms, the demand for fossil fuels seems destined to fall; oil rich dictators can no longer depend on their resource rents as a predictable source of income. Saudi Arabia and the United Arab Emirates, for example, seem to be preparing for this future by removing fuel subsidies and allowing greater social freedoms (“Arab Petrostates,” 2023). But the next step for such regimes is uncertain. Perhaps economic reform will be accompanied by political liberalization; greater informational freedom will illuminate government inefficiency and allow citizens to select officials who are capable of carrying out such a huge restructuring process. Or perhaps economic reform will happen under tight authoritarian control, as it did in a number of Asian countries, and leaders will have to seek institutions that provide the same feedback as independent media without the same risks. Either way, it will be interesting to see how informational freedom changes in these places over the next couple decades. And what if oil is supplanted as the world’s most valuable resource? The profile of countries with prized resources may change, and patterns of informational freedom (and repression) may shift to new regions.

Datasets

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Appendix

Table 1a: Correlation Coefficients Between EGS and Updated Data

Correlation	Variable
0.99992	Media freedom
0.93894	Oil reserves
0.99961	Oil production
0.98718	Log of oil reserves
0.99997	Log of oil production
0.99132	Polity2 score
0.97683	Log of GDP per capita PPP
0.99879	Log of total population
0.90190	Log of government expenditure per GDP

Table 2a: Fixed Effects Regressions for Media Freedom on Oil Reserves in Two Periods

	Media Freedom					
	All Countries 1992- 2007 (1)	Autocracies 1992- 2007 (Polity < 7) (2)	Democracies 1992- 2007 (3)	All Countries 2008- 2017 (4)	Autocracies 2008- 2017 (Polity < 7) (5)	Democracies 2008- 2017 (6)
Log oil reserves	-1.660*** (0.313)	-5.341*** (0.579)	-0.958** (0.444)	-1.823*** (0.338)	-2.469*** (0.531)	0.558 (0.637)
Log oil reserves x Polity	0.133*** (0.031)			-0.001 (0.037)		
Polity	2.024*** (0.060)			2.205*** (0.082)		
Log GDP per capita, PPP	5.273*** (0.343)	1.469** (0.615)	6.967*** (0.494)	6.482*** (0.394)	-0.238 (0.640)	7.707*** (0.551)
Log population	-1.325*** (0.227)	0.209 (0.467)	-1.147*** (0.294)	-0.313 (0.272)	-0.378 (0.533)	-1.141*** (0.379)
Log of gov. exp/GDP	4.124*** (0.678)	2.852*** (1.019)	8.291*** (1.173)	5.598*** (1.007)	1.652 (1.650)	7.299*** (1.614)
Observations	2,125	1,114	973	1,149	525	604
R ²	0.610	0.109	0.330	0.674	0.086	0.350
Adjusted R ²	0.586	0.040	0.281	0.646	-0.028	0.281
F Statistic	520.807*** (df = 6; 2002) (p = 0.000)	31.552*** (df = 4; 1033) (p = 0.000)	111.490*** (df = 4; 905) (p = 0.000)	364.503*** (df = 6; 1059) (p = 0.000)	10.894*** (df = 4; 466) (p = 0.00000)	73.402*** (df = 4; 545) (p = 0.000)
Significance levels	<i>p</i> < 0.1; <i>p</i> < 0.05; <i>p</i> < 0.01					

Table 3a: Fixed Effects Regressions for Internet Freedom on Oil Production, 2000 to 2020

	Internet Freedom			
	Censorship, Democracies	Shutdowns, Democracies	Censorship, Autocracies	Shutdowns Autocracies
	(1)	(2)	(3)	(4)
Log oil production	0.067*** (0.008)	0.058*** (0.006)	-0.095*** (0.011)	-0.192*** (0.013)
Log GDP per capita, PPP	0.240*** (0.022)	0.274*** (0.017)	-0.222*** (0.027)	0.133*** (0.031)
Log population	-0.183*** (0.014)	-0.102*** (0.011)	0.021 (0.023)	0.041 (0.026)
Log of gov. exp/GDP	0.384*** (0.058)	0.100** (0.045)	0.220*** (0.058)	0.076 (0.065)
Observations	1,525	1,525	1,403	1,403
R ²	0.230	0.255	0.209	0.185
Adjusted R ²	0.177	0.203	0.149	0.123
F Statistic	106.674*** (df = 4; 1425) (p = 0.000)	121.763*** (df = 4; 1425) (p = 0.000)	86.221*** (df = 4; 1303) (p = 0.000)	73.961*** (df = 4; 1303) (p = 0.000)
Significance levels	<i>p</i> <0.1; <i>p</i> <0.05; <i>p</i> <0.01			

Table 4a: Fixed Effects Regressions for Internet Freedom on Oil Reserves, 2000 to 2020

	Internet Freedom			
	censorship Democracies	shutdowns Democracies	censorship Autocracies	shutdowns Autocracies
	(1)	(2)	(3)	(4)
Log oil reserves	0.201*** (0.025)	0.245*** (0.019)	-0.064** (0.025)	-0.313*** (0.029)
Log GDP per capita, PPP	0.251*** (0.021)	0.276*** (0.016)	-0.317*** (0.028)	0.059* (0.032)
Log population	-0.182*** (0.015)	-0.124*** (0.011)	-0.039* (0.024)	-0.010 (0.027)
Log of gov. exp/GDP	0.395*** (0.058)	0.099** (0.043)	0.226*** (0.060)	0.144** (0.068)
Observations	1,525	1,525	1,403	1,403
R ²	0.227	0.292	0.171	0.121
Adjusted R ²	0.173	0.242	0.108	0.054
F Statistic	104.523*** (df = 4; 1425) (p = 0.000)	146.696*** (df = 4; 1425) (p = 0.000)	67.036*** (df = 4; 1303) (p = 0.000)	44.937*** (df = 4; 1303) (p = 0.000)
Significance levels	<i>p</i> <0.1; <i>p</i> <0.05; <i>p</i> <0.01			

The censorship measure is an average score for the following three questions:

- How frequently does the government censor political information (text, audio, images, or video) on the Internet by filtering (blocking access to certain websites)?
- How comprehensive is the surveillance of political content in social media by the government or its agents?
- To what degree does the government censor political content (i.e., deleting or filtering specific posts for political reasons) on social media in practice?

The shutdowns measure is an average score for the following two questions:

- How often does the government shut down domestic access to the Internet?
- How often does the government shut down access to social media platforms?

Table 5a: Fixed Effects Regressions for Quality of Governance Indicators on Traditional Media Freedom vs. Internet Freedom, All Countries 2000 to 2017, Controlling for Oil Reserves

	Quality of Governance					
	Regulatory Quality (1)	Government Effectiveness (2)	Control of Corruption (3)	Regulatory Quality (4)	Government Effectiveness (5)	Control of Corruption (6)
Media freedom/100	0.503*** (0.088)	0.143 (0.088)	0.479*** (0.083)			
Censorship scaled				0.168** (0.083)	-0.162* (0.083)	0.121 (0.078)
Log oil reserves	-0.079** (0.036)	0.014 (0.036)	-0.056 (0.034)	-0.051 (0.035)	0.041 (0.035)	-0.030 (0.033)
Polity	-0.004* (0.002)	-0.0001 (0.002)	0.002 (0.002)	0.00004 (0.002)	0.003 (0.002)	0.007*** (0.002)
Log GDP per capita, PPP	0.529*** (0.034)	0.470*** (0.034)	0.443*** (0.033)	0.509*** (0.033)	0.430*** (0.033)	0.451*** (0.031)
Log population	0.216*** (0.057)	0.232*** (0.057)	0.157*** (0.054)	0.211*** (0.055)	0.185*** (0.055)	0.150*** (0.052)
Log of gov. exp/GDP	0.125*** (0.022)	0.037* (0.022)	0.096*** (0.021)	0.130*** (0.022)	0.044** (0.022)	0.095*** (0.021)
Observations	2,125	2,125	2,125	2,270	2,270	2,270
R ²	0.129	0.091	0.113	0.110	0.089	0.105
Adjusted R ²	0.054	0.013	0.036	0.038	0.015	0.033
F Statistic	48.409*** (df = 6; 1955) (p = 0.000)	32.705*** (df = 6; 1955) (p = 0.000)	41.396*** (df = 6; 1955) (p = 0.000)	43.218*** (df = 6; 2099) (p = 0.000)	34.259*** (df = 6; 2099) (p = 0.000)	41.124*** (df = 6; 2099) (p = 0.000)
Significance levels	<i>p</i> < 0.1; <i>p</i> < 0.05; <i>p</i> < 0.01					