Oil and Democracy: Endogenous Natural Resources and the Political ‘Resource Curse’

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Oil is the world’s biggest industry. It has variously been called “black gold” and “the devil’s excrement.” It is found in abundance both in the world’s most democratic and well-governed nations such as Norway and Canada, and in some of the most autocratic and corrupt nations such as Nigeria. Oil’s treatment in the scholarly literature has been no less antinomical: In the first half of the 20th century a conventional wisdom emerged that natural resource wealth was typically a positive force for economic—and thus political—development. Among other benefits, oil was praised for lessening foreign exchange constraints, for its linkages to the broader economy, and as a revenue foundation for the provision of public goods. This mid-20th-century optimism was replaced, however, by a pessimism that drew from the dire and seemingly-inexorable afflictions of resource-rich states in the Middle East and West Africa, where decades of oil revenue had failed to encourage effective state-building, growth, or sustained improvements in the non-oil sectors of these economies. In the political realm, corruption, clientelism, autocratic rule, and, paradoxically, weak governmental institutions likewise were found to be commonplace in these regions. Natural resource abundance thus presents a considerable paradox for scholarly research: what would seem to be an unambiguous “blessing” for political and economic development appeared instead to be a “curse” that renders these goals all but unreachable.

In recent years, however, the resource curse consensus has begun to give way. In the face of a growing number of seemingly-exceptional cases such as Australia, Botswana, Canada and Norway, in which natural resource wealth has been nurturing of, or at least not hostile to, economic growth and democracy, researchers have begun to conceptualize natural resource abundance as a conditional curse. Setting their sights on explaining when and why resource-rich countries sort into ‘good’ or ‘bad’ equilibria, scholars have offered quite disparate claims about the conditioning factors, including the quality of domestic institutions—whether they foster “grabbing” or productive investment (Mehlum et al. 2006); the structure of oil industry ownership—whether it is public or private (Jones Luong and Weinthal 2010) and inequality in the nonresource sector (Dunning 2008). Yet, little progress has been made toward sorting out, or building upon, these contrasting claims.
Nearly all of the resource curse literature, moreover, has overlooked the possibility that oil endowments may be endogenous to the domestic political economy in which they are cultivated (see however, David and Wright 1997; Stijns 2006). However, to the extent that oil wealth is endogenous to variables that also affect the chances of democracy, then the task of disentangling the oil and democracy link becomes muddy, at best. Finally, the political resource curse hypothesis has developed almost exclusively as a story of the domestic political economy. As such, this literature has failed to account for crucial international forces – particularly the interdependence of regime type across nations – that may alter the relationship between resource wealth and regime. The implications of these problems are profound, and if unaddressed, may threaten our confidence in dominant approaches to the political consequences of natural resource wealth.

We attempt to address these theoretical and empirical challenges to our understanding of the political resource curse in three ways. First, we examine the potential endogeneity of natural resource wealth to investments in human capital and industrial development. For if oil wealth is not a fixed or exogenous ‘gift of nature,’ but rather is amenable to decidedly different patterns of exploitation and revenue, then it opens up the possibility that resource wealth and political development are connected in very unexpected ways. Indeed, for late industrializers, we argue that both greater natural resource wealth and democracy may be byproducts of developmental state efforts, with public investments in human capital and the emergence of organized urban industrial and working class actors providing the causal links between these processes. Our claim with regard to oil specifically is that just as countries with higher stocks of human capital may be better able to adopt and own the newest technology to enhance growth (Benhabib and Spiegel 1994; Lall 1992, 1996; Nelson and Phelps 1966), higher stocks of human capital should likewise enable countries to utilize that technology to discover and develop increasing quantities of natural resources, given whatever level of ecological endowments they might have. Developmental efforts also may provide important political spillovers to the extent that they give rise to organized urban middle class and industrial groups who later may provide fertile ground for later
democratic transitions. Where such developmental efforts are robust, we thus expect both the level of oil wealth and the prospects for democracy to be increased. Finally, we argue that the exclusive focus on domestic politics that is characteristic of the resource curse literature threatens the validity of its findings to the extent that transitions to democracy in one country are not independent across nations. Our analysis of global data from 1960-2009 demonstrates that oil is endogenous to industrialization, and that when accounting for endogenous natural resource wealth and regime diffusion, oil wealth is not a curse for democracy.

**Oil and Authoritarianism**

The idea that natural resource abundance may become a curse - fueling authoritarianism and undermining growth – came to dominate scholarship in political economy in the end of the twentieth century. Within this literature, seminal works by Madhavy (1970) and Ross (2001) drew attention to rents accruing from the export of natural resources that were said to provide sustenance for increasingly unaccountable rulers. Such rents, according to this research, allow autocrats to buy off opposition and fund an internal security apparatus without recourse to substantial domestic taxation. Subsequent research has found empirical support for the thesis that natural resources and democracy do not mix (Aslaksen 2010; Goldberg et al 2008; Smith 2007; Jensen and Wantchekon 2004). Central to this literature is the idea that natural resource booms alter both what governments want to do, and what they can do to achieve those ends (Yates 1996; Karl 1997; Clark 1997, Smith 2004). On the one hand, windfall revenue from natural resource exports are said to truncate the time horizons of political leaders, resulting in the over-expansion of bureaucracy, neglect of human capital and avoidance of economic reform and the difficult task of building revenue-generating institutions – what Ross (2001) calls the ‘rentier’ effect (Robinson et al., 2006; Auty 2001; Gelb 1988; Chaudhry 1997; Gylfason, 2000, 2001; Leite and Weidmann 1999; Mahdavy 1970; Papyrakis and Gerlagh, 2004). Modernization itself also may be circumscribed as incentives to diversify out of natural resources may be foreclosed by high rents that produce either “Dutch Disease” problems of deindustrialization caused by exchange rate appreciation, or such rents may simply
raise the returns to unproductive investments such as lobbying too much (van Wijnbergen 1984; Auty and Gelb 2000; Dunning 2005; Robinson and Verdier 2002; Ross 2001; Torvik 2002). The result of such predation is more than institutional decay; slow growth, corruption and conflict may become mutually reinforcing with resource dependence (Robinson and Verdier 2004; Collier and Hoeffler 2005; Ades and Di Tella 1999; Sachs and Warner 1999). Other authors provide a different link between resources and regime outcomes, arguing that authoritarianism is perpetuated by natural resource wealth to the extent that resource rents enable autocrats to divide and buy-off the opposition, influence election outcomes, and fund repression (Acemoglu et al. 2004; Jensen and Wantchekon 2004; Robinson et al. 2006; Ross 2001).

A crucial premise of this research is that regime type and quality are determined heavily by state actions, while citizens merely respond to price signals. Low taxation, for example, is assumed to yield a public that is, “less likely to demand accountability from – and representation in – their government.” (Ross 2001, p. 332). Thus, resource-rich states may effectively neutralize demands for representation by opening the now-burgeoning fiscal coffers. Citizens, in this view, lack much agency in the determination of regime type; instead, they passively accept in the coin of patronage what they are denied in political rights. Challenges to autocracy by opposing political forces also may be pre-empted by the use of government spending and by resource-funded security apparatuses. Of course, this approach implies the theoretically and empirically questionable converse as well – that resource poor states “must” construct vigorous taxation institutions and should thereby engender demands for political incorporation, and ultimately, democracy.

Yet an ample literature has indicated not only that transitions to democracy may be prompted at least to some degree by pressure from organized actors – from below – with material or political interests in democracy, even where regimes have abundant fiscal resources (Moore 1966; Rueschemeyer et al. 1992; R. Collier 1999; Haggard and Kaufman 1995; Wood 2000). To make matters even more complicated, regime outcomes may be interdependent, wherein the prospects for democracy in one country may be affected by similar outcomes in other nations (Gleditch and Ward 2006; O'Loughlin et al.
1998; Simmons et al. 2008; Brinks and Coppedge 2006). Thus not only are many of the theoretical contributions of much of the resource curse literature erected on potentially dubious assumptions, but empirical design problems also render many such findings far-from definitive.

The claim that rents accruing from natural resource exports cause institutional atrophy and authoritarianism also relies on the assumption that governments in natural resource-rich nations are myopic, and that they trade off long-term growth for immediate consumption and power. As Gylfason (2001) explains, “nations that are confident that their natural resources are their most important asset may inadvertently – and perhaps deliberately – neglect the development of their [other] resources, by devoting inadequate attention and expenditure to education.” (c.f., Stijns 2006, p. 1061). Auty offers the corollary that, “resource-poor countries, mindful of their marginal position, may compensate for their disadvantage by adopting firmer and more farsighted policies” (1994, p. 12). A nation is said to escape such a quandary only under conditions of natural resource scarcity, where the scope for postponing or avoiding economic liberalization is closely circumscribed (Auty and Gelb 2000 ), or where the country is blessed ex ante with “favorable” institutions (Mehlum et al. 2006).1

Such a deterministic view of government incentives and time horizons runs into difficulty on theoretical and empirical terms. For there is an extensive microeconomic literature positing that conditions of scarcity, rather than abundance, induce a higher rate of time preference due to the more immediate survival imperatives under scarcity; individuals in situations of abundance, by contrast, tend to engage in more future-oriented behavior such as saving and investment that is associated with longer time horizons afforded by financial slack (Murphree, 1993; Bardhan, 1996; Lumley,1997). The correlation between scarcity and myopia also has substantiated the claim that the poor tend to degrade the environment at a faster rate than the rich due to their higher time preference (e.g., Dasgupta 1997). This poverty-myopia link also underpinned recommendations by international development institutions that growth is essential for environmental sustainability (also see, Brundtland Commission, 1987; UNCED, 1 Of course, defining this in a non-tautological fashion is difficult.
Thus, other economic literature offers powerful theoretical reasons to reconsider the assumption that governments facing situations of resource abundance would *necessarily* discount future political and economic outcomes more than otherwise-comparable resource-poor counterparts perforce of their abundant natural capital.

The assumption of resource-induced myopia also may be challenged on empirical grounds. Most prominent here is the number of sovereign wealth funds that have been created to manage natural resource revenue accruing to sovereign governments. With more than $4.8 trillion in assets under management globally by 2012, sovereign wealth funds have grown dramatically in recent years, with a majority being funded by oil and mineral revenue (Sovereign Wealth Fund Institute 2012). These funds are said to operate on longer investment horizons than private firms because they typically do not have to meet liabilities on the same temporality as firms such as pension funds and insurance companies (Beck and Fidora 2008). For this reason scholars have attributed to sovereign wealth funds a stabilizing effect on global markets in times of credit rationing (Gieve 2008). Thus, the notion that oil wealth necessarily induces governments to descend into a short-termist grabbing equilibrium stands on weak grounds in both theoretical and empirical terms. Many politically and economically quite varied resource-rich governments have saved and invested enormous sums for a comparatively distant future.² And, as we will argue below, many have made productive investments in nontraditional sectors and in human capital as part of long-term developmental efforts. The implications for levels of natural resource exploitation and democracy are potentially quite profound.

Indeed, the growing number of exceptions to the putative resource curse has prompted scholars to focus increasingly on explaining the *conditions* under which natural resource wealth can have positive or negative implications for democracy (Dunning 2008), growth (Mehlum et al. 2006) or conflict (Fearon

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² Two of the three largest sovereign wealth funds in 2012 are funded by oil revenue. They are from the United Arab Emirates, with six funds, the largest of which is valued at more than $600 billion, and Norway, with more than $500 billion in its fund (Sovereign Wealth Institute, [http://www.swfinstitute.org/fund-rankings/](http://www.swfinstitute.org/fund-rankings/)). Other top resource-based SWFs are from Kuwait, Chile, Saudi Arabia, Russia, Venezuela, Botswana and Alaska (Deutsche Bank, 2007).
2005; Ron 2005; Snyder 2006). For one set of scholars, the existence of high-quality institutions – i.e., those creating positive incentives for entrepreneurial growth – is crucial to determining whether resources become a ‘curse’ (Bulte et al., 2005; Mehlum et al., 2006; Robinson et al., 2006; Snyder, 2006). Others consider geography and historical factor endowments and their associated social and economic structures as shaping the positive or negative utilization of resource wealth (Dixit 2007; Sokoloff and Engerman 2000; Schrank 2004). For Dunning (2008), as the level of inequality in the non-resource sector rises, the cost of democracy falls as natural resource rents dampen conflicts over the tax rate. Morrison (2009) argues more generally that non-tax revenue is neither ‘pro-democratic’ nor ‘anti-democratic’ by its nature; rather, such income merely stabilizes the extant regime. While this literature has brought much-needed attention to the contingency of natural resource effects, it has failed generally to explain how ‘good’ institutions emerge in resource-rich countries, or why they are not undermined by the allegedly “easy money” from natural resource sectors.

Other scholars question the very existence of the resource curse on empirical grounds (Haber and Menaldo 2011). These scholars have argued that the basic thesis that oil fuels authoritarianism is essentially an over-time, within-country phenomenon, and that there may be unmeasurable country-specific factors (which may include for instance, state capacity) that can shape both the key independent (resource reliance) and dependent (regime) variables. Haber and Menaldo thus argue that it is inappropriate to test this thesis using statistical techniques that rely on cross-sectional variance. By controlling for country fixed effects, which focuses the analysis on within-case variance, they find that the association between resource wealth and authoritarianism disappears. Their contribution, while significant, is mainly methodological and empirical, as they do not advance an alternative causal theory to explain their finding that oil income is either positive or unrelated to democratic regime outcomes.

It is here that we expect to enter the conversation. In the next section, we lay out our own argument about when and how democracy and oil may be mutually supportive. We focus on two features of the oil-democracy relationship that have been largely neglected in the political economy literature. The
first is that natural resource wealth may be to some degree endogenous to domestic industrial development, which in late industrializers emerged through a mix of policies characteristic of the “developmental state.” In addition, the structural changes brought about by developmental states, particularly the formation of domestic capitalist and working classes, favored the emergence of social-structural conditions favoring democracy. Industrialization in this sense, even when germinated by statist protection and authoritarian cooptation of urban sectors, may over time promote both a greater abundance of natural resource wealth and raise the likelihood of democracy. Structural changes with industrial development are far from a sufficient explanation for democracy and regime type, however. And thus our second argument looks to the heavily interdependent nature of political regimes to explain when and where oil and democracy may emerge together.

Endogenous Natural Resources and the Developmental State

It is commonplace in the resource curse literature to view natural resources as more or less fixed and exogenously-given endowment – or “manna from heaven” (Dunning 2008). Some states are assumed to have natural capital in abundance, and others not. We seek to join a small but important literature that challenges this conventional understanding by recognizing that there may be a critical endogeneity in the development of natural resource wealth that serves to deepen the differences between the positive and negative resource-induced equilibria (e.g., David and Wright 1997; Stijns 2006). Rather than being a ‘gift of nature’ from which states obtain substantial revenue, effective resource endowments may be endogenous to the technology used to detect and extract them. For, only oil that is both discovered and extracted can become a developmental resource, and both conditions are heavily shaped by the technology of exploitation that is available and locally employed. Such technology, in turn, should be related to domestic industrial capacity and human capital investments in the country.

While there is surely some natural limit to the quantity of oil underground, proven reserves of oil and the amount produced may be more constrained by the locally-available technology than by
underlying natural endowments. In this view, human capital investments should generate a national-level capacity to adopt and indigenize technology and know-how brought through international trade (Lall 1992; Grossman and Helpman 1990, 1991), which in turn may sustain and increase levels of detection and extraction of natural resources. Such processes should be self-reinforcing, moreover, as technological innovation spurs not only the growth of industry, but also the domestic capacity to detect and utilize natural resource stocks. Such a capacity also makes possible much more rational long-term management of oil fields. For national governments and associated local actors will have substantially longer time horizons that international investors (and must perforce discount future production in relationship to the credibility of the government’s commitments to contractual provisions). They also have different utility functions, where foreign firms operating in low-capacity environments make investment and management decisions in relation to global profit maximizing constraints, costs of alternative production sites, and the demands of myopic stock market investors.

We can see this relationship empirically in the paradigmatic Norwegian case, where oil profits underwrote a massive expansion of the technical education infrastructure, subsequently enabling large increases in the human capital base in the economy through the creation of entirely new research and educational institutions. These were themselves subsequently linked to the ability to indigenize new oil-linked sectors and to substantial improvements in economic output well beyond the oil production sector itself (Engen 2007:20-21). In this way, oil wealth became the foundation upon which Norway developed the capacity to manufacture and export the high-tech capital goods that make possible oil production – from offshore platforms to downstream transportation service.

Why is industrialization so important? The logic of global petroleum production suggests that the easiest-to-develop (and therefore low-cost) fields should be found and developed first, all else equal. Empirically, this is the case (Van Vactor 2008: 1). In most places, however, petroleum is found in a mix of comparatively easier and harder-to-reach places. Over time, however, as well pressures drop, even once-easy fields become technologically more challenging (USEIA 2010). And here is where national
differences can become very important. If the technology to discover and extract petroleum does not become indigenized – locally owned and controlled – then this is often likely to impede the continued discovery of new national oilfields and to decelerate the extraction of resources from existing ones. Critically, the application of advanced technologies is important both to the discovery of new oil finds, and to the efficient utilization of existing fields. In many cases it can very greatly expand the productive life-spans of the latter.

This potential endogeneity of natural resources is of course not because the actual “oil in the ground” is in any way affected by domestic human capital formation. Rather, it is because human capital permits domestic oil firms to adopt – or even develop – knowledge and technology at the global frontier. This capacity then enables those firms to detect and extract ever-more difficult and previously undiscovered reserves and to turn them into marketable products. Domestic human capital stocks also have been found to condition the ability of petroleum-rich countries to escape the economic resource curse of slower growth (Kurtz and Brooks 2011).

The domestic nature of industries in resource cultivation is important, we expect, because foreign multinationals tend to make investments as to the search for and extraction of new oil sources based on a global view. Multinationals may, all else equal, prefer the politically and technologically easier and cheaper sites (in extraction-cost terms) for exploration and production, whereas domestic firms face stronger incentives to take the risk of exploration at home. Particularly given that oil has one price (at least by grade) globally, but vastly dissimilar production challenges by location (given onshore/offshore status, climatic extremes, etc.), the interests of states and multinational corporations (MNCs) in relation to oil field development can diverge substantially. Many, even difficult-to-operate fields, are profitable in the sense of producing oil at a cost that is well below international wholesale prices for crude. But if easier venues are globally available, MNCs will tend not to invest in discovering or extracting these more challenging resources. Similarly, they may avoid some producing regions for reasons of political risk (Bohn and Deacon 2000). However, national producers – especially state owned producers, which are
very common in the oil context (Jones Luong and Weinthal 2010) – may have different incentives. While certainly still constrained at least in part by profitability concerns, they may in some contexts have powerful motivations to pursue the full and effective utilization of domestic sources of oil, even if it is not globally at the lowest cost of production. This is particularly true if the sector is seen to have strong positive economic externalities. This is possible where human capital stocks are sufficiently well developed to support an independent domestic effort. Thus, where producing nations host a larger domestic industrial sector and human capital stock, we expect the greater indigenous capacity to find, produce and process petroleum to be associated with an expanded scope of their reserves and production over time.3

The cultivation of domestic industrial sectors should not only help to discover and stabilize, if not expand, proven reserves of natural resources; it may also facilitate democratization, as the vast modernization literature suggests. Although mass democracy has often coincided with industrialization throughout history, scholars continue to debate whether and how these trends are linked (Lipset 1959; Collier 1999; O’Donnell 1972; Przeworski et al. 2000; Boix and Stokes 2003; Reuschemeyer et al. 1992). This structuralist literature emphasizes the fertile conditions for democratic consolidation provided by higher levels of per capita income, education, urbanization, industrialization and economic equality (Bollen 1983; Lipset 1959; Boix and Stokes 2003; Acemoglu and Robinson 2001, 2006). Other research building upon Moore (1966) emphasizes the economic interests of bourgeois actors, who, where they are dominant, provide a crucial component of pro-democratic coalitions (e.g., Karl 1989). To the extent that industrialization involves the cultivation of a significant urban industrial sector and associated working class actors, therefore, the prospects for democracy should be significantly increased as well, for labor movements have widely been seen to promote not just the economic incorporation of the working classes, but also their political inclusion.

3 An important exception might be where the producing nation happens to contain principally easy-to-obtain oil, such as Saudi Arabia, where little in the way of advanced technology is needed to extract the abundant subsoil petroleum.
The notion of a mutually reinforcing relationship between industrialization, natural resource cultivation, and democracy defies conventional views, to say the least. Not only are resource booms said to undermine industrialization by means of the ‘Dutch Disease’ of exchange rate appreciation, but high rents in the resource sector also are said to corrode incentives to invest in the nonresource economy (Sachs and Warner 1999; Auty and Gelb 2000). But as Wright has shown, the discovery of natural resource wealth and industrialization went hand in hand for early industrializers such as the United States (Wright 1992), which experienced no setback in democratic development as a consequence of its resource abundance. Indeed, critical early industrial sectors emerged precisely because of their propinquity to vast sources of energy-producing natural resources (e.g., coal and steel in Pennsylvania; hydroelectric power and aluminum in the Northwest, and oil and petrochemicals in Texas). Of course, the United States was already well on its way toward democratic consolidation at the time of its industrial and resource booms occurred. The more formidable challenge for our oil and democracy thesis rests in the late industrializing countries. Next, we argue that for such nations, the developmental state holds the key to explaining when countries sort may into the ‘good equilibrium’ of abundant oil and ultimately, democracy, and when are more likely to descend into the vicious circle of slow growth, dependence on natural resource exports, and authoritarianism.

**The Developmental State**

Although the concept of a developmental state is most closely associated with resource-scarce nations such as Japan (Johnson 1982) and South Korea (Amsden 1992), the utilization of state planning and economic incentives to promote technology adoption and industrial ‘catch up’ has long been a feature of late industrialization (Gerschenkron 1962). Given that petroleum is among the most capital-intensive industries in the world (Karl 2007), the importance of industrialization to the utilization of resource wealth in oil-rich countries cannot be overstated.
A dominant variant of developmental states in the postwar era rested on a process of import substituting industrialization (ISI). This model had as its goal the production of goods domestically that previously had been imported. Although its expression and intensity varied widely, import substitution typically emphasized heavy industrialization and the use of trade protection (tariffs, quotas and quantitative restrictions) to stimulate domestic industrial development. Taxes on agricultural exports typically provided a major source of revenue to finance these efforts. Although ISI began as a pragmatic response to the Great Depression in many countries, it cohered into a consciously-adopted economic development model in the 1940s under the sponsorship of the United Nations Economic Commission for Latin America. This model spread broadly throughout the world by the 1960s, becoming, “the preferred strategy for nearly all late industrializing countries to attempt to catch up with the industrial core countries of Western Europe and North America.” (Waterbury 1999: 323). There are important regional distinctions in the way that developmental states took shape, however (Amsden 1991). Whereas ISI was embraced broadly in Latin America and sustained in many cases into the 1960s and 1970s through the “deepening” process of developing heavy industry, ISI typically prevailed in Asia only in the early phase of industrialization and was followed by export-led growth models. In Africa and the Middle East, by contrast, import substitution was embraced only tepidly and often in an ad hoc manner with less of the transformational effects observed in Latin America and Asia (Bruton 1998). 4

ISI measures countervailed two critical features of the economic resource curse. The first is Dutch Disease, through which industrialization may be undermined by exchange rate appreciation. In the case of ISI, exchange rate overvaluation was a matter of policy design, as industrial production was oriented toward the domestic sector and nurtured through extensive subsidies and trade protection. Second, under ISI, the state’s assumption of the high and fixed costs of investment overcame a longstanding impediment to private sector diversification out of the natural resource sector. For Dunning (2005), incentives to diversify were particularly crucial for resource-based economies, where:

4 Examples in these regions include Egypt, Morocco, Kenya, Zimbabwe, Ivory Coast, Nigeria and South Africa.
“In the private sector, productivity depends on the state’s prior investment in some ‘public good.’ The intuition here is that, in a highly resource-dependent state, developing a dynamic and diversified economy may require government investments in roads, industrial parks, the provision of credit to industrialists, the use of macroeconomic tools such as tariff protections or exchange rate policy, and so on.” (455).

In addition to those economic consequences, Dunning argues that such investments had a crucial political effects of raising the opportunity cost of rebellion, and thus stabilizing the regime (Dunning 2005).

We do not wish to claim a direct and linear relationship between state-led development and democracy. Nor do we overlook the often-ruinous financial effects of inward-oriented industrialization. For beyond the severely-corrosive effects of ISI on state finances, state-led development in Latin America was plagued by balance of payments crises, production bottlenecks and allocative inefficiencies resulting from the protection and subsidies for infant industries (Roxborough 1994). ISI also had steeply regressive consequences such as inflation, labor market segmentation and what were often draconian and “chaotic” structural adjustments that attended the collapse of the ISI era (Cavarozzi 1992). Influential scholars also have linked the rise of authoritarian regimes to the ‘deepening’ of ISI and the imperatives of structural adjustment (O’Donnell 1982; Wallerstein 1980). However, we set aside for now a discussion of these deleterious fiscal consequences, as our focus is on the task of specifying how this mode of development gave rise to new political actors and capabilities that favored both democracy and natural resource revenue. Specifically, where developmental state efforts were more robustly pursued, we expect that late industrializing nations to lay claim to 1) much higher technical capacity and human capital than before these efforts were undertaken, and 2) the rise of urban industrial and working class actors. Together, these two factors provided unexpectedly-fertile soil for the subsequent emergence of democracy and higher natural resource revenue.

**Human Capital.** Broad investments in human capital were a resident feature of state-led development efforts in Latin America and Asia (Bruton 1998) and we expect that through this
mechanism, state-led industrialization would prove favorable to subsequent natural resource exploration.\(^5\) Although the level and type of educational investment varied significantly across developmental states, some form of public investment in education and research and development was used by developmental states to promote the technological learning and knowledge accumulation needed to move into skill-intensive manufacturing markets (Cardoza 1999). Developmental states also sponsored university-level programs in science and engineering to promote technology transfer, which was a costly and difficult process at the heart of state-led industrialization.\(^6\) Examining Figure 1, we see a steady expansion of educational access at the advanced level coinciding with the ‘deepening’ phase of import substitution in Latin America. Figure 2 compares human capital stocks in archetypal developmental states before and during ISI. Export-oriented industrialization, which followed the exhaustion of the first phase of ISI in Asia, also was built upon a foundation of human capital upgrading (Birdsall and Sabot 1994 153-4). Such investments often took the form of public-private partnerships that combined high quality basic education systems with extensive on-the-job training. Although educational investments varied across developmental states, they shared the common goal of promoting technical upgrading and industrial development, allowing domestic industries to adopt technologies at the global frontier – a task that hitherto was available only to foreign firms (e.g., Amsden 1992).

Rising human capital stocks, in turn, should increase the ability of the country to identify and extract natural resources at a higher rate through the use of new technology. This is because the ability of a country to adopt and utilize new technology depends critically on its existing stock of human capital (Acemoglu, 2003; Acemoglu et al., 2010; Basu & Weil, 1998; Benhabib and Spiegel, 1994; Lall, 1992; Nelson and Phelps, 1966) as well as other country-specific factors (Fagerberg, 1994; Mathews, 2001).

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\(^5\) Broad human capital investments in developing countries were less commonly made outside of concerted industrialization projects. Botswana, which invested heavily in education, infrastructure and health care without an explicit industrializing impulse may be an exception (Dunning 2005: 464). Education also may promote democracy through direct and indirect mechanisms, such as by cultivating a more moderate and informed citizenry, and by encouraging growth (Barro 1997, 2001; Carraro Gerlagh and van der Zwaan 2003; Roemer 1991; Stasavage 2005).

\(^6\) Technological transfer involved state subsidies for the import of the physical equipment and the technology embedded in these products, and the provision of information needed to properly utilize that hardware (Teece 1977).
The claim of a positive association between human capital and natural resource cultivation challenges the broad stream of literature focusing on the lack of incentive in resource-abundant nations to make such educational investments (Gylfason 2001; Birdsall, Pickney and Sabot 2001). Yet, that view has come under question by research demonstrating positive links between human capital accumulation and resource wealth (Davis 1995; Stijns 2006). Of importance to our argument is the effect of human capital on the process of technological change, which may permit both higher productivity in the industrial process, and hence growth, and the indigenization of new technology to detect and exploit natural resources. For Nelson and Wright, these two processes were mutually reinforcing of the United States’ technological leadership:

“As surprising as it may seem from a modern perspective, the rise of American industry to world leadership was intimately connected with the rise of the country to world leadership in the production of coal, iron ore, copper, petroleum, and virtually every other major industrial raw material of that era.” (Nelson and Wright 1992: 1938)

As mentioned, however, the United States was well advanced in its democratic process by this time, just as Norway and Canada were at the time of their resource-booms. Thus we focus on the developing nations, where we expect state-led industrialization efforts to give rise to both higher natural resource revenue and to critical social structural changes that promoted democracy.

**Structural Change.** The democratic consequences of urbanization and the rise of organized interests – whether the working, middle or upper class actors – is a bedrock of modernization theory and its contemporary offshoots (e.g. Boix 2003). Although scholars debate the precise causal priority of working versus middle sectors in democratic transitions, few accounts overlook the importance of organized urban constituencies as crucial catalysts of democracy. From Bismarck to Vargas, development-oriented governments forged powerful urban coalitions of workers and industrialists through the use of social policy instruments – including education and social security – and cooptation within corporatist decision-making structures (Malloy 1977; Rock 1994). Despite their antidemocratic incorporation, urban working class and industrial organizations that emerged as part of the process of
state-led industrialization may have provided important forces in democratization in late industrializing countries. And despite the fact that industrial groups continued to pursue rents such as protection and subsidies well after their ‘maturation,’ we do not expect them to be antagonistic to democratization or further resource exploration. For as Mehlum and colleagues have found, in the presence of institutions that are supportive of industrial production make rent-seeking and production complimentary activities (Mehlum et al. 2006: 2-3).

In Indonesia, scholars have shown that state sponsorship of technology diffusion transformed the country’s raw timber endowment into a globally-competitive industry that became the world’s largest paper-product exporter in the 1980s (van Dijk and Szirmai 2006). Indeed, the development “boom” under Suharto’s New Order regime induced a broad diversification away from agriculture, with manufacturing rising from less than 10 percent of GDP in 1966 to 25 percent in 1996 (Dunning 2005). Industrialization in that case had another important byproduct: the growth of an urban working class, especially in Java and Sumatra, that was educated and more aware of its rights, and of foreign ideas about democracy (Uhlin 1997). Although these groups emerged as clients of the developmental state, over time the working class and economic elites came to have an economic interest in democracy (Uhlin 1997: 246).

Indeed, developmental states were rarely democratic in their political ambitions or instruments. Roxborough (1994), for instance, credits import substitution with the long-term fragility of democracy in Latin America. Yet, he describes a particularly conservative version of import substitution, based on a heavy role for foreign capital and scarce redistribution – an image that is closer to the cases of Venezuela and Colombia than to the archetypal ISI deepeners, Brazil, Mexico, Chile, Uruguay, Argentina. In the latter cases, state-led development brought meaningful growth of domestic industrial sectors, rising real wages and extensive technology transfer (Roxborough 1994: 260). Although populist governments in most every instance sought to co-opt and control burgeoning urban labor movements through corporatist institutions and to create an urban industrial sector that was subordinate to and dependent on the state (Cavarozzi 1992; Waterbury 1999), in doing so they empowered these actors as core participants in
politics through the formation of collective interests and organizations. Later, that capacity for collective action might prove favorable to democratic transitions.

Indeed, Karl (1987) argues that industrialization in Venezuela, “was the cement that could bond the newly emerging social forces with entrepreneurial elites in party form, and it therefore became a central part of the [opposition AD] party platform.” (1987: 73). Thus, even though industrialists had been core supporters of authoritarian regimes at the height of ISI, in many cases they later pressed for democratization after being excluded from access to state decision-making under dictatorships (Karl 1987; Cavarozzi 1992). Other research suggests a similar dynamic in Indonesia, where industrialists who had been dependent on state patronage subsequently became important supporters of the opposition Indonesian Democratic Party (PDI). As Dunning explains, “the structural changes in the economy induced by Suharto’s diversification efforts did end up empowering independent business and industry associations, particularly as Sino-Indonesian industrialists began to use these associations to advance their independent claims rather than simply working within patron-client relationships with state elites.” (2005: 470). Along with the increasingly autonomous labor movement, emergent groups of urban industrialists became important sources of pressure for reform, despite their clientelistic mode of incorporation.

We thus see within the industrialization process, which occurred in the developing world through conscious, state-guided development efforts, an important – and often unintended – consequence of neutralizing the putative “curse” of natural resource abundance. Industrialization may enhance the ability to detect and earn revenue from natural resource wealth as human capital investments allow indigenization of high technology. And industrialization may bring about crucial changes in the social structure that are supportive of democracy, including the formation of urban working class and industrial actors. Even as the consequences of industrialization improved the prospects for democracy, they were far from sufficient to explain how and when such regime transitions occurred. Next, we argue that the task of sorting out the relationship between oil and democracy must also account for the diffusion of regime forms within regions.
Interdependence and Democratic Regimes

Even though democracy spread throughout the world in “waves” (Huntington 1991), characterized by close correlations in the timing and location of democratic transitions, the political economy of the resource curse has been conceptualized almost exclusively as a domestic phenomenon with regimes determined independently by domestic political, economic and geological conditions alone. Until very recently (e.g., Haber and Menaldo 2011), scholars have either overlooked the possibility of interdependence in quantitative analyses of the political resource curse (e.g., Jensen and Wantchekon 2004) or have dismissed it as a serious causal variable (Ross 2001). The close spatial and temporal correlations in democratization and similarity of regime within regions, however, present a sharp empirical challenge to such approaches. For instance, nations in the Middle East presented (at least until 2011) little variation in regime type, despite their vastly-different natural resource endowments: whereas Saudi Arabia, Bahrain, the United Arab Emirates, Oman, Kuwait, Qatar and Libya are oil-rich, Egypt, Syria and Jordan are not (Haber and Menaldo 2011). Ross (2001: 329) explains these anomalies through reference to ‘locational rents’ associated with oil pipelines in the latter three resource-scarce nations, whereas regimes in Egypt, Yemen, Syria, Lebanon, Tunisia, Algeria and Morocco were said to be supported by remittances, and Israel, Egypt, Jordan by foreign aid rents. Yet, Latin America also presents a challenge to the resource curse: Despite their vast but varied natural resource endowments, nations in that region lurched toward procedural democracy in close sequence in the 1980s, just as they had descended into authoritarianism in close succession decades earlier. To the extent that such regime outcomes are interdependent, a failure to account for this effect risks introducing bias into empirical analyses due to the omission of a crucial causal variable, which may lead scholars to attribute excessive weight to common shocks or unit-level (domestic) explanations (Franzese and Hays 2007).

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7 Although Huntington (1991) identified powerful regional trends in democratization, he assumed that oil wealth provided a bulwark for authoritarianism in the Middle East.
Beyond the prima facie evidence of democratic ‘waves’ within and across regions, there are ample theoretical grounds on which to base our expectation that democratic diffusion matters (Brinks and Coppedge 2006; Dahl 1998; Gleditch and Ward 2006; O’Laughlin et al 1998; Przeworski and Limongi 1993; Przeworski et al. 2000; Strang 1990; Starr 1991). Diffusion refers simply to “the process by which an innovation is communicated through certain channels over time among the members of a social system.” (Rogers 1995, p. 5). To the extent that regime types are interdependent, the outcomes in one unit (here, countries) are influenced systematically by the outcomes of similar processes elsewhere. Diffusion is said to be more powerful at closer geographic proximity – measured in linear distance between countries (O’Laughlin et al 1998; Gleditch and Ward 2006). Closeness is said to foster the spread of ideas and norms through more dense communication channels among neighboring nations, which are likewise prone to structural similarity (Wejnert 2005) and shared colonial ties (Dahl 1998). The regime diffusion literature thus has brought much-needed attention to the horizontal channels through which democracy has spread around the world, challenging an earlier emphasis on the imposition of democracy by a hegemonic power.

We do not expect diffusion to operate solely as a function of linear distance between nations. Rather, we expect such dynamics to unfold at the regional level. For one thing, it is at this level that economic development models have shown the most significant distinctions (Amsden 1991). In addition, emulation, or has been found to be most powerful where social contact is most extensive, and among countries that share common cultural ties. Because nations within the same region tend to share extensive cultural, religious and economic ties, we expect region to be the principal source of reference for such “mimetic isomorphism” (DiMaggio and Powell 1983; Simmons and Elkins 2005). Diffusion channels also may operate at the sub-regional level (Brooks and Kurtz 2012). Learning, for instance, which involves the incorporation of new information into the formation of beliefs about a policy (Braun and Gilardi 2006; Meseguer 2005), may bring the attention of policy makers to faster-growing countries in the region. Alternatively, government actors may be swayed by the regime dynamics in wealthier countries of
the region, which stand out as more attractive models to emulate. To the extent that such interdependencies are important predictors of regime outcomes in any given nation, then the potential for bias in analyses that fail to account for diffusion is high. Such concerns are amplified further in analysis of the resource-regime link due to the correlation between resources and region. In the next section, we test for the possibility that one country’s regime type may be affected by the regime type of other nations at the regional level through three different channels of democratic diffusion: region-wide isomorphism, learning from ‘successful’ (faster-growing) regional peers, and emulation of wealthier countries.

**Methods, Data, and Models**

The empirical challenges faced in this paper are multiple and potentially quite complex. To begin, we have argued that the actual petroleum wealth available to a country is not directly determined by the quantity of subsoil endowments. Indeed, one could plausibly go still further and contend that the level of proven reserves is conditioned also by aspects of the national political economy that are principally determined by national political decisions. But for our immediate purposes, we have argued that oil wealth is an increasing function of the level of industrialization and the human capital stock available for economic utilization, all else equal. But the *ceteris paribus* condition is important, and not necessarily easy to model, for countries differ widely in their actual ecological endowments: some have no oil, others have substantial oil reservoirs that are hard to access, and others have vast quantities of easily-accessed petroleum deposits. Countries in any given year also differ in the extent to which the oilfields that operate within their borders are mature, and thus face the problem of declining pressures and lower productivity, or are comparatively new, from which oil is more readily and rapidly extractable.

The challenge that is thus posed for us is to demonstrate whether oil income is in fact endogenous to industrialization that is often itself driven by economic policy and human capital formation. To do this we must accommodate the large cross-country differences in geological endowments, as well as the
variations in antecedent conditions that characterize each country’s oil sector at any particular point in time. Our approach can be summarized in the general model we seek to estimate, described as follows:

\[ y_{it} = y_{it-1} + \gamma + X_{it}\beta + \eta_t + \nu_i + \epsilon_{it} \]  

where \( \eta_t \) represents a linear time trend, \( \nu_i \) represents unit fixed effects, while the dependent variable \( y_{it} \) is the total oil income per capita for country \( i \) at time \( t \), and \( X_{it}\beta \) represents a matrix of independent variables.

In constructing a simple model to evaluate the possibility that actual oil income is importantly shaped by policy-created human capital stocks and complementary industrial sectors we thus pay attention to providing a modeling strategy that makes a ceteris paribus claim plausible. In equation (1.1) above, we take two principal steps to achieve this outcome. First, since our data are time-series cross-sectional, we employ a fixed effects specification (hence the inclusion of time invariant country-specific effects, \( \nu_i \)). By removing from the estimation of the effect of human capital or industrialization on oil income all time-invariant, cross-national variation, we avoid the problem of differing underlying physical oil endowments. This is doubly imperatave, for our models are very parsimonious and it is all-too-likely that there are further country-level characteristics (e.g., geology, climate, oil type and quality, inter alia) that would be related to the per-capita oil income. Thus instead, we consider only across-time variation within each panel, making the results net of total potential resource endowments (which are of course effectively constant within a country). The maturity of the oil field – or, equally, the degree to which pumping capacity has or has not yet come online – is also important. There is a well-known time-varying pattern to oilfield output, rising initially to a plateau, followed by a gradual or steep decline in production (depending on oilfield management, ongoing investment, technology employed, and geology). To cope with this potential source of bias, we control in our estimates for the lagged level of oil output in the previous period. Thus, in this step we are seeking to evaluate the factors that predict whether oil income
will be higher or lower than what would be expected given income in the previous year. The lagged value of oil revenue thus serves as a summary of antecedent conditions in the oil sector of each country.

There is one further potential source of bias that we explicitly evaluate. On the one hand, theories of the economic resource curse would suggest a form of negative endogeneity in our models – higher levels of oil income per capita should, over time, be associated with lower levels of industrialization as the oil sector renders other industrial pursuits non-competitive due to Dutch Disease effects. Of course, alternatively, if oil revenues are used productively (purposively or through market-based channels) for investment purposes, we might expect higher oil wealth instead to produce increases in subsequent industrialization. After all, foreign exchange and capital scarcity have long been seen as crucial bottlenecks for industrial development of poorer countries, and substantial oil wealth necessarily mitigates these problems. Thus, as a final robustness check we estimate Arellano-Bond models, allowing us to explicitly consider the potential endogeneity between industrialization and oil income, as well as instrumenting for the lagged dependent variable that can be subject to bias because of its correlation with the unmeasured fixed effects in such models.

After we show that it is at least plausibly the case that the oil wealth accruing to a state (or at least the potentially-taxable revenues generated by oil extraction) is not necessarily a gift of nature but rather quite amenable to change based on public policies – affecting industrialization, human capital formation, and the like – it remains to consider a strategy that can connect this insight to an examination of the political resource curse. The basic question that frames this discussion – Does natural resource wealth tend to promote authoritarianism? – is quite simple. But successive efforts to examine the question empirically, and the prevailing dissensus that appears in the literature, makes clear that adequately specifying and examining this relationship is anything but simple.

In our re-examination of the ‘resource curse,’ we begin with the insight above – that oil wealth is not strictly fixed. Instead, it is at least in part related to industrial strategy and human capital formation,
which can themselves be connected to democracy, as an ample body of research suggests. But this raises the possibility of a potential (at least indirect) endogeneity between the political regime and the actual level of oil wealth. If democracy leads to the greater production of public goods like education and infrastructure, *ceteris paribus*, and this in turn helps make industrialization more viable, then standard treatments of the relationship between oil wealth and regime type are potentially biased. We take two strategies for the examination of this potential endogeneity, with an eye to producing a more appropriate estimate of the actual effect of oil wealth on regime outcomes. First, we employ Arellano-Bond estimates of this potential endogeneity. For robustness, we also examine whether more traditional instrumental variables approaches to endogeneity produce a similar result. For these models we employ three instruments for oil wealth – land area, land area per capita, and proven reserves. All three are correlated with oil revenue per capita (net of the other included right hand side variables), but are not correlated with political regime.

Of course, it is also possible that there is some inertia in political regime outcomes, which we model with a lagged dependent variable. While this is always potentially problematic (see Achen 2000), we follow Keele and Kelly (2006) in including it for two reasons. First, it is theoretically important, given that there is very likely stickiness to institutions, and thus antecedent democracy or authoritarianism is likely to at least partially induce subsequent persistence in that regime type. Second, failing to include a theoretically relevant lagged dependent variable can induce potentially quite serious bias, and this bias is typically large relative to that induced by any remaining autocorrelation in the residuals.

There are still further complexities, however, that must be addressed before we can meaningfully assess the political resource curse. Earlier scholarship has been suggestive of the possibility that diffusion processes are at work in the transformation of political regimes around the world. These diffusion processes very likely operate at a regional level. What is not yet well-understood, however, is what is *driving* the diffusion processes. Instead, to date, scholars have typically only treated diffusion as a nuisance, and controlled for it rather crudely by including the proportion of democracies in the region or
around the world as regressors. We seek to improve on this state of the art by including measures of a series of alternative plausible regional diffusion processes in our analysis of the relationship between oil wealth and political regime. To start, we note that the simple control for the proportion of democracies in a region is not, strictly speaking, an appropriate indicator of the status of peer countries. This fraction necessarily includes information on all countries in a region – and thus implicitly suggests that a polity’s own political regime contributes to the international diffusion process to which it is subject. This of course is impossible, though only likely to induce a serious bias in regions containing comparatively small numbers of countries. Secondarily, we seek to investigate a series of potentially plausible alternative channels of diffusion, including the simple mimicry of regional peers, asymmetrical diffusion from the wealthier countries, and diffusion from economically more successful countries in the region. Thus, by way of example, in terms of relevant international models, Colombian elites might examine the experience of larger and faster-growing Brazil, but probably are not subject to diffusion influences from places like Honduras, that are both poorer and growing less rapidly.

We operationalize these diffusion processes through the construction of three spatial weight matrices, which permit us to create a spatial lag representing the effect of each process. These matrices will allow us to weight the influence of peers in theoretically relevant ways. In the most straightforward case, of simple mimicry, all peers are weighted equally, and the diffusion variable would thus simply be the weighted average score on the regime variable for all other countries in the region. For the other processes, the influence of peers will depend upon their specific characteristics. In the case of level of development, the influence of a regional peer is proportional to the degree to which its level of economic development exceeds that of the reference country, and its effect is zero if it is less wealthy. Similarly, for diffusion based on economic performance, a peer’s weight is proportional to the degree to which its antecedent growth rate exceeds that of the referent country. All matrices are row standardized such that the diffusion variables included in the model represents the weighted average regime score given each diffusion process.
Thus, the overall approach we take to examining the political resource curse is to estimate models of the general form:

\[ y_{it} = y_{it-1} + W_1 y_{it} \alpha_1 + W_2 y_{it} \alpha_2 + W_3 y_{it} \alpha_3 + X_{it} \beta + \nu_i + \eta_t + \epsilon_{it} \]  

(1.2)

where the \( W_y \) terms represent the three different spatial lag terms, \( \nu_i \) represents unit fixed effects, \( \eta_t \) represents a linear time trend, and \( X_{it} \beta \) represents the matrix of other independent variables (including oil income, which will in most estimations be treated as endogenous).

The inclusion of regional diffusion processes is particularly critical, for it is quite likely that they are correlated with our critical variable of interest – oil wealth. Consider, for example, the Middle East. Until very recently this was a bastion of authoritarianism – but it was also a region characterized by some of the most extensive oil wealth in the world. This correlation, often seen as prima facie evidence of a political resource curse, however, may be spurious. If authoritarianism in the Middle East is in important ways stabilized by peer diffusion – and the regimes in the region were overwhelmingly authoritarian during the period of our analysis – this could induce a spurious correlation. And of course the wave of democratization that has recently begun in the region suggests that investigating this sort of process is imperative. The effects of diffusion processes might also underlie what some have called the “Latin American exception” to the resource curse – by introducing a countervailing effect, this time in the direction of a democratic regime outcome, in what might otherwise be authoritarian, resource rich countries.

**Data.** Our analysis centers on two distinct dependent variables. We begin by examining the possibility that natural resource endowments are much more than gifts of nature, but rather that levels of actually-produced petroleum are susceptible to very different trajectories depending on important features of the domestic political economy. Thus we begin by examining the determinants of oil revenue through time. The measure we employ is taken from Haber and Menaldo (2011), and it represents the value of oil revenue per capita (in constant dollars of 2007). We are interested in how oil income responds to features
of the domestic political economy, so we include as regressors in these models: (1) *Industrialization*, which is the contribution of industrial value added to GDP for each year; (2) *wealth*, taken as the logarithm of the real GDP per capita at purchasing power parity (both variables from World Development Indicators 2010); we include a measure of *human capital* taken from Barro and Lee (2010) which measures the stock of education in the population as the average years of schooling amongst those ages fifteen and above; and finally we include a linear *time trend* which increments by one in each successive year.

For theoretical reasons, and because our models of oil income are so parsimonious, we include a lagged dependent variable – to capture the fact that a high level of oil income in one year is likely to be related to a high level in the next year, typically a product of large physical endowments and investments. This variable will also summarize some of the effects of other potential omitted variables that might otherwise bias the analysis. Second, our models are far too parsimonious to capture all the relevant, but temporally constant, cross-national differences that might account for oil income (such as state capacity) and thus we also include country fixed effects in all our specifications.

For our models of the political resource curse (1.2), we take as the dependent variable *regime type*, as measured by the polity2 scoring of political institutions (Marshall and Jaggers 2011). In these models, *oil income* becomes a key independent variable of interest. In addition we include controls for *wealth*, *human capital*, and *industrialization*. All are defining conditions in the literature of socio-economic modernization, which has been strongly correlated with political regime outcomes. In addition, these models test our three diffusion variables (regional diffusion, regional development diffusion, and regional growth diffusion), all of which are described above. Finally, two more controls that have been associated with regime outcomes in the literature are introduced: *trade* represents international economic integration, measured as exports plus imports as a share of GDP (WDI 2010) and *civil war* codes for the presence of civil war (Haber and Menaldo 2011).
Empirical Analysis

We opened the paper by making the potentially-controversial claim that oil wealth – at least in the form actually-extracted and marketed oil – is not simply, or perhaps even principally, a gift of nature. While it is certainly true that barring the passage of geologic time the actual quantity of subsoil oil is fixed, what matters from a human and political perspective is the amount of oil that is extracted, and this is importantly a function of investment, oilfield management, and technology. We hypothesized that oil revenue – net of subsoil endowments – should respond positively to both the level of industrialization and the stocks of human capital in the economy. In Table 1 we proceed to examine this question empirically.

Our approach to this empirical analysis is extremely conservative. In Model I we utilize a generalized least squares estimator, and include as regressors a lagged dependent variable (antecedent oil revenue) as well as country fixed effects. The latter should remove from the estimation of the parameters on the time-varying covariates the effects of fixed ecological endowments of oil. The former allows us to focus on the increments or decrements to oil output that are explained by factors other than the antecedent level of income (which in effect summarizes the scale of the investment in production, and pre-existing pumping capacity). The question then, is, net of endowments and antecedent income, are policy-amenable variables robust predictors of the level of oil income per capita? The results in Model I suggest that the answer is affirmative. Even in a very conservative specification that considers only over-time variation in oil income, the level of industrialization of the overall national economy is positively associated with oil income. This is not simply a function of the fact that wealthier countries (which naturally have more capital available for investment) are also more industrial, for we control for country wealth. We do not, however, detect a direct association between the stock of human capital and oil output (the coefficient is statistically insignificant), though this is perhaps not surprising given the collinearity between human capital, industrialization, and country wealth. And, of course, to the extent that human capital induces industrialization, its effects will be transmitted through that more proximate variable in this model.
Of course, Model I is only a starting point. It is well known that lagged dependent variables are correlated with unit fixed effects in these sorts of models, raising the potential for biased estimates in finite samples (Drukker 2008). To examine the robustness of our findings, we thus estimate two more models, both employing the Arellano-Bond estimator that instruments for this problem in an effort to overcome this potential bias. In Model II we once again see that industrialization is positively associated with oil income, only in this instance with a substantially more substantive effect. Wealth and human capital, as before, are statistically indistinguishable from zero in their effects. We have one further concern, however, since it is the case that industrialization and human capital formation are in large measure consequences of public policy, it is potentially the case that increases in oil wealth – which are, after all, usually seen as easily taxed or directly state-owned – might well enable states to increase their investments in industrialization and education. So in our final model, we treat industrialization and human capital as potentially endogenous to oil income. The results remain consistent with our earlier estimates. Industrialization remains a robust predictor of oil income, while country wealth and human capital stocks remain unassociated with it.

Reconsidering the “resource curse.” What are the implications of the fact that petroleum wealth is at least in part a product of policy-amenable industrialization outcomes for the widely-heralded “resource curse?” Our analysis suggests that carefully examining the data provides evidence that not only is oil not a curse, but that it can in fact contribute positively to the creation of democratic political regimes. This result is broadly supportive of the recent work of Haber and Menaldo (2011), but conflicts with the findings of both the traditional and conditional resource curse accounts – for even in our least-optimistic of scenarios, oil has no discernible negative effect on democratic regime outcomes.
We begin our empirical investigation of the regime effects of oil with Model IV. In this fixed effects, instrumental variables specification\(^8\) we find that oil income is weakly but positively related to democratic regime outcomes (a higher score on the regime variable indicators a more democratic outcome). We instrument for oil income because we believe it is likely to be endogenous to the political regime, for as we have noted above, democracy has been shown in the literature to be positively associated with human capital formation and thus likely to be so with industrialization as well. Model IV (and indeed all our models), following Acemoglu et al. (2009), also incorporates a lagged dependent variable to account for likely inertia in the institutions of the political regime.

This result, however, is fairly modest. The next step in our analysis is to consider the possibility that international diffusion effects may be in effect masking the real underlying relationship between oil wealth and political regime. As we noted above, we include three distinct mechanisms of diffusion in Model V, and we note particularly that region and resource wealth are on their face quite related.\(^9\) Including international diffusion effects produces several important results. First, the positive effect of oil wealth on democracy increases both in substantive and statistical significance in Model V. At the same time, there is evidence of at least two different channels of international diffusion. Most importantly, there appears to be a substantial amount of institutional isomorphism within regions (“Regional Diffusion”). There is also evidence of a performance based diffusion process, wherein countries are systematically more likely to adopt regime forms of their regional, more-developed, peers (“Regional Development Diffusion”).

As before, we must also be concerned with the potential bias induced by the correlation between the unmeasured fixed effects and the lagged dependent variable. Thus, models VI and VII replicate the

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\(^8\) We instrument oil income with three variables: land area, land area per capita, and proven reserves. All three exhibit reasonable correlation with our measure of oil production, and are (net of the other regressors in the model) essentially unrelated to regime outcomes.

\(^9\) Consider, for example, that the Middle East as a region has quite high levels of oil income, and at the same time (during the period of our dataset) is almost universally authoritarian. At the same time, much of this period in other, less resource endowed regions, had much higher levels of democracy, on average.
instrumental variables models, this time using an Arellano-Bond estimator. In both of these models we also explicitly treat oil income as potentially endogenous. A similar pattern of results emerges: once we have controlled for regional diffusion processes, once again natural resource wealth is positively related to political regime. Similar results on the diffusion variables are also observed.

Our final model is in the spirit of an attempt to examine the causal mechanism we have posited in the connection between natural resource wealth and regime outcomes. We suggested that industrialization and oil revenue are related in a positive way, and that this could well be associated with a positive resource/ regime equilibrium represented by such countries as Norway, the United States, Canada, etc. In Model VIII we decompose oil income into two constituent parts. What we call Predicted Oil is that portion of the Oil Income variable that can be predicted by the level of industrialization. Orthogonal oil is that portion that is explained by factors other than the level of industrialization. What we find in this model is suggestive that it is the portion of oil income that can be associated with industrialization that is driving the positive connection between resources and political democracy. Its coefficient is much larger and verges on the edge of statistical significance at the p<0.1 level. Oil wealth related to other factors, by contrast, is unassociated with political regime outcomes.¹⁰

Conclusion

Do oil and democracy mix? We have argued, contrary to the conventional resource curse, that it is entirely possible that they do, although this relationship is far from direct or deterministic. And we have advanced the claim that efforts to disentangle precise causal linkages between natural resource abundance and political regime have been complicated by two possibilities. The first is that both democracy and oil revenue are endogenous to earlier industrialization processes that in the developing world have been most often guided by statist policies typically considered to be inimical to both outcomes. In addition, the possibility that democracy is interdependent, rather than a function solely of the domestic political

¹⁰ It should be noted that industrialization cannot be included as a regressor in this model as it is a direct linear transformation of the predicted oil variable, by construction.
economy, as it is portrayed in much of the resource curse literature. The joint possibilities of endogeneity and interdependence, we expected, threatened the reliability of statistical analyses of the resource-regime connection in much of the empirical research on this question, and justified our closer examination of this relationship. Our analysis sought to address these concerns both empirically and theoretically. We examined the mechanisms through which oil may be endogenous to industrialization through public investments in human capital, technological upgrading and industrial deepening. And we demonstrated empirically that oil revenue is predicted significantly by the extent of industrial development in a nation. Second, we explored the relationship between endogenous natural resource wealth and democracy while accounting for democratic diffusion among regional peers. We found that oil is not a curse, and that the extent of democracy in one nation is predicted significantly by the democratic tendencies among regional peers, particularly those peers that are more highly developed. Our results are preliminary, but they are suggestive of a broad research program that probes more deeply the consequences of endogenous natural resource endowments, and that explores the implications of the sequencing of economic development, natural resource exploration, and democracy.
Figure 1.

Investment in Higher Education

Source: Barro and Lee (2010).

Figure 2.

Percent of the Population in School

Source: Amsden (1992, p. 217, Table 9.1). *Brazil the first data point is for 1887 rather than 1928; ** For Korea, the 1928 data include North Korea.
### Table 1. Is Oil a Fixed Endowment? (Coefficient estimates/Standard Errors)

Dependent Variable: Oil Income

<table>
<thead>
<tr>
<th></th>
<th>Model I</th>
<th>Model II</th>
<th>Model III</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fixed Effects Regression</td>
<td>Arellano-Bond Estimates</td>
<td>Arellano-Bond estimates with Industrialization and Human Capital Endogenous</td>
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<td>Oil $t_{-1}$</td>
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<td>0.689865</td>
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<td></td>
<td>0.014697</td>
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<td>Industrialization</td>
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<td></td>
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<td>8.719176</td>
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<td></td>
<td>5.861408</td>
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<td>151.1956</td>
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<td></td>
<td>1.780574</td>
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<td>64.44122</td>
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<td>Time Trend</td>
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<td>-1923.68</td>
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<td>45.59438</td>
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<td>2667</td>
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</tbody>
</table>

Notes: Coefficients on the country-level fixed effects are not displayed for Model I, they are removed via differencing in the Arellano-Bond estimates. Model I is a cross-sectional, time-series GLS estimate with heteroskedasticity-consistent standard errors. Data include all non-communist countries from 1970-2006, including the communist successor states after 1990. Countries with populations less than one million are omitted from the analysis.

Bold font indicates a coefficient significant at $p<0.05$. 
<table>
<thead>
<tr>
<th>Variable</th>
<th>Model IV</th>
<th>Model V</th>
<th>Model VI</th>
<th>Model VII</th>
<th>Model VIII</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regime_{t-1}</td>
<td>0.80621</td>
<td>0.775191</td>
<td>0.78247</td>
<td>0.685444</td>
<td>0.662962</td>
</tr>
<tr>
<td>Oil Income</td>
<td>9.05E-05</td>
<td>0.000351</td>
<td>2.4E-05</td>
<td>7.04E-05</td>
<td>3.53E-05</td>
</tr>
<tr>
<td>Predicted Oil</td>
<td></td>
<td></td>
<td></td>
<td>0.000426*</td>
<td>0.000266</td>
</tr>
<tr>
<td>Orthogonal Oil</td>
<td></td>
<td></td>
<td></td>
<td>8.59E-05</td>
<td>6.66E-05</td>
</tr>
<tr>
<td>Wealth</td>
<td>-1.29671</td>
<td>-1.22789</td>
<td>-0.65248</td>
<td>-1.35097</td>
<td>-2.24163</td>
</tr>
<tr>
<td>Industrialization</td>
<td>0.015651</td>
<td>-0.00232</td>
<td>0.016728</td>
<td>0.007796</td>
<td>0.016851</td>
</tr>
<tr>
<td>Human Capital</td>
<td>-0.08259</td>
<td>-0.0899</td>
<td>0.04401</td>
<td>0.102902</td>
<td>-0.25504</td>
</tr>
<tr>
<td>Regional Diffusion</td>
<td>0.143552</td>
<td>0.100556</td>
<td>0.155215</td>
<td>0.27493</td>
<td>0.30265</td>
</tr>
<tr>
<td>Regional Development Diffusion</td>
<td>0.083759</td>
<td>0.029088</td>
<td>0.013364</td>
<td>0.018651</td>
<td>0.016851</td>
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<tr>
<td>Regional Growth Diffusion</td>
<td>-0.02987</td>
<td>-0.04597</td>
<td>-0.04151</td>
<td>-0.04151</td>
<td>-0.04151</td>
</tr>
<tr>
<td>Trade</td>
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<td>-0.00132</td>
<td>-0.00078</td>
<td>-0.00262</td>
<td>-0.00717</td>
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<tr>
<td>Civil War</td>
<td>-0.32118</td>
<td>-0.30975</td>
<td>-0.4123</td>
<td>-0.22401</td>
<td>0.002978</td>
</tr>
<tr>
<td>Time Trend</td>
<td>0.065094</td>
<td>0.041528</td>
<td>0.028854</td>
<td>0.028127</td>
<td>0.06332</td>
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<tr>
<td>Constant</td>
<td>10.13915</td>
<td>10.03921</td>
<td>4.859979</td>
<td>10.25478</td>
<td>19.19036</td>
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<tr>
<td>N</td>
<td>2595</td>
<td>2239</td>
<td>2535</td>
<td>2109</td>
<td>2109</td>
</tr>
</tbody>
</table>

Notes: In the instrumental variables models, land area, land area per capita, and reserves in billions are used as instruments for total oil income per capita. In the Arellano-Bond models, oil income is treated as endogenous. All regressors except regional diffusion are lagged one period. Industrialization is omitted in Model VIII because it is a perfectly linearly related to Predicted Oil by construction. The instrumental variables models include fixed effects (not shown). Bold font implies statistical significance at p<0.05; * p<0.109.
Works Cited (Partial list)


Mehlum, Halvor, Moene, Karl and Torvik, Ragnar. 2006. Cursed by resources or institutions? World Economy, 29(8), 1117-1131.


