

RENT SEEKING AND THE RESOURCE CURSE

Robert T. Deacon and Ashwin Rode*

September 26, 2012

Abstract

Many countries receiving natural resource windfalls suffer from slow growth, low incomes and weak political institutions, an empirical regularity dubbed the resource curse. Patterns in the data suggest a political link is involved: some countries escape this fate, those that succumb generally have weak institutions initially, and a curse is most likely when the resource is spatially concentrated. Rent-seeking for a resource prize is a prominent theme in theoretical explanations of the curse. While the precise mechanisms vary, several postulate that rent-seeking diverts activity or resources away from productive employment, e.g., private capital may be shifted to a less productive but secure sector, potential entrepreneurs may be attracted into rent-seeking rather than wealth creation, labor may be diverted away from producing output and toward competing for a resource rent prize. While empirical results remain somewhat controversial, there is now extensive evidence supporting both the curse and a political transmission channel. Three aspects of this work are particularly important for rent-seeking: (i) political theories of the resource curse consistently predict more than 100 percent dissipation of the resource windfall, a finding at odds with theoretical treatments of rent-seeking; (ii) variations in pre-windfall political institutions can magnify, moderate or overturn the resource curse effect; and (iii) a resource windfall can alter the quality of political institutions.

Key Words: Resource Rents, Government Institutions, Rent-seeking

JEL Categories: Q3, H4, O1

I. Introduction

The term “resource curse” describes the notion that resource-rich areas tend to be poor and often politically oppressed. Although it seems paradoxical, the idea of a resource curse is difficult to ignore. Angola, Congo, Nigeria, Venezuela, and the Middle East are notable examples of places that are rich in natural resources, but also plagued by low or negative GDP growth, widespread poverty,

state failure, civil war, corruption, and political oppression. Nigeria is an often-cited example: its per capita GDP in 2000 was 30% lower than in 1965, despite oil revenues of roughly \$350 billion (1995\$) during the intervening period.¹ Lane and Tornell (1996) note that oil-rich Venezuela's terms of trade rose 13.7% per year during 1970-1990, while per capita output declined at a rate of 1.4% per year. They also point out that Saudi Arabia's real per capita GDP actually declined between 1970 and 1999. Gylfason (2001, p. 848) claims that per capita GNP in OPEC countries fell 1.3% per year during 1965-1998, while all lower- and middle-income countries were growing at an average rate of 2.2%.

Although there is no shortage of countries that support the resource curse hypothesis, several notable counter-examples do exist. Resource-rich countries such as Norway, Chile, Malaysia, and Botswana have largely escaped the unfavorable outcomes described above and have experienced rapid economic growth. The experiences of these countries suggest that the resource curse phenomenon is neither universal nor inevitable. Whether resource abundance is a curse or blessing appears to hinge on host country circumstances and on the particular resource involved. Still, the notion that having more of any natural resource could be disadvantageous in any circumstance is sufficiently counter-intuitive to merit serious study. Indeed there has been a proliferation of research on the resource curse by economists and other social scientists over the past two decades. This paper focuses on a specific subset of this research—theoretical and empirical research that brings to bear the idea of rent-seeking to explain the resource curse phenomenon.

The idea of rent-seeking has a long history in economics, dating back to the seminal work of Tullock (1967). Although originally developed to explain the social welfare losses involved in the establishment of monopolies, tariffs, and subsidies, models of rent-seeking behavior have been at the forefront of recent attempts to explain the resource curse phenomenon. A common theme of these models is that political institutions conducive to rent-seeking underlie failures of societies to

realize benefits from natural resource wealth. Natural resource wealth is a “curse” rather than a benefit to society when property rights are not defined or respected and the wealth becomes a rent-seeking prize (Congleton et al., 2008).

Anecdotal evidence, for example from Venezuela and Nigeria, is consistent with the notion that rent-seeking by political elites is responsible for the resource curse. The oil price jump of 1979-81 induced Venezuela to increase public spending on infrastructure and industrial policy, which mainly benefitted political elites; the increase was so dramatic that that Venezuela ran a current account deficit despite a large, favorable shift in its terms of trade (Lane and Tornell 1996, p. 216). In Nigeria, which is rich in oil, income became highly concentrated during the oil price run-up between 1970 and the early 2000s. By 2000, the share of income controlled by the richest 2% of the population equaled that of the poorest 55%; in 1970; the richest 2% earned as much as the poorest 17% in 1970. The fraction of Nigerians who subsist on \$1 per day or less rose from 26% to 70% over the same period (van der Ploeg 2011, pp. 367-8). By contrast, institutions that have been relatively effective in discouraging rent-seeking activity can explain the more favorable outcomes in resource-rich countries such as Norway, Chile, Malaysia, and Botswana.

While a country’s political institutions can affect the way its economy responds to natural resource wealth, several observers argue that natural resource wealth can alter a country’s political institutions, for example by altering property rights, democracy, political stability, or friendliness to rent-seeking. This idea has been incorporated into theories of the resource curse and is also consistent with anecdotal and case-study evidence. Karl (1997) reviewed the historical record of six resource-rich countries and found that resource wealth and resource rent windfalls can alter the political climate in the host country, particularly if its institutions are precarious at the outset. When wealth is concentrated in minerals and the resulting rents are directed to State coffers, she finds that government’s decision-making framework and the locus of authority can be shifted. Control over

mineral rents becomes a basis for political power and institutions evolve to perpetuate existing patterns of control.

European colonists who discovered and first exploited mineral resources found it possible to extract mineral rents by controlling only specific mining and export sites, without extending civil authority and the rule of law to the countryside, (Karl 1997, pp. 60-61). This was possible because mineral resources tend to be concentrated in space, rather than widely dispersed. A detailed analysis of Venezuela, whose economy is dominated by oil, indicates that government's nationalization of the resource, and resulting shift of resource rents to the state, promoted a rent-seeking culture and a patron-client system of governance (Karl 1997). She also notes that the enhanced payoffs to rent seeking enticed individuals with entrepreneurial talent, who otherwise might have been the creators of wealth and future prosperity in the country, to direct their talents to rent seeking. Ross (2001) argues that a hardwood timber price boom in Southeast Asia impaired governance in similar ways in the Philippines, in Indonesia and in the Malay states of Sarawak and Sabah. Political elites in all three states altered institutions of governance to capture greater control of timber rents once timber harvesting came to dominate the economies of these countries. As political elites channeled these newly created rents to their supporters, corruption increased and political power became more concentrated.

Having introduced the resource curse phenomenon and its political economy dimensions, the remainder of this paper surveys selected theoretical and empirical literature at the intersection of rent-seeking and the resource curse. The rest of the paper is organized as follows: Section II describes the basic idea of rent-seeking, along with why and how the resource curse literature has appropriated this idea; Section III reviews a number of theoretical models that develop links between rent-seeking behavior and the resource curse; Section IV focuses on purely empirical research on the same topic; Section V presents concluding thoughts and offers directions for future

research.

II. An Overview of Rent-seeking and its Connection to the Resource Curse

II.1 Rent-seeking Basics

The term “rent-seeking” was introduced by Krueger (1974), but the fundamental theory had already been developed by Tullock (1967). The basic idea is best demonstrated through the case of a monopoly depicted in Figure 1.² As usual, the horizontal axis measures the quantity sold of a particular good, while the vertical axis measures the price of this good. Consider a given demand curve, D . Under perfect competition, Q^* units of the good will be sold at price P^* . However, if a monopoly were established, it would sell Q^M units of the good at price P^M . According to traditional economic theory, the net social loss (i.e. deadweight loss) from the monopoly is the area of the shaded triangle, often referred to as the Harberger triangle. This area represents the consumer surplus that would have been obtained from the purchase of those units between Q^M and Q^* , which are neither purchased nor produced under the monopoly. On the other hand, the area of the dotted rectangle (i.e. monopoly rents) has been traditionally regarded as simply a transfer of surplus from consumers to the monopolist. Because they are all members of the same society, there is no net social loss involved in this transfer.

The idea of rent-seeking challenges the traditional economic assessment of the net social losses that arise from monopolies and other market interventions such as tariffs and subsidies. According to the rent-seeking view, the fundamental problem with the traditional theory is its implicit assumption that the monopoly is created costlessly, whereas in fact real resources are used to create monopolies. Moreover, “the activity of creating monopolies is a competitive industry” (Tullock 1987, p. 147). At any given time, a number of economic agents are devoting resources in an

effort to secure a monopoly, only some of whom will succeed. Tullock (1967) and Krueger (1974) argued that profit-seeking businessmen would be willing to expend resources in an effort to obtain a monopoly from the government, up to the point where the last dollar so invested exactly offset the improved probability of obtaining the monopoly.³ From this it was concluded that the monopoly rents would be entirely dissipated. The net social loss involved in the monopoly extends beyond the Harberger triangle of traditional economic theory and also includes the dotted rectangle.

Tullock (1980) elaborates on the theoretical conditions under which monopoly rents are fully dissipated, less than fully dissipated, or more than fully dissipated. The full dissipation outcome relies on a particular form for the “contest function” that relates dollars invested in rent-seeking to the probability of obtaining the monopoly.⁴ Specifically, the contest function must be linear for full dissipation to occur, with each dollar invested having exactly the same payoff as the previous dollar in raising probability of achieving the monopoly. If the contest function exhibits diseconomies of scale, less than full dissipation can occur in equilibrium even if monopoly creation is a perfectly competitive industry with free entry. On the other hand, if the contest function exhibits economies of scale, it is possible for more than full dissipation to occur in what is termed a “pseudo-equilibrium”. In this case, “equilibrium” is prefixed with the qualifier “pseudo” because although the mathematical conditions for equilibrium are satisfied, it is absurd to think that businessmen will enter into what amounts to a lottery with negative expected value.

Since its initial appearance over four decades ago, the idea that resources are used unproductively in rent-seeking contests has been applied to many areas of economics and other social sciences.⁵ Many models of the resource curse are variations on the theme of rent-seeking in that resource wealth is treated as a rent that is subject to dissipation. However there are some notable differences between the original rent-seeking models and those that address the resource curse. One major difference is that rent-seeking models of the resource curse tend to be general

equilibrium in nature and often focus on effects on economic growth. These features facilitate a recurring result in these models—that more than full dissipation of resource rents can occur in equilibrium.⁶ In other words, natural resource wealth can actually engender a decline in welfare, which is tantamount to a resource curse. Another distinguishing aspect of rent-seeking models of the resource curse is a focused concern with political institutions. A country’s political institutions provide a set of constraints that may or may not be effective in preventing dissipation of resource rents. At the same time, some treatments of the resource curse postulate that a resource windfall can itself hamper the effectiveness of these institutions.

In the next subsection, we provide a brief history of the resource curse literature and discuss the reasons for its movement toward political economy explanations. After establishing this general context, we then tighten the focus to how the resource curse literature has adopted the idea of rent-seeking in particular.

II.2 Political Economy and the Resource Curse

Research on the resource curse can be broadly divided into two categories based on the type of causal explanations advocated. One category of research offers market-based explanations for the resource curse, while research in the other category emphasizes political economy explanations.

Market-based explanations for the resource curse often revolve around a crowding-out phenomenon, whereby a natural resource boom diverts economic activity in ways that are counter-productive.⁷ A leading example is the “Dutch Disease” theory, which was formulated to explain the poor economic performance of the Netherlands following the discovery of North Sea oil. This theory postulates that a natural resource boom causes a country’s exchange rate to appreciate, making its manufacturing exports less competitive. Dutch disease adherents see manufacturing exports as the engine of growth, while resource exports are not, leading them to conclude that a

resource boom that crowds out manufacturing will retard growth. Sachs and Warner (1997, 2001) provided some of the earliest cross-country, cross-sectional empirical evidence that natural resource abundance is associated with lower economic growth. They emphasized the “Dutch Disease” as an explanation.⁸ According to Bulte et al. (2005), however, terms of trade effects generally are not significant in economic growth regressions and, overall, there is little empirical support for the Dutch disease argument.⁹ The same authors point to an abundance of exceptions to the resource curse and emphasize that the growth experiences of resource-rich countries are highly varied.

It is these varied experiences and exceptions that have motivated researchers to examine the resource curse phenomenon through the lens of political economy. In particular, two empirical regularities have led the search for causal links to consider interactions with political institutions. First, resource abundance or a resource boom tends to generate a resource curse in countries with weak pre-boom institutions, but not in countries where governance and the rule of law are strong initially.¹⁰ Second, a curse is more likely to plague resources found in dense concentrations, while other resources seem largely immune.¹¹ Neither of these regularities is consistent with market-based explanations for the resource curse; they do agree with theories of how resource extraction and political systems interact, however.

We now turn our attention to the role of rent-seeking behavior in political economy theories of the resource curse.

II.3 The Resource Curse as a Variation on the Theme of Rent-Seeking

As described previously, the mainstream literature on rent-seeking has argued that traditional economic theory is incomplete in its assessment of the net social losses from monopolies, tariffs, and subsidies. However, in contrast to monopolies, tariffs, and subsidies, traditional economic theory predicts no social losses at all from natural resource wealth and in fact argues that greater natural

resource wealth can only benefit a society. Applying the logic of rent-seeking to explain net welfare losses from natural resource wealth thus represents an even further departure from traditional economic theory.

Mainstream models of rent-seeking tend to focus only on competition for a fixed prize without taking into account general equilibrium effects. Models of the resource curse often stand in stark contrast, by incorporating a general equilibrium framework that addresses questions of economic growth. Because of their general equilibrium nature, these models routinely predict more than full dissipation of resource rents in equilibrium. The exact mechanism involved varies across models. In the voracity model, government's coercive power is used solely to transfer wealth from the private sector to powerful interests (Lane and Tornell 1996 and Tornell and Lane 1999). In the event of a resource price boom or new discovery, a country could experience a more than proportional increase in such transfers, thereby slowing down growth. Another class of models invokes the mechanism of diverted entrepreneurship. A resource windfall becomes a curse by diverting entrepreneurial talent away from wealth-creating industrialization and toward rent-seeking (Torvik 2002, Mehlum et al. 2006). Yet another model (Hodler 2006) uses a contest function that resembles those of the mainstream rent-seeking literature.¹² More than full dissipation occurs in this model due to a spillover effect of rent-seeking whereby property rights get more broadly eroded as a consequence of rent-seeking for resource wealth.

The role of political institutions is central to all rent-seeking models of the resource curse. At the very least, the predictions of these models vary depending on how effective political institutions are at preventing rent-seeking behavior. Moreover, institutions are themselves endogenous in many of the models and can be negatively affected by a resource windfall. In addition to the models of Mehlum et al. (2006) and Hodler (2006), just described, the following theoretical and empirical contributions all treat institutions as endogenous: Aslaksen and Torvik

(2006), Caselli and Michaels (2009), Tsui (2010) and Vicente (2010). This endogeneity of institutions is a distinguishing aspect of rent-seeking models of the resource curse that is not present in mainstream rent-seeking models.

In some resource curse contributions, details of government institutions become part of the model and generate theoretical predictions and testable hypotheses. Aslaksen and Torvik (2006) model a democratic government that can descend into anarchy if the prospect of capturing a resource prize is sufficiently attractive to cause one of the political contestants to reject the outcome of an election. Robinson, Torvik and Verdier (2006) portray a country with formally democratic institutions in which an incumbent can, nevertheless, sway the outcome of an election by offering public employment benefits to prospective voters. In this treatment the arrival of a resource windfall gives the incumbent both an added incentive, and the fiscal means, to provide such benefits.

In the next section, we review a number of papers that theoretically explain the resource curse phenomenon on the grounds of rent-seeking behavior. In addition to theoretical models, these papers also contain empirical tests directed toward the predictions of their models. We discuss both the models and the associated empirical work in the next section. Purely empirical papers on rent-seeking and the resource curse, however, are taken up in Section IV.

III. Theoretical Models of Rent-Seeking and the Resource Curse

III.1 Voracity, Growth and the Resource Curse

The ‘voracity’ model describes a situation in which government’s coercive power is used solely to transfer wealth from the private sector to powerful interests, possibly by taxation, theft, bribe demands, forced participation, nationalization or expropriation (Lane and Tornell 1996, Tornell and Lane 1999). Government does not appear as a distinct entity in this model, but

functions implicitly as a conduit for such transfers. Private sector capital is effectively a common pool in this world and competition for it is constrained only by the transfers of other groups. In a model with a single asset the consequences of such transfers are intuitive: the incentive to accumulate capital is diminished, lowering the economy's growth rate and present value utility. If there were only a single group involved in appropriation it would internalize the disincentive effect of wealth transfers, enabling the first-best outcome to be achieved. With several groups vying to capture private sector capital, growth is slowed and welfare diminishes, which agrees with intuition about common pools.

Introducing a second asset that is less productive, but which can serve as a secure wealth haven, alters these results dramatically. In a developing country context, which implicitly is the model's intended application, the wealth haven could be capital in the 'informal' economy, a sector that tax authorities and powerful interests cannot reach. Alternatively, it might be the capital market in a foreign country with well-functioning governance system and rule of law institutions that protect assets from arbitrary appropriation. The terms formal and informal refer to sectors in which capital is vulnerable versus invulnerable to transfers; introducing the informal sector leads to the prediction that capital will flow from the formal to the informal sector. The informal sector, though secure, has a lower rate of return, however, so such shifts slow the economy's growth rate.

The counterpart to a resource windfall in this model is an increase in the return to formal sector capital, which could arise from enhanced productivity or a higher output price. Counter-intuitively, a positive shock to formal capital's return causes elite groups to boost the theft of formal capital by an amount that exceeds the productivity gain, so the formal sector capital stock actually shrinks. This is the 'voracity effect' in Tornell and Lane's (1999) terminology. Its strength depends on the number of competing groups in a surprising way. With a small number of groups, each knows that it will get back a relatively large fraction of any capital transferred from the formal sector

stock. With this knowledge, formal sector capital owners are willing to keep capital in the formal sector even if the amount transferred to the informal sector exceeds what would be required to equalize gross-of-transfer rates of return.

Implications for the resource curse follow from the predicted negative growth response to an increase in productivity. If natural resource wealth is the main form of formal capital, a resource price boom or a new discovery should raise the formal sector's rate of return. The voracity theory predicts that such a windfall will cause capital to flow to the less productive sector, slowing growth. The voracity effect will not operate, however, if there are institutional barriers that prevent rent-seeking, since it is rent-seeking, particularly theft of formal capital, which causes capital to flow to the less productive sector. According to the theory, therefore, a resource productivity windfall should increase growth and welfare if institutional barriers prevent such transfers. This observation thus provides an explanation for why economic performance following the oil boom of the 1970s was so different in, for example, Norway and Nigeria. It also argues for adopting an empirical specification that allows for different effects of resource windfalls in different institutional contexts.

Informal tests of the model's key predictions were largely borne out. Tornell and Lane (1999) examined responses to oil price-driven windfalls in three countries with weak institutions—Mexico, Venezuela and Nigeria. The authors examined the responses of government transfers and economic growth rates in each country to the oil price shocks of the 1970s and early 1980s. In each country, government transfers as a share of GDP more than doubled between 1970 and the early 1980s; assuming these transfers represent payments to powerful interests, this is consistent with predictions from the voracity model.¹³ Over the same period GDP growth rates in Nigeria and Venezuela were negative and, though positive in Mexico, were well below predicted values from a cross-country growth regression.

More detailed empirical analysis is reported in Lane and Tornell (1996), where the focus is on the institutional conditions required for the voracity effect to operate. The model argues that the presence of powerful rent-seeking groups and an absence of institutional restraints on transfers are key enabling conditions. To represent this they form a measure of industrial concentration to proxy concentrated political power and interact it with a governance indicator that represents weak institutional barriers.¹⁴ They use positive terms of trade shocks to represent windfalls and rely on a cross-country cross sectional dataset for testing. In a specification that controls for initial income, education and continent fixed effects, they find that positive terms of trade shocks yield significant improvement in economic growth and investment in non-vulnerable countries, but not in voracity-vulnerable countries. Further, investment responds negatively to positive terms of trade shocks in voracity-vulnerable countries, but this evidence is less robust.

Arezki and Brückner (2010) recently improved on this analysis by examining panel data for 145 countries during 1970-2007. They represented windfalls, specifically formal sector price booms, with country specific commodity price indices. They also gave more careful attention to the representation of powerful groups with divergent interests. In a panel specification that includes fixed effects for countries and years, they found that commodity price booms lead to increased domestic and foreign asset investment in countries that are not dominated by polarized groups, which is the conventional response. In countries with polarized groups, however, price booms generally leave foreign investment unchanged, but lead to significant *decreases* in domestic investment. More directly relevant to the rent-seeking question, commodity price booms are followed by increases in government expenditures, increased corruption and higher expropriation risk in polarized countries, while less polarized countries exhibit no such effects.

III.2 Diverting Entrepreneurial Talent to Unproductive Rent-seeking

The arrival of a resource windfall to the State's coffers will plausibly induce some individuals to focus on rent-seeking, particularly if the country's institutions do not provide barriers. This process could slow growth and even reduce income if the talent diverted to rent-seeking has the potential for entrepreneurship and wealth creation. Torvik (2002) and Mehlum et al. (2006) incorporate this intuition in models of the resource curse. In their models, individuals who might otherwise develop 'modern', increasing returns-to-scale industries switch to non-productive rent-seeking instead, and switching continues until the private returns in the two pursuits are equalized. This leads to 'over-dissipation' (greater than 100 percent loss) because of a demand-linked externality from modern firm production that these individuals would otherwise have generated.

Initial institutional quality enters the model of Mehlum et al. (2006) because the payoff to rent-seeking effort depends both on the quality of a country's institutions as well as the size of the resource rent. For a given a level of resource rent, sufficiently high institutional quality will prevent a resource curse from occurring because the return to rent-seeking is never high enough to divert entrepreneurs to rent-seeking activity. If institutional quality is sufficiently low, however, the same resource rent will divert entrepreneurial talent and the resource curse will apply.

It is worth noting that Mehlum et al.'s (2006) rent-dissipation results do not emerge from a contest function. The direct loss due to effort spent trying to capture a prize is not the only source of dissipation. Instead, dissipation emerges from a condition that rates of return in alternative occupations (productive entrepreneurship and rent-seeking) are equalized. A resource boom combines with weak institutions to put the country onto a lower growth path because productive entrepreneurship is killed off.

According to Karl (1997), this diverted entrepreneurship hypothesis provides a reasonable

explanation for the demise of Spain after its discoveries and appropriation of gold in the New World. This 16th century episode, arguably the most spectacular natural resource windfall documented historically, was followed a severe boom and bust cycle during that century and the next. Indeed, Spain declared bankruptcy on eight separate occasions between 1557 and 1680 — seemingly a resource curse of epic proportions. In line with diverted entrepreneurship theories, (Karl, 1997, p. 35) describes Spain’s demise as follows:

“[The monarchy] consolidated the loyalty of the lesser aristocracy through political favoritism, especially by selling patents of nobility and ecclesiastical appointments. This practice dramatically expanded the size of a parasitic noble class . . . while simultaneously siphoning off the most productive talent from business and commerce. . . . The state bought the talents of those who might have become small entrepreneurs through awarding of offices . . .”

More formal empirical evidence presented by Mehlum et al. (2006) is based on a Sachs-Warner type cross-country growth regression approach. A key feature of their analysis, and a sharp departure from Sachs-Warner, is their focus on the key prediction that resource wealth is a curse only when institutional barriers to rent-seeking are absent. This was easily tested by adding an interaction term between institutional quality and resource abundance to standard Sachs-Warner type cross-country growth regressions.¹⁵ They found resource abundance to be correlated with slow growth when institutional quality is low; significantly, however, they found no evidence for a resource curse in countries with high institutional quality.¹⁶

The empirical contribution of Mehlum et al. (2006) shared one shortcoming with Sachs and Warner (1997, 2001) — reliance on cross-country regressions with one observation per country. The results from such empirics are open to skepticism as they may be driven by country-specific

unobservable factors that are correlated with resource abundance. Papyrakis and Gerlagh (2007) addressed this concern by testing for a resource curse among states within the United States. Using cross-section data from states within a single country eliminates cross-country heterogeneity. While unobserved cross-state heterogeneity remains, this is arguably less problematic than cross-country heterogeneity. Papyrakis and Gerlagh (2007) took growth in real per capita gross state product (GSP) between 1986 and 2000 as the outcome variable and represented resource abundance by the share of primary products in a state's 1986 GSP. Other control variables included initial income, trade openness, investment rates, and schooling, as well as governance institutions, which were represented by political corruption convictions between 1991 and 2007 per 100,000 citizens. Papyrakis and Gerlagh (2007) found evidence of a resource curse when no control variables other than initial income were included, but the effect became insignificant and small when further control variables, e.g., investment rates, schooling levels, openness, and institutions were added. From this they concluded that a resource curse does exist among U.S. states, but it operates through indirect channels.

Rode (2012) points out that Papyrakis and Gerlagh (2007) did not incorporate a widely acknowledged regularity—that resource abundance is a curse if institutions are initially weak, but not otherwise. Rode (2012) extended their cross-state analysis to include an interaction term between resource abundance and corruption.¹⁷ Adding the interaction term causes the coefficient on resource abundance to switch from negative to positive, indicating that for U.S. states, resource abundance is a blessing when institutions are strong. The coefficient on the interaction term itself is negative, indicating that poor institutions can erode or overcome the otherwise beneficial effects of resource abundance.¹⁸ This result agrees with Mehlum et al. (2006) and is consistent with the resource curse story.¹⁹

III.3 Conflict over Resource Rents and Institutional Decline

According to historical accounts, competition among influential groups over resource windfalls may not just dissipate resource rent, but erode a country's political institutions as well. Institutional erosion is a strong theme in Ross's (2001) examination of the hardwood timber boom in Southeast Asia and in Karl's (1997) analysis of political events in oil producing states following the price shocks of the 1970s and 1980s. Hodler (2006) develops a formal model of competition among interest groups for a fixed rent in which the process of competition erodes institutions. The equilibrium effect on income is excess dissipation, i.e., income is lowered as a consequence of the windfall. The key to excess dissipation is institutional erosion and the extent of dissipation depends on the number of competing claimants.

Each interest group in Hodler's model decides how to allocate a fixed endowment of effort between ordinary production and rent-seeking, and effort spent in the latter activity generates a straightforward form of rent dissipation. In effect, the resource rent is a 'common pool' resource and results from this component of the model echo results from the theory of common pools: a larger rent leads to greater rent seeking effort and correspondingly greater waste and the degree of dissipation depends positively on the number of agents competing for the prize, approaching 100 percent as the number of groups increases.

Excess dissipation, the *sine qua non* of a 'resource curse', arises in Hodler's (2006) model because the windfall-induced rent-seeking erodes property rights in the non-resource sector. In the model, a fraction of these non-resource assets become subject to the same common pool competition that plagues natural resource assets. The result is a true resource curse—a decline in welfare resulting from a windfall.²⁰ Formally, the analysis is set up as a one-shot, simultaneous move game and the outcome just described is the unique pure strategy Nash equilibrium. Unlike other

political economy treatments of the resource curse, Hodler (2006) does not entertain the possibility that institutional constraints could limit rent-seeking.

The key predictions from this model are that a resource windfall will lead to lower income and weaker property rights for ordinary assets and both effects will be most severe when the number of competing groups is large. Hodler (2006) tests these predictions with data from a cross section of roughly 90 countries, where per capita GDP and a property rights security index are the key outcome variables. The number of competing groups is captured by measures of ethnic, linguistic, and religious fractionalization.²¹ Unlike other empirical specifications, the model does not allow for the possibility that institutional constraints could limit rent seeking and soften or overturn the adverse effects of a windfall. Hodler (2006) finds that greater resource wealth is correlated with lower income when fractionalization is high; greater natural resource wealth and greater fractionalization are also associated with weaker property rights. As with other studies that rely on cross country data, one cannot rule out the possibility that the results are due to unobserved cross country heterogeneity.

The papers highlighted in this section have been primarily theoretical, with associated empirical contributions aimed at testing the theoretical predictions. In the next section, we turn to papers whose contribution is entirely empirical.

IV. Empirical Research on Rent-Seeking and the Resource Curse

Some of the earliest work on the resource curse was entirely empirical. Sachs and Warner's (1997) original working paper ushered in a line of empirical research that examined the connections between economic growth, resource wealth, and institutions, often using a cross-section of countries. We surveyed this body of work earlier in this paper.²² We also alluded to the problem of unobserved heterogeneity that makes the results of cross-country studies open to skepticism.

Despite the problems inherent in the cross-country approach, the resource curse remains a potentially fruitful venue for testing political economy theories, which often are not readily amenable to empirical testing. The causal factor is the arrival of a resource windfall and such windfalls can generally be documented. Often, one can pin down the arrival time of a resource windfall, as when a discovery is made or when a resource price jumps. This enables research designs that examine within-country behavior before and after an event while controlling for untreated observations, i.e. countries that did not experience a resource windfall. A common prediction of the theories reviewed in Section III is that a resource boom will increase theft of private assets or diversion of government held wealth for private uses by rent-seekers in societies lacking institutional barriers to rent-seeking. As a consequence, such societies will experience slow growth and reduced income following a resource boom. Many theories also predict that a resource boom can overwhelm otherwise favorable institutions, making them less effective in curbing rent-seeking.

In this section, we discuss leading examples of empirical studies that a) use more nuanced empirical strategies than cross-country regressions with one observation per country and b) shed light on the connection between resource wealth and rent-seeking. The first of these studies (Collier and Goderis, 2009) uses panel data methods to distinguish between short- and long-run responses to resource windfalls in countries with weak vs. strong governance. The subsequent three studies focus on oil as a resource and its potential link to governance.

IV.1 Short- and Long-run Responses to Resource Booms

Reliance on cross-country, cross-sectional data rules out using fixed effects to account for unobserved country-level heterogeneity and also precludes the possibility of distinguishing between short- and long-run responses to discoveries or price booms. Collier and Goderis (2009) overcome these weaknesses by constructing a panel of cross-country observations on resource windfalls, governance institutions and growth outcomes. They assemble commodity export price indices for

individual countries with data on each country's commodity exports and international price series.²³ A resource windfall is captured by a rise in a country's commodity export price index.

They find support for the resource curse as a long-run phenomenon, particularly for non-agricultural commodities (metals and fossil fuels) in countries with weak governance. In the short-run, standard economic intuition seems to be confirmed as higher commodity prices are positively associated with GDP growth. However, these effects last only about two years. Higher commodity prices for metals and fuels significantly reduce long-run real GDP growth in countries with weak governance. In contrast, long-run effects in countries with strong governance are generally positive, albeit insignificant.²⁴

IV.2 The Resource Curse in Oil-Rich Countries

Although the work of Collier and Goderis (2009) validates certain important results on resource wealth, growth, and institutions, it only indirectly addresses the theoretical prediction that a resource windfall will, in the absence of initially strong institutions, trigger an increase in rent-seeking. Furthermore, Collier and Goderis (2009) regard institutions as fixed, and therefore cannot test the prediction that a resource windfall will engender institutional decline. A cluster of recent empirical studies uses data on governance indicators and oil booms to address both these predictions. Due to the economic importance of oil as a natural resource, oil booms are salient examples of resource windfalls. Oil booms may take the form of price booms or discoveries. Petroleum price movements are readily observable, and over the past half-century, there have been several episodes of dramatic price jumps. Because these jumps occur at particular points in time and represent a windfall only for oil-endowed economies, empirical tests can take a difference-in-difference approach. The effect of a price boom on a given outcome (e.g. growth rates) can be identified by comparing the difference in the outcome before versus after the price boom in an oil-

endowed economy, against the same difference in an economy without oil. Oil discoveries provide scope for similar empirical testing; they also occur at particular points in time and are geographically isolated and often economically dramatic. Both ‘before versus after’ comparisons, as well as ‘with versus without’ comparisons to control regions in the same country that are unaffected by a discovery can help to identify the effect of interest. The three studies described next exploit these strategies.

IV.2.A Oil and Municipal Corruption in Brazil

Brazil has emerged as an important oil producer since production began in the 1940’s and now accounts for 2 percent of world output. The oil industry in Brazil is essentially monopolistic and is heavily regulated. Municipalities are entitled to royalties that ultimately amount to roughly 3% of the value of their gross oil output. In the leading oil-producing municipalities, these royalties constitute up to 30 percent of total municipal revenue.

Caselli and Michaels (2009) present one of the few attempts to examine the resource curse hypothesis using data from political subdivisions within a single country²⁵, in their case municipalities within Brazil. They regard oil royalty revenues as a resource windfall and test for effects on various outcomes at the municipality level.²⁶ They find that royalty revenues are associated with increased spending on education and culture, health, sanitation, housing, transportation and social transfers. However, they do not find evidence that this spending leads to improved living standards, whether measured by per capita income, housing quality, or delivery of public services. While there is some evidence of increased staffing for education and health services, the amounts are miniscule. More strikingly, royalty receipts actually have a *negative* association with social transfers for unemployment and poverty assistance. Caselli and Michaels (2009) attribute this discrepancy to theft of royalty revenue by municipal officials. Although they cannot conclusively prove such theft actually occurred, they do provide circumstantial evidence. They find that municipal employees in oil-endowed

communities live in larger homes than in non-endowed communities; they also find that media reports of municipal corruption are more common in oil-rich municipalities. The Caselli and Michaels (2009) results thus support the governance-linked predictions from rent-seeking models of the resource curse. They strongly suggest that rents are being captured via the political process, but are not informative about the costs of actions taken in seeking those rents. It is therefore difficult to conclude anything concrete regarding rent dissipation.

IV.2.B Results from a Natural Experiment in Africa

Starting in 1997, speculation emerged in the media regarding a potential major oil discovery in Sao Tome and Principe (STP), an island nation off the coast of West Africa.²⁷ In late 1998, this speculation gained credibility as Exxon/Mobil was granted preferential exploration rights. The magnitude of the discovery became evident in 2003 during the first round of auctions for production rights: the highest bids amounted to nearly 240% of STP's annual GDP. Vicente (2010) exploits the STP oil discovery to study the impact of a resource windfall on corruption, which is a plausible signal of rent-seeking activity. He uses the neighboring island nation of Cape Verde (CV) as a control group. Though the historical and political trajectories of the two countries have been similar, CV has neither oil reserves nor prospects for future discoveries.²⁸

A World Bank Corruption indicator was trending downwards in both countries prior to the discovery. After the discovery, STP's corruption trend turned sharply upward, while CV's continued its downward path. In 2005-2006, Vicente (2010) conducted retrospective surveys of corruption perceptions in both STP and CV. Citizens of both countries were asked to rate the corruption they perceived in past periods (both pre- and post-discovery) in various government functions, including application of customs laws, allocation of college scholarships, financing of schools, public investments in infrastructure, health care provision, public procurements, and elections. The survey

responses form the basis of Vicente's (2010) formal empirical tests. Difference-in-difference estimates show that perceived corruption increased significantly in STP after the discovery across numerous government functions. Although no direct evidence is presented on dissipation of rents, the results strongly suggest rampant rent-seeking activity triggered by the oil discovery. The results also lend support to the claim that a resource windfall can impair the ability of governance institutions to stop such activity.

IV.2.C Oil Discoveries and Trends in Governance

Several theoretical models postulate that a resource windfall can cause a country to shift away from democratic governance, particularly if the country is relatively non-democratic to begin with.²⁹ Tsui (2010) tests this prediction with cross-country data on the timing and importance of oil discoveries and a time-varying governance indicator, the Polity IV 'Democracy' Index.

The outcome variable is the 30 year change in a country's democracy index following its year of major oil discovery. The explanatory variables include the amount of oil discovered and its quality, plus interactions between these variables and the democracy level as of the discovery date; the trend in democracy prior to discovery is included as a control.³⁰

For countries with low democracy scores at the time of discovery, the democracy score thirty years later is found to be 10-20 percentage points lower than it would have been had the pre-discovery trend continued. In contrast, no such pattern is seen for countries relatively high democracy scores at the time of discovery.³¹ These results provide evidence for a link between resource windfalls and further institutional erosion in societies that begin with poor institutions. Such institutional erosion can plausibly facilitate an increase in subsequent rent-seeking activity and rent dissipation.

V. Concluding Thoughts and Directions for Future Research

In recent years the literature on the resource curse has taken a turn toward political economy explanations. This turn was motivated by two empirical regularities that are consistent with a political economy story: 1) resource abundance tends to be a curse only when governance institutions are weak initially, and 2) a curse is most likely to plague resources that are found in dense concentrations and are thus easily appropriable. As part of the broad shift toward political economy frameworks, several authors have relied on the idea of rent-seeking to make sense of the resource curse phenomenon. The theoretical and empirical research at the intersection of rent-seeking and the resource curse has been surveyed in this paper.

Although rent-seeking models of the resource curse are essentially adaptations of standard rent-seeking models to a particular context, they seemingly have much to offer to the broader rent-seeking literature. They contain certain unique features that are not present, or at least not prominent, in the standard rent-seeking paradigm. One such unique feature is that the competition for resource rents is modeled as common pool competition in which each participant receives a portion of the prize, but the cost of competitive effort diminishes the net value of what is received. This stands in contrast to the mainstream rent-seeking literature, which models the prize as a payoff that only one participant will capture and the contest as either a lottery (Tullock, 1980) or an all-pay auction (Congleton, 1980).

The three theoretical models highlighted in this paper postulate that common pool competition for resource rents takes place within one of two economic sectors; it is the existence of an alternative sector that leads to a general equilibrium result of greater than 100 percent rent dissipation. The general equilibrium aspect of these models can inform further work on rent-seeking more generally. In the voracity model, the two alternatives are capital invested in a high productivity

sector vulnerable to rent-seeking versus a low productivity sector that is secure. In models of diverted entrepreneurship the alternative activities to which effort can be allocated are rent-seeking versus productive wealth creation. In the model of Hodler (2006), productive inputs can either be deployed toward producing output or toward competing for rents, and eroding property rights to private capital in the process. In each model, common pool competition does not just fully dissipate the resource windfall; it also lowers welfare by drawing inputs away from more productive economic pursuits. The large corpus of empirical evidence associating resource wealth with reduced economic growth, particularly in societies with poor governance institutions, gives credence to the prediction of dissipation exceeding 100 percent.³²

Another distinguishing feature of rent-seeking models of the resource curse is the explicit treatment of the institutional context within which rent-seeking occurs. While the mainstream rent-seeking literature has rightly pointed out that the social losses from monopolies, tariffs, and subsidies extend beyond the Harberger triangle, it has paid relatively little attention to the idea that rent-seeking can be constrained by effective governance institutions.³³ This idea is, however, central to most rent-seeking models of the resource curse³⁴, and is supported by empirical results demonstrating that a resource curse only applies to societies with poor governance institutions.

An arguably more prominent departure from the rent-seeking literature is the view, now common in the resource curse literature, that institutions are endogenous and can be eroded by competition for a resource prize. This feature has not been explored by the mainstream rent-seeking literature to our knowledge. The hypothesis on institutional erosion has now been tested several times and generally validated; see, for example, Vicente (2010) and Tsui (2010).

While political economy theories often are difficult to test empirically, incorporating the resource curse phenomenon into the analysis may well provide new opportunities for testing. The

resource curse hypothesis postulates that a resource windfall will set off increased rent-seeking competition, with its attendant consequences. Resource windfalls are generally observable in price shocks or in new discoveries. This provides a source of observable variation in the intensity of rent-seeking competition, which may allow political economy researchers to test hypotheses that to date have been inaccessible to empirical research.

In conclusion, the resource curse phenomenon has proven to be a fertile ground for applying the idea of rent-seeking, but the two strains of literature have largely proceeded independently. Applying a general rent-seeking orientation in explaining the resource curse phenomenon has led researchers to make notable modifications to mainstream rent-seeking models, which in turn may usefully inform future research on rent-seeking. Rent-seeking as common pool competition, cast in a general equilibrium setting, seems to represent a new way of thinking about rent-seeking. Within this economic environment it is not difficult to find equilibria with more than full rent dissipation. The resource curse application has also provided scope for institutions to not only play a major role in rent-seeking models, but also to be determined through the models rather than exogenously imposed.

References

- Anderson, Simon P., Jacob K. Goeree, and Charles A. Holt, 1998. "Rent seeking with bounded rationality: An analysis of the all-pay auction." *Journal of Political Economy* 106, 828–53.
- Arezki, Rabah and Markus Brückner, 2010. *Commodity Windfalls, Polarization, and Net Foreign Assets: Panel Data Evidence on the Voracity Effect*. IMF Working Paper WP/10/209, International Monetary Fund.
- Aslaksen, Silje, and Ragnar Torvik, 2006. "A Theory of Civil Conflict and Democracy in Rentier States", *Scandinavian Journal of Economics* 108(4) 571-585.
- Bohn, H., and R. T. Deacon, 2000. "Ownership risk, investment, and the use of natural resources." *American Economic Review*, 90 (3), 526-49.
- Boschini, A. D., J. Petterson and J. Roine, 2007. "Resource Curse or Not: A Question of Appropriability" *Scandinavian Journal of Economics* 109(3) 593-617.
- Bulte, E. H., Richard Damania, Robert T. Deacon, 2005. "Resource intensity, institutions and development." *World Development*, Volume 33, Issue 7, July 2005, Pages 1029-1044.
- Caselli, Francesco, and Guy Michaels, 2009. "Do Oil Windfalls Improve Living Standards? Evidence from Brazil" NBER Working paper 15550.
- Collier, Paul, and Benedikt Goderis, 2009. "Commodity Prices, Growth, and the Natural Resource Curse: Reconciling a Conundrum". Unpublished manuscript, Department of Economics, University of Oxford.
- Collier, P., and A. E. Hoeffler, 1998. "On Economic Causes of Civil War." *Oxford Economic Papers* Vol. 50:563-73.

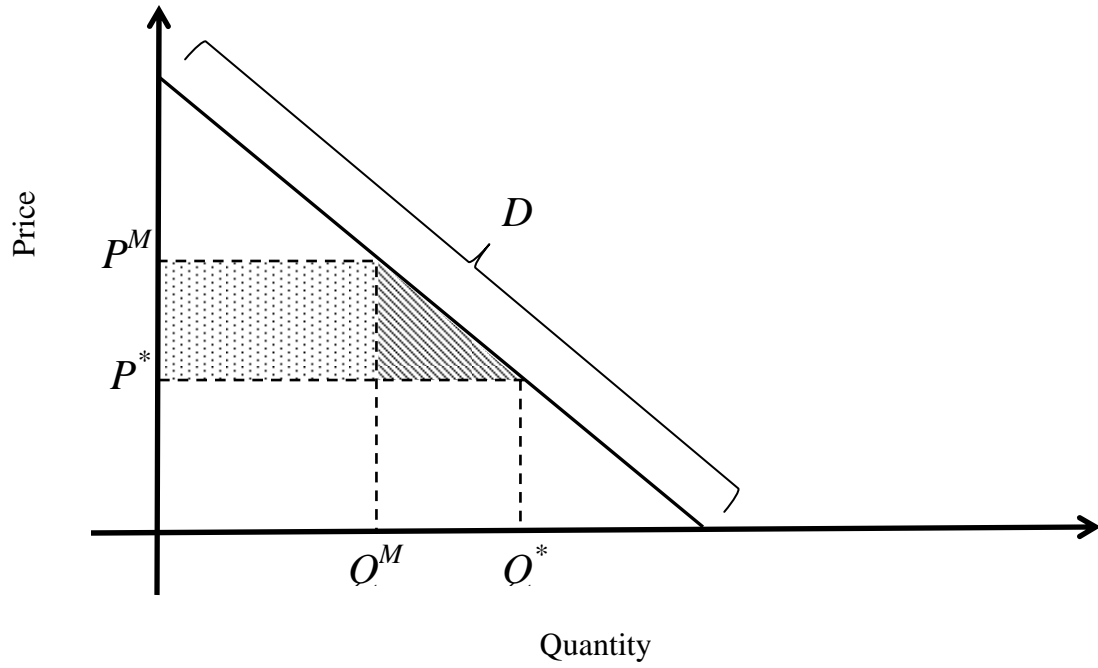
- Collier, P., and A. E. Hoeffler, 2004. "Greed and Grievance in Civil War" *Oxford Economic Papers* Vol. 56: 563-595.
- Congleton, Roger D. 1980. "Competitive process, competitive waste, and institutions." In James M. Buchanan, Robert D. Tollison, and Gordon Tullock (eds.), *Toward a Theory of the Rent-Seeking Society*. College Station: Texas A&M University Press, pp. 153–79.
- Congleton, Roger D. 1984. "Committees and rent-seeking effort." *Journal of Public Economics* 25, 197–209.
- Congleton, Roger D., Arye L. Hillman and Kai . Konrad. 2008. "Forty Years of Research on Rent Seeking: An Overview." In Roger D. Congleton, Arye L. Hillman and Kai . Konrad, Eds. *Forty Years of Research on Rent Seeking 1*. Berlin: Springer.
- Deacon, Robert T. 2012. "The Political Economy of the Resource Curse: A Survey of Theory and Evidence." *Foundations and Trends in Microeconomics* Volume 7 Issue 2.
- Frankel, Jeffrey, 2010. "The Natural Resource Curse: A Survey" Discussion Paper 2010--21, Cambridge, Mass.: Harvard Environmental Economics Program, Sept., 2010.
- Gelb, A.H. and Associates *Oil Windfalls: Blessing or Curse?*, (Published for the World Bank) New York: Oxford University Press, 1988.
- Gylfason, T., 2001. "Natural resources, education, and economic development." *European Economic Review* 45 847-59.
- Heston, Alan , Robert Summers and Bettina Aten, 2002. Penn World Table Version 6.1, Center for International Comparisons of Production, Income and Prices at the University of Pennsylvania, October 2002.

- Hehenkamp, Burkhard, Wolfgang Leininger and Alex Possajennikov, 2004. "Evolutionary equilibrium in Tullock contests: Spite and overdissipation." *European Journal of Political Economy* 20, 1045–57.
- Higgins, Richard S., William F. Shughart II, and Robert D. Tollison, 1985. "Free entry and efficient rent seeking." *Public Choice* 46, 247–58.
- Hillman, Arye, L. and Dov Samet, 1987. "Dissipation of contestable rents by small numbers of contenders." *Public Choice* 54, 63–82.
- Hodler, R.. 2006. "The curse of natural resources in fractionalized countries." *European Economic Review*, 2006.
- Isham, Jonathan, Michael Wookcock , Lant Pritchett and Gwen Busby, 2003. "The Varieties of Resource Experience: How Natural Resource Export Structures Affect the Political Economy of Economic Growth". Middlebury College Economics Discussion Paper No. 03-08, Middlebury Vt.
- Karl, Terry Lynn, 1997. *The Paradox of Plenty: Oil Booms and Petro-States*. Berkeley, University of California Press.
- Krueger, Anne O.. 1974. "The Political Economy of the Rent-Seeking Society." *American Economic Review* Vol. 64, No. 3 (June 1974) 291-303.
- Lane, Philip R., and Aaron Tornell, 1996. "Power, Growth and the Voracity Effect", *Journal of Economic Growth*, 1:(June 1996) 213-241.
- Leite, C and J. Weidmann, 1999. *Does Mother Nature Corrupt? Natural Resources, Corruption and Economic Growth*, Working Paper of the International Monetary Fund, IMF Working Paper WP/99/85.

- Mehlum, H.,K. Moene and R. Torvik, 2006. "Institutions and the Resource Curse". *Economic Journal*, 116 (Jan) 1-20.
- Papyrakis, Elissaios and Reyer Gerlagh, 2007. "Resource Abundance and Economic Growth in the United States" *European Economic Review* 51:1011-1039.
- van der Ploeg, Frederick, and Dominic Rohner, 2010. "War and Natural Resource Exploitation", Presented at 2010 AEA Meetings, Atlanta, GA.
- van der Ploeg, Frederick, 2011. "Natural Resources: Curse or Blessing?" *Journal of Economic Literature*, Vol. XLIX (June 2011) 366-420.
- Robinson, JA., R Torvik, T Verdier, 2006. "Political foundations of the resource curse." *Journal of Development Economics*, 2006.
- Rode, Ashwin, 2012. "Institutions and the Resource Curse within the United States" Unpublished. Department of Economics, University of California, Santa Barbara.
- Ross, Michael L., 2001. *Timber Booms and Institutional Breakdown in Southeast Asia*. Cambridge: Cambridge University Press.
- Ross, Michael L., 2006. "A Closer Look at Oil, Diamonds, and Civil War" *American Review of Political Science*, 9, 265-300.
- Sachs, J. D. and A. M. Warner 1997 *Natural Resource Abundance and Economic Growth*, Working paper, Center for International Development and Harvard Institute for International Development, November 1997.
- Sachs, J. D. and A. M. Warner. 2001. "The curse of natural resources" *European Economic Review* 45 827-38.

- Sala-i-Martin, Xavier, and Arvind Subramanian, 2003. "Addressing the Natural Resource Curse: An Illustration from Nigeria," Cambridge Mass., National Bureau of Economic Research, Working Paper 9804.
- Sylwester, Kevin. 2001. "A model of institutional formation within a rent-seeking environment." *Journal of Economic Behavior and Organization* 44, 169–76.
- Tornell, Aaron, and Philip R. Lane, 1999. "The Voracity Effect." *American Economic Review* Vol. 89(1) (March 1999) 22-46.
- Torvik, R., 2002. "Natural resources, rent seeking and welfare." *Journal of Development Economics*, 2002.
- Tsui, K. Kevin, 2010. "More Oil, Less Democracy: Evidence from Worldwide Crude Oil Discoveries." *Economic Journal*, 121(551), March 2011: 89-115.
- Tullock, Gordon. 1967. "The Welfare Costs of Tariffs, Monopolies, and Theft." *Western Economic Journal* (now *Economic Inquiry*) 5, 224-32.
- Tullock, Gordon. 1980. "Efficient Rent seeking." In J. Buchanan, R. Tollison and G. Tullock, eds., *Toward a Theory of the Rent-Seeking Society*. College Station, TX: Texas A&M University Press.
- Tullock, Gordon. 1987. "Rent Seeking" *The New Palgrave: A Dictionary of Economics*. First Edition. Eds. John Eatwell, Murray Milgate and Peter Newman. Palgrave Macmillan, 1987.
- Vicente, PC., 2010. "Does oil corrupt? Evidence from a natural experiment in West Africa". *Journal of Development Economics*, 2010.

Figure 1: Net Social Losses from a Monopoly



* Department of Economics, University of California, Santa Barbara.

¹ The dollar figure represents oil revenues after payments to foreign companies, as reported by Sala-i-Martin and Subramanian (2003, p. 4). Information on income is from Heston, Summers and Aten (2002).

² This example and the ensuing discussion are derived from Tullock (1987).

³ Tullock (1987, p. 147) writes, “Most discussion of rent seeking has tended to concentrate on those monopolies that are government created or protected, probably because these are observed to be the commonest and strongest. It should be kept in mind, however, that purely private monopolies are possible—indeed some actually exist.”

⁴ A rent-seeking contest need not be characterized as a lottery. An alternative characterization is an all-pay auction, in which contenders bid for the rent, the highest bid wins, and all contenders lose the value of their bids regardless of whether they win or not (Congleton et al., 2008). For more on rent-seeking as an all-pay auction see Congleton (1980) and Hillman and Samet (1987).

⁵ For an efficient summary of the research on rent-seeking over the last forty years, see Congleton et al. (2008).

⁶ In the mainstream literature on rent-seeking, there are only a few instances where more than full dissipation has been obtained as an equilibrium result. Higgins et al. (1985) propose a model in which rent-seeking effort is imperfectly observed. There exists a mixed strategy equilibrium in which, on average, rents are fully dissipated, but ex-post, more than full dissipation may be observed. The model of Hillman and Samet (1987) obtains a similar result. Other authors have resorted to behavioral explanations for more than full dissipation, for example bounded rationality (Anderson et al., 1998) and spite (Hehenkamp et al., 1998).

⁷ A comprehensive survey of market-based explanations for the resource curse is beyond the scope of this paper, however interested readers may refer to Frankel (2010) and van der Ploeg (2011).

⁸ Using a cross-section of countries, Sachs and Warner related growth in per capita income to the importance of primary products in a country’s exports, which they interpreted as natural resource abundance, controlling for initial income, openness to trade, and the investment to GDP ratio. The coefficient on resource abundance was negative and substantial—seemingly to indicate a natural resource curse. Increasing the primary products export share caused the predicted growth rate to fall by 0.6 to 1.5 percentage points. Sachs’ and Warner’s use of a country’s primary products export share as a measure of natural resource abundance has been criticized on several grounds. Primary products include food, agricultural goods, fuels, and minerals, so the goods are heterogeneous. Furthermore, export share is a flow variable, while abundance is a stock variable. Perhaps the most significant criticism is that export share is clearly determined by economic behavior and is therefore endogenous.

⁹ Roughly a decade before Sachs-Warner’s analysis, Gelb (1988) noted that the poor performance of oil rich countries after 1970 cannot be explained by conventional economic arguments and concluded that faulty government decision-making was a significant factor.

¹⁰ Sala-i-Martin and Subramanian (2003) were among the first to look for a political link in the connection between resource abundance and reduced economic growth. Adopting the Sachs-Warner cross-sectional empirical strategy, they found that, while resource abundance is linked to slow economic growth, the entire effect operates through an institutional channel, operationalized by a rule of law index. If the institutional effect is controlled for, resource abundance has no further direct effect on economic growth.

¹¹ Leite and Weidmann (1999), Isham et al. (2003), and Boschini et al. (2005) all report this result.

¹² Contest functions are also used in the model of van der Ploeg and Rohner (2010), which is a model of violent conflict fueled by natural resource wealth. The idea that natural resource wealth can lead to armed conflict constitutes a different kind of resource curse that is exemplified the experiences of countries such as Angola, Nigeria, Sierra Leone, and the Democratic Republic of the Congo (formerly Zaire). We do not cover work on natural resources and armed conflict in our paper. Interested readers can refer to the survey by Ross (2006) as well as key empirical contributions by Collier and Hoeffler (1998, 2004).

¹³ In Mexico government’s share of GDP rose by more than 150% between 1970 and the oil price peak of the early 1980s.

¹⁴ The institutional indicator is a dummy variable based on data from the International Country Risk Guide.

¹⁵ Institutional quality is represented by an index that combines ratings (from the International Country Risk Guide) on corruption in government, risk of contract repudiation, risk of expropriation, bureaucratic quality and rule of law.

¹⁶ The finding that growth rates slow in weak-institution countries when a windfall arrives may indirectly agree with the excess dissipation hypothesis, if dissipation is construed as a reduction in present value income and the discount rate applied to future income is sufficiently low. Mehlum et al. (2006) do not carry out the calculations necessary to

determine this, however.

¹⁷ The data suggest that in the context of U.S. states corruption and abundance of resources, at least fossil fuel resources, may be linked. Several of the high corruption states, such as Oklahoma, Montana, North Dakota, Louisiana and Alaska, have large fossil fuel extraction sectors and are resource rich more generally (Rode, 2012).

¹⁸ Both coefficients are only marginally significant.

¹⁹ Rode's (2012) empirical strategy does not address possible endogeneity of corruption.

²⁰ This result rests on the key assumption that natural resource rents are allocated only by rent-seeking, whereas other forms of wealth are, in the absence of institutional impairment, allocated according to the effort provided to produce them.

²¹ Fractionalization is the probability that two randomly drawn individuals share a common trait.

²² There also exist a number of critical appraisals that question whether the resource curse is a real phenomenon or merely a spurious correlation. Readers may refer to Deacon (2012) for a summary of this line of work.

²³ Country-specific commodity price indices are constructed using each country's 1990 export levels and treating these as fixed. Collier and Goderis (2009) use panel cointegration methods to separately identify short and long run effects. They include country fixed effects and regional time dummies to account for unobserved heterogeneity and include an error correction term to capture short-run responses to shocks. They regard institutions as fixed, unaffected by resource price booms.

²⁴ Price booms in agricultural commodities are generally beneficial for both weak- and strong-governance countries.

²⁵ Other such attempts include Papyrakis and Gerlagh (2007) and Rode (2012), both of which use data from U.S. states.

²⁶ Royalty payments to a municipality are determined by a complex set of rules that take into account the value of a municipality's oil production, as well its population size and the oil infrastructure situated within its territory. By using oil production as an instrumental variable, Caselli and Michaels (2009) are able to exploit royalty revenue as an exogenous source of a resource windfall. They argue that oil production is a valid instrument because it is seen to be correlated with royalty revenue and is plausibly uncorrelated with a municipality's unobservable characteristics. The latter point is justified by showing that outcome variables did not differ between oil-endowed and non-endowed municipalities prior to oil discoveries. Caselli and Michaels (2009) also find that royalty revenue has no effect on local GDP or the composition of output beyond its direct contribution to petroleum sector output, so resource wealth is not a curse on pure economic grounds.

²⁷ Except where otherwise indicated all of the information in this subsection is taken from Vicente (2010).

²⁸ Both countries were Portuguese colonies for roughly 500 years, before gaining independence in the mid 1970s. Post-independence, both had autocratic socialist regimes until 1989, both conducted their first multi-party elections in 1991, and in each country the incumbent was defeated. In the years since, both have experienced similar electoral cycles and shifts in party dominance. Geographically, both are small island nations located in close proximity to one another, and in recent decades there have been considerable migratory flows between the two countries. Both countries have received similar packages of aid from the IMF and World Bank and have faced similar conditions from these agencies.

²⁹ See for example Aslaksen and Torvik (2006) and Robinson, Torvik and Verdier (2006).

³⁰ Oil quality (depth and physical characteristics) variables are included to control for variations in the value of oil discovered, as the underlying hypothesis on corruption involves rents derived from petroleum extraction. Tsui (2010) also recognizes that discoveries can be determined by institutions, as Bohn and Deacon (2000) have shown, and uses a two stage procedure that allows for endogeneity of reserve discoveries.

³¹ Adding variables for oil quality to the democracy interactions roughly doubles the estimated negative effect of discoveries on democracy trends. Including fixed effects for decades (to control for temporal effects that may cause democracy shifts worldwide) and for large oil producing Middle Eastern states affects the size of the estimated effects but does not eliminate their statistical significance.

³² We are not aware, however, of any direct attempts to verify that dissipation exceeds 100 percent.

³³ This is not to say that institutions are entirely absent from the mainstream rent-seeking literature. Rather they tend to appear implicitly in aspects of the economic environment, e.g. the shape of the contest function or possible barriers to entry in rent-seeking, and are not usually a central concern of the models. Congleton (1980, 1984) and Sylwester (2001) are among the few examples from the mainstream rent-seeking literature that explicitly consider the role of institutions.

³⁴ Hodler (2006) is an exception.