International Interactions
Empirical and Theoretical Research in International Relations
Publication details, including instructions for authors and subscription information:
http://www.informaworld.com/smpp/title~content=t713718605

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Online Publication Date: 01 April 2008

To cite this Article: Nooruddin, Irfan (2008) 'The Political Economy of National Debt Burdens, 1970-2000', International Interactions, 34:2, 156 — 185

To link to this article: DOI: 10.1080/03050620802083228
URL: http://dx.doi.org/10.1080/03050620802083228

International Interactions, 34:156–185, 2008

ISSN: 0305-0629
DOI: 10.1080/03050620802083228

The Political Economy of National Debt Burdens, 1970–2000

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Why did developing country governments find themselves mired in high debt by the end of the twentieth century? This paper develops a theoretical framework to understand the relationship between political institutions, resource wealth, and debt burdens. Hypotheses generated are tested on a time-series cross-section data set of developing countries from 1970–2000. Three main findings are reported: oil wealth has a positive relationship with debt; this relationship is weakly conditional on the country's regime type; and the relationship is independent of general commodity price volatility. The paper concludes with a discussion of the implications of this research for our understanding of the 'resource curse.'

KEYWORDS *oil, debt, democracy, development, resource curse*

The recent campaign for debt forgiveness by the world's poorest countries returns national debt to center stage after a few decades of relatively little attention. The ability to generate debt by selling loans to foreign actors is an important tool of sovereign governments who can use the credit to generate revenue for much-needed spending projects without having to resort to distortionary taxation (Barro, 1979; Lucas and Stokey, 1983). Yet, as the experience of developing countries over the past twenty-five years suggests, debt can be a double-edged sword. Recent research shows that debt has had at least

I thank Carew Boulding, Pradeep Chhibber, Tim Frye, Steve Kretzmann, Jennifer Nowlin, Michael Ross, Heidi Sherman, Joel Simmons, and three anonymous reviewers for comments and suggestions. Michael Ross and Steve Kretzmann aided with the construction of the data set used here; this paper would not have been possible without their help and encouragement. Michael Litzinger provided research assistance. All errors remain my own.

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three distinct negative effects on the economic performance of developing economies. First, as the size of external debt grows relative to the size of GDP, the debt-overhang hypothesis suggests that the debt acts as a tax on future output, which discourages output and encourages capital flight. Second, debt-servicing burdens eat away a major proportion of export earnings, and crowd out domestic investment. As such, programs necessary for fostering long-term economic growth such as investment in human capital and infrastructure development are neglected. Third, the pressure of the debt burden reduces the ability of governments to enact and sustain necessary adjustment programs to place their economies on more stable footing (Ajayi, 2000; Boyce and Ndikumana, 2001; Clements et al., 2004; Edo, 2002; Hermes and Lensink, 1992; Mahdavi, 2004; Manzano and Rigobon, 2001).

The academic study of national debt burdens reached its peak within political science in the mid-1980s and typically focused on debt's consequences rather than its determinants. This literature, spearheaded by Latin Americanists in the aftermath of the Mexican peso crisis, focused mainly on the impact of the twin oil shocks of the 1970s on oil-importing developing countries. Further contributions, most notably by Robert Kaufman (1985) and Jeffrey Frieden (1991), explored the interaction of domestic political institutions and societal coalitions in shaping government responses to the debt crisis. Most recently, scholars have considered the source of a democratic advantage in generating debt, and its implications for state-building and states' war-making abilities (Schultz and Weingast 2003; Stasavage 2003).

This paper seeks to contribute to this literature by offering a theoretical framework for understanding the determinants of national debt in developing countries in the latter half of the twentieth century. To be satisfying to political scientists, any such framework should accomplish three tasks. First, it must provide a political foundation for expecting variation in the size of debt burdens. Second, it must explain why, unlike in the developed world where debt helped build state capacity (Schultz and Weingast, 2003; Stasavage, 2003), developing country debt burdens spiraled out of control and eventually required the debtor states to demand debt relief or threaten default. That is, it must be able to explain why rational governments would borrow too much and why rational lenders would lend too much. Third, the explanation should account for why the bulk of developing country debt was generated in the last twenty-five years; what was it about this period that led to the explosion of debt burdens?

The main details of the argument are as follows. Democratically-elected governments face constant pressure from constituents to provide increased levels of public services. In developing countries, where tax bases are typically narrow and extraction capacity limited, governments sell loans to foreign creditors to generate the fiscal space required to provide these public services. Democracies, in particular, are more susceptible to constituent pressures for increased services and therefore have a greater need to generate

loans, which they do by leveraging their greater ability to make credible commitments to repaying their debts (Schultz and Weingast, 2003). While domestic politics tells part of the story, the other part is played by international economic factors beyond the control of any given government. Specifically, the beginning of the period covered here coincides almost exactly with the formation of the Organization of Oil Exporting Countries (OPEC) and the first oil price shock. The drastic increase in oil prices had two effects. For oil importers, the higher prices meant ballooning energy bills; for oil exporters, the higher prices promised a hitherto unimaginable revenue stream that could be mortgaged to generate revenues in the present. Thus, the argument developed in this paper provides both a political basis for debt, and explains why debt proved difficult for developing countries to manage and why debt distress became a way of life for developing countries over the past twenty years.

This argument is developed in more detail in the next section, and integrated with previous explanations of developing country debt. Then I describe the research design and data used to test the argument's observable implications, and present the results of the statistical analysis. The paper concludes with a summary of the paper's contributions and its implications for our understanding of the "resource curse."

POLITICS, RESOURCES, AND DEBT

Politics might be defined as the problem of satisfying a multiplicity of demands with a scarcity of resources. Governments face many more demands on their resources than they are able to meet, which forces them to make choices and trade-offs. All governments provide (some) citizens access to the state's resources, in exchange for which these citizens reward governments with their continued support. While by no means the only way, a primary form of this exchange is public spending. Governments reward their supporters in one of three ways: through graft and corruption, through private or club goods, or through the provision of public services. A principal distinction between these three methods is the number of citizens targeted under each, with graft and corruption opportunities accruing to few and access to public services to many. All governments can use a combination of these three methods, and the weight placed on each is a function of two factors: (1) the political rules-of-the-game which determine how political support is translated into political survival, and (2) the resources available to the state.

While all governments are sensitive to the importance of currying favor with key supporters, some have to win support from greater shares of their total population than others (Bueno de Mesquita et al., 2003). Democracies, or systems in which leaders must win the support of a plurality of eligible

voters, are therefore more likely to provide public services than nondemocracies (Avelino, Brown, and Hunter, 2005; Brown and Hunter, 2004; Chhibber and Nooruddin, 2004; Lake and Baum, 2001; Stasavage, 2005). The demand for state-provided resources is never-ending and ever-increasing and political leaders cannot simply rest on their prior accomplishments but rather must continuously provide constituents resources in order to be reëlected. This explanation is thus consistent with the empirical observation that the size of governments in democracies tends to be larger, *ceteris paribus*, and that the size of governments grows over time (Meltzer and Richard, 1981; Tanzi and Schuknecht, 2000).

To fund their programs, governments must have sufficient revenues. Revenues can come from one of two sources: taxation or deficits funded by the sale of loans. In developing countries, tax bases are typically narrow and the state's ability to extract taxes is notoriously limited. Therefore, governments utilize their ability to sell loans internationally to generate revenue needed to fund domestic spending projects. Here, democracies enjoy a considerable advantage over nondemocracies due to the greater credibility of their commitments to repay their debts. Schultz and Weingast state this argument succinctly: "[R]epresentative institutions enhance a state's borrowing power by making it easier for those with a stake in the repayment of debt to punish the sovereign in the event of default." Therefore, "the commitment technology provided by these institutions means that states possessing them have superior access to credit than states that are not similarly constrained" (2003, p. 5). In other words, other factors equal, *democracies should be able to generate more debt than nondemocracies*.

The argument thus far has emphasized the government's credibility as a determinant of lender's willingness to buy loans. But the size of national debt is also shaped by the revenues available to governments. First, governments with smaller revenues have greater need for external credit and therefore likely to demand more, other things equal. And, second and somewhat counterintuitively at first blush, governments with larger revenue streams should be able to acquire more credit due to their higher levels of solvency and liquidity (Kraay and Nehru, 2006). In the 1970s, a single factor became relevant for both aspects of the revenue-debt relationship: Oil.

In 1984, economist William Cline wrote that "the single most important exogenous cause of the debt burden of nonoil developing countries is the sharp rise in the price of oil in 1973–74 and again in 1979–80" (Cline, 1984, pp. 8–9). Further, Cline estimated that developing countries "lost $141 billion in higher interest payments, lower export receipts, and higher import costs as the consequence of adverse international macroeconomic conditions" that resulted from the oil shocks (1984., p. 13). The key details of this story are as follows: Flush with the petrodollars resulting from the first OPEC-induced oil price increases in the early 1970s, banks in the West were quick to offer generous loans to developing countries who were eager and

desperate for infusions of capital to finance their development programs. The development and industrialization of these developing economies generated an almost insatiable appetite for energy resources. When oil prices rose again in the late 1970s, due to uncertainties surrounding the Iranian revolution and the decisions of nervous Western investors to purchase oil on the spot market in anticipation of further increases in the prices of oil, a second oil shock hit the developing world. Overnight the price of these countries' energy imports doubled or tripled, leaving them little option but to generate more debt to pay for their imports.

Concurrently, the world economy sank into a recession in the late 1970s as a result of increased oil prices. The U.S. government chose to respond with a deflationary economic policy and increased interest rates, which strengthened the dollar and caused debt burdens in the developing world to increase since much of their debt was dollar-denominated (Cline, 1984, pp. 11–12). Another impact of the higher interest rates on developing states was their reduced ability to sell new loans, which meant a diminished net cash inflow (Aliber, 1985–86, p. 122). This was exacerbated by the Mexican peso crisis in 1982, after which lenders were reluctant to purchase new loans from other developing countries too (Aliber., p. 123). The reduction in cash inflows meant many developing countries were no longer able to pay the interest on their existing debt, let alone pay down the principal, and fell into arrears. Their debt burden further soared.

A final contributing factor was the rapidly declining terms-of-trade for developing countries (Cline, 1984, pp. 12–13). The increased oil prices and the global recession resulted in a collapse of commodity prices because of reduced demand in the industrialized West for raw materials exported by developing countries, which hurt the export earning potential for most developing states. And even the oil exporters, who were enjoying higher oil revenues, did not escape this effect. First, "Dutch disease" set in whereby the rapid growth of the oil sector hurt the competitiveness of other export sectors. Second, many oil-exporting states used their revenues to increase imports. The increased oil prices, however, had led to increased prices of manufactured goods imported from developed countries (Baker, 1977, pp. 192–193). Thus, the non-oil import bills for developing countries also increased rapidly. A second observable implication of the argument is thus that countries with greater levels of energy imports should have higher debt burdens, *ceteris paribus*.

Writing in the aftermath of the first OPEC oil shock of 1973–1974, Baker wrote that "no event since World War Two has had such an impact on global economic and political relationships as the quadrupling of the international price of crude oil at the end of 1973 and beginning of 1974" (1977, p. 192). Those "fortunate" enough to have oil reserves were expected to benefit considerably by the increase in export revenues, while those "unlucky" enough to lack oil reserves of their own were overnight saddled

with unbearably large energy bills. This expectation provided only half-correct. For the reasons discussed above, oil importers incurred deep debts, the effects of which they continue to feel three decades later. But, in thinking that the oil exporters were the "lucky ones," analysts reached a mistaken conclusion. While the causal mechanisms were distinct, oil exporting countries too soon found themselves burdened by large and unsustainable external debts, even as they enjoyed previously unthinkable revenues from oil sales. Why would this be the case?

Cline's analysis of this relationship in the aftermath of the 1982 Mexican peso crisis provides a useful starting point for this portion of the argument:

> Mexico's large build-up of debt was almost certainly accelerated rather than deterred by higher oil prices. Mexico first borrowed heavily to develop oil production, and subsequently the promise of oil exports was the main basis for its ability to borrow large amounts more generally in pursuit of a high-growth strategy. (Cline, 1984, p. 10)

And the same is probably true, he suggests, for the debts of Venezuela, Nigeria, Indonesia, and Ecuador (Cline, p. 11). In her seminal study of the detrimental consequences of oil wealth, Terry Karl also suggests that oil resources and debt are causally related (1997, pp. 29–30).

Three effects of a revenue windfall are crucial to understanding why oil wealth might lead to high debt burdens. First, the revenues gained from oil exports were not the only new source of income for developing country governments. Flush with petro-dollars, and seeking to invest in what appeared to be a promising future, developed country banks and governments, as well as multilateral lenders, were quick to open lines of cheap credit to these oil-rich states. In addition, since most of these developing states lacked the technological resources required to extract and refine their oil, foreign investors rushed to provide these services, leading to an additional influx of foreign capital into the government's coffers. Overnight, any resource constraint that might have existed vanished.

Indeed, easy access to international capital on the strength of their oil resources allowed oil-rich countries to finance fiscal and balance-of-payment deficits. Aliber, in his analysis of the Latin American debt cycle, argues that "the common factor explaining the increase in external loans of both oil-importing and oil-exporting countries is that international lenders were relaxing their credit-rationing standards" (1985–86, p. 118). In part, these lower standards were the result of increased deposits of petrodollars into these banks as a result of the oil shocks. The banks had more money on hand to lend, and there as no shortage of developing countries willing to borrow. But a second aspect of a bank's lending decision concerns the credit-worthiness of the potential borrower. And here the presence of proven oil reserves in an era of increasing oil prices gave oil-exporting

developing countries a credit-rating far higher than their domestic political and macroeconomic fundamentals would have otherwise justified. Solvency and liquidity are two criteria lenders use to evaluate a country's creditworthiness (Ajayi, 2000, pp. 30–33; Kraay and Nehru, 2006). A country is considered solvent if the growth rate of its exports exceeds the interest rate on the debt, and is considered liquid if its export earnings exceed its net debt (that is, its debt is less than its foreign reserves). For the oil-exporting countries in the 1970s, both measures leaned heavily in their favor. Their liquidity was extremely high as they were relatively under-borrowed given their new-found oil wealth and their export earnings were skyrocketing. Likewise, in an era of low global interest rates, the growth rate of their exports far exceeded the interest rate on their debt. Therefore, they were able to leverage their oil wealth to generate huge influxes of foreign loans. Further, there exists a paradox with respect to a country's debt and its ability to pay off its interest on a regular basis. The greater the ability and willingness of a country to pay its interest on a scheduled basis, the less likely the lenders will oblige it to do so, and in fact the mere demonstration of willingness to pay the interest might persuade lenders to buy new loans. This allows countries to capitalize scheduled interest payments into ever-increasing external debt (Aliber, 1985–86, p. 122). Nor were borrowing governments alone in endorsing this strategy. International lenders have proven eager to provide financing to countries with oil resources because they anticipate this source of wealth coming online. The World Bank and IMF have also been quick to finance projects to develop extractive sectors because of anticipated high rates of return, even though evidence is mounting that such sectors rarely do much good for the country in the long run (Ross, 1999, 2001, 2003; Vallette and Kretzmann, 2004).

Given the claim that governments trade access to state resources for political support, a second expectation stemming from rapidly increasing oil revenues is that governments should spend more money. Previous research has demonstrated that political survival is tied to the size of the economic pie (Karl, 1997, p. 228; Przeworski et al., 2000) and, based on data from India, Nooruddin and Chhibber (2008) conclude that governments in resource-strapped states were more likely to experience vote swings against them. Ideally, states experiencing a dramatic revenue windfall, such as the one caused by oil exports in the 1970s, would store some of these revenues away for a rainy day (Devlin and Titman, 2004; Sandbu, 2006). But, as Karl states, this is easier said than done: "Booms not only exacerbate existing rent-seeking behavior but create such behavior where it did not already exist" (1997, p. 66). The demands on governments grew rapidly, and governments themselves were quick to recognize opportunities to bolster political support using their newfound resources.

Nigeria's experience is instructive. The revenue windfall from the first oil shock led to significant increases in government expenditure designed to

expand infrastructure and improve non-oil productive capacity. The pressures to spend these newfound resources came from all quarters of the Nigerian state (Lewis, 1996, p. 81). The state created a large number of parastatals to oversee this development, resulting in a bloated civil service. Nigeria also used its oil export revenues to finance its growing appetite for imports both in terms of capital-intensive technology and assembly-type industries required for industrial development and in terms of consumer goods. The increased public expenditures went primarily into transportation, primary education, a major steel complex, construction, and an automobile assembly plant (Pinto, 1987, p. 432). Nigeria's federal structure, and the increase in the number of states from 4 (after 1963) to 19, meant higher expenditures on infrastructure at the local levels as well and less federal control over spending (Suberu and Diamond, 2002, p. 406; Rimmer, 1985; IMF, 2004). As such, these expenditures were not fundamentally misguided for a developing country. Rather, the problem was that buoyant oil revenues enabled the government to rule "excessively, inefficiently, corruptly, and often ineffectively" (Rimmer, 1985, p. 438; Sala-i-Martin and Subramaniam, 2003 make a similar point).

In Ecuador, a similar situation unfolded. In 1972, just as oil revenues spiked, the military seized power. The new leader, Rodríquez Lara, expanded the state's role in economy, relying on increased petroleum revenues to fund an ambitious five-year development plan that included import-substitution industrialization, infrastructural development (especially energy and roads), generous state incentives and tariff protection for domestic producers, low interest rates, and high subsidies (Weiss, 1997, p. 14; Beckerman, 2001, p. 5). Over the course of the next few years, Lara's popularity gradually declined till he was replaced by a military triumvirate in 1976. The new rulers leveraged their oil revenues to increase foreign borrowing to finance higher expenditures and a balance-of-payments deficit, which they hoped would limit domestic unrest (Weiss, 1997, p. 14; IMF, 2003, p. 11). Within a year, the debt increased exponentially, and even though oil prices continued to rise in the late 1970s, by 1980, Ecuador's debt stock stood at over 200 percent of its exports, and its total public and publicly-guaranteed (PPG) external debt, which was a mere US$328 million when Lara came to power, now reached US$3.3 billion (IMF 2003).

The third effect of the oil windfall, which is closely related to the argument above, is that the rapidly increasing economic pie encouraged corrupt and rent-seeking behavior (Ajayi, 2000; Boyce and Ndikumana, 2001; Edo, 2002). In many developing countries, oil wealth barely made a difference for everyday life. The World Bank estimates that 80 percent of the revenues from Nigeria's oil industry accrue to just one percent of the population (DOE, 2005b, p. 6). While it remains unclear just how much money has been stolen outright, it is clear that much of it has been used for patronage purposes (Ross, 2003, p. 12). Patronage politics also claimed a lion's share of

oil revenues in Congo-Brazzaville. The oil wealth led to an expansion of imports, including consumer goods and foods, to which the Congolese population became accustomed (Clark, 1997, p. 73). Further, Presidents Ngouabi and Sassou-Nguesso used the oil revenues to provide patronage, promising civil service jobs to all new university graduates (Clark, 1997, pp. 65–67). No wonder the civil service expanded from 3300 in 1960 to 73,000 in 1986, amounting to more than a quarter of the work force (Clark, 1994, p. 3). These leaders also expanded the size of Congo's armed forces and financed a well-paid presidential guard, both of which were used to maintain order and preserve power (Clark, 1997, p. 67). Finally, other export sectors declined due to Dutch Disease, and the rapidly growing state sector bred corruption and proved a drain on resources "requiring heavy subsidization to cover losses due to over-staffing and inefficiency" (1997). Likewise, in Angola, the oil revenues were used to buy military supplies to fund a long and devastating civil war (Pycroft, 1994, p. 244). And, more recently, a 2004 report by Human Rights Watch alleges that, between 1997 and 2002, over $4.2 billion of Angola's oil revenues could not be accounted for by the Angolan government (DOE, 2005a, p. 2).

To summarize the argument thus far: Positive price shocks were wasted because developing country governments grew too rapidly and without adequate concern for the quality of their investments. The increased revenues from positive price shocks also created incentives for corrupt and rent-seeking behavior, and exacerbated societal tensions when the distribution of oil revenues were not considered equitable. Further, the higher volatility in revenues reduced the time horizons of policy actors who felt compelled to spend the revenues when they are there. Put together, these various effects of revenue volatility resulted in rising fiscal deficits, the financing for which governments relied on external borrowing (Dornbusch, 1989; Edo, 2002).

The strategy of leveraging oil wealth to gain access to international capital is not in itself a mistake. Indeed, since oil is an asset, one of its advantages is to facilitate intertemporal trade, allowing a developing country to run current account deficits now and use future surpluses to repay them (Pinto, 1987, p. 435). But the sustainability of such a strategy depends on the expectation that boom and bust years will alternate at roughly the same frequency. If, however, the oil market were to enter a period of sustained sluggishness, serious dislocations are the consequence (Dehn, 2004; Devlin and Titman, 2004; Pinto, 1987). In hindsight, we know that this is exactly what happened. Oil-exporting developing countries generated huge external debts in anticipation of increasing earnings from oil exports, but reduced demand for oil due to the global recession coupled with the oil glut of 1982 resulted in declining oil prices, leaving these countries extremely overexposed and vulnerable. This risk was certainly considered in the 1970s, but expectations about the future of oil prices proved overly

optimistic. For instance, even as he warned about the "general international price instability which has traditionally afflicted a whole range of primary products," Baker concludes that "at present it seems improbable that oil prices will fall" (1977, p. 190). Nor was he alone in such optimism. Pinto (1987, p. 424) argues that it is quite plausible "that the transient nature of the oil boom was not foreseen in the mid-1970s." To support this claim, Pinto provides the following forecasts from the World Bank's Economic Analysis and Projections Department for the 1985 price of a barrel of oil made at 3 different points in time: "in 1976, the forecast was $21.9; in 1979, following the second oil shock, the number was revised upward to $47.3" (1987). Following the oil glut of 1982, in 1983 the Bank revised the forecast downward to $29.0, but even this proved too optimistic. Von Lazar and McNabb (1985, pp. 124–125) concur: "Popular prevailing wisdom forecast national economic expansion and growth throughout the 1980s, with oil prices reaching the $75–80 level by 1990." But the oil glut and decline in demand resulted in a much greater than anticipated softening in the price of oil, the net effect of which "was that heavy borrowers/exporters suddenly found themselves unable to service even their debt charges, much less to pay on the actual principal" (von Lazar and McNabb, 1985, p. 125).

The three effects of a revenue windfall discussed here together suggest a third observable implication: *Ceteris paribus, increased oil revenues should lead to higher debt burdens*.

Does oil have this debt-inducing impact in all countries, or are some polities more prone to this syndrome than others? Earlier I argued that democratic governments face greater pressure to provide state resources to their citizens and that they enjoy greater access to international credit due to institutional structures allowing debtors to punish leaders who default on debt. This argument, in conjunction with the revenue windfall argument developed above, implies an interactive relationship between oil resources and domestic political institutions: *Increasing oil revenues should result in higher debt in democratic countries than in nondemocratic countries, ceteris paribus*. This expectation accords well with recent research that provides suggestive evidence for the existence of a conditional relationship between resources, domestic factors, and policy outcomes. For instance, Hodler (2006) argues that whether natural resources are a blessing or curse depends on the societal fractionalization of the country in question. In fractionalized countries, resource wealth leads to increased conflict and lower income, but in homogenous countries, resource wealth increases income. Similarly, Nooruddin and Simmons (2006) show that democracies and non-democracies react differently to structural adjustment programs imposed by the International Monetary Fund (IMF).

In this section, I have presented a political economy explanation for developing country debts that focuses on the interaction of political incentives, resource wealth, and exogenous price shocks that resulted in

overspending by governments and overlending by banks and multilateral organizations. The explanation yields four observable implications which I subject to statistical testing below. In the next section, I describe the research design and data used to test these hypotheses, and then discuss the results of these tests.

DATA AND RESULTS

The dependent variable, *Debt*, is measured by two different indicators. The first, external debt as a proportion of GDP, focuses on the total debt owed to nonresidents repayable in foreign currency, goods, or services. It is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt. The second measure, debt service as a proportion of gross national income, is the sum of principal repayments and interest actually paid in foreign currency, goods, or services on long-term obligations of public debtors and long-term private obligations guaranteed by a public entity.

The main explanatory variables are democracy and oil resources. Democracy is measured using the 20-point Polity scale developed by Marshall, Jaggers, and Gurr (2005). To measure oil resources, I consider two different measures, both of which are designed to avoid problems of conflating resource wealth with its effects on the rest of the economy. The first is a country's annual level of crude oil production, measured in units of 1000 metric tons.[1] An advantage of this indicator is that it captures nicely the size of the oil industry in a particular country, while reducing concern that we are simply measuring the consequences of "Dutch Disease." For example, a measure of oil dependence in the form of the share of national income comprised from oil revenues might tell us about how large the oil industry is, but is also correlated with the performance of other sectors in the economy. Thus, a "monoculture" economy dominated by oil could have a higher Oil-GDP (or Oil-Exports) ratio than one in which the economy is diversified even if the latter country produced and exported more oil annually.

Second, as a robustness check, I utilize a new indicator from the World Bank that seeks to measure the true size of revenues earned from oil production. *Oil Rents* is the ratio of total rents from oil to GDP.[2] This variable is calculated as (Production Volume)*(International Market Price – Average Unit Production Cost). I consider the effect of the absolute size of oil revenues, which I enter in the statistical model in its logged form.[3]

To ensure that any association between oil and debt is not spurious, the analysis includes other factors typically identified in the theoretical and policy literature as leading to higher levels of debt and that might also

covary with large oil sectors. Existing explanations of debt identify the following factors: *Size of Economy*: The larger a country's economy, the more likely it is to be able to attract loans and to generate debt; *Growth Rate*: Similarly, countries that are growing faster should have lower levels of debt burden; *Liquidity*: The size of a country's reserves should be negatively correlated with debt since countries with larger reserves have smaller need for outside capital; *Trade Openness*: Developing countries with more of their economy exposed to the vagaries of international trade might be expected to have higher debt burdens because of higher volatility of income and the possibility of trade deficits; *Energy Import Dependence*: Countries that rely on imports to meet their energy needs are more likely to be hurt by price shocks, and since energy demand is relatively inelastic in the short run, this is likely to lead to higher debts. In other models, I also include a measure of Commodity Price Volatility to test whether oil's effect on debt is distinct from that of general developing country dependence on volatile commodity exports for income. However, since data for this variable are more limited, I do not include it in the base model to maximize sample size. Descriptions and summary statistics for all the variables are provided in the appendix.

Before turning to the multiple regression analysis, consider Figures 1 and 2 which document an apparent relationship between two different measures of a country's oil wealth and its indebtedness. To ameliorate concerns of reverse causation, the oil wealth variables are measured as averages for the 1990s while the debt service variable is measured as an averages of 2001 and 2002.[4] This lag allows us to be more confident that any apparent relationship can be attributed to oil wealth leading to debt rather than the other way around.

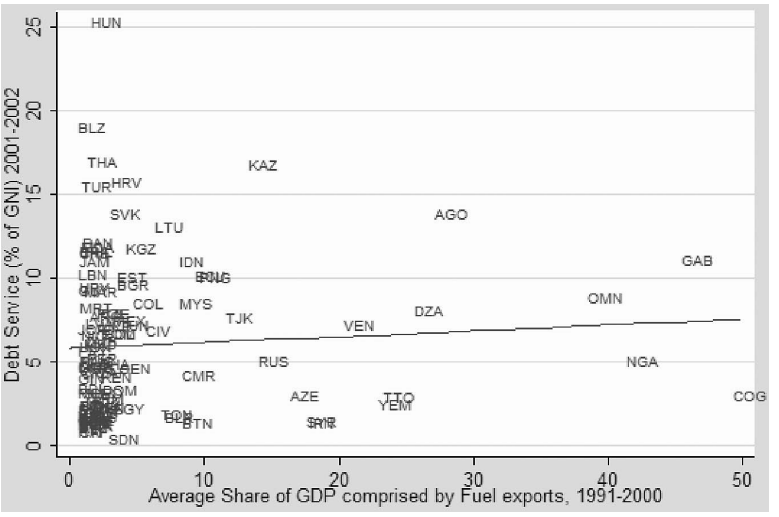

FIGURE 1 Fuel Exports and Debt Service Burdens.

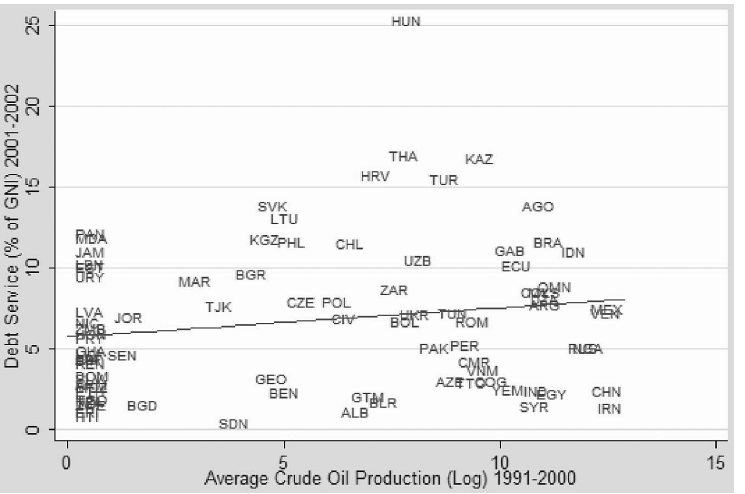

FIGURE 2 Oil Production and Debt Service Burdens.

In each figure, the horizonal axis arrays countries according to the size of their oil sector, while the vertical axis arrays them by the size of their debt service burden. The data points are labeled using the World Bank country codes for each country. Though both scatterplots reveal a few outlying observations (Hungary, for instance), in each the overall trend-line indicates a positive relationship between oil wealth and debt burdens. Of course, these plots — while suggestive — are hardly definitive evidence of a relationship since other factors could be driving the relationship. Therefore, to answer the question of whether oil wealth leads to higher debt burdens more rigorously, I utilize World Bank data on all developing countries for the period 1970–2000 in a statistical model of debt burden. The extension of the time frame and issues of data availability for some of the other variables results in fewer countries being included in the regression analysis than in the bivariate graphs. A full list of the countries included in the statistical analyses reported below is provided in the appendix.

Conceptually, I use the following format for the regression model:

$$D = \alpha C + \beta_1 OIL + \beta_2 DEM + \beta_3 OIL * DEM + \varepsilon \quad (1)$$

where *D* is a measure of *Debt*, *C* is a vector of controls (as described above and including a vector of country and year fixed effects), OIL and DEM represent measures of Oil Wealth and the country's level of democracy, α and β are vectors of coefficients to be estimated, and ε is the error term. I estimate these models using an error-correction framework in which the dependent variable is expressed as its first difference, and all right-hand-side variables

are entered in their lagged levels, and, depending on theory, some are introduced as contemporaneous changes (Beck, 1991). I also control for the previous year's change in debt (Δ $Debt_{t-1}$ = $Debt_{t-1}$-$Debt_{t-2}$) and the lagged level of debt (that is, $Debt_{t-1}$). The empirical specification is thus rather conservative, including as it does a lagged dependent variable as well as country and year fixed effects.

Table 1 reports the results from the estimation of Equation 1 but without the interaction between oil wealth and regime type. With two measures of debt and two of oil wealth, we have four sets of results reported in the table. First, as expected, the data series are persistent and the lagged change and level of debt are statistically significant with signs in the anticipated directions. Second, countries that experience higher economic growth have smaller debt levels, but, interestingly, increases in the size of GDP are not related to increases in debt service. Note that this could be an artifact of how debt service burdens are measured. Since the burden posed by paying back one's debt is measured as the share of GDP allocated to debt service, an increase in GDP leads to an increase in the denominator of the dependent variable. Thus, even if the increased GDP is used to increase debt payments, no effect might be apparent. Third, the size of developing country

TABLE 1 Does Oil Increase Debt?

	Δ(Debt)t		Δ(DebtService)t	
	Model1	Model2	Model 3	Model 4
$\Delta(Debt)_{t-1}$	0.29*** (0.08)	0.29*** (0.08)		
$(Debt)_{t-1}$	−0.24*** (0.03)	−0.24*** (0.03)		
$\Delta(DebtService)_{t-1}$			−0.17*** (0.03)	−0.17*** (0.03)
$(DebtService)_{t-1}$			−0.40*** (0.07)	−0.40*** (0.07)
$\Delta(GDP)_t$	−65.76*** (11.71)	−65.07*** (11.40)	−2.68 (2.22)	−2.47 (2.17)
$(GDP)_{t-1}$	−15.65* (8.10)	−15.43* (8.01)	−0.85 (0.70)	−0.78 (0.68)
$\Delta(NetReserves)_t$	−0.26 (0.30)	−0.25 (0.30)	0.03 (0.02)	0.03 (0.02)
$(NetReserves)_{t-1}$	−0.03 (0.45)	−0.02 (0.45)	0.04 (0.04)	0.04 (0.04)
$\Delta(TradeOpenness)_t$	0.70*** (0.14)	0.70*** (0.14)	0.07*** (0.02)	0.07*** (0.02)
$(TradeOpenness)_{t-1}$	0.17** (0.07)	0.18*** (0.07)	0.03*** (0.01)	0.03*** (0.01)
$\Delta(NetEnergyImports)_t$	−0.02 (0.01)	−0.02 (0.01)	−0.00*** (0.00)	−0.00*** (0.00)
$(NetEnergyImports)_{t-1}$	−0.00 (0.00)	−0.01 (0.00)	−0.00** (0.00)	−0.00*** (0.00)
$\Delta(CrudeOilProduction)_t$	0.54 (0.78)		0.22 (0.15)	
$(CrudeOilProduction)_{t-1}$	0.99*** (0.29)		0.13* (0.06)	
$\Delta(OilRents)_t$	0.18 (0.13)			−0.01 (0.03)
$(OilRents)_{t-1}$	0.42*** (0.14)			0.04 (0.03)
$(Democracy)_{t-1}$	−0.13 (0.11)	−0.14 (0.11)	−0.01 (0.02)	−0.01 (0.02)
No. of Observations	1573	1579	1511	1515
AIC	14081.46	14127.56	7111.06	7125.64
BIC	14301.25	14347.51	7329.20	7343.89
Country Fixed Effects?	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes

Notes: *p < 0.10, **p < 0.05, ***p < 0.01; Robust standard errors corrected for clustering in parentheses. Coefficients for country and year fixed effects suppressed to conserve space.

reserves does not appear to be related to either measure of debt. However, exposure to the world economy is: both the overall level of trade openness and increases in that level are found to be positively correlated with both measures of debt. Fifth, net energy imports, which is measured as the share of total energy use comprised by energy not produced domestically, does not have any effect on overall debt, but countries that rely less on energy imports to meet their needs do have lower debt service burdens. Turning to the main variables of interest, we find that oil wealth is positively correlated with both measures of debt, and that this relationship is statistically significant in three of four models reported in Table 1. Countries that produce more oil have higher debt, as do countries that receive higher rents from oil. Both these effects occur via the lagged levels of the relevant variables, which means that the estimated effects are capturing longer-term or "equilibrium" relationships between oil and debt. The contemporaneous-change oil measures are not statistically significant in any of the models, which means that, controlling for everything else in the model, year-to-year changes in oil production and rents are not immediately converted into increased debt. Finally, the democracy variable is not statistically significant in any of the models, suggesting that regime type does not have a direct relationship with debt.

Does democracy have an indirect or conditional relationship with debt, however? Table 2 investigates the possibility of an interactive relationship between oil and democracy. Before I discuss that result, note that including an interaction term does not alter any of the other results discussed above. Therefore, I focus my discussion of Table 2 solely on the interaction term. While the positive relationship between oil resources and debt documented above is evident in these models too, in general, there is limited evidence for the existence of a conditional relationship between oil and regime type. Most of the interaction terms reported in Table 2 are not statistically significant and have small estimated coefficients. But from two models an interesting finding emerges. In Models 1 and 3 of Table 2, the interaction of regime type with the change in level of oil production is statistically significant and positively signed. This means that year-to-year increases in oil production are correlated with higher debt levels and debt service burdens, and that the size of this relationship increases as the country in question scores higher on the Polity scale. Theoretically, this finding is provocative. One possibility is that democracies are more creditworthy and better able to leverage their natural resource assets for increased credit internationally. But another is that democracies feel greater pressures to provide state resources to their citizenries and therefore rely more heavily on their oil wealth to do so. The regression results discussed here cannot distinguish between these alternative causal mechanisms, but future research should pay more attention to theorizing and identifying the nature of the conditional relationship uncovered here.

TABLE 2 Is Oil's Effect on Debt Conditional on Regime Type?

	Δ(Debt)t		Δ(DebtService)t	
	Model 1	Model 2	Model 3	Model 4
$\Delta(\text{Debt})_{t-1}$	0.29*** (0.08)	0.29*** (0.08)		
$(\text{Debt})_{t-1}$	−0.24*** (0.03)	−0.24*** (0.03)		
$\Delta(\text{DebtService})_{t-1}$			−0.17*** (0.03)	−0.17*** (0.03)
$(\text{DebtService})_{t-1}$			−0.40*** (0.07)	−0.40*** (0.07)
$\Delta(\text{GDP})_{t}$	−66.20*** (11.86)	−64.82*** (11.45)	−2.85 (2.24)	−2.59 (2.16)
$(\text{GDP})_{t-1}$	−15.80* (8.23)	−15.39* (8.05)	−0.81 (0.68)	−0.71 (0.66)
$\Delta(\text{NetReserves})_{t}$	−0.26 (0.30)	−0.25 (0.30)	0.03 (0.02)	0.03 (0.02)
$(\text{NetReserves})_{t-1}$	−0.03 (0.45)	−0.02 (0.45)	0.04 (0.04)	0.04 (0.04)
$\Delta(\text{TradeOpenness})_{t}$	0.70*** (0.14)	0.70*** (0.14)	0.07*** (0.02)	0.07*** (0.02)
$(\text{TradeOpenness})_{t-1}$	0.17** (0.07)	0.18*** (0.07)	0.03*** (0.01)	0.03*** (0.01)
$\Delta(\text{NetEnergyImports})_{t}$	−0.01 (0.01)	−0.02 (0.01)	−0.00*** 0.00	−0.00*** 0.00
$(\text{NetEnergyImports})_{t-1}$	−0.00 (0.00)	−0.01 (0.00)	−0.00*** (0.00)	−0.00*** (0.00)
$\Delta(\text{CrudeOilProduction})_{t}$	0.51 (0.78)		0.23 (0.15)	
$(\text{CrudeOilProduction})_{t-1}$	0.90*** (0.30)		0.15* (0.08)	
$\Delta(\text{OilRents})_{t}$		0.25 (0.16)		−0.02 (0.03)
$(\text{OilRents})_{t-1}$		0.35** (0.14)		0.05 (0.03)
$(\text{Democracy})_{t-1}$	−0.16 (0.14)	−0.21 (0.14)	0.02 (0.03)	0.02 (0.03)
$(\text{Democracy})_{t-1} \times (\text{OilProduction})_{t-1}$	0.00 (0.02)		−0.00 (0.00)	
$(\text{Democracy})_{t-1} \times \Delta(\text{OilProduction})_{t}$	0.05** (0.02)		0.02* (0.01)	
$(\text{Democracy})_{t-1} \times (\text{OilRents})_{t-1}$		0.01 (0.01)		−0.00 (0.00)
$(\text{Democracy})_{t-1} \times \Delta(\text{OilRents})_{t}$		(0.02) (0.02)		−0.00 (0.00)
No. of Observations	1560	1579	1498	1515
AIC	13979.26	14130.55	7061.96	7127.18
BIC	14204.06	14361.23	7285.06	7356.08
Country Fixed Effects?	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes

Notes: *p < 0.10, **p < 0.05, ***p < 0.01; Robust standard errors corrected for clustering in parentheses. Coefficients for country and year fixed effects suppressed to conserve space.

ROBUSTNESS CHECKS

In this section, I turn to ensuring my results are robust to various considerations. First, I replicate the preceding analysis using two alternative statistical estimators. Second, I include a measure of commodity price volatility in our main model to increase confidence that the relationship described in the previous section is not spurious.

Alternative Statistical Estimators

I begin the robustness checks by using two different statistical estimation techniques to replicate our results. The first set of results described in this

section was obtained with cross-national time-series analysis using a Generalized Method of Moments (GMM) estimator in Stata 9.2. The GMM dynamic panel data estimator, developed by Arellano and Bond (1991) and described in Bond (2002), posits a model of the following form:

$$D_{it} = \sum D_{i,t-1}\alpha + OIL_{i,t}\beta + \sum \mathbf{X}_k\beta_{k+1} + v_i + \varepsilon_i \quad (2)$$

where Di,t is a measure of debt for country i in time t; OIL is a measure of oil dependence; $\mathbf{X}$ is a matrix of K variables that might affect debt; and ν_i are random effects that are independently and identically distributed (i.i.d.) over the panels, and ε_i are i.i.d. over the whole sample.

First differencing Equation 2 removes the ν_i and produces an equation that can be estimated via instrumental variables. Arellano and Bond (1991) derive a Generalized Method of Moments (GMM) estimator that uses lagged levels of the dependent variable and any predetermined or endogenous variables, and first differences of any strictly exogenous variables, as instruments.[5] Estimates are consistent provided there is no second-order serial correlation present in the residuals.

This first-differenced GMM estimator has been shown to have poor finite sample properties in the particular case when the lagged levels are weak instruments for the subsequent first-differences. In the AR(1) model of Equation 2, this occurs as the autoregressive parameter (α in Equation 3) approaches unity; that is, when the data series are highly persistent, the first-differenced GMM estimator works less well, specifically exhibiting a large downward finite-sample bias (Bond, Hoeffler, and Temple, 2001, p. 6). In this case, one can use instead the "system" GMM estimator which combines the set of equations in first-differences instrumented by suitably lagged levels, with an additional set of equations in levels which uses lagged first-differences as instruments.

For my purposes, the external debt stock indicator is highly persistent with estimates of its autoregressive estimate above 0.9 (and as high as 0.98). The debt service indicator, on the other hand, is not persistent, with estimates of α around 0.5. Therefore, I use the system GMM estimator to analyze the external debt stock data, and the differenced GMM estimator to analyze the debt service burden data. In both cases, I utilize the one-step version of these estimators and restrict the set of instruments to three lags.[6]

Second, I also conducted the analysis using a Least Squares Dummy Variable (LSDV) estimator that includes fixed country and period effects. For time samples approaching 30 periods, Monte Carlo evidence indicates that the LSDV estimator is at least as good as the GMM estimators in terms of bias (Judson and Owen, 1999, p. 13) and superior in terms of its Mean Squared Error (MSE) (Beck and Katz, 2004).

The statistical results using the GMM and LSDV estimators and variables described above are presented in Table 3.[7] Results using an alternative measure of oil wealth are reported in Table 4, which summarizes the results from using two other oil wealth measures instead of the oil production indicator. To conserve space, Table 4 reports only the main coefficients relevant to the argument.[8]

As the results from Table 3 make clear, there is a strong and positive relationship between oil dependence and debt burdens, whether measured as the absolute size of a country's debt or the amount of its national income devoted to servicing that debt. And the effect is sizable. Doubling a country's annual production of crude oil is predicted to increase the size of its total external debt as a share of GDP by 43.2 percent. Likewise, the same change is predicted to increase a country's debt service burden by 31 percent. The results reported in Table 4 also support the argument that oil wealth is related to higher levels of debt.

TABLE 3 Robustness Check: Effects of Oil Production on Debt Using Alternative Statistical Estimators

	(Debt)t		(DebtService)t	
	GMM	LSDV	GMM	LSDV
1-Year Lag of Dependent Variable	0.982 (.031)***	0.914 (.034)***	0.529 (.056)***	0.591 (.058)***
2-Year Lag of Dependent Variable	−0.096 (.029)***	−0.109 (.035)***	0.112 (.049)**	0.118 (.055)**
Gross Domestic Product (Log)	−1.473 (.523)***	−14.615 (3.379)***	−1.396 (1.078)	−0.552 (0.494)
GDP Growth Rate (%)	−0.668 (.105)***	−0.526 (.110)***	−0.043 (.022)**	−0.026 (0.019)
Net Energy Imports	0.008 (.003)**	−0.007 (0.006)	−0.0001 (0.002)	−0.001 (0.001)
Foreign Reserves (% of GDP)	0.007 (.199)	0.034 (.198)	0.023 (0.022)	0.027 (0.023)
Trade Openness (% of GDP)	0.07 (.024)***	0.248 (.045)***	0.03 (.009)***	0.025 (.008)***
Democracy (Polity)	−0.189 (.061)***	−0.164 (.106)	−0.011 (.034)	−0.007 (.018)
Annual Oil Production (Log)	0.431 (.210)**	0.753 (.251)***	0.308 (.186)*	0.112 (.049)**
No. of Observations	1542	1542	1392	1474
No. of Countries	84	84	79	80
First-order Autocorrelation	0.000	0.949	0.000	1.000
Second-order Autocorrelation	0.054	0.649	0.085	1.000
Country Fixed Effects Included?	NA	Yes	NA	Yes
Period Fixed Effects Included?	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors reported in parentheses; 2. p-values: *p < 0.10; **p < 0.05; ***p < 0.01; 3 p-values reported for tests of first- and second-order autocorrelation; 4. Fixed effect coefficients and inter cept suppressed.

TABLE 4 Robustness Check: Effects of Oil Production on Debt Using Alternative Statistical Estimator and Alternative Oil Wealth Measure

	$Debt_t$		$DebtService_t$	
	GMM	LSDV	GMM	LSDV
Oil Rents (Log)	0.182 (0.081)**	0.302 (0.103)***	0.048–0.038	0.02–0.021
Oil Rents (% of GDP)	0.143–0.112	0.201–0.184	0.065 (0.03)**	0.052 (0.03)**
Country Fixed Effects Included?	NA	Yes	NA	Yes
Period Fixed Effects Included?	Yes	Yes	Yes	Yes

Notes: 1. Robust standard errors reported in parentheses; 2. p-values: * $p < 0.10$; **$p < 0.05$; *** $p < 0.01$; 3. Coefficients and standard errors for control variables, fixed effects, and intercept suppressed.

The effect of oil on debt is dynamically increasing over time. Figure 3 plots the predicted effect on future debt stocks for different one-time changes in oil production in 1972. This simulation assumes that all other factors remain unchanged. Specifically, Figure 3 plots the effects of a country increasing its oil production levels by 20 percent and 40 percent in 1972, and then maintaining this increased oil production for the next three decades. Of course, most oil-producing countries continued to increase their production levels each year, but this simulation is conservative in exploring the effect of just a single increase.

Figure 3 makes two points quite clearly. First, the effect of a single one-time increase in oil production levels has long-term consequences, as debt

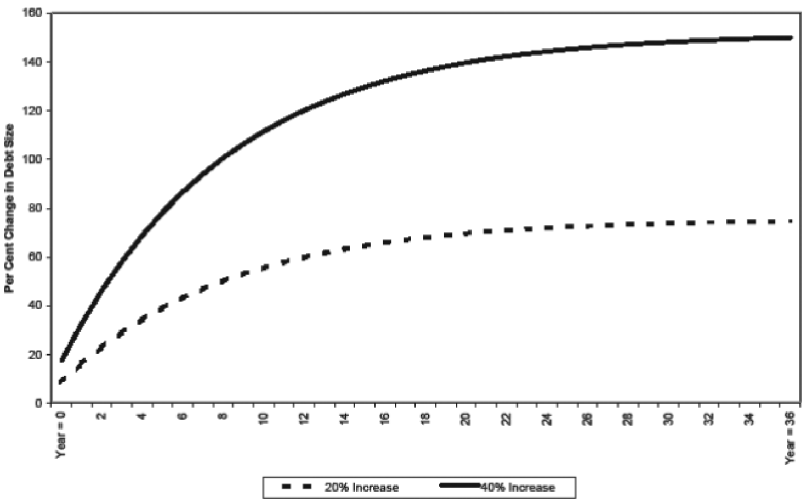

FIGURE 3 Predicted Percentage Change in Debt for Different Changes in Oil Production Levels.

levels continue to rise for many years after in response to that decision. Second, the effect of oil production increases on debt burdens accumulate. Ten years after a decision to increase oil production by 40 percent, the predicted level of debt is predicted to have doubled (an increase of 110 percent), all else equal. Larger increases would have even greater effects, and given that many oil-rich countries seek to increase their oil production levels each year (the worldwide average increase in oil production levels between 1972 and 2000, according to World Bank data, is 17 percent), the possible impact on growth of debt is easy to see.

Commodity Price Volatility

The results thus far provide robust empirical support for claims outlined above: oil wealth is correlated with higher debt burdens, and this relationship is enhanced in democracies. But is this about oil per se, or about the reliance on commodity exports that characterize developing country economies more generally? That is, if oil wealth leads to higher debt simply because of price volatility rather than the policy pathologies it is alleged to encourage, then one would expect countries reliant on other commodities with volatile prices also to have higher debts. To test this claim, I utilize data on commodity price volatility gathered by Dehn (2004), based on the Deaton-Miller commodity prices. To the models discussed in the previous paragraph, I add commodity price volatility, which I measure here as the standard deviation of the real prices of the country's commodity basket over the previous five years.[9] Unfortunately, these data are slightly more limited in their availability, which results in more missing data than in the previous models, but the overall results are robust to the smaller sample and the inclusion of the new variable (Table 5).

Oil resources have a positive effect on debt levels, and, again, there is limited evidence of a conditional effect between democracy and increased oil production on debt. The other variables included in the model also have effects in anticipated directions. The commodity price volatility measure, on the other hand, yields mixed results depending on which measure of the dependent variable on considers. When the dependent variable is the overall debt level, the relationship is estimated very imprecisely. But, when one uses the debt service burden as the dependent variable, commodity price volatility has a statistically significant negative effect. A plausible interpretation of this finding is that commodity price volatility hurts governments' abilities to pay down their debts in the short term. Further, that including this variable in the analysis does not alter the positive relationship found between oil wealth and debt suggests that oil's effect on debt goes beyond price fluctuations. And, finally, it is worth remembering that all the models reported in this paper included country and period fixed effects, which rules out the possibility that this finding is spuriously generated by price shocks in particular years or due to unobserved country-specific factors.

TABLE 5 Robustness Check: Is Oil's Effect Distinct from Commodity Price Volatility?

	$\Delta(\text{Debt})_t$		$\Delta(\text{DebtService})_t$	
	Model 1	Model 2	Model 3	Model 4
$\Delta(\text{Debt})_{t-1}$	0.33*** (0.07)	0.33*** (0.07)		
$(\text{Debt})_{t-1}$	−0.25*** (0.04)	−0.25*** (0.04)		
Δ (DebtService) $_{t-1}$			−0.16*** (0.03)	−0.16*** (0.03)
$(\text{DebtService})_{t-1}$			−0.48*** (0.07)	−0.47*** (0.07)
Δ (GDP) $_t$	−71.11*** (14.88)	−69.67*** (13.97)	−5.56** (2.24)	−5.17** (2.14)
$(\text{GDP})_{t-1}$	−20.27 (13.07)	−19.82 (12.89)	−0.72 (1.00)	−0.58 (0.97)
$\Delta(\text{NetReserves})_t$	−0.31 (0.31)	−0.31 (0.30)	0.02 (0.03)	0.02 (0.03)
$(\text{NetReserves})_{t-1}$	−0.08 (0.46)	−0.08 (0.46)	0.01 (0.05)	0.01 (0.05)
Δ (TradeOpenness) $_t$	0.98*** (0.22)	0.98*** (0.22)	0.10*** (0.02)	0.09*** (0.02)
$(\text{TradeOpenness})_{t-1}$	0.25* (0.15)	0.25* (0.14)	0.04** (0.02)	0.04** (0.02)
Δ (NetEnergyImports)$_t$	−0.01 (0.01)	−0.01 (0.01)	−0.00* (0.00)	−0.00* (0.00)
Δ (NetEnergyImports)$_{t-1}$	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)	−0.00 (0.00)
(CommodityPrice Volatility) $_{t-1}$	−0.39 (6.71)	−0.06 (6.56)	−2.08*** (0.75)	−2.03*** (0.74)
$\Delta(\text{CrudeOilProduction})_t$	0.43 (0.76)		0.28* (0.17)	
$(\text{CrudeOilProduction})_{t-1}$	0.90*** (0.30)		0.19* (0.10)	
Δ (OilRents)$_t$		0.35 (0.29)		−0.00 (0.04)
Δ (OilRents)$_{t-1}$		0.31* (0.16)		0.07 (0.04)
$(\text{Democracy})_{t-1}$	−0.12 (0.16)	−0.18 (0.17)	0.06 (0.05)	0.06 (0.05)
$(\text{Democracy})_{t-1}$ ×(OilProduction) $_{t-1}$	−0.00 (0.03)		−0.01 (0.01)	
$(\text{Democracy})_{t-1}$ ×(OilProduction) $_t$	0.06 (0.06)		0.03** −0.01	
Democracy) $_{t-1}$ × (OilRents) $_{t-1}$		0.00 (0.01)		−0.01* (0.00)
$(\text{Democracy})_{t-1}$ × $(\text{OilRents})_t$		(0.03) (0.06)		−0.00 (0.00)
No. of Observations	1204	1223	1166	1183
AIC	10987.09	11142.47	5552.98	5620.07
BIC	11190.82	11351.95	5755.43	5828.18
Country Fixed Effects?	Yes	Yes	Yes	Yes
Year Fixed Effects?	Yes	Yes	Yes	Yes

Notes: *p < 0.10, **p < 0.05, ***p < 0.01; Robust standard errors corrected for clustering in parentheses. Coefficients for country and year fixed effects suppressed to conserve space.

Discussion

The preceding statistical analysis permitted the evaluation of four testable implications of the theoretical argument presented in this paper. Two of these are drawn from the existing literature, and tested against a large sample of developing country experiences for the first time to my knowledge. These are the claims that democracies enjoy a credibility-based advantage in generating revenue and that net energy importers were hard hit by the oil shocks of the 1979s which resulted in their indebtedness. The other two — that oil producers in the developing world also found themselves deep in debt and that there might exist an interactive relationship between regime type and oil resource wealth — are novel to this analysis.

The results provide strong support for the latter two hypotheses. There does appear to be an interactive relationship between regime type and resource wealth, and at higher levels of oil production, democratic states do appear to have an advantage in generating credit through the sale of debt. The strongest result, overall, is for a relationship between oil production and debt. Controlling for past debt, past changes in debt, other plausible control variables, as well as country and period fixed effects, one still finds a positive and statistically significant relationship between the level of oil production in a country and its level of debt. Further, this relationship is robust to using an alternative measure of oil rents, as well as to the choice of statistical estimator. Finally, the result holds even when one controls directly for commodity price volatility, suggesting that the relationship cannot simply be reduced to oil price fluctuations.

Before considering the implications of these results, two caveats are worth noting. First, while the tests were designed to be as conservative as possible, the fact that the statistical significance of the interaction term fluctuates depending on the measure of debt or oil wealth used is worrisome and suggests that this result be treated with some skepticism. Second, and more importantly, it remains to be seen if the relationships uncovered here are unique to the period under investigation or if they are more general. The discovery of oil in the developing world in the 1970s, the two oil price shocks that followed, and the subsequent collapse of oil prices in the early 1980s provided a "perfect storm" to create the debt situation we eventually observed. But does one require the price collapse to be as drastic, or the resource to be as crucial, for there to be a relationship between resource wealth and debt? To some degree, this question is unanswerable in the present, but recent increases in oil prices suggest that a reevaluation of this study at some point in the future is warranted.

CONCLUSION

Given that debt servicing by developing country governments results in a massive transfer of resources from the poor to rich countries of the world, and that recovering from debt distress has required many of these countries to undergo conditionality programs, understanding the determinants of debt should be a central concern to political scientists. To this end, this paper makes two principal contributions. First, to my knowledge, it provides the first general test of Karl's claim that oil wealth leads to higher levels of debt (1997, pp. 29–30). Second, the theoretical argument presented here is flexible enough to account for the empirical observations that developing country debts spiraled over the past thirty years and that they did so in both oil and non-oil states, and the causal mechanisms implied here should be subjected to systematic evaluation via case-study research.

I conclude by considering the implications of the main finding for the resource curse literature. The cornerstone of this literature has been that oil wealth retards economic development (Sachs and Warner, 1997). Existing explanations emphasize the onset of "Dutch Disease," the growth of corruption and rent-seeking behavior, and the volatility of oil prices. More recent research, however, argues that existing explanations have ignored a crucial variable — debt. Manzano and Rigobon (2001) replicate the influential Sachs and Warner (1997) analysis of the resource curse but add the debt-to-GDP ratio, which they label "credit constraint," to the model. They find that "non-agricultural exports no longer have a negative effect and rather this credit constraint ratio has a negative effect on growth . . . [which] implies that the resource abundance variable was picking up the fact that these countries were highly indebted at the beginning of the decade."[10]

My analysis offers an important qualification to the Manzano-Rigobon challenge to Sachs-Warner. The fact that debt appears to "pick up" the effect of resource abundance need not invalidate the resource curse, but, more plausibly given the analysis presented here, indicate another mechanism through which resource abundance hurts growth. The consensus view thus far has been that resource wealth hurts the societies "lucky" enough to have it by encouraging rent-seeking, increasing revenue and economic volatility, inducing Dutch disease, increasing corruption and reducing institutional quality, and increasing the risk of civil war (Karl, 1997; Hamilton et al., 2005; Ross, 2003; Sala-I-Martin and Subramanian, 2003). To this dismal list we might now add the high debts generated as a result of fiscal irresponsibility and over-generous credit induced by the promise of oil.

Just how great a tragedy has been wrought is most apparent when we recall the heady optimism of thirty years ago:

> By the last decade of this century, the African oil industry will have changed both in terms of its present economic importance and geographical distribution. It is to be hoped that by then the large revenues which have accrued to the present and future producers will be used in the most effective way to provide the "take-off" to sustained economic growth, combined with a rapid improvement in living standards. On present evidence, particularly when one views Algeria and Nigeria, it seems that this hope may well be realized. (Baker, 1977, p. 212)[11]

NOTES

1. Neumayer (2005) uses the same measure in his analysis of how indebtedness affects natural resource exploitation.

2. These data are obtained from the World Bank's Environment Department and are available for download at http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/GreenAccounting. Complete details on the conceptualization and operationalization of 'Rents from Oil' can be found on the World Bank site. I thank Michael Ross for suggesting these data.

3. Measuring Oil Rents as a share of GDP does not alter the results; see the section on robustness checks below. Full results available from the author.

4. Easterly (2001) alleges an endogenous relationship between oil and debt, but Neumayer (2005) finds no evidence of that higher debt levels lead to greater oil exploitation.

5. To be conservative, I treat oil wealth, GDP growth, and size of reserves as a share of GDP, as potentially endogenous to debt levels.

6. Judson and Owen (1999, p. 13) provide evidence from Monte Carlo experiments that the one-step GMM estimator performs better than its two-step counterpart, and that a "restricted GMM" procedure does not hurt the estimator's performance while easing considerably its computation.

7. Plotting the estimated residuals versus the fitted values and examining partial leverage plots from initial estimations indicated that Oman, Nicaragua, the Republic of Congo, and Zambia might be too 'influential.' The results reported in Tables 3 and 4 are from estimations that exclude these countries from the sample. The results hold, indeed are stronger, if these countries are included.

8. Each cell in Table 4 comes from a separate estimation. Complete results are available from the author.

9. For more detail on how the commodity price basket for each country is calculated, I refer interested readers to Dehn (2004).

10. Manzano and Rigobon (2001) test this explanation jointly with alternative explanations for the "curse" and find that the result cited above holds.

11. Baker identifies three countries as the unlucky ones whose known hydrocarbon reserves are considered unsuitable for profitable production: Benin, Ghana, and South Africa. Ironically, most observers of African politics today would probably consider them among the "success" stories in terms of economic performance and democratic governance (e.g., see Acemoglu, Johnson, and Robinson, 2003).

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APPENDIX: DESCRIPTION OF DATA

Countries Included in Estimation Sample

Albania, Algeria, Angola, Argentina, Armenia, Azerbaijan, Bahrain, Bangladesh, Belarus, Benin, Bolivia, Brazil, Bulgaria, Cameroon, Chile, China, Colombia, Congo (Democratic Republic of), Congo (Republic of), Costa Rica, Cote d'Ivoire, Croatia, Czech Republic, Dominican Republic, Ecuador, Egypt, El Salvador, Estonia, Ethiopia, Gabon, Georgia, Ghana, Guatemala, Haiti, Honduras, Hungary, India, Indonesia, Iran, Jamaica, Jordan, Kazakhstan, Kenya, Korea (Republic of), Kuwait, Kyrgyz Republic, Latvia, Lithuania, Malaysia, Mexico, Moldova, Morocco, Mozambique, Nepal, Nicaragua, Nigeria, Oman, Pakistan, Panama, Paraguay, Peru, Philippines, Poland, Russian Federation, Saudi Arabia, Senegal, Slovak Republic, South Africa, Sri Lanka, Sudan, Syria, Tajikistan, Thailand, Togo, Trinidad and Tobago, Tunisia, Turkey, Turkmenistan, Ukraine, Uruguay, Uzbekistan, Venezuela, Vietnam, Yemen (Republic of), Zambia, and Zimbabwe.

Definitions of Variables

EXTERNAL DEBT, TOTAL (% of GDP). Total debt owed to nonresidents repayable in foreign currency, goods, or services. It is the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt includes all debt having an original maturity of one year or less and interest in arrears on long-term debt. Total external debt is measured here as a share of total GDP. (World Bank, 2004)

DEBT SERVICE, TOTAL (% of GDP). The sum of principal repayments and interest actually paid in foreign currency, goods, or services on long-term obligations of public debtors and long-term private obligations guaranteed by a public entity. Debt service is measured here as a share of total GDP. (World Bank, 2004)

PRODUCTION OF CRUDE OIL. Measured in 1,000 metric tons. Data are from the International Energy Agency (IEA). (World Bank, 2004)

OIL RENTS (% of GDP). The ratio of total rents from oil to GDP. Oil rents are calculated as (Production Volume)*(Int'l Market Price – Average Unit Production Cost). Data are obtained from the World Bank's Environment Department and are available for download at http://lnweb18.worldbank.org/ESSD/envext.nsf/44ByDocName/GreenAccounting

GOVERNMENT CONSUMPTION, TOTAL (% of GDP). All government current expenditures for purchases of goods and services, including employee compensation. It also includes most expenditures on national defense and security. (World Bank, 2004)

NET ENERGY IMPORTS. Measured as energy use less production, both in oil equivalents, as a percentage of total energy use. (World Bank, 2004)

GDP PER CAPITA (constant 1995 US$). GDP per capita is gross domestic product divided by midyear population. Source: World Bank national accounts data. (World Bank, 2004).

GDP GROWTH (annual %). "Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 1995 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources." Source: World Bank national accounts data, and OECD National Accounts data files. (World Bank, 2004).

GROSS DOMESTIC PRODUCT (GDP) (constant 1995 US$). GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Source: World Bank national accounts data, and OECD National Accounts data files. (World Bank, 2004).

TRADE OPENNESS (% of GDP). Measured as sum of exports and imports.

EXPORTS OF GOODS AND SERVICES (% of GDP). Exports of goods and services represent the value of all goods and other market services provided to the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude labor and property income (formerly called factor services) as well as transfer payments. Source: World Bank national accounts data. (World Bank, 2004).

IMPORTS OF GOODS AND SERVICES (% of GDP). Imports of goods and services represent the value of all goods and other market services received from the rest of the world. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude labor and property income (formerly called factor services) as well as transfer payments. Source: World Bank national accounts data. (World Bank, 2004).

MERCHANDISE EXPORTS (% of Trade). The share of overall trade comprised by exports of merchandise goods.

COMMODITY PRICE VOLATILITY: Standard deviation of commodity price index for five-year period. Commodity price index based on Deaton-Miller data and provided in Dehn (2004).

LIQUIDITY: Change in reserves as a share of GDP.

DEMOCRACY: Polity combined scale of regime type (Rescaled to range from 1 (perfect nondemocracy) to 21 (perfect democracy)). Source: Polity 4 database. Available at: http://www.cidcm.umd.edu/inscr/polity/ (Marshall, Jaggers, and Gurr, 2005).

Summary Statistics

Variable	N	Mean	Std. Dev.	Min	Max
External Debt (% of GDP)	2985	63.4	68.6	0	1064.4
Debt Service (% of GNI)	3358	5.1	5.1	0	107.4
Oil Production (Log)	3660	4.6	4.6	0	13.1
Oil Rents (% of GDP)	2856	0.03	0.1	0	86.3
GDP (Log)	4255	23.2	2.2	18	29.8
Growth of GDP (%)	4331	3.3	6.6	−50.6	85.9
Net Energy Imports	3804	−96.7	652.6	16983.2	100
Foreign Reserves (% of GDP)	3339	−0.9	3.9	−34.4	26.215
Trade Openness (% of GDP)	4083	71.4	45.7	1.1	439
Democracy (Polity)	4776	−0.6	7.53	−10	10