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SHOULD CANADA WORRY ABOUT A RESOURCE CURSE?

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SUMMARY

An abundance of natural resources might seem like something any nation would want to be blessed with. But in some countries, a bounty of energy, minerals and other resources can become as much a curse as a blessing. The difference between whether resources benefit a country's people, or lead to adversity and even suffering, has everything to do with how a country manages its resources. It is the difference between a resource-rich, free and democratically accountable country, such as Canada, and a resource-rich, corrupt, violent and impoverished country, such as the Democratic Republic of Congo. In many resource-rich countries, the effect of ample natural wealth has been to sever the accountability link between citizens and government, slowing or even reversing democratic and social progress, while mostly enriching a few politically favoured constituencies.

Canada's plentiful resources are an indisputable blessing, and those critics of federal industrial policy who compare this country to illiberal and corrupt "petro-states" are being either ignorant or deceitful. There are numerous critical factors at work here that ensure that the Canadian public benefits, rather than suffers, from our natural endowments. We have a diversity of resources, as opposed to being reliant on a single commodity, and our natural-resource sector makes up only a small portion of our larger economy. We have well-established and diligently enforced standards for financial transparency and accountability, in both the private and public sectors. But, just as importantly, there is a national consensus in Canada that public wealth amassed from resource rents should be invested in strengthening human capital, through education, training and social services, as well as in improved infrastructure and better governance, eventually parlaying natural-resource wealth into a yet larger, further-diversified economy.

But Canada – and especially resource-rich provinces, such as Alberta – cannot take these factors for granted. A combination of complacency and natural wealth has the potential to turn a blessing into a curse. Even once reasonably democratic and accountable countries, such as Venezuela, have been caught unprepared on the dangerous double edge of a resource boom and have seen their governance systems substantially eroded. Developing the fiscal capacity to withstand commodity-market shocks, creating effective and durable checks and balances on systems of legislative power, enforcing transparency in budgeting and public-investment management, and maximizing tax efficiencies and tax administration, are all areas where Canadians can and should focus their efforts. These are the fundamental safeguards that will ensure our ample natural resources continue to be seen by our citizens as a blessing and not – as is the unfortunate case in so many other countries – a curse.

[†] I am indebted to my co-authors Michel Beine from the University of Luxembourg and Charles Bos from Vu University Amsterdam. Many insights and analyses presented in this paper have been developed jointly during the research period for the preparation of M. Beine, C. Bos and S. Coulombe, "Does the Canadian Economy Suffer from Dutch Disease?" *Resource and Energy Economics* 34, 4 (2012). I also thank the editor, Michal Moore, and two anonymous referees whose comments helped improve this paper.

LE CANADA DOIT-IL CRAINDRE LA MALÉDICTION DES RESSOURCES?

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RÉSUMÉ

Quelle nation ne voudrait pas posséder de vastes ressources naturelles? Pourtant, dans certains pays, l'abondance de ressources énergétiques, minérales et autres se transforme parfois en malédiction. En effet, les ressources peuvent être autant source d'enrichissement que d'adversité — et même de souffrance — pour les habitants d'un pays, selon la façon dont elles sont gérées par l'État. C'est ce qui distingue un pays riche en ressources, libre et démocratiquement responsable, comme le Canada, d'un pays riche en ressources, corrompu, violent et appauvri, comme la République démocratique du Congo. Dans nombre de pays, l'abondance de richesses naturelles a rompu le lien de responsabilité entre les citoyens et le gouvernement, provoquant un ralentissement, voire un recul, des progrès démocratiques et sociaux, et concentrant la richesse dans quelques circonscriptions favorisées politiquement.

Il est incontestable que les ressources abondantes du Canada constituent une véritable bénédiction, quoi qu'en disent les détracteurs de la politique industrielle du gouvernement fédéral, qui font preuve d'ignorance ou de malhonnêteté en comparant notre pays à des États pétroliers totalitaires et corrompus. De nombreux facteurs critiques font en sorte que la population canadienne, loin de souffrir de nos richesses naturelles, en tire de réels avantages. La diversification de nos ressources nous permet de ne pas dépendre d'un seul produit de base et, de fait, le secteur des ressources naturelles n'occupe qu'une petite portion de notre économie. En outre, nous sommes dotés de normes de transparence et de responsabilité financière bien établies et diligemment appliquées dans les secteurs privé et public. Enfin, il importe de mentionner l'existence d'un consensus national au Canada sur la nécessité d'investir les bénéfices tirés des ressources dans le renforcement du capital humain — par le biais de services d'éducation et de formation et de services sociaux — ainsi que dans l'amélioration des infrastructures et de la gouvernance, afin de faire fructifier la richesse de nos ressources naturelles dans une économie de plus en plus vaste et diversifiée.

Mais le Canada — en particulier dans les provinces riches en ressources, comme l'Alberta — ne peut se permettre de tenir ces facteurs pour acquis. Il faut à tout prix éviter de faire preuve de complaisance en matière de richesses naturelles, sous peine de transformer une bénédiction en malédiction. Même des pays au passé raisonnablement démocratique et responsable, comme le Venezuela, ont été pris au dépourvu par le dangereux double tranchant de l'essor des ressources, qui a sapé considérablement leurs systèmes de gouvernance. Les Canadiens peuvent et doivent concentrer leurs efforts sur le renforcement de la capacité financière, en vue de résister aux bouleversements sur les marchés des produits de base, sur la création de systèmes de freins et contrepoids efficaces du pouvoir législatif, sur le renforcement de la transparence en matière de budgétisation et de gestion des fonds publics et sur la maximisation de l'efficacité fiscale et de l'administration de l'impôt. C'est grâce à ces garanties fondamentales que nos vastes ressources naturelles continueront d'être perçues par nos citoyens non pas comme une malédiction, comme c'est malheureusement le cas dans beaucoup d'autres pays, mais comme une bénédiction.

[†] Je suis redevable à mes coauteurs Michel Beine de l'Université du Luxembourg et Charles Bos de l'Université libre d'Amsterdam (VU). Bon nombre des points de vue et analyses présentés dans ce document ont été élaborés conjointement lors des recherches effectuées pour la rédaction de l'article suivant : M. Beine, C. Bos et S. Coulombe, « Does the Canadian Economy Suffer from Dutch Disease? » *Resource and Energy Economics* 34, 4 (2012). Je remercie également le réviseur, Michal Moore, et deux lecteurs anonymes dont les commentaires m'ont permis d'améliorer cet article.

“Projects of mining, instead of replacing the capital employed in them, together with ordinary profits of stock, commonly absorb both capital and stock. They are the projects, therefore, to which all others a prudent law-giver, who desired to increase the capital of his nation, would least chuse to give any extraordinary encouragement.” — *Adam Smith, 1776.*¹

“You think we are lucky. I don’t think so. We are dying of indigestion ... I call petroleum ‘the devils’ excrement.’ It brings trouble. Look around you. Look at this locura — waste, corruption, consumption, our public services falling apart ... And debt, debt we shall have for years. We are putting our grandchildren in debt.” — *Juan Pablo Perez Alfonso, Venezuelan co-founder of OPEC, 1975.*²

“I thought then that wealth depended mainly on the possession of territory and natural resources, whether fertile land ... or valuable minerals or oil and gas. It was only after I had been in office for some years that I recognized ... that the decisive factors were the people, their natural abilities, education and training.” — *Lee Kuan Yew, The Singapore Story.*³

INTRODUCTION

The term “Dutch disease,” as coined by *The Economist* in its famous 1977 article, referred to the displacement of the manufacturing industry in the Netherlands by rising costs caused by the inflow of resources from North Sea gas and the concern that, in the aftermath of the boom, there would be little left to sustain growth. However, doubts over natural resources as a driver of long-term growth and development have a longer and wider history. Adam Smith saw the extractive industry, based on the depletion of finite mineral resources, as inherently less desirable than the expansion of manufacturing, with its accompanying potential for specialization, technical progress and productivity growth. Corden⁴ notes that, as early as 1859, Cairnes had voiced similar concerns about the impact of gold discoveries in raising domestic costs and prices in Australia, thus crowding out the growth of the manufacturing industry. Forsyth and Nicholas⁵ describe how Spanish resource discoveries in the Americas left in their wake a lagging Iberian power, in contrast to other European countries that fed the resulting demand for industrial goods.

¹ Adam Smith, *An Inquiry into the Wealth of Nations* (Oxford: 1976), 562.

² Cited by T.L. Karl, *The Political Economy of Petrodollars in Venezuela* (Stanford University, 1982), 18.

³ Cited by T. Gylfason “Natural Resource Endowment: A Mixed Blessing?” in *Beyond the Curse: Policies to Harness the Power of Natural Resources*, ed. R. Arezki, T. Gylfason and A. Sy (Washington: International Monetary Fund, 2011).

⁴ W. M. Corden, “Booming Sector and Dutch Disease Economics: Survey and Consolidation,” *Oxford Economic Papers* 36 (1984).

⁵ P. Forsyth and S. Nicholas, “The Decline of Spanish Industry and the Price Revolution: A Neoclassical Analysis,” *Journal of European Economic History* (1983).

Debate on the role of resources in development rises and falls with the commodity cycle. The first post-war resource boom coincided with the Korean War. The great oil boom of 1973–81 unleashed a phase of intense research on oil exporting countries. The current resource super-cycle, which started around 2004 with unusually synchronized booms in the prices of hydrocarbons, minerals and many other commodities, has raised similar questions, both for high-income resource-rich countries such as Canada and Australia, and for the many developing countries that are heavily dependent on extractive industries for exports and fiscal revenue. The exact number of countries considered to be resource dependent varies according to the definitions used and the level of resource prices. Before the recent boom, some 35 countries were generally considered to be heavily dependent on oil and gas for exports and/or fiscal revenues, and a further dozen on hard minerals. With a spate of new discoveries, the list continues to grow.⁶

The set of resource-based countries includes some spectacular failures. Most of the countries near the bottom of the 2011 Human Development Index (HDI) are African resource-based exporters and many concentrate on metals and oil — the “Bottom of the Barrel” countries, as expressed by Karl.⁷ At the same time, it is by no means clear that a strong natural-resource base is an inevitable impediment to long-term growth and development. Of the top six countries in the HDI, four — Norway, Australia, Canada and New Zealand — are conspicuously resource rich, including in metals and oil, as well as other commodities. Another of the six is the “diseased” Netherlands. The U.S. rounds out the set, as a country with not inconsiderable resource wealth. As further discussed below, the first three countries in this set are richer, in terms of the value of proven sub-soil assets per head, than most of the oil and mineral exporters at the bottom of the HDI. Chile and Botswana are, by many measures, the most successful economies in Latin America and Sub-Saharan Africa. Both are highly specialized mineral producers.⁸

Where, then, does this leave the “Dutch disease”? Certainly, resource discoveries or large shifts in resource prices will have an impact on producing economies. Labour will be drawn towards a booming resource sector, and also to construction- and service-sector jobs created by resource-led spending. As the real exchange rate appreciates, manufactured exports may fall and import-competing firms become more exposed to import competition. But are these shifts simply a natural, market-driven adjustment to changes in comparative advantage rather than a symptom of disease? If there is a disease, through what channels does it work? Are some countries more vulnerable than others? What can governments of producing countries do to head it off — or better still, to turn resource riches into a stimulus to growth and development?

⁶ Countries are typically considered dependent when the share of the key resource in exports exceeds 30 per cent, but the ratio is often much higher. Oil exporters are, on average, more specialized in their key resource than countries exporting other products. On average, oil provides major exporters with around 56 per cent of fiscal revenues, with levels higher in the Gulf countries. Export dependence is almost total for some producers. Countries specialized in mining are usually less specialized than oil producers, especially as some produce a variety of minerals. Fiscal dependence is actually higher than is apparent because of other sources of revenue — including corporate taxes and tariffs — made possible by resource production. In addition, many oil exporters provide large fuel subsidies that are not recognized in the budget.

⁷ T. L. Karl, *Bottom of the Barrel: Africa's Oil Boom and the Poor* (Catholic Relief Services, June 2003).

⁸ Sweden, Finland and other countries near the top of the HDI have also built on resource-based industries to create highly competitive economies.

This paper considers these questions, drawing on a large and growing body of analysis. It has become increasingly clear that the issues around resources and development are only partly economic in nature. Much of the action centres on the interplay between resource rents and the political and social institutions, as well as human capacity, that determine the ability of countries to manage them. In the process, the debate around Dutch disease has deepened, into what is more aptly termed the “resource curse.”⁹ The paper does not try to cover all of the many studies on this topic, but draws selectively to illustrate certain aspects and cases, and to suggest areas of focus for policy-makers.

The next section of this paper summarizes the broad conclusion of research as shown by cross-country studies. All of the earliest works that found in favour of the curse have been challenged; the question is more complex than originally realized and there are still some debatable questions, including how to best measure resources and the metric by which success should be measured. Studies have taken somewhat different perspectives and used a range of alternative variables to come to a broadly shared conclusion. Natural resources are a potential asset rather than a pre-ordained curse. They expand the choice set for a country and its people. But the outcome depends on whether this additional degree of freedom is used well. Managing resource economies effectively is not easy because resources pose difficult challenges. These are most severe for “point-source” extractive sectors with high natural rents, such as mining and especially oil.

Many channels have been proposed for the so-called curse, but two stand out as particularly important. The first problem is that specialized resource exporters are exposed to highly volatile commodity markets and price shifts that are very difficult to predict, and that addressing this requires an economic horizon that may be longer than the political horizon. The second is that resource wealth opens up the prospect of destructive rent-seeking competition, especially when property rights are not strongly rooted in politics and society. Failure to manage either one of these challenges can create losses that more than offset the favourable income effect of the resources themselves, turning a potential windfall into a net loss. Environmental costs associated with resource extraction could also be a factor but there has been less research on their macroeconomic impact.

Because countries differ greatly in terms of their economic structure and management capacity, the impact of resources on development is diverse. In general, high-income countries have more human capital and stronger institutions than do poor countries, and they are also more economically diversified. Cross-country analyses provide no evidence that rich countries have experienced a curse from abundant resources. Even with the displacement effects and adjustment costs that come with the resource cycle, strong resource bases have been assets for these countries. Other countries have been less lucky, and the problem worsens the lower the country is on the development spectrum.

⁹ For an excellent recent survey of the resource-curse literature see F. van der Ploeg, “Natural Resources: Curse or Blessing?” *Journal of Economic Literature* 49, 2 (2011). The many other works providing overviews include: R. Auty, ed., *Resource Abundance and Economic Development* (Oxford: Oxford University Press, 2001); D. Lederman and W. Maloney, ed., *Natural Resources: Neither Curse Nor Destiny* (Redwood City, CA: Stanford University Press, 2007); D. Lederman and W. Maloney, *Does What You Export Matter?* (Washington: World Bank, 2012); J. A. Frankel, “The Natural Resource Curse: A Survey,” NBER Working Paper 15836 (March 2010); Arezki, Gylfason and Sy, *Beyond the Curse*; and N. Barma, K. Kaiser and L. Vinuela, *Rents to Riches: The Political Economy of Natural Resource Development* (Washington: World Bank, 2012). A. Gelb, *Oil Windfalls: Blessing or Curse?* (Oxford: Oxford University Press, 1988) provides an overview of the experience of selected oil exporters through the 1973–81 boom and its aftermath.

A subsequent section of this paper considers some of the channels through which a natural-resource curse could work. In addition to the problem of market volatility, the more economic channels include lock-in to stagnating markets with declining terms of trade, and the proposition that a structural shift from manufacturing to the extractive industry — and to the service and construction sectors that typically boom — reduces opportunities for technical change and learning-by-doing as well as, perhaps, incentives for human capital formation. Countries might also fail to save adequately to offset the exhaustion of finite reserves or the risk that technical or demand shifts reduce markets for the key resource. The evidence supporting these channels for the resource curse is less convincing than the evidence of the risks of mismanaging volatility, but some studies, including those on the impact of negative environmental spillovers from resource extraction, offer food for thought and pointers towards important areas for more study.

The other channels are more institutional and political. In most countries (with the conspicuous exception of the United States), all sub-soil assets are owned by the nation or by sub-national governments. Even when such ownership is clearly enshrined in the constitution, there is little clear guidance on how public ownership translates into the distribution of natural rent among individual citizens. This leaves rent distribution to be defined by political bargaining rather than market forces or by immutable law, and opens the way to destructive rent-seeking competition. This problem has been accentuated by structural changes in the natural-resource industries, with the de-linking of resource discovery and production from resource use, and the rise of resource nationalism in many countries.

There is still some question of the degree to which policies and institutions are endogenous to natural-resource rents rather than determining both economic structure (including resource dependence) and the nature of the struggle. But country cases show that the channel of rent contestation can play out in many different ways. In all cases, contestable point-source resources encourage the growth of “rent grabbing” behaviour and institutions that reduce productive entrepreneurship, investment, labour and income. At the most basic level, contestable resource rents, possibly in combination with other factors such as ethnic tensions or grievances, can encourage or sustain civil conflict. More generally, easy access to rent-based taxes can reduce government accountability to citizen taxpayers. The consequences can include the entrenchment of autocratic regimes, less budget transparency, greater executive discretion with weaker checks and balances, and less effective management of public funds including public investment programs. Resource-rich governments — whether national or sub-national — may fail to correct bad policies as rapidly as would have been the case without resource taxes to cushion the errors. They may seek re-election by expanding populist spending with little substantive benefit. Public programs may be captured to distribute rents to favoured insiders. Federal systems also need to manage the complex problem of how to distribute resource revenues between different levels of government. Avoiding these problems requires a combination of political accountability and credibility (or checks and balances) that is lacking in many countries.

It is important to emphasize that there is no automatic presumption that rent flows will undermine accountability or institutions, especially when they are initially strong. Resource industries can have a modernizing effect, both directly and through the income they provide. For example, the early onset of democracy in Venezuela was partly due to the growth of the oil industry. Resource taxes have provided fiscal revenues to enable some countries, such as Botswana, to recruit, train and retain a high-quality civil service. Resource-rich countries in the

Gulf probably have higher quality administrations than they would have enjoyed without the enormous income gains from oil. Yet all too often, resource rents appear to have slowed transitions to democracy, weakened institutions of accountability, and encouraged politicians to undermine capable institutions and to emasculate agents of restraint.

The more economic and the more political channels can interact in various ways. For example, countries with weaker institutions are plausibly less able to save for the future or to implement counter-cyclical fiscal policies to head off a boom-bust cycle. There is some evidence that resource wealth can choke off economic opportunities for women to enter the labour force in societies with occupational gender segregation, delaying social and political modernization. The more a resource boom shifts the economy out of other traded sectors, the less powerful are constituencies with an interest in sound management of resource windfalls; this can further weaken macroeconomic management. The country-specific nature of the effects means that not all will be identified by cross-country analysis. Cases are as important in revealing the possibilities.

What can resource-rich countries learn, and what risk indicators should they monitor as they weigh their future? The final section of this paper concludes on these questions. Every country is different, but there are some common themes that span rich industrial (or post-industrial) countries, such as Canada, and poor countries attempting to make a first leap away from commodity dependence. They include the importance of prudent fiscal management, and measures to ensure that an influx of resource wealth builds human and institutional capital, as well as physical capital, rather than undermining critical institutions.

RESOURCES AND GROWTH: ONE PICTURE OR MANY?

Countries with rich endowments of natural resources, whether sub-soil assets such as oil, gas and mineral reserves, or rich forests and productive farmland, could be expected to be stronger economic performers than those without them. However, cross-country studies relating long-run growth rates to measures of the role played by natural resources in the economy tend to show a negative association. The first large-scale cross-country estimates for this relationship were those of Sachs and Warner.¹⁰ Using the share of natural-resource exports in GDP as a proxy for resource wealth, and controlling for a number of other factors, they found a negative relationship over 1970–1990, unleashing much debate on the reasons for this surprising finding.

One set of critiques focuses on how to measure the weight of resources in trade. Lederman and Maloney¹¹ note that a gross measure of natural-resource exports leads to counter-intuitive results for countries such as Singapore and Trinidad and Tobago, which have large re-exports of refined raw materials, and that the gross measure had been replaced in the Sachs-Warner database with a measure of net resource exports relative to GDP. Replicating their regressions using either net resource exports for all countries or the gross resource exports without the adjustment for the two countries causes the negative resource effect to disappear.

¹⁰ J. Sachs and A. Warner, “Natural Resource Abundance and Economic Growth,” NBER Working paper 5398 (Cambridge Mass.: 1995); J. Sachs and A. Warner, “Natural Resource Abundance and Economic Growth – Revised” (Cambridge, Mass.: Harvard University, Center for Economic Development, 1997).

¹¹ Lederman and Maloney, *Natural Resources*.

Another strand of research centres on the difference between measures of resource dependence and resource abundance. Sachs and Warner use a measure of resource dependence, the importance of resources relative to other sectors of the economy.¹² This can be misleading as an indicator of resource abundance, defined as the magnitude of resource reserves or output, either in absolute terms or per head. The World Bank¹³ has compiled the most complete cross-country estimates of national wealth for the years 2000 and 2005.¹⁴ These distinguish three components. Natural capital is measured as the present value of expected resource-rent flows based on measures of a range of natural assets. The estimates include proven reserves for sub-soil assets (oil, gas, coal and 10 important metals and minerals), as well as cropland, timber and forests. Produced capital includes physical investments and the value of urban land. The balance of estimated national wealth consists of “intangible capital,” which includes the sum of formal and informal institutional capital as well as acquired human capabilities.

Table 1A compares estimates of wealth per head in 2005 for three high-income, resource-rich countries — Australia, Canada and Norway — and a number of lower-income resource exporters. Sub-soil reserve wealth is generally higher in the high-income countries than in most of the developing economies. Their natural capital wealth is also greater: Canada, for example, has lower sub-soil assets per head than oil-rich Venezuela, but higher natural capital per head, indicating a far more diversified resource portfolio. At the same time the share of natural capital in total wealth is far smaller for the high-income countries: between seven per cent and 13 per cent, compared to around 50 per cent for the selected developing countries.¹⁵

¹² Other measures of resource dependence can include the share of resource exports in total exports, the share of resource taxes in fiscal revenues, the estimated level of resource rents in GDP or the sectoral share of resource industries. These measures may not always point in a similar direction. For example, export and output data can show different pictures because demand varies widely across countries. Fiscal revenues can be far less than natural rents if a country provides a large share of oil rent to its population in the form of cheap fuels.

¹³ World Bank, *Where is the Wealth of Nations? Measuring Capital for the 21st Century* (Washington: 2005); World Bank, *The Changing Wealth of Nations: Measuring Sustainable Development in the New Millennium* (Washington: 2011).

¹⁴ The methodology is set out in World Bank 2011, Appendix A. Because of data limitations, not all minerals can be included. Diamonds are excluded, although they are critical for a few countries. “Rents” are defined as the excess of expected output value over production costs. This calculation requires projections of costs as well as prices, as well as assumptions on the future production profile. The horizon for future rents is capped at 25 years.

¹⁵ Natural capital is actually greater than total wealth in the Democratic Republic of Congo. This signifies a negative value for intangible wealth; the present value of the economy is lower than the estimated value of its resources, including proven sub-soil assets.

TABLE 1A: NATIONAL WEALTH IN SOME RESOURCE-RICH COUNTRIES

	Sub-Soil Assets	Natural Capital	Total Wealth	Natural Capital %
High-Income Resource Exporters				
Australia	20,328	39,979	518,805	8
Canada	12,644	36,924	538,697	7
Norway	99,706	110,162	861,797	13
Some Developing Resource Exporters				
Venezuela	24,090	30,567	69,795	44
Chile	9,563	18,870	101,901	19
Ecuador	6,442	22,454	43,634	51
Bolivia	2,191	8,305	15,068	55
Angola	11,052	13,307	13,804	96
Rep. of Congo	11,816	14,679	6,017	244
Nigeria	3,940	6,042	10,982	55
Chad	2,231	4,637	4,994	93

Source: World Bank, The Changing Wealth of Nations, Table C1.

Table 1B shows the 2005 wealth estimates for different country income groups. National wealth per head increases with income following a systematic pattern. As countries become richer, the composition of their wealth shifts away from natural capital and towards intangible capital. But even though the relative weight of natural capital in total capital is lower in rich countries, the absolute level of natural capital per head is higher than in poor ones. Low-income countries as a group have more than one-third of their total wealth in natural capital, compared with only two per cent for high-income countries. But even so, they have a fraction of the absolute level of natural capital per head. The pattern is similar, and even more pronounced for sub-soil assets. Oil exporting Chad, for example, has a modest level of sub-soil assets but is a pathetically poor country in terms of total wealth.

TABLE 1B: NATIONAL WEALTH BY INCOME GROUP

	Sub-Soil Assets	Natural Capital	Total Wealth	Natural Capital %	Produced Capital %	Intangible Capital %
High-Income OECD	2,927	10,946	581,424	2	17	81
Upper-Middle	2,388	6,307	84,844	7	17	68
Lower-Middle	1,207	4,357	17,112	25	25	51
Low-Income	393	2,316	6,523	36	14	53

Source: World Bank, The Changing Wealth of Nations, Table C1.

If we consider the ratio of natural capital to total wealth as a measure of resource dependence and natural capital per head as a measure of resource wealth, poor countries are resource dependent relative to rich ones, but rich countries are resource rich relative to poor ones. These apparently contradictory conclusions point to the difficulty of finding an exogenous measure for resources. High resource dependence can reflect institutional conditions that discourage the growth of other sectors, especially non-subsistence agriculture and industry. These “transaction-intensive” activities are more sensitive to domestic conditions, including macroeconomic predictability, infrastructure services, the security of property rights and ability

to enforce contracts, corruption, and security. As such business climate conditions worsen, the non-resource sectors will contract until the economy is dominated by enclave sectors, such as offshore oil wells and subsistence agriculture, that are not dependent on domestic conditions.^{16,17}

The alternative is to use a measure of resource abundance, rather than dependence, and many studies argue that this measure is preferable. However, abundance, as measured by proven reserves or even by probable reserves, is not fully exogenous either. As discussed by Wright and Czelusta¹⁸ among others, the historical development of mining sectors was closely related to technological and knowledge advances in their host countries. Mining and oil, in turn, played an important role in the development of new processes and industries including, for example, petrochemicals, metallurgy and capital-goods sectors. Proven reserve levels and the wider productive capacity of the economy were intertwined.

This link is not automatic; conditions in some countries might not be such as to encourage spillovers from mining to the wider economy or vice versa. Considering the global picture, linkages have probably weakened in recent decades with structural changes in the oil and mining industries. Resource production is now more spatially separated from resource use. Resource nationalism has resulted in increased host-country control of oil and gas reserves where about 90 per cent of proven reserves are in the hands of national companies. Nationalization has not been so large a factor in mining, but host governments have claimed a larger share of the rent.¹⁹ While this is excellent from an equity perspective — reserves are, after all, the patrimony of the host nation — many countries receiving resource rents have little or no technical or human capability in mining or oil extraction.²⁰

High-income countries have been far more thoroughly surveyed and prospected than low-income countries. Geo-scientific data is produced at considerable public expense by countries such as Canada and Australia to encourage exploration; in contrast, data for Africa is fragmented and partial, and large areas have not been surveyed using modern methods. Estimates of probable, but unproven, reserves that rely largely on geological extrapolation suffer from the same weakness because extrapolation is only possible from what is known.

¹⁶ P. Collier and J. Gunning, “Why has Africa Grown Slowly?” *Journal of Economic Perspectives* 13, 3 (1999), consider the influence of institutional conditions on the slow growth of Sub-Saharan Africa and its economic structure. Some exceptional non-resource firms may of course survive in very difficult conditions. The Heineken brewery has continued to operate through years of upheaval in the Democratic Republic of Congo. The SAB-Miller brewery is also the sole private large-scale modern firm in oil-rich, conflict-ridden South Sudan, and is reportedly very profitable.

¹⁷ In addition, reduced income and demand for fuels and metals due to lower income opens up space for exports, further endogenizing the exporter category. For example, in 2011, the oil-importing U.S. produced 1.1 tons of oil per person, far above the figure for exporters such as Nigeria (0.7 tons) or Chad (0.5 tons).

¹⁸ G. Wright and J. Czelusta, “Resource-Based Growth Past and Present,” in Lederman and Maloney, *Natural Resources*.

¹⁹ D. Humphreys, “Transatlantic Mining Companies in the Age of Resource Nationalism,” *Transatlantic Paper Series* (May 2012), considers changes in the structure of mining industries and resource nationalism. The rise in taxes and royalties has resulted in an increasing share of resource rents being channeled to producer governments. For four large mining companies over 2006–2001, shareholders saw gains of 174 per cent, but governments increased their take by 447 per cent.

²⁰ Between 1998 and 2006, 19 countries became new oil and gas exporters, of which most were lower-income countries. In 1995, only four countries in Sub-Saharan Africa produced oil; by 2015 about 19 countries are expected to do so (M. Ross, *The Oil Curse: How Petroleum Wealth Shapes the Development of Nations* (Princeton, N.J.: Princeton University Press, 2012)). Few of these have the technical and human capacity to integrate the oil sector into their economies.

In addition, the true extent of reserves often only becomes apparent as initial finds are developed, leading to an increase in knowledge about the geology of surrounding areas as production progresses. While they might not be “headline” discoveries, such induced discoveries can be very large relative to initial proven finds.²¹ And since proven reserves are an economic, rather than a physical concept, only finds considered capable of profitable extraction given prevailing conditions are considered proven. Countries with a stronger, low-cost business climate and more predictable mining laws will therefore be able to prove lower-grade reserves than will very risky countries. The historical and institutional conditions that shape economic performance also therefore influence discovery and estimates of proven reserves, and it is difficult to think of plausible instruments for resource richness that have no independent impact on economic success.

Recognizing these problems, it is still useful to examine the relationship between both measures of resources and growth.²² Gylfason²³ estimates the impact of resource abundance and dependence on growth over 1960–2000 using World Bank wealth data for 2000. His results show a negative effect of initial income per head (convergence), a positive effect of resource wealth (natural capital per head) and a negative effect of resource dependence (the share of natural capital in total capital). The results are robust to the inclusion of measures of democracy, the investment rate, secondary-school enrolment and fertility. These variables enter with the expected signs, and their inclusion halves the estimated co-efficients of the resource variables but the latter retain significance and sign. The final equation replaces the four variables by predicted values, with virtually no effect.

Figure 1 depicts Gylfason’s final equation (Model 8) graphically for the growth impact of a very large resource windfall, capable of increasing the share of natural capital in total capital by 10 percentage points.²⁴ Countries are ordered in terms of total national wealth per head. The growth effect is high and positive in high-capital countries but negative in poor countries with little wealth. The figure also compares Canada and the Democratic Republic of Congo (DRC), countries with a very different growth response. Intangible capital in the DRC is \$678 per head; in Canada it is \$415,000, more than 600 times higher.

Because both resource measures are at least partly endogenous, Gylfason’s results cannot be interpreted as strictly causal relationships. But they point to different ways in which the relationship between resources and growth can be viewed, and show how countries that have been able to build on their natural capital to create a complementary stock of non-resource capital have benefited from resource discoveries while others have not.

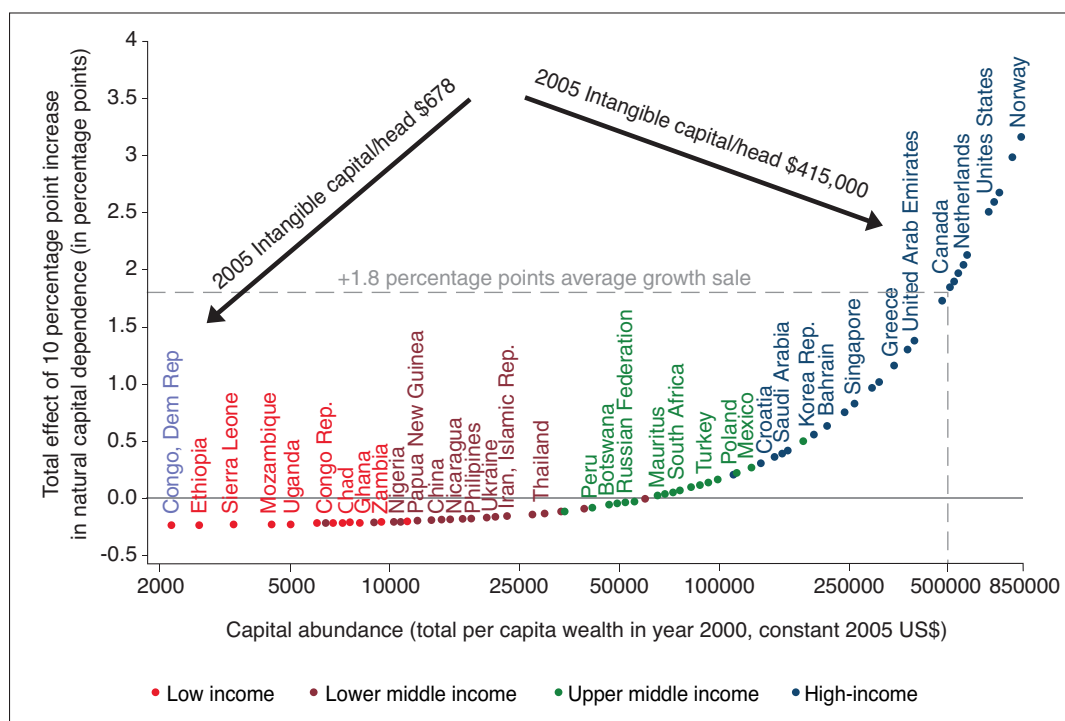
²¹ A. Gelb, K. Kaiser and L. Vinuela, “How Much Does Natural Resource Extraction Really Diminish National Wealth? The Implications of Discovery” Working Paper 290 (Center for Global Development, March 2012).

²² Growth might also not be the most appropriate metric for success, especially if resource income has already boosted income to high levels at the start of the data period. This qualification applies to the Gulf countries, in particular.

²³ Gylfason “Natural Resource Endowment.”

²⁴ The effect of a resource windfall is both to increase natural capital per head (with a positive growth impact) and to increase the share of natural capital in total capital (a negative impact). The net impact depends on the initial level of natural-capital dependence. The higher this is, the more unbalanced is the national-capital stock and the more negative is the windfall. The simulated increase in natural capital would be an enormous discovery effect, equivalent to doubling sub-soil assets for Canada or Australia.

FIGURE 1: EFFECT OF A LARGE RESOURCE DISCOVERY ON GROWTH



Source: Adapted from Gylfason 2008 Table 2, based on World Bank Wealth of Nations data.

Can we find a more plausibly exogenous right-hand-side variable to throw light on the differential impact of resources on growth? Several studies bear on this question. Mehlum, Moene and Torvik²⁵ revisit the Sachs-Warner study of resource dependence on growth allowing for initial income, openness, investment and also the interaction of a measure of institutional quality with resources. Their institutional measure is chosen to capture the extent of “producer-friendly” versus “grabber-friendly” institutions, rather than democracy.²⁶ They find that the resource effect is negative in countries with weak institutions and neutral in those with strong institutions. The cross-term enters in regressions with a strongly positive sign, suggesting that institutions and resources are strongly complementary for growth. The resource curse is weaker the higher the institutional quality. Countries with a high enough index of institutional quality will experience resource dependence as a blessing rather than a curse; this applies to 15 out of the 87 countries included in their sample. Because their measures of institutional quality are strongly correlated with measures of intangible capital, the set of countries will have a high overlap with those indicated by Gylfason’s study as benefiting from a resource windfall. In particular, they include the set of high-income, resource-rich countries previously noted as likely to benefit from a windfall.

²⁵ H. Mehlum, K. Moene and R. Torvik, “Institutions and the Resource Curse,” *Economic Journal* 116 (2006).

²⁶ The measure used is an average of five indices from Political Risk Services: rule of law, bureaucratic quality, corruption, risk of expropriation and government repudiation of contracts. It does not include direct measures of democracy or accountability.

Another relevant study is Brava-Ortega and de Gregorio.²⁷ Following the proposition that there will be strong links and spillovers from resource sectors to others only if countries have sufficient stocks of knowledge to exploit them, they find that the effect of resource dependence (measured relative to GDP) becomes less negative as the stock of human capital rises, and that it becomes positive in countries with a sufficiently high level of human capital. Again, the list of countries with a positive effect will have a high overlap with those found earlier, since levels of human capital will, by and large, be closely correlated across countries with levels of intangible national wealth and strong institutions.

A further study that focuses on the other end of the scale is Aydin,²⁸ which considers only low- and middle-income countries. Per-capita growth tends to be lower in resource-dependent countries than in their more diversified peers, but this effect is largely confined to low-income countries. Poor, resource-dependent countries grow more slowly than countries at higher levels of income, suggesting a low-income resource trap. Convergence would take a long time as growth gradually raises a poor country to the break-even income level of \$2,000 per head. However, introducing measures of institutional quality causes the poverty-trap effect to lose significance. And, introducing indicators for the quality of structural and macroeconomic management causes the sign of the resource variable to change from negative to positive.

Do the conclusions of these studies make the resource curse “a tale of paradoxes and red herrings” as expressed by Brunnschweiler and Bulte?²⁹ Probably yes, in the sense that the problem is not the resources themselves. For countries that can manage, the curse is a myth. But this is not the case for poor, low-capacity countries — for them, the curse can be real.

CHANNELS FOR THE RESOURCE CURSE

Cross-country growth regressions already provide a number of indications of channels through which a resource curse could operate. We now consider some of these channels in more detail.

Channels with more limited empirical support. There is no firm evidence in favour of the Prebisch-Singer thesis that long-term commodity prices are on a secular downward trend. Commodity prices move in long, irregular cycles, with shorter-term fluctuations superimposed, and it can be difficult to separate out cyclical factors from trends. Depending on timing, studies find a mixed picture, with some slightly upward and some slightly downward. Cuddington, Ludema and Jayasuriya³⁰ cannot reject the hypothesis that, during the 20th century, prices have followed a random walk with a single break in 1929.

²⁷ C. Brava-Ortega and J. de Gregorio, “The Relative Richness of the Poor? Natural Resources, Human Capital and Economic Growth,” in Lederman and Maloney, *Natural Resources*.

²⁸ B. Aydin, “Ghana: Will it be Gifted or Will it be Cursed?” IMF Working Paper 11/104 (2011).

²⁹ C. Brunnschweiler and E. Bulte, “The resource curse revisited and revised: A tale of paradoxes and red herrings,” *Journal of Environmental Economics and Management* 55, 3 (May 2008).

³⁰ J. Cuddington, R. Ludema, and S. Jayasuriya “Prebisch-Singer Redux,” in Lederman and Maloney, *Natural Resources*.

It is also not clear that failure to invest in physical or financial assets to offset reserve exhaustion has been a prevalent driver of decline. Measures of adjusted net savings, which deduct the rent value of oil, gas and mining output from conventionally measured gross national savings rates, find that many resource exporters have sharply negative savings. These countries appear to be eating up their resource bases.^{31,32} However, the estimates fail to take into account the increases in proven reserves that many countries have experienced through discovery. When this is factored in, many countries with low or negative adjusted savings have been seeing higher, not lower, natural-resource assets even with accelerated extraction. The risk is more that long-term price trends make reserves uneconomic to extract, even with better technology.³³ The only country in recent times to have exhausted mineral reserves in a physical sense is the tiny island of Nauru.³⁴ Some countries have failed to benefit from heavy investments made in periods of high oil prices.³⁵

³¹ World Bank, *Where is the Wealth*; World Bank, *The Changing Wealth*.

³² The measures adjust for several factors, including depreciation and investment in education as well as resource extraction. Examples of the adjustment for 2008 include: Canada: Gross National Savings (GNS) 23.4 per cent, adjusted 7.6 per cent; Australia: 32.9 per cent and 15.0 per cent; Angola: 24.1 per cent and -42.6 per cent; Chile: 24.2 per cent and -0.4 per cent; Democratic Republic of Congo: 26.7 per cent and -57.1 per cent.

³³ In recent years, discovery has outpaced extraction for many minerals as well as oil and gas. For example, global proven reserves for copper have been expanding despite accelerating mining; discovery over 2000–2008 represented 70 per cent of proven reserves at the start of the period. Technology advances and high prices have spurred new oil, gas and mineral discoveries in countries such as Ghana, Mozambique, Uganda, Tanzania, Kenya and Afghanistan. With the discovery of the Marengo diamond field and projected investments in platinum, Zimbabwe is poised to switch from an agriculture-based economy to one driven by minerals. Gelb, Kaiser and Vinuela (“How Much Does”) find that discovery over this period averages four per cent of the level of proven reserves per year for a range of minerals. Discovery is of course affected by long-term price trends. The risk is less the exhaustion of reserves and more that the development of substitutes and shifts in demand render reserves uneconomic to extract. Absent such demand shifts, it seems inconsistent to assume both declining long-term prices and global reserve exhaustion. Van der Ploeg (“Natural Resources: Curse”) discusses the implications of long-term price assumptions on optimal savings rates. K. Hamilton and G. Atkinson, “Resource Discovery, Learning and National Income Accounting,” Policy Research Paper 6505 (World Bank, June 2013), offer a new methodology for integrating resource discovery into national income accounting.

³⁴ In the years after independence in 1968, Nauru possessed very high GDP per capita due to its rich phosphate deposits. In anticipation of their exhaustion, substantial investments were made in trust funds aimed to help cushion the transition and provide for Nauru’s economic future. However, because of heavy spending from the trust funds, including some wasteful investment activities, the government moved into virtual bankruptcy. To cut costs, it called for a freeze on wages, a reduction of over-staffed public-service departments, privatization of numerous government agencies, and closure of overseas consulates. Economic uncertainty caused by financial mismanagement and corruption, combined with shortages of basic goods, has resulted in domestic unrest. In 2004, Nauru was faced with chaos amid political strife and the collapse of the island’s telecommunications system. The island is now heavily dependent on Australian aid.

³⁵ X. Sala-i-Martin and A. Subramanian, “Addressing the Natural Resource Curse: An Illustration from Nigeria,” NBER Working Paper 9804 (June 2003), note that Nigeria accumulated physical capital at the high rate of 6.7 per cent but experienced negative total factor productivity growth of 1.2 per cent and a large decline in capacity-use in manufacturing. Income per head was lower in 2000 than in 1965 and poverty rates far higher. Gelb, *Oil Windfalls*, documents wasteful spending and the poor performance of countries such as Algeria and Venezuela after their investment splurges financed by the oil boom of 1973–81.

Another elusive proposition is that countries have experienced long-term declines in growth as a result of shifting from manufacturing to minerals. Hausmann, Hwang and Rodrik³⁶ develop the proposition that countries that are able to boost the sophistication of their exports grow more rapidly. They measure sophistication by “EXPY” — the weighted income levels of the set of countries that export the bundle of products in a particular country’s export base. Countries able to manufacture products generally produced by richer countries grow faster; this typically involves a shift towards progressively more complex manufactures and “connected” products, where capability in one leads to the acquisition of capabilities in others. Since it is unrealistic to expect a low-income country to produce technologically advanced products, the policy prescription coming from these studies is to aim to export products typically exported by countries at around twice the level of per-capita income. While intuitively appealing, this result is challenged by Lederman and Maloney³⁷ who find that including the investment share in GDP, or a measure of export concentration, eliminates the effect of EXPY on growth. They conclude that there may be a case for encouraging export diversification and also for supporting areas of the economy that increase the return to schooling, but that the case for selective intervention to support particular industries is unproven.³⁸

At the same time, resources do influence incentives, including the incentive to create human capital, and to invest in different sectors. While resource dependence is often associated with increased income inequality, De la Torre and Messina³⁹ consider the decline in income inequality in Latin America over the last decade. Real exchange-rate appreciation and booming construction and service sectors have increased demand for lower-skilled labour in commodity-exporting countries, reducing skill premiums and enabling some 70 million people to move out of poverty. This news is welcome, but as expressed by the authors: “... [it] seems to hide a dark side, the specialization of the region’s economies in activities that are relatively low in skill intensity and therefore tend to be of lower productivity.”

McMillan and Rodrik⁴⁰ find that much of the growth difference between countries in Asia and those in Latin America and Africa has been due to their different patterns of structural change. Labour in Asia has shifted from low-productivity sectors towards “modern,” high-productivity sectors, especially manufacturing. The reverse has been true in the other regions, with many countries actually de-industrializing in favour of services and construction, and in some cases

³⁶ R. Hausmann, J. Hwang and D. Rodrik, “What you export matters,” *Journal of Economic Growth* 12, 1 (March 2007).

³⁷ Lederman and Maloney, *Does What You*.

³⁸ In addition to the argument that mining has, in fact, been characterized by high productivity growth (G. Wright and J. Czelusta, “Resource-Based Growth”), W. Martin and D. Mitra, “Productivity Growth in Agriculture and Manufacturing,” *Economic Development and Cultural Change* 49, 2 (2001), offer evidence that productivity growth has been at least as high in modern agriculture as in manufacturing. Some processed primary exports are exported mainly by rich countries: the top ham and bacon exporters for example are the Netherlands, Denmark, Germany, the U.S., Italy, Spain and Canada. The rest of the world accounts for only 13 per cent of world exports.

³⁹ Augusto de la Torre and Julián Messina, “The trend reversal in income inequality and returns to education: How bad is this good news for Latin America?” VoxEu.org (March 7, 2013), <http://www.voxeu.org/article/trend-reversal-income-inequality-and-returns-education-how-bad-good-news-latin-america>.

⁴⁰ M. McMillan and D. Rodrik, “Globalization, Structural Change and Productivity Growth,” Working Paper 17143 (National Bureau of Economic Research, June 2011).

shifting back towards low-productivity agriculture. The degree of resource dependence, as measured by the share of raw materials in exports, is shown to be an important determinant of the shift direction. This study confirms one of the mechanisms through which resource dependence can be associated with slower growth. But it does not prove the case for selective policy since resource dependence, as discussed above, is itself endogenous.⁴¹

There appear to be few rigorous studies on the macroeconomic impact of environmental spillovers, but these could be considerable. Mining can inflict negative externalities on other sectors, especially with weak environmental regulation. Environmental degradation in the Niger Delta, for example, has probably impacted on the agricultural potential of that region. One important, though preliminary, assessment of the local impact of mining on agricultural productivity in Ghana is Aragon and Rud.⁴² Comparing productivity trends from districts close to mining activities with those further afield, they conclude that the fiscal contribution from mining is not enough to compensate the income losses of affected populations. More research is needed in this area, including on the costs of cleanup after mining and oil extraction, and how they will be allocated.

The challenge of managing volatility. Oil prices have been highly variable over time, with a coefficient of variation of 0.7, and hard mineral prices are not far behind. This is not to say that resource prices are actually more volatile than other prices. Arezki, Lederman and Zhao⁴³ study the volatility of commodity prices with a large dataset over the period 2002 to 2011. In contrast to the conventional wisdom, they find that, on average, the prices of individual primary commodities tend to be less volatile than those of individual manufactured goods, but that for the latter the focus is usually on price indexes composed of multiple commodities and products. This indicates that the volatility problem facing resource exporters is their lack of diversification rather than the particular nature of their export commodity. Nevertheless, the resulting terms-of-trade shocks to specialized resource producers can be enormous. For many countries, starting from a baseline of \$100, the difference between an oil export price of \$50 and \$150 is on the order of 50 per cent of GDP. In OPEC countries, oil exports per head have ranged from around \$200 (in constant dollars, adjusted to the year 2000) to over \$1,200 through the last two oil cycles.

⁴¹ Zambia, for example, has failed to diversify out of mining. It experienced a decline in employment in (largely public) industry as protection was reduced in the 1990s, but it is far from clear that continuing protection would have resulted in a competitive industrial sector in this sparse, landlocked, country. Labour costs in manufacturing in 2007 were about twice as high as in India and three times those in Bangladesh (A. Gelb, C. Mayer and V. Ramachandran, "Does Poor Mean Cheap? A Comparative Look at Africa's Industrial Labor Costs," Center for Global Development. (Paper delivered at 2013 CSAE Conference, Oxford, March 2013). Zambia has also failed to develop other resource-based sectors, such as tourism, where it has great potential.

⁴² F. Aragon and J. Rud, "Mining, Pollution and Agricultural Productivity: Evidence from Ghana" (Paper produced for the International Growth Center, 2012).

⁴³ R. Arezki, D. Lederman and H. Zhao, "The Relative Volatility of Commodity Prices: A Reappraisal," IMF Working Paper WP/11/279 (November 2011).

Efforts to predict price trends have an unsatisfactory record. Major turning points have not been generally identified, whether in an upward or downward direction. Influenced perhaps by the 1972 study *The Limits to Growth*, price forecasts failed to anticipate the collapse in oil prices after their peak in 1981; the consensus forecast was for a sustained rise at three per cent in real terms. Sharing in the euphoria, Mexico budgeted on the basis of a projected six-per-cent real oil-price increase. The situation is a little better today in that there is less of a tendency to simply extrapolate trends, but not much better for economic planning. Forward oil prices through the super-cycle have largely projected current prices, suggesting that the perceived path of prices is close to a random walk. This is not so far off the mark, according to statistical studies. Hamilton⁴⁴ estimated the likely price band for oil prices up to four years into the future. Starting from an initial price of \$115 per barrel, the range was between \$34 and \$391. At the time, in the middle of the super-boom with prices spiking up to \$140, no one could have imagined prices at the low end of the scale, but they collapsed to that level shortly after the publication of the study with the onset of the global crisis.

The boom-bust cycles induced by these price swings can be very damaging to resource exporters. Gelb⁴⁵ simulates the Mexico forecasting error using a computable general equilibrium model of Indonesia with sticky factor markets, adjustment costs for public spending and fiscal lock-in. Following an “optimal” spending path conditional on the wrong projection leaves the economy in a terrible state to face the price crash that follows. Public spending must be suddenly cut, with large adjustment costs and inadequate recurrent budget to operate and maintain capital projects initiated during the boom. Alternative exports take time to materialize as the economy takes time to reallocate factors. The net effect is to turn a large export windfall into a substantial loss.⁴⁶

On the empirical side, a number of studies confirm the link between volatility and growth for concentrated resource exporters. Van de Ploeg and Poelhekke⁴⁷ show that adverse growth effects of natural resources result mainly from the volatility of commodity prices, especially for point-based resources. Indeed, the indirect effects of resource exports on growth via the volatility channel outweigh a direct positive effect of resource endowments on growth. The adverse impact of volatility increases more than linearly, being more problematic for countries with high growth volatility than for those that are able to cushion the effect on their economies.

⁴⁴ J. Hamilton, “Understanding Crude Oil Prices,” Working Paper 14492 (National Bureau of Economic Research, November 2008).

⁴⁵ Gelb, *Oil Windfalls*.

⁴⁶ A similar conclusion follows from the estimates of Paul Collier and Anthony J. Venables, “Illusory Revenues: Tariffs in Resource-Rich and Aid-Rich Economies,” *CEPR Discussion Papers* 6729 (2008), that countries suffering a large, adverse terms-of-trade shock see reduced growth that is not compensated when terms of trade reverse. A. Gelb and S. Grasmann, “How Should Oil Exporters Spend Their Rents?” Working Paper 221 (Center for Global Development, August, 2010), calibrate a very simple model using their parameters, applying this to a resource boom of uncertain duration. They find that it is better to be cautious, assuming booms to be temporary at least until sufficient reserves have been saved to cushion the shock when they reverse.

⁴⁷ F. van der Ploeg and S. Poelhekke, “The Pungent Smell of Red Herrings: Subsoil Assets, Rents, Volatility and the Resource Curse,” *Journal of Environmental Economics and Management* 60, 1 (2010).

These effects are not independent of country characteristics, such as the levels of export concentration and financial development, and the quality of political institutions. Lederman and Maloney⁴⁸ find that the resource curse disappears when resource dependence is augmented in country regressions by a measure of export concentration. Van der Ploeg and Poelhekke⁴⁹ show the effect of deep financial markets in blunting the impact of export volatility on growth. Arezki, Hamilton and Karimov⁵⁰ find that overall government spending in resource-exporting countries has been pro-cyclical relative to commodity prices and that, in the long run, resource windfalls have negative effects on the growth of non-resource GDP. But both the effects of windfalls on macroeconomic stability and on growth are moderated by the quality of political institutions.⁵¹ These differences probably account for failure to find an adverse long-term relationship between resources and economic performance for rich countries, even though they too experience some resource-curse-like effects: appreciating real exchange rates, pressure on manufacturing sub-sectors exposed to import competition, and fiscal and structural adjustment costs.⁵²

Failure to cushion a producing economy against volatility can induce structural change that further worsens vulnerability to commodity price shocks. Hausmann and Rigobon⁵³ show how bankruptcy costs cause interest rates to increase with higher volatility, and to steer investment away from non-resource traded sectors. This set in place a vicious circle, with inefficient “premature specialization” in resource sectors and further increases in economic volatility because the only avenue for adjustment is through demand adjustments.

⁴⁸ Lederman and Maloney, *Natural Resources*.

⁴⁹ Van der Ploeg and Poelhekke, “The Pungent Smell.”

⁵⁰ R. Arezki, K. Hamilton and K. Karimov, “Resource Windfalls, Macroeconomic Stability and Growth: the Role of Political Institutions,” IMF Working Paper 11/42 (2011).

⁵¹ In this study, GDP is purged of resource rents by subtracting estimates of the real value of natural-resource rents from GDP to derive a measure of non-resource GDP, and political institutions are measured by the Polity 2 score of the Polity IV database.

⁵² C. Taylor et al., *Beyond the Boom: Australia's Productivity Imperative* (McKinsey Global Institute, August 2012), estimate that 58 per cent of Australia's income growth over 2005–2011 was driven by temporary resource-boom factors; during this period labour-productivity growth fell sharply to 0.3 per cent, while capital productivity actually declined. Part of this may have been due to long-gestation mining investments, but capital productivity declined also in manufacturing, especially that part not most directly exposed to low-wage imports through the appreciating real exchange rate. The exposed sub-sectors posted the largest job losses and, at the same time, the greater productivity increases. Not all of these effects are directly attributable to the resource boom; some reflect more secular factors. There is also debate in Canada on the impact of the resource boom on manufacturing; see, for example: M. Beine, C. Bos and S. Coulombe “Does the Canadian economy suffer from Dutch Disease?” CREA Paper 2009-06 (University of Luxembourg, 2009). For global gravity-model estimates of the (substantial) impact of resource prices and exports on manufactured exports, see: J. Stijns, “An Empirical Test of the Dutch Disease Hypothesis Using a Gravity Model of Trade” (paper presented to the 2003 Congress of the EEA, Stockholm).

⁵³ R. Hausmann and R Rigobon, “An Alternative Interpretation of the Resource Curse: Theory and Policy Implications,” in *Fiscal Policy Formulation and Implementation in Oil-Producing Countries*, ed. Davis J., R. Ossowski and A Fedelino (Washington D.C.: International Monetary Fund, 2003).

Improved capacity to manage shocks, a more robust financial sector, and efforts to encourage a reasonably diversified export economy may therefore be some of the ways in which resource-rich countries can work to minimize the curse. Some, like Chile, have succeeded in sustaining counter-cyclical policies using fiscal rules and transparent and independent projections of long-run resource prices to guide policy.⁵⁴ Even for these few countries, it has not been easy to resist the pressure to increase spending when resource prices have been high. Others have promulgated rules and set up stabilization funds, as well as savings funds, in vain. For many, sustaining such policies and protecting funds from looting will not be possible without improvements in political institutions.⁵⁵

The political and institutional foundations of the resource curse. A number of studies have investigated whether high resource rents inhibit democracy, encourage conflict and erode institutional capital. Aslaksen and Torvik⁵⁶ propose that rents will increase the payoff from conflict more than the payoff from elections and that resource wealth puts democratic institutions to a survival test. Countries will not pass this test if resource wealth is sufficiently high, labour productivity is sufficiently low, political competition is sufficiently strong or politicians are sufficiently shortsighted. In these cases, the perceived opportunity cost of conflict is low relative to the potential gains from appropriating the rents.

Similar reasoning underlies generalizations of this argument to cases when conflict is not open, but involves destructive struggles to appropriate rents through other mechanisms. Especially when property rights are endogenous, this can cause over-dissipation of the resource rents, turning a resource bonanza into a net loss.⁵⁷ In the model of Robinson, Torvik and Verdier,⁵⁸ political patronage is modeled as an increase in public employment. In a setting of partisan politics, a permanent resource boom, as well as an anticipated boom, increases public employment in response to short-term pressures from client groups and decreases private employment and output. The net effect can be to increase or decrease total income. Resources can have a less adverse effect if they lead incumbents to believe that they will be able to stay in power longer. But only countries with institutions that promote accountability and state competence (for example, merit-based public hiring policy) will be able to resist patrimonial practices to reap the benefits.

⁵⁴ J. de Gregorio and F. Labbe, "Copper, the Real Exchange rate and Macroeconomic Fluctuations in Chile," in Arezki, Gylfason and Sy, *Beyond the Curse: Policies to Harness the Power of Natural Resources*.

⁵⁵ van den Brenner and van der Ploeg 2012 note that the appropriate size of a country's stabilization fund will also depend on the propensity to consume out of oil income. A country with a low reserve/output ratio and little expectation of finding more should consume less of its current income; in this case the savings fund can cushion short-term volatility. A stabilization fund is more needed in a country like Venezuela, with very large reserves.

⁵⁶ S. Aslaksen and R. Torvik, "A Theory of Civil Conflict and Democracy in Rentier State," *Scandinavian Journal of Economics* 108, 4 (2006).

⁵⁷ R. Hodler, "The curse of natural resources in fractionalized countries," *European Economic Review* 50 (2006); P. Lane and A. Tornell, "The Voracity Effect," *American Economic Review* 89, 1 (1999).

⁵⁸ J. Robinson, R. Torvik and T. Verdier, "Political foundations of the resource curse," *Journal of Development Economics* 79 (2006).

These arguments have considerable empirical support. The incidence of civil conflict has certainly been higher in poor, resource-dependent countries than in others.⁵⁹ Destructive rent-seeking competition seems most likely in countries with large ethnic divisions. Hodler⁶⁰ compares the impact of resource rents in ethnically homogenous and fractionalized countries. He concludes that property rights tend to be stronger and economic freedom greater when countries are more homogenous and natural capital is lower relative to other national wealth. The positive income effect of rich natural resources is reduced in ethnically fractured countries.

To assess the impact of resources on the evolution of democracy, Ross⁶¹ uses pooled data for 113 states over the period 1971–1997 and fuel-based exports to GDP as a measure of resource dependence. Changes are assessed over five-year periods, using lagged values of resource and other variables. He concludes that oil in particular impedes movement towards democracy, and that this effect is more pronounced in poor states than in rich ones. One standard deviation in oil dependence produces a five-per-cent fall in the democracy index over each five-year period. Minerals have a similar effect, though only half as large. The effect is robust to the inclusion of regional dummies for Africa and the Middle East; it is not confined to either of these regions.

Three causal mechanisms for the effect receive substantial, but not total, empirical support. A rentier effect sees governments using low tax rates and high spending to dampen pressures for democracy, accountability and representation. Patronage spending also is used to undermine the formation of independent groups that can provide checks and balances. Resource rents also finance a repression effect, marked by increased military and security spending. Country cases illustrate a range of such experiences.⁶²

The third effect is delayed social modernization, as the labour force is less likely to move into sectors, such as industry, that require a more educated and autonomous workforce. Ross⁶³ analyzes this further in looking at the interaction of oil, Islam and women, arguing that the underrepresentation of women in the workforce and in government is more because of oil than because of Islam. Using estimated oil rents per head to reduce reverse causality and controls for income, regional dummies including the Middle East, Islam and political institutions, he finds that oil rents have a large negative effect on female labour-force participation, and that rents are also negatively associated with female political representation, even after allowing for a positive income effect. An increase in oil rents of one standard deviation (about \$1,280 per head) causes female representation to fall from 12.5 per cent of seats to 10.5 per cent for a country at the sample mean.

⁵⁹ P. Collier and A. Hoeffler, "Greed and Grievance in Civil War," *Oxford Economic Papers* 56, 4 (2004); Paul Collier, *The Bottom Billion: Why the Poorest Countries Are Failing and What Can Be Done About It* (Oxford: Oxford University Press, 2007); M. Ross, "Does Oil Hinder Democracy?" *World Politics* 53 (April 2001); Ross, *The Oil Curse*.

⁶⁰ Hodler, "The curse of natural."

⁶¹ Ross, "Does Oil Hinder."

⁶² S. Schubert, "Revisiting the Oil Curse: Are oil-rich nations really doomed to autocracy and inequality?" Munich Personal RePec Archive Paper 10109 (2006), cites the rentier-state example of Kuwait. Before the discovery of oil, its economy and the maintenance of the ruling Al Sabah family were reliant on taxes on the merchants of the pearl trade. After oil discovery, the sheik disbanded the previously influential merchants' assembly and eliminated taxes. He then arranged jobs for pearl merchants, provided free education and health care, buying off potential opposition. All of the Persian Gulf states provide a range of subsidies to their citizens, in particular protected employment. B. McSharry, "The Political Economy of Oil in Equatorial Guinea," *African Studies Quarterly* 8 (2006), sees Equatorial Guinea as closer to the repressive model since rents sustain a pathology of authoritarian rule and underdevelopment, with few benefits trickling down to the population.

⁶³ M. Ross, "Oil Islam and Women," *American Political Science Review* 102, 1 (2007).

Ross observes that the entry point for female workers in countries with traditions of occupational segregation are usually the low-wage clothing and textile industries, whereas construction and heavy industry are traditionally dominated by males. Oil wealth both boosts the reservation wage and exposes these sectors to intensified international competition. Lacking oil wealth, Tunisia and Morocco have developed such industries, with overwhelmingly female workforces leading to a variety of female social and political organizations. With high income from oil and gas, Algeria pursued a path of heavy industry and failed to diversify exports and open up to new business entrants. Its female labour participation rate is far lower as is its rate of female parliamentary representation. This strategy has had other consequences. The combination of a highly protected internal market and the capture of industrial incentives by privileged networks to compete for oil rents has resulted in a stagnant economy, with even less competitive non-oil exports.⁶⁴

Ross's 2001 study⁶⁵ is vulnerable to the critique that the measure of resource dependence, though lagged, could reflect factors that both inhibit democracy and the ability of a country to diversify away from resource sectors. Tsui⁶⁶ considers the long-term relationship between major oil discoveries and democracy, measured one decade before and up to three decades after the discovery period, and comes to a similar conclusion. Oil discovery has no effect on robustly democratic countries. However, it impedes the transition to democracy for less democratic ones; discovering 100 billion barrels of oil pushes their democracy score 10 percentage points below trend three decades after.⁶⁷

Cross-country comparisons provide more evidence of a generally adverse relationship between resources (especially oil) and institutions. The Open Budget Index shows that budgets in oil-exporting countries are far less transparent than in other countries at comparable levels of income. This mirrors the lower level of accountability in such countries as captured by a range of other indicators. High rents increase the incentives for opacity and may reduce the incentives of citizens to hold government accountable for the use of tax revenues. To strengthen accountability, a number of studies argue that all natural rents should be directly distributed to citizens, with transparent tax-back by government to finance the budget.⁶⁸

⁶⁴ R. Hausmann, B. Klinger and J. Lopez-Calix, "Export Diversification in Algeria," in *Trade Competitiveness of the Middle East and North Africa*, ed. J. Lopez-Calix, P. Walkenhorst and N. Diop (Washington: World Bank, 2010) find that the sophistication of Algeria's non-oil exports, as measured by the EXPY measure, has risen only slowly and has fallen behind that of Indonesia, although the latter is a far poorer country.

⁶⁵ Ross, "Does Oil Hinder."

⁶⁶ K. Tsui, "More Oil, Less Democracy: Evidence from Worldwide Crude Discoveries," *Economic Journal* 121 (2010).

⁶⁷ Tsui recognizes the possibility that oil discovery might be at least somewhat endogenous to political conditions and also uses a measure of estimated resource endowment as an instrument. This does not completely solve the problem however, given that prior exploration may also depend on country-specific factors. The results also appear to be heavily influenced by a few cases, a consequence of using a total, rather than per-head, definition of discoveries.

⁶⁸ D. Brautigam, O-H. Fjeldstad and M. Moore, *Taxation and State-Building in Developing Countries: Capacity and Consent* (Cambridge: Cambridge University Press, 2008) consider the role of taxation in development. For more on the topic of oil-to-cash (including discussions for particular countries) see: http://www.cgdev.org/section/initiatives/_active/revenues_distribution. While the approach has not been implemented on a full scale, recent advances in identification and payments technology now make it technically possible, even for poor countries.

Tax collection offers another example; oil-exporting countries typically collect less in non-resource taxes than other countries, but they fail to use the slack offered by lower immediate need for revenues to streamline their tax systems. The quality of (non-oil) tax administration is significantly worse in countries with large sovereign rents.⁶⁹ Yet another area is public investment: IMF estimates of the quality of public investment management find this to be substantially worse in oil exporters than in other countries.

The accrual of substantial resource rents to sub-national governments introduces an additional layer of complexity and competition for resource rents. Countries vary widely in terms of their constitutional arrangements for resource ownership and revenue allocation. As discussed in Haysom and Kane,⁷⁰ some are unitary states with centralized arrangements while others are federal, or countries facing powerful demands for local ownership, control and revenues. Well-defined decentralized arrangements have some potential advantages, as well as reflecting political realities, but they raise their own problems. The fact that resource rents are so variable increases the difficulty of settling on a stable allocation formula. What seems reasonable in a period of low prices can produce wildly differing levels of fiscal resources per head when prices soar or when new reserves are discovered. Not all countries can deal with these stresses in a co-operative way. It can also be harder to reach national agreement on environmental policies, including on greenhouse-gas emissions, when some provinces or states are heavily specialized in extractive industries, while others are not.

Especially if resource revenues are entitlements, central government may have limited oversight on their use at local levels. Some Brazilian municipalities receive large payments from oil; studies find indications of greater corruption and entrenchment of incumbents but little evidence of improved service delivery.⁷¹ Cash-rich regional or local governments can also frustrate national efforts to smooth spending over the commodity cycle, spending heavily when their revenues are high and pleading for assistance when commodity prices collapse. This may be because they do not internalize the adjustment externalities that fall on resource-poor regions, or because they lack confidence that funds saved on their behalf will be returned when commodity prices come down. Highly politicized competition for oil rent between central and state-level governments has made it more difficult to focus on counter-cyclical fiscal policy and the quality of spending in Nigeria. Even highly developed countries, such as Canada, experience some of these stresses; for example, when a resource-rich province, such as Alberta, implements less-than-prudent fiscal policy during a resource boom.

⁶⁹ S. Knack, "Sovereign Rents and the Quality of Tax Policy and Administration," Policy Research Report 4773 (World Bank, November 2008).

⁷⁰ N. Haysom and S. Kane, "Negotiating natural resources for peace: Ownership, control and wealth-sharing" (Geneva: Center for Humanitarian Dialogue, October 2009).

⁷¹ F. Casselli and G. Michaels, "Does Oil Improve Living Standards? Evidence from Brazil," NBER Working Paper 15550 (2009); F. Brollo et al., "The Political Resource Curse," NBER Working Paper 5705 (2010).

Which institutions are most critical for managing resource wealth? Collier finds that democracy alone is not sufficient.⁷² Without effective checks and balances on power, competition for natural-resource rents can make democracies malfunction. Unlike normal taxation, they do not invite public scrutiny and political accountability, and therefore encourage the emergence of patronage politics. Barma, Kaiser and Vinuela⁷³ build on classifications developed in several previous studies to define two dimensions: political inclusiveness and inter-temporal credibility. The first is needed to ensure that rents are spent in a broadly developmental way. The second is to enable countries to contract efficiently with natural-resource companies and to manage inter-temporal volatility.⁷⁴

The recent resource boom offers an opportunity to test these political economy models. Figure 2 compares governance measures in 2000 and 2011 for four groups of oil exporters, as well as the mineral exporters Chile and Botswana, classified as in Eifert, Gelb and Tallroth.⁷⁵ One dimension is political inclusion, which is measured by the voice and accountability indicator from the Worldwide Governance Indicators (WGI). The other, economic management, averages the WGI indicators for bureaucratic capability, regulatory quality and rule of law.⁷⁶ Countries rated high on both dimensions — the so-called “mature democracies” — have not been institutionally destabilized by the huge boom in natural rents. Neither has the influx of resources changed the political or management ratings in the low-rated “predatory autocracies”: these remain locked into their low-level equilibriums. Rents have further entrenched the traditional “paternalistic traditional autocracies” in the Gulf. In the “factional democracies” of Latin America, which rate higher on political inclusion than on economic management, the distribution of natural rent is strongly contested. These countries have been severely stressed over the boom: the governance indicators move in the same adverse way for all three, although Venezuela has experienced the most pronounced decline. By 2011, only 30 per cent of its oil revenues were subject to even feeble parliamentary oversight. In an increasingly authoritarian setting, the remainder was channeled towards populist off-budget programs or directly distributed by PDVSA, the national oil company.⁷⁷ The company is a shadow of its former self; previously regarded as a professional and capable institution, it is highly politicized and has lost much of its leading human capacity.

⁷² Collier, *The Bottom Billion*.

⁷³ Barma, Kaiser and Vinuela, *Rents to Riches*.

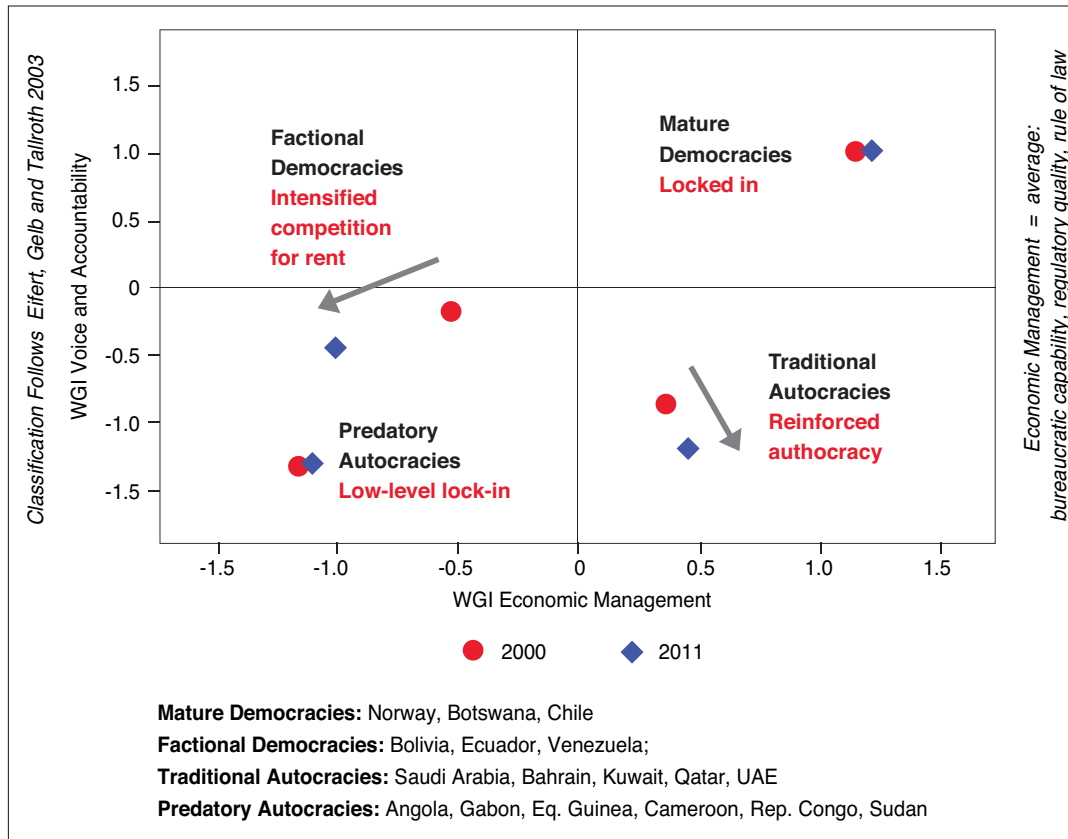
⁷⁴ Case studies indicated the importance of institutions in managing resource wealth quite early on. “A more accurate statement therefore is that Indonesia’s good performance during the oil booms reflected the institutions developed earlier to nurse the economy back to health, the approach to policy set in the Suharto government’s formative years and the *unusual degree of continuity*,” — Gelb, *Oil Windfalls* (page 223) cited in Robinson, Torvik and Verdier, “Political foundations.” The institutions included by Mehlum, Moene and Torvik, “Institutions and the Resource,” are very much along the credibility dimension.

⁷⁵ B. Eifert, A. Gelb and N. Tallroth, “The Political Economy of Fiscal Policy in Oil-Exporting Countries” in *Fiscal Policy Formulation and Implementation in Oil-Producing Countries*, ed. J. Davis, R. Ossowski and A. Fedelino (Washington: International Monetary Fund, 2003). This classification distinguishes “factional” democracies from “mature” democracies, and argues that highly personalized politics and rent-seeking in the former result in short-horizon, patronage-driven electoral competition and non-transparent allocation of rents. Avoiding this requires effective checks and balances on the executive.

⁷⁶ These three measures are highly correlated across the WGI dataset. Combining them yields a broad measure that draws on many individual governance assessments.

⁷⁷ P. Rodríguez, J. Morales and F. Monaldi, “Direct Distribution of Oil Revenues in Venezuela: A Viable Alternative?” Working Paper 306 (Washington: Center for Global Development, 2012).

FIGURE 2: GOVERNANCE OVER THE RESOURCE BOOM: 2000-2011 SELECTED COUNTRIES



CONCLUSION

What does this survey suggest for a developed, high-income resource producer like Canada? Some issues are remote, such as the association between mineral wealth and civil wars. Others provide insights that Canadian policy-makers might bear in mind.

Evidence confirms that a rich resource base is a potential asset for a country rather than a liability. The problems, when they arise, are due to shortcomings in managing the resource sector to produce wider benefits, and they are more prevalent for hydrocarbons and mining that provide high “point-source” natural-resource rents. But to dismiss the resource curse as a myth trivializes the risks. It does not make the curse any less real for those countries that are not able to manage resource riches effectively.⁷⁸ It may also lull better-managed countries into complacency — always a risk because country cases show how even some strong and capable organizations have been weakened by rent-related political struggles.

⁷⁸ The issue is not unique to resources; it can apply to other flows or discoveries that expand choice sets and, at the same time, open up risks. One example is the contentious effect of foreign-aid inflows on development. Another (contentious) example is firearms. Guns certainly open up the choice set of both individuals and nations relative to, say, bows and arrows, and the assertion that “guns don’t kill people, people kill people” is also technically correct. Nevertheless, many countries limit access to firearms on the basis that the risks of widespread ownership are greater than the benefits.

All resource-rich countries experience sectoral shifts, adjustment costs and fiscal stresses as the markets for their resources wax and wane, or when they make new discoveries. Sometimes this has been painful but there is no evidence that this has turned resources into a liability for high-income OECD countries. The situation can be very different for poor countries, which are often less diversified and, at the same time, have less mature political systems and fewer institutional resources to manage both large terms-of-trade shocks and distributional struggles sharpened by a high component of rent in GDP. These can play out in different ways depending on the context. One extreme is civil conflict, the other an insidious process of undermining mechanisms of management and oversight or shaping policies to steer rents to favoured constituents.

Every country is different, but there are some common themes.

- Countries with a rich and varied resource portfolio have an advantage over those that are highly specialized in one or other resource sectors. Canada is fortunate here, with a balanced portfolio including hydrocarbons, minerals, agriculture and forestry. While it is resource rich, it is not excessively resource dependent, at least to the extent that might suggest a negative overall impact from resource windfalls.
- Countries do better when they can create and sustain a national consensus that rents be used to strengthen human capital and institutional capacity, as well as physical investments, to further diversify national capital.
- Economic diversification has benefits. It may be useful to focus on factors that limit ability to build on the resource base to create upstream, downstream or horizontal linkages with other industries. This can include a focus on skills and essential infrastructure. It may not call for highly selective industrial policy.
- Prudent counter-cyclical macroeconomic management is essential to avoid excessive boom-bust spending cycles that have high macroeconomic and efficiency costs. Fiscal rules are not sufficient but can provide helpful and transparent benchmarks for policy. It is important to have strong checks and balances on public spending, as well as to factor in the level of uncertainty in resource markets. This may be especially great for provinces such as Alberta with high-cost resources such as oil sands, because rent margins will be even more volatile than prices.
- Countries need an appropriate balance between consumption and saving, but physical investment alone is not enough. Quality spending is even more important than quantity. National and sub-national governments with high dependence on resource rents should benchmark their performance in areas such as budget transparency and the quality of public investment management. They should also take advantage of rent-based taxes to streamline their tax systems and improve tax administration.
- Polarized politics aggravate the management of natural rent. And countries should avoid the capture of rents by an incumbent elite at the expense of inhibiting new entry and innovation.

About the Author

Alan Gelb is a senior fellow at the Center for Global Development. His recent research includes the special development challenges of resource-rich countries, aid and development outcomes and the development applications of biometric ID technology. He was previously director of development policy at the World Bank and chief economist for the bank's Africa region and staff director for the 1996 World Development Report "From Plan to Market." He has a D.Phil from Oxford University and is the author of several books and of a number of articles on these topics.

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