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**MINING IN  
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**WORLD BANK AND  
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This is the first in a series of short papers that the World Bank Group's Mining Department will publish to share some of the experience and knowledge gained through daily work with developing country policymakers, the mining industry, and mining communities and their organizations. Over the coming years, as the sector expands, governments, businesses, and communities in many developing countries will face more and more complex issues and difficult trade-offs. We hope to see the "Mining and Development" series inform a wide range of interested parties on the opportunities, as well as the risks, the sector presents.

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## CONTENTS

v	Foreword, by James Bond
1	Mining and Development: A Key Question for 3.5 Billion People
2	What's So Special about Mining?
3	The "Mining Is Good" Hypothesis
4	The "Mining Is Bad" Hypothesis
6	What Do the Data Tell Us?
9	Emerging Lessons from Best and Worst Performers
12	Strengthening Mining Countries' Economic and Fiscal Management: Emerging Priorities
13	If All Goes Right: Does Mining-Induced Growth Contribute to Poverty Reduction?
14	The Challenge of "Getting It Right"
15	<b>Box 1:</b> What Can Policymakers Do to Improve Their Mining Sectors?
16	<b>Appendix A:</b> Why Look at Mining Separately from Oil, Gas, and Other Natural Resources?
17	<b>Appendix B:</b> The Relevance of Mining in 51 Mining Countries, 1990-99
18	<b>Appendix C:</b> The Regional Dimension of Mining Countries' Growth, 1990-99
19	<b>Appendix D:</b> On Data Quality and Research Design
21	<b>Appendix E:</b> Research on the Relationship between Extractive Sectors and Economic Growth
22	References



## FOREWORD

Can countries consider their mineral wealth an asset, to be used to stimulate or enhance their economic growth potential, or are there reasons to steer an economy away from the development of the mineral sector? Reviewing the cases of 51 “mining countries” in the developing world, three conclusions can be drawn:

- ▶ First, in more cases than not, mining countries appear to fare better than other countries in their respective regions.
- ▶ Second, where they do fare well, their good performance appears to be associated mostly with institutional stability and overall good economic management, particularly that relating to the management of revenues from the mining sector and the management of the sector itself.
- ▶ Third, the need to build institutional stability and improve economic management is most urgent in countries where the mining sector dominates an economy *and* where poor economic management and weak institutions are persistent features.

In contrast to some analyses, this paper can find no reason to assume a *causal* relationship between a dominant mining sector and overwhelming economic ills. Nonetheless, it acknowledges the need to take special steps to prevent vested interests from expropriating mining and mineral resources that could otherwise be used to create economic assets for future generations. To these ends, the paper emphasizes the need for policymakers to design and strengthen general economic policies and institutions for financial management, as well as specific frameworks and institutions for the mining sector.

The challenge is to turn the national endowment of mineral resources into national wealth. In this regard, there are lessons to be learned for other mining countries from both the “worst of class” and “best of class” performers profiled in this study.

*James Bond*  
*Mining Department, World Bank Group*  
*March 2002, Washington D. C.*



## Treasure or Trouble?

### Mining and Development: A Key Question for 3.5 Billion People

In more than 100 countries around the world, mining companies and individual miners dig minerals and metals out of the ground, satisfying a slowly but continuously increasing demand from industrial production, agriculture, high-tech sectors, and merchandise producers. Among those countries are more than 50 that can be considered “mining countries,” well known for the sector’s contribution to export earnings, including Australia, Botswana, Chile,

**Our definition of “mining” encompasses metals and minerals but does not include oil or gas (see appendix A). Mining operations include open-pit and underground mining, and large-scale operations as well as activities of small-scale and artisanal miners.**

Canada, Guinea, Kazakhstan, Papua New Guinea, Peru, and South Africa. Mining countries also include those where the sector is highly relevant domestically, either because it primarily serves large domestic markets, as in the United States, or because it employs millions of workers, such as in China or India (see appendixes B, C). Not included in this list are a number of countries that have had significant mining activities in the past, such as Malaysia and Thailand, or that own natural

<sup>1</sup> For purposes of this study, the relevance of a country’s mining sector for the country’s economy was estimated based on *exports of mining products* such as metals, diamonds, and minerals, including industrial and chemical minerals (see appendix D). Countries where mining contributes more than 6 percent to exports are considered “mining countries,” as well as countries with large domestic mining sectors.

## MINING IN DEVELOPING COUNTRIES

resources with potential to move onto the “mining country” list in the future, such as Argentina and Mozambique.

About 3.9 billion people live in today’s 56 “mining countries,” 90 percent of them in the 51 developing and transition countries on this list.<sup>1</sup> Among the 3.5 billion people in these countries, about 1.5 billion live on less than \$2 a day, making up nearly two thirds of the world’s poorest population. Their countries have potential wealth – mineral wealth – and thus one of the key questions for them is how they can turn this endowment into an economic asset that will help them find ways out of persistent poverty.<sup>2</sup>

These are opportunities that will be around for some time. There is practically no doubt that mining as an industry will continue to expand over the next 20 to 30 years. Developing countries will almost certainly play an increasingly important role in that expansion on the demand side, as population and economies grow, as well as on the supply side, given shifts in exploration and mining development investments.<sup>3</sup> However, there are concerns as to whether the development of these resources actually benefits the countries and their economic development, or rather poses risks and involves costs – largely in terms of missed opportunities in other sectors, or in terms of conflicts over the revenue flows generated.

<sup>2</sup> This was a central question in the 18th, 19th, and 20th centuries for several countries that are now among the most wealthy in the world, including Australia, Canada, Sweden, and the United States.

<sup>3</sup> The Metals Economics Group estimates that about 29 percent of exploration budgets are directed to Latin America, about 14 percent to Africa, and about 7 percent to Pacific Southeast Asia (*Mining Journal*, November 2001, p. 353).

## What's So Special about Mining?

Why would a country's reliance on its mining sector have beneficial or detrimental effects on the country's economic growth? A vibrant mining sector, just as any other sector, should provide significant opportunities for a country's growth. Yet there are a number of features that distinguish mining, at times along with other extractive activities such as oil or gas, from sectors such as manufacturing or tourism.

► **What's under the ground is a national asset.** For centuries, extractive natural resources have been treated differently from other natural endowments. Many countries consider metals and minerals to be assets belonging to the "public" as a whole. This has resulted either in state ownership of mining companies or in more-than-usual involvement of the state in the licensing of mining companies, the regulation of the sector, and fiscal and financial matters, including taxation, fees, and investments in supporting infrastructure.

► **A "footprint industry."** By its very nature, the mining industry, just like the oil and gas industries, leaves behind a "footprint" – an environmental, social, and economic impact. However, even when only local or regional in nature, badly managed impacts on the environment or the social fabric of society can reflect negatively on economic parameters countrywide. It is thus important to weigh the benefits against the risks and costs surrounding the industry's operations, and to mitigate any negative impacts.

► **A priority area for foreign direct investment.** Many developing countries pose high risks for foreign investors. Mining operations in these countries, with their export orientation and dollar-based cost and revenues, are often the first ones to present an acceptable risk-reward formula to investors. In this "early mover" situation, governments might find themselves unprepared when negotiating contracts with mining investors. In turn, mining investors might find themselves tackling special difficulties in interacting with government agencies and other local actors.

► **A large source of government revenues.** A vibrant mining sector tends to generate large fiscal incomes, relative to other sectors. Since in most developing countries large parts of fiscal incomes are export-based, export sectors such as minerals and ores gain more-than-proportionate weight for government incomes.<sup>4</sup> In some mining countries, up to 25 or 30 percent of fiscal revenues rely directly on the mining sector. The sheer size of these revenues poses an unusual challenge to governments, in terms both of responsible management and in the political economy of distributing them.

Concerns as to whether mining may benefit or hinder a developing country in its quest for economic growth and prosperity have given rise to a growing body of research. Some analysts favor the use of a country's mining sector to promote economic growth (the "mining is good" hypothesis). Others advocate the cessation of mining ("the mining is bad" hypothesis).

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<sup>4</sup> Relying on export commodities generated by a few large firms for a significant part of fiscal revenues is a feature shared not only with countries depending on oil and gas, but also with those relying on drink crops like coffee and cocoa, and other agricultural export commodities.

### The “Mining Is Good” Hypothesis: A Story of Cluster Development, Innovation, and Competent Institutions

Mining has been, and in many cases remains, important to the economic development of a number of industrialized countries such as Australia, Canada, Sweden, and the United States, which in many ways based their development on their natural resources. Various cities and regions, as well, have built their wealth and industrial development at least in part on mining. Historical examples include Monterrey in Mexico, which emerged from the mining boom of the 19th century as a processor of iron ore and steel,<sup>5</sup> Colombia's Antioquia province, with its epicenter Medellín, and São Paulo, Brazil. Current examples include Zambia's copper belt, Chile's Antofagasta region, the southwestern area of Ghana, and China's Shanxi province.

For purposes of this paper, authors and researchers supporting the “mining is good” hypothesis are grouped into three main schools of thought:

▶ **“Origin of cluster growth” and “staples theory.”** Proponents of this view look at the ability of mineral resources to provide commodities that encourage the emergence of downstream local industrial production.<sup>6</sup> If necessary preconditions such as the availability of transport and power are met, mining is considered to contribute to the creation of “clusters” of industrial growth.

▶ **“Miners bring technology and innovation.”** The sector's orientation toward technology and innovative drive

has prompted some observers to argue that mining can be “fundamentally a collective learning experience.”<sup>7</sup> Mining, it is argued, with its emphasis on technology and capital-intensive production, can create and support the emergence of “national innovative capacity” or the ability of countries to produce and commercialize knowledge over the long term. This, in turn, will create a platform from which innovative potential can be launched in other sectors and parts of the economy, contributing to sustained economic growth.

▶ **“It's not what you do, but how you do it.”** This line of thought centers on the substantial income flows that governments often receive from mining (or other natural resources). It examines the quality of economic management, governance systems, and institutional capital necessary to transform such flows and the dynamics associated with foreign direct investment in the sector into viable assets sustainable in the longer term. The arguments depart from various points, ranging from the need, under certain circumstances, for careful and measured industrial policy to suggestions for independent and transparent financial management institutions, including the use of independent investment funds.<sup>8</sup> Most of the studies argue that where such institutions and policies exist, mining sustains and enhances economic growth in developing countries.

All the arguments presented above are based on the understanding that even though *abundance* of natural resources is exogenous, natural *wealth* itself is not. Rather, it is a function of the quality and

<sup>5</sup> See de Ferranti and others (2001).

<sup>6</sup> Among others, Irwin (2000), Ramos (1998), Duffy (1994), Watkins (1963), Innis (1933).

<sup>7</sup> Among others, Wright (1999).

<sup>8</sup> De Ferranti and others (2001), O'Brian (1994), McMahon (1997), Auty (1999), Harberger (1994).

extent of a number of other factors. These include enabling infrastructure and related downstream economic activity; knowledge and improvements in exploration and extraction techniques; the sector's institutional and regulatory frameworks; and, more generally, institutional capital and the quality of economic management at large.

Some of these assertions may appear unusual at first sight. For example, the argument that a vibrant mining sector can spur technology innovation in other sectors appears unusual, particularly given the stereotype of an otherwise rather conservative industry. However, the sector has achieved extraordinary advances in management practices and technology over the last 20 years, necessitated mostly by drastic falls in commodity prices. This has resulted in aggressive cost-cutting, as well as in the development of new technologies that have expanded the ability of mining operations to extract minerals and metals from lower and lower grade ores. It is worth noting that the “mining brings innovation” argument emphasizes, just as much as the other two lines of argument, the importance of institutions in *enabling* the innovative drive of the sector to take hold and permeate to other sectors.

### **The “Mining Is Bad” Hypothesis: A Story of Specialization, Misguided Investment Policies, Greed and War, and, Most of All, Poor Institutional Capital**

There are some spectacular cases in which mining wealth has been squandered and where countries are no better off – if not worse off – because of mismanaged mining development and plundered mineral

wealth. Recent examples include Congo and Sierra Leone; earlier ones include Angola and Liberia. These cases and others observed among oil countries have led a number of economists to argue that economies generating large incomes from natural resources have grown more slowly than others. Proponents of the “mining is bad” hypothesis appear to belong to three main schools of thought.

► **The “trap of specialization.”** A number of different arguments, each pointing to the presumed inevitability of slower economic growth in resource-rich countries, emphasize as a starting point the risks from an economy's specialization on the resource sector. While normally economists would argue that specialization on high-rent sectors is efficient and the underlying reallocation of labor and capital toward this sector is rational, specificities with the resource sector per se are what gives rise to concern. One line of argument focuses on the well-documented dangers imminent in a decline of the terms of trade of natural resources.<sup>9</sup> A second strand emphasizes the vulnerability of resource-reliant economies to shocks from the invariable fluctuations in resource prices which are inherent in the commodity character of natural resources.<sup>10</sup> A third points to the risk of drawing capital and labor away from other sectors that would have achieved higher productivity growth and

<sup>9</sup> See Prebisch (1959) and Singer (1950). Recently contradicted by Hadass and Williamson (2001), who find that the terms of trade actually *improved* for resource economies, largely due to rapidly declining transport costs during the same sample period.

<sup>10</sup> Mostly during the 1960s and 1970s, UNCTAD pointed to difficulties in investment planning due to price fluctuations (see Lazlo and others, 1978). More recently, concerns relating to price instability focus on resulting fluctuations in government fiscal revenues.

thus would have contributed to a more sustainable long-term economic growth than the fickle resource sector.<sup>11</sup> It is ultimately not the resource sector itself but the *neglect* of and downturn in other, presumably more innovative, sectors that would slow down growth in economies that rely largely on natural resource sectors such as mining. The latter argument is sometimes called the “Dutch Disease,” the phenomenon that in resource-abundant economies a positive price or quantity shock may result in de-industrialization. The term arose from the effects of the discovery of North Sea gas on the manufacturing sector in the Netherlands.<sup>12</sup>

The “trap of specialization” argument appears strongest when put forward alongside an analysis of “rent-seeking behavior.” Self-interested political lobbying, it is said, by sectors not reliant on natural resources – typically manufacturing – forces governments to adopt import-substituting protectionist policies. These shield these sectors from competition and slow down innovation. Eventually, it is argued, incomes from natural resources drop, subsidies to other sectors can no longer be paid, and protection becomes too expensive. Then these sectors are exposed to fierce competition and are forced to contract, in turn leading to slower or even negative growth rates of the economy overall.

► **“Misguided investment policies”**

This line of reasoning focuses on the challenges of managing the revenue flows to governments based on natural

resources such as mining.<sup>13</sup> It argues that governments with resource “windfalls” face challenges due both to the extraordinary volume of these revenues and to their volatility. Governments must identify large numbers of investment projects, mostly simultaneously, through which the revenues generated can earn appropriate rates of return. This challenge is exacerbated by the emergence of self-interested parties that attempt to divert funds toward their own causes. Such vested interests can take the form of political lobbying or, at the extreme, of corruption or mobster-style activities. In particular, when committed to investing the revenues locally, and when driven by self-interested parties, governments may end up investing in projects that not only generate low returns but also involve large recurrent costs. These eventually become a fiscal drain as revenues from resource operations fluctuate. Both tendencies – to choose investment projects with suboptimal returns, and to choose projects with recurrent costs – would then result in slower economic growth than had occurred otherwise, it is argued.

► **“Financing conflict.”** A further proposition, much discussed by the media, is that revenues from mineral resources can fuel already existing conflicts by providing easily accessible financing for military expenditures.<sup>14</sup> This concern has attracted much public attention, mostly with regard to diamond mining in Angola and Sierra Leone. A number of initiatives have begun to develop ways of stopping the trade with

<sup>11</sup>Among others, Leamer and others (1999), as well as Birdsall, Pinckney, and Sabot (2000).

<sup>12</sup>Evidence for Dutch Disease actually taking hold anywhere is mixed (see, for example, McMahon 1997).

<sup>13</sup>Collier and Gunning (1996), Davis (1983).

<sup>13</sup>Collier and Gunning (1996), Davis (1983).

<sup>14</sup>Collier (2000), Soysa (2000), Ross (2001).

so-called “blood diamonds”: that is, diamonds from conflict areas.<sup>15</sup> It is worth noting that certain features related to the minerals themselves can influence their potential to “finance conflict.” Is gold mined underground, or is it panned above ground and thus easy to reach? Is the dominant source of income diamonds that are easy to smuggle, or less portable industrial minerals? The answers can largely determine whether and to what extent mining rents *can* be diverted and misused by warlords and other self-interested groups.

Most authors argue strongly that the *availability* of income from mining (or other extractive resources such as oil or gas) in and of itself *triggers* self-interested behavior and ineffective systems in the public policy realm. Whether called “rent-seeking” or “greed,” it is this behavior that is understood to be at the bottom of distortionary policy regimes in resource-rich countries. This, it is argued, leads to misguided decisions in economic management, public expenditure, and trade regimes, all with great potential to slow down economic growth.<sup>16</sup> In this view, extractive resources are a curse.

Is all that the proponents of this view are saying then that “money is the root of all evil”? While there may be some truth to such a statement, it remains a somewhat paternalistic assertion when applied to policy-making in resource-rich countries. At the same time, this critique has the merit of pinpointing one of the key challenges for these countries: the necessity of setting policies and building institutions and systems that can handle large revenue flows without falling prey to rent-seeking behavior.

<sup>15</sup> Goreux (2001).

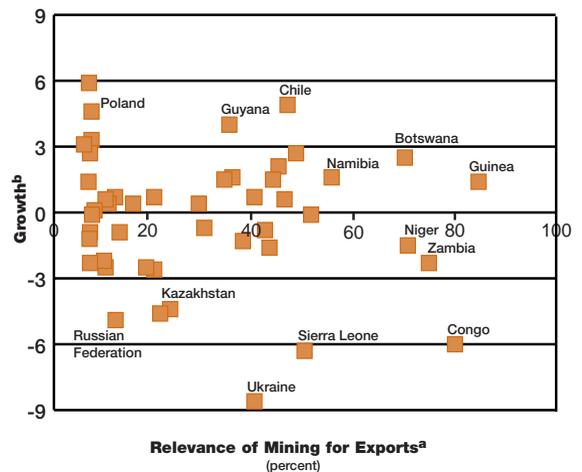
<sup>16</sup> Anderson (1997), Auty (1998).

## What Do the Data Tell Us and What Is Really Happening?

A wealth of research and studies has been undertaken to substantiate the presumed positive or negative impact of the mining sector on countries’ growth (see appendix E). In making their arguments, researchers rely on different forms of evidence, both qualitative and quantitative in nature. Some serious limitations exist on the quantitative side in terms of availability, comparability, and quality of data. Presumably, issues of data quality are one of the reasons why econometric studies of the question often come to contradictory results (see appendix D).

For purposes of this discussion, we choose to focus first on broad averages and relationships. Then we present a few country-cases to better discuss the driving forces behind individual countries’ economic performance.

**FIGURE 1: GROWTH IN MINING COUNTRIES, 1990-99 (average GDP/capita growth)**



Note:

a. Estimates further discussed in appendix D.

b. Growth defined as annual growth in GDP/capita, averaged over 1990-99 (see appendix B).

Source: World Bank World Development Indicators (WDI), with estimates as in appendix B.

Mining countries are a very diverse group, with massive differences in economic performance. Average annual GDP/capita growth rates ranged between nearly +6 percent and –9 percent during the 1990s (see figure 1). To get more of an overview, we have grouped countries into clusters in which mining can be considered a “dominant” sector, contributing more than 50 percent of exports, a “critical” sector, contributing between 15 and 50 percent of exports, or a “relevant” sector, contributing between 6 and 15 percent of exports (table 1). We have also included some of the countries where mining is not a major contributor to export earnings but sustains an important part of the local economy by providing minerals and metals for local processing and production.

**TABLE 1: OVERVIEW OF DEVELOPING “MINING COUNTRIES”**

Mining products as % of exports <sup>a</sup>	Number of countries/population (millions)	GNI/capita, 1999 <sup>b</sup> (US\$)	Growth in GDP/capita <sup>c</sup> 1990-99 (%)
<b>Dominant (&gt;50%)</b>	8 (91)	\$1,096	-2.3%
<b>Critical (15–50%)</b>	22 (318)	\$1,040	-1.1
<b>Relevant (6–15%)</b>	18 (714)	\$3,443	-0.7
<b>Mining a “domestic” sector</b>	3 (2,341)	\$867	6.8
<b>All developing “mining countries”</b>	51 (3,464)	\$1,179	1.6
<b>All developing and transition countries</b>	132 (5,152)	\$1,200	1.7

Note:

a. For details, see appendix D.

b. Gross national income, simple average across countries.

c. Growth for the respective groups is calculated as the real annual GDP/capita growth rate for the entire group of respective countries, averaged across the 1990s.

For country-specific figures, see appendixes B and C.

Source: WDI, with estimates as discussed in appendix D.

A first look at the growth performance of mining countries as a group seems indeed to suggest that countries with substantial incomes from mining performed less well than countries with less income from mining. For all 51 countries, GDP per capita grew at a rate of 1.6 percent a year on average during the 1990s, slightly slower than the rate calculated for all developing and transition economies (1.7 percent). In fact, if China is excluded from the group, average annual GDP/capita growth for the remaining mining countries drops to –0.4 percent (compared to 0.7 percent for the rest of the developing world, without China). Clearly, some individual countries have the potential to distort comparisons here.

In looking to compare like with like, we suggest taking a closer look at the regional dimension of mining countries’ growth (see also appendix C). Mineral endowments, by their very nature, are geological phenomena that have no political borders. Thus, the regional dimension to mineral *endowments* is strong. There are also a number of arguments that suggest a regional dimension to mineral *wealth*: that is, to countries’ abilities to manage their endowments in a way that allows them to turn these into investments and assets for future economic growth.

As noted, one of the key factors behind a country’s competence in managing mineral wealth is a set of functioning and capable institutions. Institutional capital has a cultural dimension that can have a strong regional component. Most prominently, Amartya Sen (2000:14) has argued that the development of values and business morality is “one of the major challenges that developing countries face in early

industrialization.” He points, for example, to significant geographic differences in the extent of corruption among different countries and financial cultures.

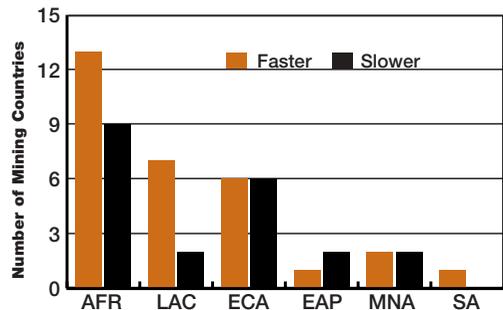
David de Ferranti and others (2001) further argue that Latin America’s colonial heritage initially encouraged a *rentier* mentality of living off the income from the New World mines that discouraged the emergence of entrepreneurship and the pursuit of scientific knowledge. Economic historian David Landes (1998) looks at the rate of adoption of technological advances in the southern European countries relative to their rapid adoption in Scandinavia and argues that slower progress in the south was a legacy of being intellectually closed following the *reconquista* in Spain. Conceivably, some regions, based on their cultural heritage and colonial and other historical experiences, have developed institutional capital that enables the management of mineral wealth better than systems and institutions in other regions. Moreover, regionally driven political factors might have encouraged, or discouraged, regional integration in trade and economic development – an important consideration for mineral production.

Indeed, the view of mining countries’ economic performance changes when their performance is put into the respective regional context. Overall, the majority of mining countries appear to have been *ahead* of their respective regions in terms of GDP/capita growth during the 1990s (see figure 2). About 60 percent of poor and middle-income mining countries grew faster during the 1990s than their respective regions. The difference was strongest in Latin America and Africa. Among the mining countries in these

regions, in 7 out of 9, and 13 out of 22 countries, respectively, GDP/capita grew faster than the respective regional average during the 1990s.

## FIGURE 2: DOES MINING LEAD TO FASTER OR SLOWER GROWTH?

(Number of mining countries in which growth was faster or slower than the regional average during the 1990s)



Note:

AFR=Sub-Saharan Africa. LAC=Latin America and Caribbean. ECA=Eastern Europe and Central Asia. EAP=East Asia and Pacific. MNA=Middle East and North Africa. SA=South Asia.

Source: WDI, with estimates as discussed in appendix D. For details on specific countries, see appendix C.

Over and above comparing *individual* mining countries’ growth with the regional average, we also look at the performance of mining countries as a *group* within a region, comparing that performance to the regional average. This allows us to weigh in the relative importance of larger countries and economies in the region. In Latin America, the Middle East and North Africa, and East Asia, annual GDP/capita growth for mining countries as a whole was faster than for the region as a whole. In contrast, in Sub-Saharan Africa and Eastern Europe and Central Asia, GDP/capita grew more slowly for the mining countries, as a group, than for the overall region, even though in Africa the difference was only slight (see appendix C).

This paper has taken a somewhat unusual approach in looking at mining countries’

growth. Most authors consider a country “resource-rich” only if the share of exports based on resources exceeds 30 or 40 percent. In contrast, we have analyzed countries whose reliance on mining ranges anywhere from 6 to 85 percent of exports. This has resulted in the inclusion of a number of countries that might not be familiar to some observers of “resource-rich economies” but that clearly are established and important mining countries to mining sector experts. Interestingly enough, as we move to the discussion of the “best in class” and the “worst in class,” we find that in particular on the “extreme” ends of the respective spectrum, countries dominate which would fit the more common definition of a resource-rich country: that is, whose exports are indeed largely dependent on the sector.

Differentiating by regions has yielded additional insights about mining countries’ growth performance; further differentiation could deepen the understanding of underlying driving forces even more. One is tempted to form subcategories not only in terms of regions but also according to various economic parameters (such as the size of the economy or the local cost of transport) or institutional and political features (early reformers versus late reformers, or openness to trade, for example). As the need for more detail in the analysis increases, it becomes more useful to look at individual country examples. Such an analysis follows.

### Emerging Lessons from Best and Worst Performers

Clearly, some “best of class” and “worst of class” examples emerge when comparing the GDP/capita growth of individual mining

countries during the 1990s with the GDP/capita growth achieved by their respective regions overall (see table 2).<sup>17</sup> What, if anything, did the mining sectors in these countries have to do with this performance? Can any lessons be learned from these countries?

**TABLE 2: “BEST” AND “WORST” OF CLASS, 1990-99**  
(mining countries’ growth performance relative to their region)

Country	Relevance of mining (percent)	Percentage by which country’s growth differs from regional growth
<b>“BEST OF CLASS”</b>		
<b>Botswana</b>	70.0	418
<b>Chile</b>	46.6	309
<b>Namibia</b>	55.4	301
<b>Ghana</b>	34.0	295
<b>Poland</b>	7.5	282
<b>“WORST OF CLASS”</b>		
<b>Cameroon</b>	7.2	-191
<b>Zambia</b>	74.8	-192
<b>Ukraine</b>	40.0	-242
<b>Congo, Dem. Rep.</b>	50.0	-654
<b>Sierra Leone</b>	80.0	-694

*Note:*

“Growth performance” measured as annual real GDP/capita growth during the 1990s. For other mining countries’ relative growth performance, see appendix C.

*Source:* WDI, with estimates as discussed in appendix D.

<sup>17</sup> Sudan, whose mining exports are estimated to make up about 7 percent of total exports, was not included in the “best of class” list. Nonetheless, it had an impressive average per capita GDP growth of 7 percent during the 1990s. Emerging from years of civil war and unrest, Sudan’s jump in GDP/capita during the 1990s was based mostly on a large boost in oil exports and thus would not serve as a good example for mining countries’ growth.

What is striking about both the five “best of class” and the five “worst of class” cases is the diversity of the countries. From a regional standpoint, African countries predominate among both the “best of class” and the “worst of class.” No Latin American country ranks among the “worst of class,” Eastern European countries fall into both groups, but Asian countries appear in neither. The “best in class” group includes mostly countries with strong institutions and well-formed policies. In the cases of Chile and Poland, they are also among the earliest reformers in their respective regions. By contrast, the “worst of class” group includes countries that have been slow to reform (Ukraine) and countries that have fallen into civil strife (Congo and Sierra Leone).

Notwithstanding the diversity, there might be lessons to be learned for other mining countries from the “worst of class” and “best of class” performers.

► **Building on mineral wealth versus plundering it: Botswana and Namibia versus Sierra Leone and Congo**

Four of the eight countries with “dominant” mining sectors are among those that perform on the extreme in terms of economic growth. Two are among the “best of class” (Botswana and Namibia) and two are among the “worst of class” (Congo and Sierra Leone). Certainly, geopolitical and historical reasons were at the root of the rise of kleptocracies and warlords in Congo and Sierra Leone. Yet, there is not much doubt that in the absence of incomes from the sales of diamonds and metals, they would have abandoned their arms much earlier. At the same time, Botswana and Namibia offer

counter-examples of African countries with huge mining sectors that have outperformed other African economies in terms of economic growth. Both have opted strongly for private sector-led mining and have focused the role of government on economic management and regulation of the sector. Revenue flows from the mining sector have helped finance public sector investments that have supported economic growth overall. Indeed, these four African examples suggest that, depending on the quality of a country’s economic management and the competence of its institutions, mineral-rich countries can either fare spectacularly well or fail in similarly spectacular ways.

► **Restructuring loss-making state industries in transition: The Eastern European mining countries**

Poland is among the “best performers” in terms of mining countries’ GDP/capita growth during the 1990s, and the Ukraine is among the “worst performers.” In both countries, the respective mining sectors play a slightly different role. Yet, both have large coal sectors that help provide a life-line for heat in their cold climates and affordable fuel for energy-intensive industries. Ukraine, in particular, is a major producer of metals and metal-related products for export, relying on coal to fuel industrial production. For much of the 1990s in Ukraine, economic reforms were significantly delayed and import-substitution and protectionism were upheld. For much of the industrial sector, delays were enforced by interest groups related to large mining and steel ventures, which succeeded in dominating domestic politics and economics. This contrasts sharply with Poland, which – albeit under

very different political and historical circumstances – has aggressively restructured its economy and taken bold steps toward economic integration and trade. In line with overall economic policies, Poland opted for a far-reaching restructuring program for its coal sector that resulted in the closure of a large number of uneconomical mines.

These examples suggest an important conclusion. Ultimately, it is the quality of economic management at large, as well as the competency and independence of institutions, that determines whether a country's mining sector can support and enhance economic growth or is instead likely to fuel deterioration.

► **Mining in Latin America:  
The case of Chile**

The Chilean economy outperformed all other Latin American economies by far during the 1990s – a period of economic expansion and increasing prosperity for many of them. The mining sector has been critical for Chile, providing about 46 percent of export revenues and 8 percent of GDP on average during the 1990s. Chile's outstanding economic performance appears largely related to the significant economic turnaround achieved in the 1980s, when the country launched a number of institutional reforms that still serve as models in many areas, from pension reform to mining sector reform. While over the past decade revenues generated from mining have helped strengthen economic growth, the overall economic performance cannot be understood other than in the light of the overall quality of institutions and economic management.

► **A very different case: In China and India, mining provides resources necessary for growth in other sectors**

Another important category is countries with large mining sectors that employ millions of workers yet primarily serve their domestic markets, and thus generate a relatively small direct contribution to exports. Most analyses of “mining countries” ignore this type of country, even though its mining sector can be very influential for overall economic management. The availability of minerals and ores may be crucial for the development of competitive local industries. Examples are India and China – countries that economists rarely think of as “mining countries,” but which, for mining experts, are among the countries with the largest mining sectors in the world.

China and India are interesting cases because their respective mining sectors could by no means be considered among the world's best managed. They suffer economic inefficiencies, poor management, and dismal health and safety records. Both countries, however, rely on their domestic mining sectors for economic growth. On the one hand, domestically mined coal makes up between 60 and 80 percent of their energy balance, providing affordable fuel for electrification and industrial development. On the other hand, domestic minerals and metals have fueled the emergence of large domestic manufacturing sectors. GDP/capita in India and China grew at an impressive annual rate of 3.7 and 8.5 percent respectively during the 1990s, well above that in most other mining countries. This rate was even ahead of the respective

regional growth rates of South Asia (3.5 percent) and East Asia (5.9 percent), which in and of themselves were already much ahead of most of the world. The excellent growth performance of both India and China is unlikely to have taken place without ready access to affordable fuel and nonfuel minerals and metals produced domestically.

Despite the diversity in the country examples presented here, a conclusion emerges that might seem banal in other contexts but is still worth considering in the much-heated debate about extractive industries. The contribution of a mining sector to a country's economy does not take place in isolation, but rather in the overall context of the country's economic management and institutions. *It is thus the quality and competency of these policies and institutions* that will determine whether a mining sector can promote economic growth, or whether revenues generated by the sector might impede development.

What connects the three best performing mining countries – Botswana, Chile, and Namibia – is that they:

- ▶ were committed to outward-looking and conservative principles of macroeconomic management;
- ▶ opted for a variety of models of sound financial management of mining sector revenues, channeling large parts into appropriate investments; and
- ▶ chose not to go on extended investment spending sprees, at least not for long periods of time.

These features are shared, to varying extents, by other mining countries that have not experienced as spectacular

growth in GDP/capita, but that can count as reasonably good examples of the positive impact that well-managed mineral wealth can have on overall economic growth. Such countries would include Ghana and Guinea in Africa, and Bolivia and the Dominican Republic in Latin America. All of them, of course, face continued challenges in the quality of economic management and institutional competence. Further improvements in the quality of economic policies, as well as substantive reforms of the mining sector, promise great potential for enhancing and sustaining economic growth.

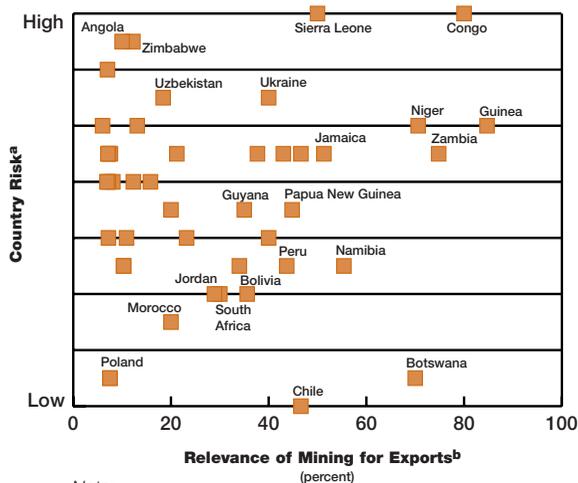
### **Strengthening Mining Countries' Economic and Fiscal Management: Emerging Priorities**

This paper has argued that mining countries' governance structures, in terms of quality of economic management and competency of institutions, greatly determine whether and to what extent these countries will be able to use their mining sectors to generate assets for the future. This conclusion suggests a number of priorities.

Priority countries are clear: They are those mining countries that rely heavily on mining for their export revenues *and* that score high in terms of country risk – taken here as a proxy for persistent weaknesses in terms of governance and economic management (see figure 3). As a matter of urgency, governments in “priority countries” should be expected, by their constituencies as well as by the international community, to focus on improving the quality and competency of economic management and mining sector management. Multilateral institutions and

bilateral donor agencies would be called upon to support these countries (and other resource-rich countries “in trouble”) through programs specifically dedicated to strengthening governance, economic management, and institutional capacity.

**FIGURE 3: PROBLEMS OF GOVERNANCE AND INSTITUTIONS IN MINING COUNTRIES**



Note:

a. In providing a comparable indicator for the quality of governance, institutional capacity, and stability, a measure of country risk was estimated, as considered by international financial institutions when making investment decisions and assessing portfolio risk.

b. Estimates further discussed in appendix D.

Source: World Bank Development Indicators (WDI) and Author's estimates.

Foreign mining investors would also be expected to take extra steps, wherever possible, to play a responsible role. And civil society groups that focus on governance issues could concentrate on helping local groups fulfill their in-country role toward enhancing governance and institutional quality.

### If All Goes Right: Does Mining-Induced Growth Contribute to Poverty Reduction?

Many countries have demonstrated how they have successfully turned their mineral endowments into mineral wealth,

enhancing and sustaining per capita growth over extended periods of time. But what can, or cannot, the development of the mining sector contribute to the reduction of poverty? Overall, economic growth *per se* is a well-documented prerequisite to sustainable development and poverty reduction. Growth in national income has been shown to benefit all groups, including the poorest, and is strongly associated with other measures of well-being such as health, nutrition, and education.<sup>18</sup> Thus, growth in GDP/capita, whether based on the creation of mineral wealth or on other assets, can also be expected to reduce poverty profiles overall.

Yet, further study of the micro-effects of managing mineral wealth would be needed to appropriately assess the extent of the impact of mining activities on the various dimensions of poverty: people's opportunities, their capabilities, their security, and their situation in terms of empowerment.<sup>19</sup> Certainly, mining can contribute to these micro-dimensions of poverty reduction in a variety of ways:

- ▶ By creating income-generating opportunities for the poor directly in the mining sector;
- ▶ By promoting growth in lateral or downstream businesses;
- ▶ By catalyzing improvements in physical infrastructure – a basis for economic activity; and
- ▶ By funding investments in the capabilities of the poor, through investments that improve social services and make them more accessible to the poor.

<sup>18</sup> See IFC (2000).

<sup>19</sup>For a discussion of the broader issues relating to poverty, see World Development Report 2000/01, *Attacking Poverty*.

At the same time, mining operations have the potential, if not well managed, to worsen certain micro-dimensions of poverty, most notably through negative impacts on the environment, often crucial for the livelihood of many local communities. Mining operations have also been associated with rising rates of infectious diseases such as HIV/AIDS, mostly when large numbers of migrant workers are involved in an operation.

Such effects need to be reviewed in more detail than possible here. A detailed case-by-case analysis by Gary McMahon and Felix Remy (2001) provides insights into policies and instruments suitable for successfully managing the micro-dimension of the poverty effects of mining. The study suggests roles and best practice methods for mining operators and mining communities, and provides policy recommendations to federal and local government bodies (see also box 1).

### The Challenge of “Getting It Right”

This paper set out to look for answers to the question whether the mining sector can help developing countries grow their economies, or may hinder them. Three insights have emerged:

- ▶ First, in more cases than not, mining countries outperform their own region in terms of GDP/capita growth.
- ▶ Second, where they do fare well, their good performance appears to be associated largely with the quality of economic management and the competence of institutions, mostly those relating to the management of the revenues from the sector and the management of the sector itself.

- ▶ Third, the need to rebuild institutional capacity and improve economic management appears more urgent in countries where the mining sector dominates an economy – and when the country is grappling with poor economic management and weak institutions – than in countries that lack mineral wealth but face similar weaknesses.

The urgency for action also relates to the nonrenewable character of extractive resources such as minerals and metals. Where revenues and economic development opportunities are based on a *nonrenewable* natural resource, failure to use revenues from these resources is an opportunity that will never come back. Ineffective or inappropriate use of endowments dug out of the ground is an expensive route of action for any country, let alone for a country with otherwise limited scope for action.

Fighting corruption, self-interested rent-seeking, and a general deterioration in the quality of governance in the face of large revenue streams is no doubt a challenge for countries with otherwise short histories of sound and competent institutions. There is no easy panacea to managing this challenge. At the same time, there is simply no other way to manage a mining sector successfully, and indeed a successful economy in general, than to engage in the challenging task of building effective political and economic institutions and finding competent individuals to run them. This is the essence of the development process.

**BOX 1****What Can Policymakers Do To Improve Their Mining Sectors?**

Policymakers in developing countries, concerned with strengthening the economic management and institutional competency in their mining sectors, might want to focus their attention on six points:

- ▶ Pursuing reform and capacity building for government agencies and ministries, in particular with regard to economic management and fiscal administration (This includes strengthening the independence and competence of fiscal and monetary authorities so that they can resist pressures to spend any windfalls on sub-optimal investments, and promoting the independence and competence of tax collection authorities).
- ▶ Building legal and fiscal frameworks to attract private mining investment.
- ▶ Improving social and environmental frameworks to support responsible mining.
- ▶ Privatizing parastatal mining and industrial enterprises, including closing unprofitable state-run mines.
- ▶ Regularizing small-scale and artisanal mining.
- ▶ Strengthening partnerships with important stakeholders.

*Source: Poverty Reduction Strategy Toolkit for Mining Countries ([www.worldbank.org/poverty](http://www.worldbank.org/poverty))*

## APPENDIX A

### Why Look at Mining Separately from Oil, Gas, and Other Natural Resources?

**Most studies examining the impact of natural resource sectors such as mining on economic growth look jointly at mining (metals and minerals), as well as at oil and gas. For this paper, we have consciously looked *only* at mining countries, staying away from the large oil-rich countries, ranging from Bahrain to the Arab Emirates, from Nigeria to Venezuela. Some of the “mining countries” discussed here also have sizable oil or gas resources, notably Armenia, Egypt, Indonesia, Kazakhstan, and Sudan. However, the direct overlap is fairly limited for most of the other countries. We have excluded the analysis of what happened in oil and gas countries from our discussion for three reasons:**

- ▶ The sheer size of the oil and gas sector in a typical oil and gas country is much larger, relative to the respective economy, than the size of a mining sector in a typical mining country.
- ▶ The structure of the value chain in mining typically involves a longer exploration period, a longer lead time between construction and production, and a different footprint in terms of the environmental, social, and economic changes in a region. These factors influence the flow of revenues normally paid to governments by mining companies. Thus, the share of minerals and metals in a mining country’s exports is a very different proxy for revenue flows to governments than that indicated by the share of oil and gas in a country’s exports.
- ▶ Finally, the social and political dynamics involved in mining, in particular underground mining, differ from those in oil and gas. In many mining countries, as diverse as China, Poland, Romania, and Zambia, major political changes have occurred with the active participation of miners and mining communities. While mining can bring social disruption, it also appears in many cases to generate an extraordinary social cohesion. This can be an important factor in the dynamics of the political economy of a mining country, rarely seen in oil and gas countries.

## RELEVANCE OF MINING IN 51 MINING COUNTRIES, 1990-99

## APPENDIX B

Country	Relevance of mining for exports, 1990-99 <sup>a</sup> (percent)	Population, 2000 (millions)	GNI/capita, 1999 (US\$)	Average GDP/capita growth, 1990-99 (percent)	Average GDP/capita growth of group of mining countries, 1990-99 <sup>b</sup> (percent)	
<b>MINING IS DOMINANT: &gt; 50 PERCENT OF EXPORTS</b>						
1	Guinea	84.7	7.4	490	1.42	} -2.3 (1.3)
2	Congo, Dem. Rep.	80.0	51.4	100	-6.00	
3	Zambia	74.8	10.1	320	-2.33	
4	Niger	70.6	10.8	190	-1.50	
5	Botswana	70.0	1.6	3,040	2.53	
6	Namibia	55.4	1.7	2,100	1.60	
7	Jamaica	51.3	2.6	2,400	-0.13	
8	Sierra Leone	50.0	5.0	130	-6.31	
<b>MINING IS CRUCIAL: 15 TO 50 PERCENT OF EXPORTS</b>						
1	Suriname	48.3	0.4	1,350	2.71	} -1.10 (-0.01)
2	Chile	46.6	15.2	4,600	4.86	
3	Mauritania	46.0	2.7	390	0.55	
4	Papua New Guinea	44.8	4.8	810	2.11	
5	Peru	43.7	25.7	2,130	1.50	
6	Mongolia	43.0	2.4	390	-1.64	
7	Central African Republic	42.1	3.6	290	-0.82	
8	Ukraine	40.0	49.6	770	-8.63	
9	Mali	40.0	10.8	240	0.69	
10	Togo	37.7	4.7	310	-1.27	
11	Bolivia	35.6	8.3	990	1.63	
12	Guyana	35.0	0.9	760	4.00	
13	Ghana	34.0	19.2	400	1.55	
14	South Africa	30.0	42.8	3,160	-0.67	
15	Jordan	28.9	4.9	1,630	0.40	
16	Kazakhstan	23.2	14.9	1,290	-4.36	
17	Kyrgyz Republic	21.2	4.9	300	-4.58	
18	Morocco	20.0	28.7	1,190	0.73	
19	Armenia	20.0	3.8	490	-2.60	
20	Uzbekistan	18.4	24.7	640	-2.46	
21	Cuba	17.8	11.2	500	5.60	
22	Tanzania	15.8	33.7	260	0.36	
1	Macedonia, FYR	13.1	2.0	1,660	-0.90	} -0.75 (0.45)
2	Russian Federation	12.3	145.5	1,750	-4.89	
3	Zimbabwe	12.2	12.1	530	0.74	
4	Brazil	10.9	170.1	3,880	0.40	
5	Bulgaria	10.3	8.2	1,390	-2.54	
6	Senegal	10.3	9.5	500	0.56	
7	Angola	10.0	12.7	220	-2.23	
8	Gabon	8.1	1.2	3,280	0.11	
9	Albania	7.6	3.4	930	-0.08	
10	Poland	7.5	38.7	4,060	4.60	
11	Tunisia	7.5	9.6	2,090	3.30	
12	Yugoslavia, FR	7.2	10.6	1,660	-0.90	
13	Cameroon	7.2	15.1	600	-2.31	
14	Dominican Republic	7.2	8.6	1,920	2.68	
15	Madagascar	7.1	15.5	250	-1.25	
16	Sudan	7.0	29.7	310	7.00	
17	Burkina Faso	6.9	11.3	240	1.37	
18	Indonesia	6.0	210.4	580	3.10	
1	Egypt	5.8	63.8	1,380	2.41	} 6.9 (4.9)
2	India	3.8	1,015.9	440	3.73	
3	China	1.9	1,261.1	780	8.52	

Note: a. "The Relevance of mining for exports" compiled as discussed in appendix D.

b. The GDP/capita growth of the "group of mining countries" was calculated, taking into account the respective sizes of the economy and country. Figures in parentheses refer to the simple average across the individual countries' growth performance.

Source: WDI. GDP/capita growth for Cuba, Sudan, and Yugoslavia estimated, based on other sources.

## THE REGIONAL DIMENSION OF MINING COUNTRIES' GROWTH, 1990-99

## APPENDIX C

Region/Country	Relevance of mining for exports, 1990-99 <sup>a</sup> (percent)	GNI/capita, 1999 (US\$)	Average growth, GDP/capita, 1990-99 (percent)	Average GDP/capita growth of group of mining countries, 1990-99 <sup>b</sup> (percent)	Percentage by which country's growth differs from regional growth
<b>EAST ASIA</b>		<b>1,010</b>	<b>5.9</b>		
China	1.9	780	8.5	} 7.8 (7.8)	46
Indonesia	6.0	580	3.1		-47
Papua New Guinea	44.8	810	2.1		-64
<b>EUROPE AND CENTRAL ASIA</b>		<b>1,990</b>	<b>-2.5</b>		
Albania	7.6	930	-0.1	} -4.0 (-2.4)	97
Armenia	20.0	490	-2.6		-3
Bulgaria	10.3	1,390	-2.5		-1
Kazakhstan	23.2	1,290	-4.4		-73
Kyrgyz Republic	21.2	300	-4.6		-82
Macedonia, FYR	13.1	1,660	-0.9		64
Mongolia	43.0	390	-1.6		35
Poland	7.5	4,060	4.6		282
Russian Federation	12.3	1,750	-4.9		-94
Ukraine	40.0	770	-8.6		-242
Uzbekistán	18.4	640	-2.5	2	
Yugoslavia, FR (Serbia/Montenegro)	7.2	1,660	-0.9	64	
<b>LATIN AMERICA &amp; CARIBBEAN</b>		<b>3,640</b>	<b>1.2</b>		
Bolivia	35.6	990	1.6	} 1.5 (2.6)	37
Brazil	10.9	3,880	0.4		-67
Chile	46.6	4,600	4.9		309
Cuba	17.8	500	5.6		372
Dominican Republic	7.2	1,920	2.7		126
Guyana	35.0	760	4.0		237
Jamaica	51.3	2,400	-0.1		-111
Peru	43.7	2,130	1.5		26
Suriname	48.3	1,350	2.7		128
Egypt	5.8	1,380	2.4	} 1.8 (1.7)	87
Jordan	28.9	1,630	0.4		-69
Morocco	20.0	1,190	0.7		-43
Tunisia	7.50	2,090	3.3		157
India	3.8	440	3.7		12
Angola	10.0	220	-2.2	} -1.0 (-0.3)	-180
Botswana	70.0	3,040	2.5		418
Burkina Faso	6.9	240	1.4		272
Cameroon	7.2	600	-2.3		-191
Central African Republic	42.1	290	-0.8		-3
Congo, Dem. Rep.	80.0	100	-6.0		-654
Gabon	8.1	3,280	0.1		113
Ghana	34.0	400	1.5		295
Guinea	84.7	490	1.4		278
Madagascar	7.1	250	-1.2		-57
Mali	40.0	240	0.7		187
Mauritania	46.0	390	0.6		169
Namibia	55.4	2,100	1.6		301
Níger	70.6	190	-1.5		-88
Senegal	10.3	500	0.6		170
Sierra Leone	50.0	130	-6.3		-694
South Africa	30.0	3,160	-0.7		16
Sudan	7.0	310	7.0		842
Tanzania	15.8	260	0.4		145
Togo	37.7	310	-1.3	-60	
Zambia	74.8	320	-2.3	-192	
Zimbabwe	12.2	530	0.7	193	

Note: a. "The Relevance of mining for exports" compiled as discussed in appendix D.

b. The GDP/capita growth of the "group of mining countries" was calculated, taking into account the respective sizes of the economy and country. Figures in parentheses refer to the simple average across the individual countries' growth performance.

Source: WDI. GDP/capita growth for Cuba, Sudan, and Yugoslavia estimated, based on other sources.

## APPENDIX D

### On Data Quality and Research Design

#### Quality of Data Used for This Study

In assembling data on the relevance of mining for a given country, this study relies primarily on data regarding the share of “minerals and metals in exports.” As a countercheck, the “share of mining and quarrying” in GDP was also compiled. Both data sets were compiled on the basis of series available from the World Bank World Development Indicators (WDI) ([www.worldbank.org/data](http://www.worldbank.org/data)).

This study centers mostly on the data on exports, since discussions about the influence of a mining sector on a country’s economy focus on the ability of the sector to generate revenue flows, mostly to governments. In some cases, where local processing of minerals and metals is extensive, the share of metals and mining in exports is more or less in line with the share of mining and quarrying in GDP. The latter case can also include significant small-scale mining and quarrying that would not generate the same revenue flows as reflected in the export data.

In a number of cases, data available on exports were re-estimated, mostly on the basis of information from Economist Intelligence Unit (EIU) country reports, *Mining Journal* reports, and individual statements from national central banks. This had to be done in the following cases:

- ▶ Where the data appeared to include oil as part of mining, the percentage figure on “relevance of mining for exports” was re-estimated and adjusted downward drawing on other sources (such as Economist Intelligence Unit country reports and *Mining Journal* reports).
- ▶ Where the data appeared to ignore or exclude some important minerals, the figure on “relevance of mining for exports” was re-estimated and adjusted upward. Cases included Jordan and Tunisia (phosphates) and Namibia (diamonds).
- ▶ Where the data appeared to include production and processing of metals, over and above actual mining activities, the respective figures were adjusted on a case-by-case basis. Wherever the data apparently included activities directly related to the minerals mined (such as the processing of bauxite), the figure was not changed if the mineral itself was actually mined in the country (for example, Suriname or Jamaica, but not Mozambique). This was done in the understanding that direct mining-related processing adds to the “revenue flows from mining” that positively – or negatively – affect a country’s economic growth. However, activities related to more downstream products were excluded (for example, steel production in Kazakhstan and manufacturing in Georgia).

There are quite a number of countries for which neither exact nor comparable data are available (such as Sierra Leone) or where it became difficult to disentangle minerals and ores from the products further down the value chain (such as Kazakhstan and Russia). Furthermore, in a number of cases (including Guyana and Sierra Leone), significant small-scale mining takes place but is unlikely to be reflected appropriately in the export data.

Thus, the figures overall should be taken for what they are: estimates, taken on the basis of a number of different pieces of information, certainly not compiled in a manner that would allow drawing far-reaching conclusions on the basis of detailed statistical comparisons. The figures presented in this paper on “relevance of mining for a country’s exports” allow us to place a country in certain larger categories but cannot be used to analyze marginal differences between them.

For the purpose of compiling the overall list of mining countries, Cuba was included. However, given the difficulties in compiling comparative economic data on Cuba overall, the country was excluded from any

## APPENDIX D *continued*

statements and conclusions concerning the influence of the mining sector on economic growth.

### **Other Empirical Evidence, Research, and Studies: A Variety of Methods and Data Sets**

Research and studies undertaken to substantiate the presumed positive or negative impact of the mining sector on countries' growth rely on different forms of evidence, both qualitative and quantitative in nature. Some of the studies base their arguments on cross-country data. They typically use a proxy to determine to what degree an economy relies on mining or extractive sectors at large – or, as in the Sachs/Warner study (1997), on primary exports – and, consequently, to what degree resource flows from the sector might dominate a country's political economy. The proxies for “mineral dependence” or “mineral reliance” use data on the “share of [natural resources/mining/commodities] in merchandise exports” or on the “relative size of [...] exports to GDP.” The relationship to growth is then looked at in terms of parallel or subsequent growth, over various periods, depending on the respective study and whether the argument is one of “association” or one of presumed causality.

Interestingly, the quantitative studies are about evenly divided between positive and negative conclusions regarding the impact of a country's natural resource abundance/reliance on its economic growth (see appendix E). Some authors even use the same data as previous studies and, applying different methodologies, come to different and contradictory results. Much of that discrepancy may have to do with the quality of data available.

### **Interpreting Fickle Data: A Word of Caution**

Even though this paper examines some of the same cross-country data used by a variety of other studies, a word of caution is warranted on what at times is presented as “evidence.”

First, as discussed above, the availability of systematically comparative data regarding economic activity in mining (as well as in other resource sectors) is very limited. Given the varying quality of available data, it might be best not to draw elaborate conclusions on the basis of data analysis alone, without looking at countries' performance individually.

Second, some studies attempt to go further than analyzing the impact on economic growth, venturing toward explaining countries' performance in terms of poverty, inequality, or access to education, based on a presumed relationship to the prevalence of mining (or other natural resources). This type of analysis should be interpreted with caution, since most of these indicators are highly correlated with GDP and GDP growth in the first place, as well as with one another.

Finally, the key question with which many of the studies quoted here struggle is the question of causality. Were institutions weak and governance poor before mineral resources were developed, and did these weaknesses allow the flow of revenues from mining to be diverted and abused? Or did the availability of revenues – in and of itself – create a class of self-interested politicians and kleptocrats who have squandered wealth and caused conflict?

Many of the world's poorest countries, often stricken by wars or natural disasters, have neither the luxuries of favorable geographies or climates nor endowments of useful infrastructure, competent institutions, or an innovative knowledge base. These countries pose high risks for foreign investors. Mining operations, with their export orientation and dollar-based revenues, are often the first ones to present an acceptable risk-revenue formula. Easily, this can lead to the country's reliance on the mining sector. Has the sector caused poor economic management and governance? Disentangling these effects, on the basis of data with very varied quality, needs to be done carefully, and typically requires in-depth knowledge of very specific country contexts.

## RESEARCH ON THE RELATIONSHIP BETWEEN EXTRACTIVE SECTORS AND ECONOMIC GROWTH

## APPENDIX E

Study	Countries included (cases)	Sample period	Conclusion
<b>NEGATIVE RESULTS</b>			
<b>Gylfason and Zoega (2001). Natural Resources and Economic Growth: The Role of Investment</b>	85	1965–1998	Suggests that natural capital may on average crowd out physical and human capital, thereby inhibiting economic growth.
<b>Birdsall, Pinckney, and Sabot (2000) Natural Resources, Human Capital, and Growth</b>	34	1965–1997	Countries that are resource-abundant invest less in education.
<b>Auty (1998) Resource Abundance and Economic Development</b>	85	1960–1993	Found Dutch Disease, inequality, and governance problems.
<b>Sachs and Warner (1997) Natural Resource Abundance and Economic Growth</b>	95	1970–1990	Economies with a high ratio of natural resource exports to GDP in 1970 (the base year) tended to grow slowly during the subsequent 20-year period. Holds true after controlling for many variables.
<b>INCONCLUSIVE OR MIXED RESULTS</b>			
<b>Anderson (1997) Are Resource-Abundant Economies Disadvantaged?</b>	n.a.	n.a.	Inconclusive: Other factors are more important.
<b>Manzano and Rigobon (2001) Resource Curse or Debt Overhang?</b>	97	1970–1990	Argues that factors correlated with primary exports rather than primary exports themselves are responsible for slower growth. Correcting for such other factors, resource abundance has no influence on growth performance.
<b>Auty (1993) Sustaining Development in Resource Economies</b>	6	1970–1990	Resource abundance allows countries to continue poor policies. Where these are changed (Bolivia, Chile, Peru), economic performance changes.
<b>Gelb and Associates (1988) Oil Windfalls: Blessing or Curse?</b>	6		Good outcome for Indonesia, bad outcomes for Nigeria, Trinidad and Tobago, and Venezuela. The main reason is the quality of economic policy.
<b>Auty (2002) Best Practice for Economic Diversification in Mineral Economies</b>	2	1970–1990	Mineral countries can use large resource rents to their advantage by sterilizing them and using them to reinforce macroeconomic stability and cushion social hardship of economic restructuring. Examples: Indonesia and Malaysia.
<b>Sundaram and Rock (1998) Resource Export and Resource Processing for Export in Southeast Asia</b>	4	1961–1996	Case studies of selected Asian countries. Resources are a basis for growth (Malaysia, Thailand).
<b>Irwin (2000) How Did the United States Become a Net Exporter of Manufactured Goods?</b>	2	1800–1913	Resource abundance formed the basis for U.S. export success around the turn of the century.
<b>Davis (1995) Learning to Love the Dutch Disease: Evidence from the Mineral Economies</b>	91	1970, 1991	Growth as well as HDI (human development index) in 22 mineral economies was better than in 57 non-mineral economies (even if fuel economies are omitted).
<b>Maddison (1994) Explaining the Economic Performance of Nations, 1820–1989</b>	n.a.	1913–1950	Latin America was one of the fastest-growing regions, as were other resource-rich countries like Canada, Finland, Sweden, and the United States. Resource-poor areas like Japan, Korea, and Asia more generally had negative growth.
<b>Cuddington (1989) Commodity Export Booms in Developing Countries</b>	5	1970s	Positive: Countries with conservative fiscal variables and prudent investment policies did well. Found no Dutch Disease.

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# THE WORLD BANK GROUP'S MINING DEPARTMENT

## SERVICES TO GOVERNMENTS

### **Sovereign lending and advice for the design and implementation of policy and regulatory frameworks and interventions that help:**

- ▶ Support private sector development and attract national and foreign investment for environmentally and socially sustainable mining.
- ▶ Equip government agencies to manage fiscal revenues from mining.
- ▶ Create economically, environmentally, and socially sustainable mine closure programs.
- ▶ Encourage local and regional economic development in the context of mining.
- ▶ Equip government agencies to restructure and privatize mining operations.
- ▶ Equip administrations to better administer/monitor and enforce environmental and social laws and regulations.
- ▶ Encourage coal extraction strategies that minimize global warming effects.

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- ▶ Advice and investment in support of privatization.
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- ▶ Supporting partnerships with mining firms and civil society organizations that integrate civil society in mining activities.
- ▶ Promoting general accessibility to civil society regarding World Bank and IFC-financed projects in mining and related activities.

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