MINING IN COLOMBIA: SOCIOECONOMIC AND FISCAL IMPACT

Mauricio Cárdenas
Mauricio Reina

April, 2008

CUADERNOS
FEDESARROLLO
25

Notebooks of Fedesarrollo
Number Twenty Five

This study has been contracted by:

ANDI
Cámara Asomineros

Notebooks of Fedesarrollo

1 Tasa de cambio en Colombia
Mauricio Cárdenas

2 Los dólares del narcotráfico
Roberto Steiner

3 Perspectivas de la industria aseguradora: 1997-2010
Natalia Salazar - Sandra Zuluaga

4 Salud, educación y desempleo. Diagnóstico y recomendaciones
Proyecto Agenda Colombia I
Mauricio Reina - Denisse Yanovich

5 Infraestructura, orden público y relaciones internacionales.
Diagnóstico y recomendaciones - Proyecto Agenda Colombia II
Mauricio Reina - Denisse Yanovich

6 Tributación en Colombia
Roberto Steiner - Carolina Soto

7 Las aseguradoras y el régimen de inversión
María Angélica Arbeláez - Sandra Zuluaga

8 Petróleo y región: el caso del Casanare
Alejandro Gaviria - Adriana González - Juan Gonzalo Zapata

9 La sostenibilidad de las reformas del sector eléctrico en Colombia
Ulpiano Ayala - Jaime Millán

10 Misión del ingreso público
Miembros del Consejo Directivo

11 Economías regionales en crisis: el caso del Valle del Cauca
Juan José Echavarría - Israel Fainboim - Luis Alberto Zuleta

12 El nuevo comercio minorista en Colombia
Mauricio Reina - Luis Alberto Zuleta

13 El leasing en Colombia: diagnóstico e impacto sobre la inversión y el crecimiento
María Angélica Arbeláez - Fabio Villegas - Natalia Salazar

14 Los servicios financieros y el TLC con Estados Unidos: oportunidades y retos para Colombia
Roberto Junguito - Cristina Gamboa (Editores)

15 Reflexiones sobre el aporte social y económico del sector cooperativo colombiano
Miguel Arango - Mauricio Cárdenas - Beatríz Marulanda - Mariana Paredes

16 Evaluación del impacto del TLC entre Colombia y Estados Unidos en la economía del Valle del Cauca
Camila Casas - Nicolás León - Marcela Meléndez

17 La infraestructura de transporte en Colombia
Mauricio Cárdenas - Alejandro Gaviria - Marcela Meléndez

18 El marco institucional para la regulación, supervisión y el control de los servicios públicos en Colombia: propuesta para su fortalecimiento
Carlos Caballero - Alejandro Jadresic - Manuel Ramírez Gómez

19 Análisis del sistema tributario colombiano y su impacto sobre la competitividad
Mauricio Cárdenas - Valerie Mercer-Blackman

20 El sector de materiales de la construcción en Bogotá - Cundinamarca
Camila Aguilar - Nicolás León - Marcela Meléndez

21 Estudio sobre la propiedad intelectual en el sector farmacéutico colombiano
Emilio José Archila - Gabriel Carrasquilla - Marcela Meléndez - Juan Pablo Uribe

22 La política social de telecomunicaciones en Colombia
Andrés Gómez-Lobo - Marcela Meléndez

23 El modelo de intervención ReSA: en pos de la superación del hambre en las zonas rurales
Juan José Perfetti del C.

24 La reforma del impuesto al consumo de cigarrillo y tabaco elaborado: impacto sobre el recaudo
Mauricio Santa María - Sandra Viviana Rozo

25 La minería en Colombia: impacto socioeconómico y fiscal
Mauricio Cárdenas - Mauricio Reina

26 Evaluación económica de la inclusión de la vacuna antineumocócica en el Plan Ampliado de Inmunización
Mauricio Santa María - Fabián García - María José Uribe

27 Sobre teoría de juegos, proceso presupuestal y situación fiscal en Colombia
Mauricio Olivera

Mining in Colombia: Socioeconomic and Fiscal Impact

Mauricio Cárdenas
Mauricio Reina

April, 2008

* Assistant researchers: Eliana Rubiano, Sandra Rozo and Oscar Becerra

A Fedesarrollo Publication
New Series of Notebooks of Fedesarrollo, number twenty five

Second edition: August, 2007

ISNB: 978-958-44-2512-6

Translation by Traducciones Praxis S.A.
E-mail: Traducciones_praxis@yahoo.com
Telephones: (571) 215 36 34, (571) 640 74 15
Bogotá, Colombia

Edition, Diagramming and Electronic set-up: Formas Finales Ltda.
E-mail: formas.finales@gmail.com
Telephone: (571) 211 22 72
Bogotá, Colombia

Printing and Binding:
La Imprenta Editores S.A.
E-mail: laimprenta@etb.net.co
Telephone: (571) 240 20 19
Bogotá, Colombia

Printed and made in Colombia
Impreso y hecho en Colombia

Contents

INTRODUCTION

World mining has experienced a notable boom over the last few years. In addition to the notable increase in the price of several mining products on world markets, one can add the dynamics of the investment flows made by large international mining firms. Latin America has not been oblivious to this phenomenon and, nowadays, many countries in the region benefit from a notable increase in foreign investment flows and a significant increase in mining exports. This unusual dynamism has occurred at a time in which a new paradigm has arisen, based on a review of the experience in several countries, which states that mining can be an engine for development.

In this context, certain questions regarding the situation of mining in Colombia and of its economic and social impact in the country and in the regions where it takes place gain particular importance. This study, contracted by ASOMINEROS Chamber of the National Association of Colombia Businessmen - ANDI - delves into this issue and seeks to answer these questions. The first chapter contains a review of the new paradigm regarding the role of mining in economic development and makes an assessment of several success stories. The second chapter offers an overall vision of the impact of mining on the Colombian economy in recent years, while the third chapter undertakes an evaluation of the role of mining on regional development. Chapter four assesses the competitive position of Colombian mining in an international context. Lastly, the fifth chapter shows the impact of mining on certain additional dimensions of social and regional development.

Before presenting the content of the aforementioned chapters, we submit an executive summary of the work.

EXECUTIVE SUMMARY AND CONCLUSIONS

Over the last few years, international mining companies have multiplied their investments in exploration and production around the world. Latin America has been a privileged destination for mining investments in the midst of the recent dynamics. In 2001, when the recent exploratory increase was commencing, the Latin American region was the most dynamic destination for international mining investments, receiving close to 30% of the total flows. Since then, expenses in exploration in the region have doubled. This activity has been reflected in a notable expansion in mining exports from the region.

Traditional economic development theories often tend to criticize mining activities. This negative perception of mining has been questioned in recent years with the emergence of an alternative paradigm that is based on the review of experiences in countries that have achieved a solid development in their mining activities and, at the same time, have attained adequate economic growth levels. The alternative paradigm suggests that the ultimate impact of mining on economic growth depends on other aspects of the country that is being assessed, such as the quality of its institutions, the suitability of its macroeconomic policy, and the policies it may adopt with respect to the formation of human capital and technological development.

1. The example provided by certain successful cases

Empirical evidence shows that several countries have been able to overcome the risks that mining represents for economic growth. Economies with diverse levels of development, located in different geographic locations and that produce a broad range of mining products, have been able to reconcile the existence of booming mining activity with a solid and dynamic economy.

Canada is a case that is worth highlighting among the more advanced countries. The Canadian economy records high per capita income growth rates (around 6% per year in the recent past), in a stable macroeconomic environment, with an inflation rate that is less than 3%. These achievements are significant, considering that Canadian mining represents around 5% of GDP and 15% of exports, and that the country is the world leader in the

production of potassium and uranium and ranks third in the production of aluminum. An equally successful case is that of Australia, whose per capita income has grown at sustained rates of around 3% per annum, with inflation rates of 2.5%, mining representing 40% of total exports and accounting for 8% of GDP.

It is of significant interest for the case of Colombia to review the experience of other Latin American countries. This is the case of Chile, which has been considered for several decades now to be the Latin American economic miracle on account of its macroeconomic stability and sustained growth rates of around 7% per annum over the last fifteen years. These achievements have occurred within a context where mining represents 47% of exports and around 8% of the GDP, with an average growth in the sector that has exceeded 11% per year during the last decade. Another significant case in the regional context is that of Peru. The area dedicated to mining in Peru increased from 10 million hectares in 1990 to 34 million hectares in 2000. At present, mining accounts for over 50% of all Peruvian exports and its boom has gone hand in hand with an overall growth rate of the economy that has exceeded 6% over the last few years, one of the highest in the region.

From the review that has been described, one can conclude that successful countries, such as Canada, Australia, Chile and Brazil, have had stable macroeconomic conditions that have permitted neutralizing the possible deleterious effects of oscillations in international prices for basic commodities, as well as the symptoms of the Dutch Disease. Moreover, these countries have solid institutions that eliminate the potential power of corruption on the income that is generated during the boom of a primary sector, closing spaces for illegal activities through a strong State presence. These economies have developed mining activities that have strong links with other productive activities. This has permitted them to pull increased employment and added value, promoting the emergence of productive clusters around mining development poles. Lastly, in all of these success stories, specific policies for the formation of human capital have been promoted, which have permitted increases in productivity and technological capabilities for productive mining activities and the clusters that surround them.

2. The Colombian case

Colombia does not exhibit most of the features that characterize the successful cases cited. Albeit the country has had a notable macroeconomic stability that has been acknowledged for many years now, its institutions are prone to being very fragile, which has translated into a low State presence in vast areas of the country, as well as a worrying perception of significant levels of relative corruption in international studies that have been carried out.

In spite of this, mining has represented a significant economic impact over the last few years. Following a modest performance in the nineties, Colombian mining has registered significant dynamics as of the beginning of this decade. This fact is evidenced in the growth rates that the sector has experienced, which are higher than those that have been registered by other productive segments such as manufacturing, energy, personal services, agriculture and livestock raising, forestry and fishing.

3. Production, employment, exports and investment

Throughout the nineties, mining production experienced rather slow growth, which resulted in the sector experiencing a slight loss in its share of the national GDP. This situation changed in 2003 when the value of production by the sector increased from 45.5 to 67.4 billion constant 2004 pesos. This increase in production meant that the contribution of the mining sector to the GDP went from the level of under 2% that it had experienced for several years, to 2.8% in 2003. Despite this increase, it is important to underscore that the participation of the mining sector in the Colombian GDP is significantly lower than what it has been in those countries where mining has played an important role in economic growth.

The recent evolution in mining production in Colombia is reflected in employment performance in the sector. In absolute terms, mining employment grew rapidly during the first few years of this decade, going from 120,000 to 180,000 jobs during the 2001- 2004 period. However, during the last year that was analyzed, a slight reduction in the number of jobs was observed.

The mining sector represents a fundamental component in Colombian exports. The most recent figures indicate that 21.3% of total exports are attributed to mining. As opposed to GDP and employment performance by the sector, sustained growth in the value of exports has, in fact, contributed to an increase in its share in total sales made by the country, going from 13% in 1999 to 21.3% in 2006. However, one must underscore that mining exports reached their maximum participation in sales abroad in 2003 and have registered relative stagnation as of that year. This performance is of concern, considering that it has been precisely in these recent years when the international market for minerals has exhibited considerable dynamics.

Mining has played a fundamental role in FDI flows to Colombia over the last few years. Despite having registered volatile behavior before 1999, over the last few years, its participation in foreign direct investment has been increasing and reached its maximum level in 2004, with a 41% contribution and 2,157 billion dollars. The data reveals a reduction in that participation during the last two years. It was estimated that, for the year 2006, mining, excluding hydrocarbons, represented 28% of total foreign direct investment and, as is the case of the other variables as well, there is evidence of stagnation during these recent years.

4. Impact on the Nation's revenues

The mining sector plays a significant role on account of its contributions to the current revenues of the Nation and to certain regions in the country. Specifically, mining contributes to public finances through income taxes, equity taxes and the value added tax (IVA), as do the rest of productive activities and, in addition, with a specific contribution by the sector, represented by royalties.

Mining contributes 2.3% of current revenues to the Nation, in accordance with data on collections provided by the National Tax and Customs Authority (DIAN) for the year 2006. Participation by the sector has grown in a sustained manner since 2002 and exhibited its maximum level in 2006, with a contribution of 1.17 trillion pesos. It should be noted that 92% of the contributions of the sector to the Nation's revenues correspond to income taxes, while the remaining 9% balance is distributed between the IVA (va-

lue added tax) and, to a lesser extent, equity taxes. It should be noted that equity taxes have only been levied since 2004.

Mining income tax contributions to public revenues have exhibited significant dynamics. In 2000, collections by the DIAN of contributions from the mining sector amounted to $125,781 billion pesos, an amount that has increased in subsequent years. This contribution doubled and continued growing, having reached $1,074 trillion pesos in 2006, representing approximately 4.8% of the country's total income tax collections.

As was mentioned above, the mining sector also contributes to public finances with the Value Added Tax (IVA). Although this contribution does not amount to values as high as those for income taxes, it does, however, represent 0.62% of the total collections made by the DIAN in the country for this tax. This participation has remained constant, in general terms, over the last five years, with a slight increase in the years 2005 and 2006.

Moreover, mining also makes contributions on account of the wealth tax, created in 2004. The contribution is significantly lower than those of the other two aforementioned taxes: it represents 2.6% of the total collections of the DIAN on account of equity tax in the country. It is important to underscore that, within last two years, this contribution has doubled, going from 6,400 billion pesos in 2004 to 13,644 billion pesos in 2006.

5. Mining and regional development

The growing participation of mining in the economy of certain Departments represents a core issue in the analysis of regional economic development, given that the sector bears significant importance as a source of income generation as a result of exports and taxes.

The progressive contribution of mining to the GDP in certain Departments during the last decade is an issue that is worth analyzing. Among the most outstanding cases are those of the Departments of La Guajira, Cesar and Córdoba.

The most notable case in this context is that of La Guajira, where mining has represented between 30% and 50% of the Departmental GDP during the last decade. La Guajira underwent a profound economic transformation as of the eighties. While in 1975, trade represented 58% of the Departmental

GDP and mining activity only contributed 2%, two decades later, in 2005, the latter represented 51% of the GDP and the trade sector represented just 5.3% Despite the fact that mining in this particular case has scant productive linkages, the growth of the Department has basically been associated with the change in the productive structure, which transformed itself from being a clearly commercial economy to a mining economy.

Similarly, the case of Cesar is significant, where mining went from representing 7.3% of the GDP in 1990 to 36% in 2005. On the other hand, in Córdoba, mining is the second most important economic activity, after agriculture. Whereas at the beginning of the decade of the nineties mining contributed 18% to Córdoba's GDP, by the year 2005 it had increased its participation to 25%.

6. Royalties

Royalties constitute one of the most important contributions of mining to public finances, particularly to the extent that they represent a fundamental economic benefit for certain departments and municipalities. During 2006, approximately 740 billion pesos were distributed in mining royalties, which represents an enormous advance, bearing in mind that, two years before, royalties did not surpass 350 billion pesos.

Royalties from the coal sub-sector are distributed basically among the Departments of Cesar (37.56%), La Guajira (34.15%), Magdalena (4.95%), Cundinamarca (0.51%) and Atlántico (0.26%). It is necessary to clarify that these resources are also distributed among other entities: FONPET, Ingeominas, Fondo Nacional de Regalías (National Royalties Fund) and, of course, other Departments, either because they participate in exploitation, or because they receive some type of compensation.

Royalties stemming from the production of nickel are distributed mainly between the Departments of Córdoba (62%) and Bolívar (0.91%). The remaining percentage, as is the case in coal, is distributed among various entities: the CAR, the Fondo Nacional de Regalías and the FONPET ranking among the ones with the largest participation.

In the case of the precious metals sub-sector, the largest percentage of income on account of royalties is received by the departments of Antioquia

(46.09%) and Chocó (20.88%), which, in turn, are the largest producers of gold. To a much smaller extent are the distributions made to Caldas (7.76%), Bolívar (5.79%) and Córdoba (2.34%).

7. Impact on regional development

In this study, an econometric model was estimated with the purpose of evaluating the impact of mining on development for a sample of Departments in Colombia, aimed at determining is there is statistical evidence to assert that mining contributes to departmental growth, or not.

The results of the estimate suggest that, when controlling characteristic variables in a classic economic growth model, mining does have a positive effect on the economic performance of the Departments.

Of course, for the positive impact of mining on growth to be effective, the concurrence of other factors is required, among which, two that were included in the analysis stand out: quality human capital and good institutions. This finding confirms the results mentioned in the first two chapters of this study, regarding the conditions under which mining can have a positive impact on development.

8. Competitive situation of Colombian mining

A country's international competitiveness in mining depends on several factors, some of which are associated with public policies, while others are beyond its control. Albeit geological and mining potential represents the essential element to attract the interest of entrepreneurs, the expected profitability of an investment also depends on factors such as assurances of the geological and mining potential, infrastructure, the tax environment, legal conditions and their stability.

A review of a study undertaken by the Mining and Energy Planning Unit (Unidad de Planeación Minero-Energética - UPME) and the firm Econometría, as well as of the 2007 National Competitiveness Report, permits determining how Colombia fares in some of these fronts.

Colombia ranks in an intermediate position among the main mining countries in the region with respect to its geological and mining potential,

below Chile, Peru, Brazil and Mexico, and surpassing Argentina, Bolivia and Ecuador. In matters of infrastructure, Colombia also ranks in an intermediate position, below Brazil, Mexico, Argentina and Chile, and surpassing Ecuador, Bolivia and Peru. It is necessary to state that the indicators that were assessed with respect to road infrastructure (kilometers of roads per unit of area) are insufficient to provide a clear idea of the situation in the case of Colombia.

In fact, as the 2007 National Competitiveness Report indicates, Colombia appears to be particularly behind with respect to the quality of railroad, port and road infrastructure, in accordance with the results of the Survey undertaken by the World Economic Forum. In the case of highways and roads, the percentage of these that are in poor or bad condition increased from 22% in 1998 to 29% in 2003. As a result, it comes as no surprise that Colombia ranks in one of the last places among the main economies of Latin America with respect to the number of kilometers or paved roads per million inhabitants. A similar situation occurs with respect to the percentage of kilometers of four-lane highways, a variable where Colombia also ranks in a very poor position vis-à-vis the main countries in the region.

Although the indicators for Colombia in the area of Electricity are not bad, the country has the highest electricity prices for industry in all of South America. The cost differential that Colombia exhibits with respect to the other countries is so large that this margin becomes a factor of dissuasion for investment in the sector. Consequently, it is urgent for the necessary measures to be taken in order to resolutely advance in the reduction of energy prices for the industrial sector, so as to improve Colombia's competitive position in the region. In this sense, an alternative that should be explored is to allow that the taxes paid by the users in the cost of energy (which, in the case of national taxes, amount to 22% and, in the case of municipalities, vary) may be deducted from income tax, as is allowed to a greater or lesser extent in several of the countries in the region.

The results of the UPME study permit reaching the conclusion that the degree of openness of the existing norms and regulations is apparently not critical for investment decisions in the region, given the great similarity in the indicators for the countries that were assessed. Nevertheless, Colombia, which appears in the next to the last position in the ranking, could improve

its competitive position significantly if it had a more favorable legislation, particularly for the exploration phase, with extended time periods and reduced surface levies.

The tax regulations applicable to the mining sector in Colombia do not differ from those that are in force for the other sectors in the economy, with the exception of the obligation to pay royalties on production, as well as surface levies for the right to use the land, charges that, from a technical standpoint do not represent taxes, but rather patrimonial rents to the Colombian State. In any case, it should be noted that Colombia has improved its competitiveness in this aspect with the advances attained in the latest tax reforms: the income tax rate was reduced to 33%, the 7% remittance tax was eliminated, and allowance has been made to amortize 40% of investments classified as productive fixed assets. These adjustments represent a significant reduction in the effective tax rate.

9. The point of view of international investors

A report issued by the Fraser Institute in 2006/2007, which relied on the responses of 333 mining enterprises dedicated to exploration, exploitation and consulting, indicates that, in the past, Colombia had been perceived as an unstable and hazardous country for investment, but notes that recent advances in those fronts have converted it into an interesting destination for mining enterprises. The analysis also highlights that reverting an adverse situation like the Colombian one takes time and that only the passage of time will confirm if recent advances in the business environment in the country will end up becoming sustained and structural improvements.

Other specific results of the Fraser Institute survey confirm some of the competitive limitations that we have indicated in previous paragraphs. To begin with, one has to underscore that Colombia receives a pretty low rating in the Policy Potential Index, which shows the effects that public policies have on mining activity, including aspects such as stability and fulfillment of the norms, taxation, political stability, labor issues, security and infrastructure. In this indicator, Colombia is given a rating of 25 points on a scale of 100 possible points, ranking Colombia as 55 among 65 countries and regions analyzed.

A sample of the terrain that Colombia has for advancement in developing its mining is the result that the country obtained in the two other main indicators in the study. The Current Mineral Potential Index weighs the effects of public policies contemplated in the previously mentioned indicator, with the mining potential of the subsoil in each country or region. In this case, Colombia rises significantly in the ranking, reaching position 38 among the 65 countries and regions analyzed, which reveals the positive perception that international investors have regarding the country's resources.

Lastly, the Mineral Potential under Best Practices Index shows the perception that international entrepreneurs have regarding what would happen in the countries and regions assessed if public policies were to be fine-tuned to the point that they reach the best international standards. In this case, Colombia ranks in position 14 among the 65 countries and regions assessed, surpassing the main mining countries in Latin America, with the exception of Brazil. This position gives an idea on how much international competitiveness of the Colombian mining sector could improve if the country were to adopt public policies that permit overcoming the aforementioned bottlenecks, without the need to modify the perception regarding its geological and mining potential.

10. Impact of mining on other variables

In 2004, the National Management Office for Social Responsibility at the ANDI carried out a survey in order to identify the country's specific advances in this front. Considering that the survey provides a significant source of information regarding the perceptions and practices of entrepreneurs in Colombia, the observations of the survey of the mining sector were filtered out and analyzed for this study. Eight mining companies were identified among the 152 observations in the ANDI Survey. As would be expected, this group of companies represents the most important firms in the sector and, as such, the conclusions of this section reflect the actions of the companies that are at the forefront of these practices in mining.

The data permits underscoring that the mining companies maintain trends that are similar to those of the rest of the economy in three aspects. To begin with, it was found that, for the whole of the companies interviewed,

social responsibility is to go beyond the required legal obligations. Secondly, within the group of mining companies, the main recipients of Entrepreneurial Social Responsibility (RSE, its acronym in Spanish) resources are the workers and the community. Thirdly, it was found that mining companies, in general, use the same instruments that the rest of the companies use to carry out the RSE actions. The three mechanisms that are used the most for this purpose in both groups are donations in kind, social investment, and strategic alliances.

With respect to the areas of investment by mining companies, there are certain differences with respect to investment patterns for the rest of companies. Although education is the area that most companies in both groups invest in (77.9% for the total and 83.3% for the mining sector), mining companies tend to allocate more resources to the area of culture, environmental protection, reconstruction of the social fabric, and support for vulnerable population groups. This expense represents an effort by these companies in channeling resources aimed at increasing the formation and training of human resources.

Moreover, certain aspects were identified where the mining companies surveyed exhibit better practices than the rest of the companies in the country. For instance, 87.5% of the mining companies carry out investments in programs or activities to provide incentives for human rights, whereas, for the total number of companies in the sample, this percentage is close to 55%. Similarly, it was found that all of the mining companies surveyed implement programs to protect the environment and have mechanisms in place to prevent corrupt practices. For the total sample, these percentages are 55% and 91% respectively. Lastly, it is found that mining companies carry out collective bargaining with their workers to a greater extent than the rest of the companies (71% vs. 31%).

In summary, the figures showed permit concluding that the mining sector in Colombia is in line with national RSE practices in most aspects. Nevertheless, mining companies are more conscious of the importance of investing in aspects that are sensitive for the country, such as the social fabric and vulnerable population groups. Once again, it should be highlighted here that these figures correspond to the responses given by the largest companies in the sector. Consequently, this data does not reflect the high

degree of heterogeneity that characterizes the entrepreneurial fiber in this sector, given that it excludes the perceptions and practices of the smaller companies.

For purposes of this study, social responsibility practices in certain companies in the coal, nickel, cement and gold mining sectors were analyzed. The analysis of these specific cases provides important lessons for the mining sector. RSE activities carried out by the companies that were analyzed are fundamental for the local development of the areas of influence in each of the mining operations. Activities of large mining enterprises, in general, are properly channeled towards the improvement of the well- being of society. Moreover, these actions properly support governmental efforts and do not seek to stand in or replace them. Nevertheless, in certain cases, it is evident that the actions do not seek to foster structural changes in the regions, so it is in this direction that efforts in the future should be directed.

CHAPTER ONE

Mining and Development: a New Paradigm

Traditional economic development theories usually offer a view that is critical of mining activities. According to these views, mining would not represent significant contributions to the development process of a country, and could even be detrimental for the expansion of other sectors of the economy.

This negative perception regarding mining has been questioned in recent years with the emergence of an alternative paradigm, which arises from a review of the experience of countries that have achieved solid development in their mining activities and at the same time have reached adequate economic growth levels. The alternative paradigm suggests that there are no grounds to state that mining, in and of itself, is favorable or unfavorable for development, and that its final impact on economic growth depends on other aspects of the country that is being assessed, such as the quality of its institutions, the suitability of its macroeconomic policy and the policies it adopts with respect to the formation of human capital and technological development.

The paradigm that proposes that mining can have a positive impact on development if it is accompanied with appropriate policies has generated unusual interest, to the extent that it has emerged in the midst of two very special circumstances. On the one hand, there has been a global boom in raw materials or *commodities* since 2002, which has meant that international prices for various metals have more than doubled during this period. It is important to highlight that this boom has lasted more than the average for *commodity* bonanzas that have been recorded in past decades, and that it is also probable that it will last for several years more, thanks to sustained expansion in China and the growth prospects for India.

The second circumstance that is relevant for this analysis at present is the result of the previous one and consists of the fact that, during the last few years, international mining companies have multiplied their investments in exploration and exploitation throughout the world. In fact, some estimates indicate that global spending in exploration of non-ferrous minerals has

increased from 1.9 billion dollars in 2002 to 5.0 billion dollars in 2005.[1] What makes this international boom in mining even more relevant is that Latin America has played a predominant role in the midst of the dynamics of exploration processes, to the extent that, in accordance with certain analyses, it ranks as the mining region with the highest growth in the world.[2]

In this way, we are facing an unprecedented situation: in the midst of the greatest international boom that mining products have experienced in a long time, a new paradigm has arisen that identifies the conditions that would permit mining to become an engine for economic growth. The discussion and analysis of these new ideas gains greater importance for economies such as the Latin American ones, which have benefited from the higher international prices and that have the option of increasing their mining production on account of the growing exploratory activity in the region.

The main features of the two analytical paradigms on the role of mining in economic development and its relevance in the present global situation are presented in this chapter. A brief review is made in the following section of the expansion of the world economy and its effect on the worldwide trade of *commodities*, with a special emphasis on the present situation and the outlook for prices for mining products. The second section deals with the main aspects of the traditional point of view, which characterizes mining as an activity that would have a nil or negative contribution to economic development. Lastly, the third section presents certain experiences in countries that have achieved a solid mining sector and which, in turn, have recorded satisfactory economic development levels. Moreover, it summarizes the main elements of the new paradigm.

1. Economic Growth and the Mining Boom in the World

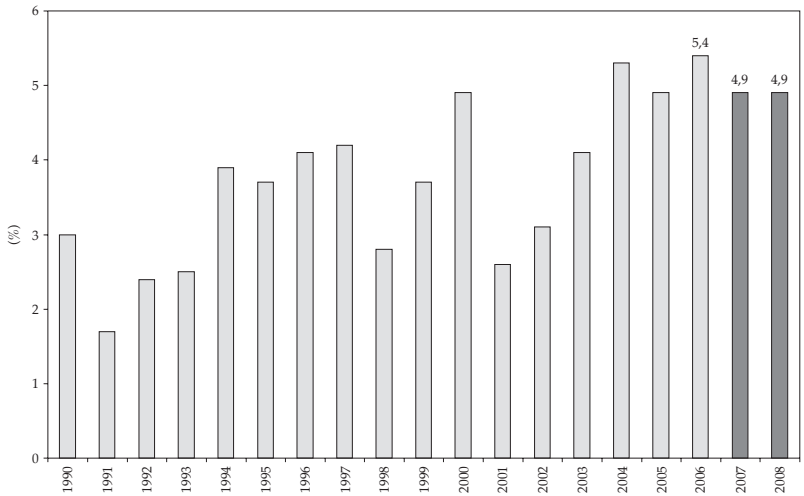
The world economy is currently undergoing an expansion process that had not been registered for quite some time (see Graph 1). In 2006, global

---

1 The Economist September 14, 2006.

2 'Project Survey 2002', in Engineering and Mining Journal 203, January 2002.

Graph 1. World GDP Economic Growth in Real Terms and Forecasts for 2007 and 2008



Source: World Bank and FMI-WEO, April 2007.

production grew by 5.5%, the largest increase observed in the last three decades. In the backdrop of this uncommon expansion, the United States economy has exhibited satisfactory performance through 2006, Europe has experienced a revival in growth in the last two years, and, above all, there is the recent notable dynamics of developing Asian countries (particularly China and India), which have registered growth rates in excess of 9%.[3] In fact, according to World Bank and International Monetary Fund estimates, Asian countries contributed 44% to world economic growth in 2006, by far exceeding the contribution of the United States (17%) and of economies of the Euro Area (8%).

The most recent forecasts of the International Monetary Fund indicate an encouraging outlook on global economic prospects (see Table 1). Even though growth in the United States economy could be lower than 2% this

[3] International Monetary Fund, World Economic Outlook, Update, July 2007.

Table 1. Outlook for the Economy

	2006	2007	2008
World Economy	5.5	5.2	5.2
United States	3.3	3.1	2.8
Union European	2.8	2.6	2.5
Latin America & the Caribbean	5.5	5.0	4.4

Source: International Monetary Fund, (IMF).

year, representing a significant drop in comparison with the 3.3% growth achieved in 2005 and 2006, that decrease in dynamism will be compensated by an unexpected strengthening in the countries in the Euro area, whose expansion rate went from 1.5% in 2005 to 2.8% in 2006. In the meantime, it is expected that the economies of developing Asian countries will surpass 9% growth, at least through 2008, thanks to the sustained dynamics in China (11.2% in 2007 and 10.5% in 2008) and India (9% in 2007 and 8.4% in 2008).

It should be noted that the validity of these forecasts is subject to the outcome of the anxiety produced by the international financial crisis on account of the bursting of the housing bubble in the United States.[4] This process has generated a crisis of confidence in the international financial system, on account of the delicate situation of many credit establishments, which has represented an increase in the perception of risk by the investors and a reduction in liquidity in the world. Although the final effect of these factors is still uncertain, it is possible that they will imply a deceleration in global economic activity.

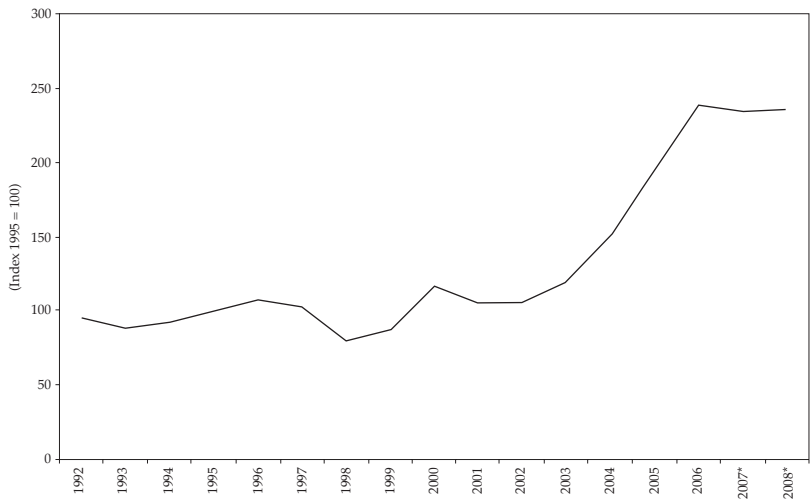
As could be expected, the boom in the world economy has gone hand in hand with an expansion in global trade. According to the latest report

[4] The bursting of the housing bubble in the United States has led many debtors to a situation where they have not been able to make their mortgage payments on time, which, in turn, has represented an enormous portfolio problem for many financial entities. This problem has transcended the borders of the United States and of the housing sector, which, by virtue of the recent development of financial instruments, many banks and credit entities around the world had purchased mortgage debts which, suddenly, simply became losses.

issued by the World Trade Organization, worldwide trade of goods increased 6% in 2006, the second largest growth rate recorded in this decade.[5] In the framework of this expansion, the prominent growth in the sales abroad made by China, which increased by 27% in 2006, needs to be highlighted, and, in general, the positive export performance of developing countries, which reached an unprecedented 36% share in global exports.

In the framework of this commercial expansion, *commodities* have had a greater and longer lasting increase than those they hade experienced in previous booms. While the five previous booms in *commodities* recorded since 1975, on average lasted 28 months, the present boom already exceeds 65 months.[6] On the other hand, while prices of *commodities* in previous booms increased by 35% on average, in the present boom, they have risen by more than 100% (see Graph 2).

Graph 2. International *Commodity* Prices



Source: International Monetary Fund, (IMF).

5 World Trade Organization, Annual Report 2007.

6 Analysis of the Société Générale Bank, cited in The Economist, July 20, 2006.

Although the figures observed to date are exceptional, from a historical point of view, the boom in *commodities* could last even longer in the near future. This optimistic vision is based on the positive outlook for the Chinese economy and its importance in the present *commodities* boom in the world. Chinese imports of basic products increased ten-fold between 2001 and 2006, thus becoming one of the main engines for the present boom. In parallel, China's share in world demand for metals increased from 10% to almost 25% during the last decade.[7]

Despite such notable growth, raw materials consumption in China is still small in comparison with the size of its population. In fact, demand per inhabitant in China for these goods is only at the levels that Japan and Korea had when they began their industrialization processes, which sheds a light of optimism on the outlook for basic products, bearing in mind that China could continue growing at rates of around 10% per annum during the next ten years. Of course, the economic outlook for emerging countries, like China, will, to a great extent, depend on the outcome that the difficult international financial situation generated by the housing crisis in the United States, which will only be fully understood in the course of 2008.

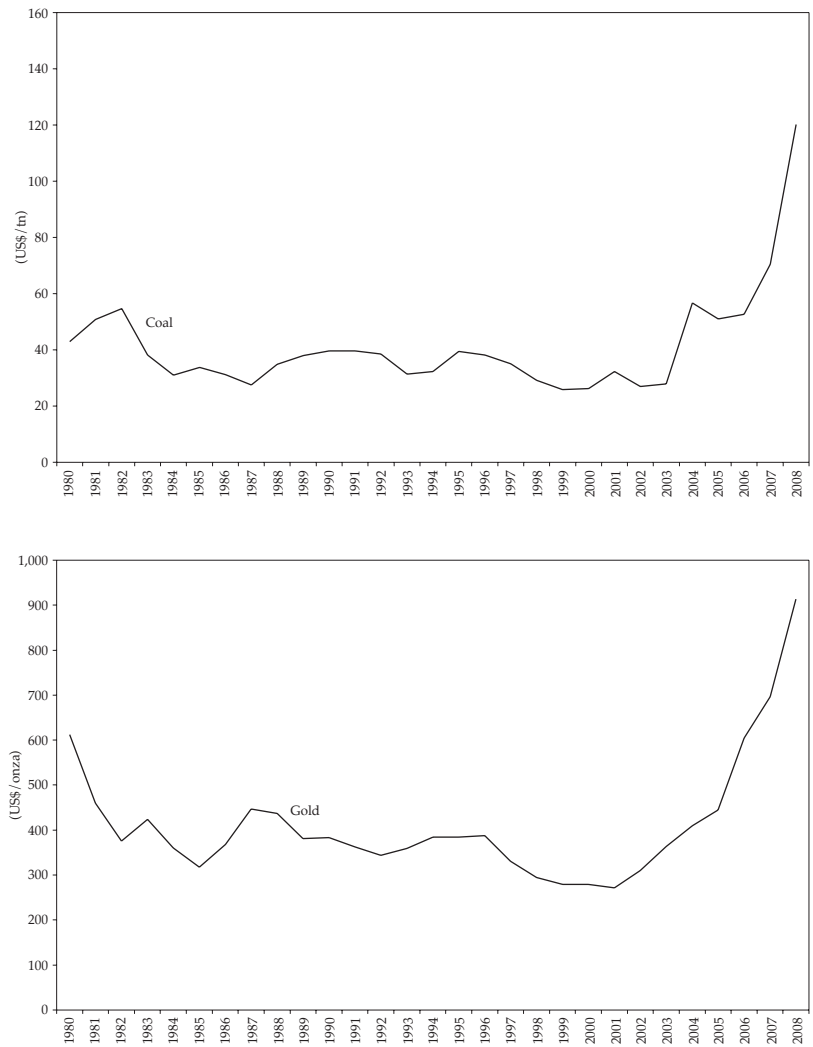
The world *commodities* boom has been reflected in the good performance of international prices for products that are of great importance for Colombian mining, particularly coal and nickel. As can be seen in Graph 3, the price for nickel, measured in real terms, has multiplied more than seven-fold between the year 2002 and June of 2007, whilst the price of coal doubled during the same period. The real price for gold, another significant product in Colombian mining, has also doubled on the international market during the same period. Nevertheless, it should be indicated that gold has unique characteristics that make its price performance atypical: it is an element that serves the purpose of representing a hedge against inflation. In this sense, the increase in its demand is due more to concerns regarding inflation that have dominated the international scene over the last few months, and not so much to excess consumption by the economic agents that use it as a consumable input.

---

[7] The Economist September 14, 2006.

As can be expected, the increase in mining products has been accompanied by an increase in investments in exploration and production. This increase has been particularly significant, bearing in mind that the low prices that characterized the world market for many years translated themselves

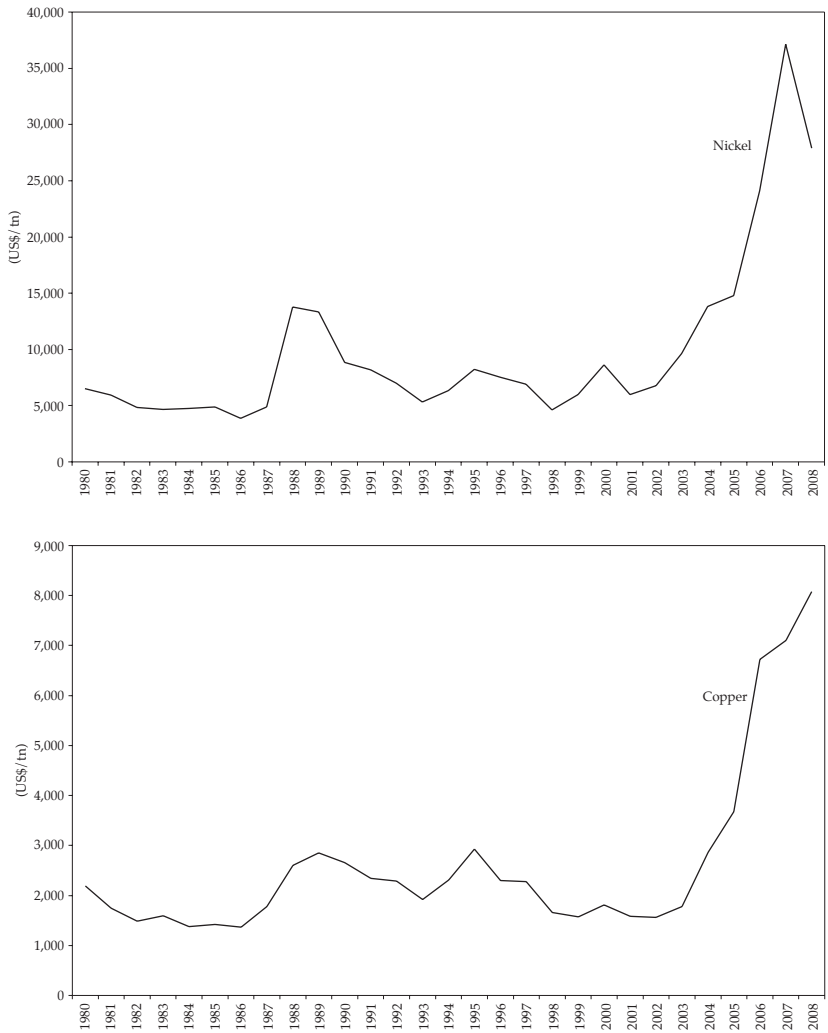
Graph 3. Price for Certain *Commodities*



Source: International Monetary Fund, (IMF).

into low levels of investment, a situation that only started to change in the recent past. It is estimated that global investments in non-ferrous metals increased by 150% between 2002 and 2005.[8] Considering that successful

Graph 3. Price for Certain *Commodities (Continuation)*



Source: International Monetary Fund, (IMF).

[8] Ibidem.

mines require around 10 years for their development, it is expected that this boom in investments will not translate into a reduction in prices in the near term.

Latin America has been a privileged destination for mining investments in the midst of the dynamics of recent years. In 2001, when the recent exploration boom was beginning, the Latin American region was the most dynamic destination for international mining investments, receiving close to 30% of total flows.[9] Since then, expenditures in exploration in the region have doubled, as can be observed in the Graph. All of that activity has been reflected in a notable expansion in mining exports from the region. According to the World Trade Organization (WTO), Latin America was one of the four regions of the world that experienced record growth levels in their exports in 2006, thanks to the fact that they have the greatest share of mining products in their external sales.[10]

For purposes of this study, it is important to highlight that Colombia has once again become a destination of interest for investments by international mining companies, although it is still behind, in relative terms, in the midst of the boom of this activity in Latin America. Even though recent performance of mining in Colombia is analyzed in detail in the next chapter, it is worth mentioning that Foreign Direct Investment in the sector increased four-fold between 2002 and 2005. A sign of the renewed interest by international investors in the national mining sector is that Colombia has again started appearing in specialized studies regarding competitiveness in attracting investments, such as the *Annual Survey of Mining Companies* published by the Fraser Institute, a survey that over 300 mining companies around the world respond to.

Moreover, as discussed below in this study, in the present situation, Colombia faces an enormous opportunity to attract new mining investments, considering that other destinations in the region are apparently

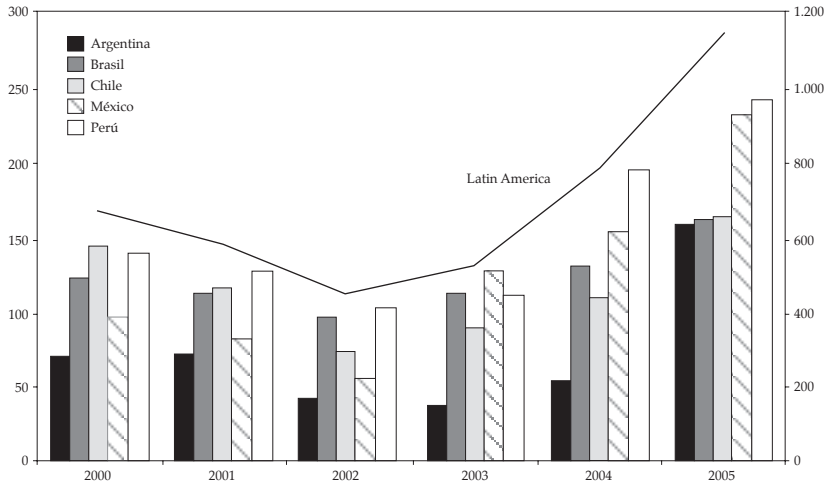
---

[9] Data from the *Raw Materials Projects Database*, Sweden 2001, cited in Project Survey 2002, Engineering and Mining Journal, January 2002, 203.

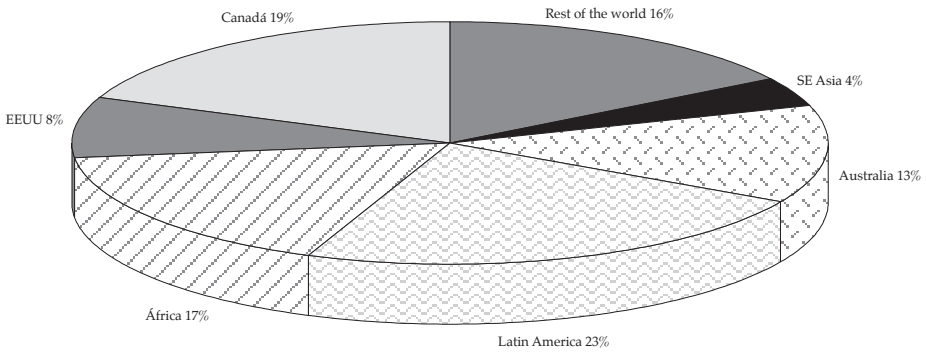
[10] World Trade Organization, Annual Report 2007, page 6.

Graph 4. Mining Investments in Latin America

Trend of exploration budgets in Latin America



Latin America participation in total exploration budgets, 2005



Source: Chilean Copper Commission.

overexploited (as is the case of Chile, Peru and Bolivia), or have introduced modifications to their legislation which have reduced their competitiveness in the international sphere (as in the case of Chile). The fourth chapter of this study analyzes Colombia's competitive situation in the regional sphere in detail.

2. Mining and Development: the Traditional Paradigm

As has already been mentioned, traditional literature on economic development offers a point of view that criticizes the role of mining activities with respect to growth. According to this point of view, mining would not have any favorable effect on the economic dynamics of a country, or could even limit it, on account of its harmful effects on macroeconomic conditions and institutions. This pessimistic view of mining oftentimes is extended to all primary activities, including agriculture.

A review of the literature that gathers the most relevant aspects of this traditional paradigm allows for the identification of several arguments regarding the negative impact of mining (or of primary production activities in general) on economic development.[11] For purposes of simplification, these diverse arguments can be grouped into three major categories, in accordance with their analytic affinities.

The first conceptual school of thought is the one that alerts about the ***descending trend in basic products (commodities)*** on the world market. The authors of this school of thought state that, beyond the natural oscillations in the short and medium term, in the long term, international prices for *commodities* register a secular downward trend. The main economic cause for this trend consists in the argument that *commodities* have a low-income elasticity, particularly when compared with that for manufactured products. If so, as countries increase their levels of income, they tend to direct a greater relative proportion of their demand towards manufactured goods, to the detriment of primary products such as foodstuffs and raw materials.

The second conceptual school of thought concentrates on the perverse macroeconomic effects that a boom in a primary sector can have on the rest of the productive apparatus, a phenomenon that is better known in economic debates as the ***Dutch disease***.

---

[11] The paragraphs that follow are based on the following sources: Singer (1950), Prebisch (1959), Mauro (1995), Tornell and Lane (1999), Collier and Hoffler (2002), Davis (2002), Sala-i-Martin (2003), World Bank (2007), World Bank (2006), World Bank and the IFC (2002), Alexeev and Conrad (2005), Auty (2000), Stijins (2001), Power *et al.* (2002).

In principle, there could be two mechanisms whereby a boom in the primary sector could generate deleterious effects on the rest of the economy. The first is associated with the foreign exchange rate. To the extent that a country has an external boom in a primary product, it will have a sudden abundance of foreign currency, which will reduce the exchange rate and will make the rest of the economy lose competitiveness in international markets, as well as in the national market, vis-à-vis imported products. The second mechanism whereby the boom in a primary sector can negatively affect the rest of the economy has to do with the assignment of productive resources. To the extent that the booming primary sector becomes more profitable, it extracts productive resources (particularly labor) from the rest of activities, thus negatively affecting their productivity and their performance.

The third analytic school of thought suggests that primary activities (and, concretely, mining) would not have a favorable effect on economic development, concentrating on the analysis of ***diverse economic and political conditions*** in the country in question. On the one hand, these statements suggest that mining would not generate a significant impact on the rest of the economy of a country when it does not generate significant links with the rest of the economy, either forward or backwards.

On the other hand, there is a group of authors (for instance, Collier and Hoffler (2002), who have linked the development of sectors based on natural resources with the expansion of groups on the fringes of the law. According to these analysts, to the extent that a booming primary sector generates large rents, it becomes an ideal target for subversive groups or other illegal agents to extort money, particularly if the phenomenon occurs in a context where the rest of the economy is relatively poor and the country's institutions are weak. Moreover, other authors have indicated that these large rents can represent an enormous power for the corruption of institutions, if it is a matter of countries that are not sufficiently mature, from a political point of view. Lastly, there is significant recent literature that questions the effects that mining activities, specifically, can have on the deterioration of the environment in the country in question.

As will be seen in the following section, the problems set forth in these three points of view that criticize primary activities, can be prevented if the proper policies are applied. Moreover, countries that have been able

to reconcile the existence of a vigorous mining sector with that of a solid economy have managed to avoid these problems.

3. Mining and Development: an Alternative Paradigm

The traditional paradigm on the role of mining in development, which warns that the sector has a nil or negative impact on growth of the rest of the economy, has been questioned in recent years. The critical review of this approach has been the result of the statement of conceptual alternatives aimed at resolving the problems mentioned in the section above, as well as the empirical review of cases of countries that have had a solid development in their economies, together with a dynamic mining sector.

This section presents, in the first place, the conceptual alternatives that have been stated in the three schools of thought that criticize the role of mining in development, as expressed in previous paragraphs. Secondly, the experiences of several countries where the mining boom has not quarreled with solid and stable development are highlighted briefly. Subsequently, the common features of these successful experiences are extracted, in order to suggest conditions under which mining can represent a solid basis for economic development.

3.1. Conceptual alternatives

Conceptual developments have arisen in the economic debates over the last few years, which propose alternatives to the three sets of problems that would limit the contribution of mining to development that were mentioned in the previous section: the hypothesis of the descending trend in the prices of *commodities*, the Dutch Disease, and the other economic and institutional issues that have been described.

The hypothesis of a decreasing trend in international prices for *commodities* has been the subject of a broad methodological debate. The work undertaken by those who have participated in this debate suggests that the soundness of the hypothesis of descending international prices for *commodities* depends on the statistical sources that are used, the time periods that are analyzed, and the set of products that are assessed.

In this context, the hypothesis would lose part of its relevance if its specific conditions would permit exploiting it in a profitable and efficient manner during a significant period of time. Proof of this is the price boom that *commodities* have experienced in the recent past, which, as was indicated above, has been more prolonged and greater than those that have occurred in the last thirty years.

The harmful macroeconomic effects that the boom in a primary sector could represent for the rest of the economy have also been subject to academic debates, which, as a result, have rendered policy proposals aimed at neutralizing them.

The first policy proposal that is usually made to confront the Dutch disease is geared at neutralizing the foreign exchange effects of a boom in exports. Although some countries resort to intervention by the monetary authority in the foreign exchange market to prevent the effect of a drop in the price of the currency, this option is not sustainable in the medium term on account of the inflationary effect that such an intervention generates. In this sense, the most suitable alternative is the creation of a fund to retain foreign currency abroad, which allows for the regulation of its inflow into the economy and the neutralization of its effect on the exchange rate. The second policy proposal that is usually made in these cases seeks to provide support for the sectors of the economy that could be adversely affected by the boom of a specific product, either through special low-interest long-term credits, or by means of mechanisms for exchange hedges or compensation.

The arguments that are usually set forth by the third school of thought to confront the problems presented in the previous section are of various types. On the one hand, as will be seen below, mining can comprise activities with diverse degrees of value added, from the mere extraction of the mineral all the way through complex and elaborate productive processes. In this sense, the policies to be applied should foster activities with a high value added component, instead of the simple extractive tasks. On the other hand, it is possible to empower linkages in the mining activity by means of the development of clusters of related activities, some of which can possess high technology, such as in the case of the design and manufacture of specialized machinery. Lastly, the negative effects that the revenues of a

primary activity may have on dimensions such as corruption or subversion can be neutralized when strong and effective political institutions exist.

3.2. The example of certain successful cases

Empirical evidence shows that several countries have been able to overcome the risks that the promotion of a primary activity, such as mining, represents for economic growth. Economies with diverse levels of development, located in different geographic areas and producing a vast range of mining products have been able to reconcile the existence of a booming mining activity with a solid and dynamic economy.

Table 2 summarizes the most relevant features of the experiences of some of these countries. The importance of the mining sector in each country is shown with respect to the good performance of the economy and the main elements of its policies.

Among the more advanced countries in the sample, the case of Canada is worth highlighting. Canada's economy is one of the most dynamic in the Group of Eight, which comprises the most influential developed countries in the world, from a political and economic standpoint. The economy exhibits high growth rates in per capita income (around 6% per annum in the recent past) within a stable macroeconomic framework, with an inflation rate of less than 3% per annum.

These achievements are significant, considering that Canadian mining represents around 5% of GDP and 15% of exports, and that the country is a leader in the world production of potassium and uranium and ranks third in the production of aluminum. An equally successful case is that of Australia, whose per capita income has grown at sustained rates of around 3% per annum, with 2.5% inflation rates, and where mining is responsible for 40% of total exports and 8% of GDP.

For the Colombian case, it is of enormous interest to review some of the experiences of the Latin American countries that are included in the sample. That is the case of Chile, which has been considered for several decades now to be the Latin American economic miracle, on account of its macroeconomic stability and its sustained growth rates of around 7% per annum over the last fifteen years. These achievements have occurred

Table 2. Mining and Development in Selected Countries

Australia		
Mining is important	**The economy is doing well**	**¿How has this been achieved?**
❍ It contributes 8% to GDP and 40% of export.	❍ The pae capita GDP grows at a 3% rate (sustained).	❍ Universities and educational centers.
❍ Its expansion goes hand in hand with technological and economic progress.	❍ Low inflation rates (2.5%).	❍ Fundamental role of institutions: clear and permanent rules, contract stability.
	❍ Growing tems of exchange (32% during 2004-2007).	❍ Linkages: growth associated with moderm manufacturing and services sectors.
	❍ High value added in the equipment and machinery industry.	❍ Macro stability and adequate management of the economy.
Canadá		
Mining is important	**The economy is doing well**	**¿How has this been achieved?**
❍ It comprises 4-5% of GDP and 15% of total exports. Strong international presence in investment and trade.	❍ The per capita GDP grows at rates of close to 6%.	❍ Services: engineering, construction, acquisitions, financial services.
❍ 28.8% of industrial production is metalic minerals and metal products.	❍ Low inflation rates (2.2%).	❍ Tax incentives and stable contracts.
❍ World leader in the production of potassium and uranium, third world producer of aluminum.	❍ At present, it exhibits one of the highest growth rates among G7 countries.	❍ Mining - industry links in capital goods. Mining was the main "engine" for transportation infraestructure.
		❍ Adequate management of macro policies, which is reflected in its performance.
		❍ Government role: infrastructure, marketing, scientific, technical research, access to information regarding the sector.
Chile		
Mining is important	**The economy is doing well**	**¿How has this been achieved?**
❍ It comprises 8% of GDP and 47% of export.	❍ During the 90s, the economy grew at rates of 8.5% per annum and during the last few years at 6% rates.	❍ Human capital (engineering and more specific knowledge areas).
❍ Mining production has grown at an average annual rate of 11% during the last decade.	❍ Leader in exports of goods and services in the region.	❍ Macro stability, property rights and attracting investments.
	❍ Represents an example of the economies in the region.	❍ Legal institutional framework to promote mining: ample authorities for exploration by nationals and foreigners.
		❍ Vertical integration: process enhancements (automation and new equipment) and clusters in certain regions.
		❍ Constant modernization stemming from the public and private sectors.

Source: Australian Bureau of Statistics, Reserve Bank of Australia, Hancock (2001), Power (2002), Wright y Czelusta (2007). Hilson (2000), Lapalme (2003), Dungan (1997), Natural Resources Canada (2000). Buitelaar (2001), Robilliard (2006), Wright y Czelusta (2007), Aroca (2001), García *et al.* (2001). Solomon (2000), Maipose (2003), World Bank (2006), Wright y Czelusta (2007), Iimi (2006), Matshediso (2005). Barreto *et al.* (2002), Banco Mundial (2006), World Bank (2007), Batista (2001).

Table 2. Mining and Development in Selected Countries *(Continuation)*

Botswana		
Mining is important	**The economy is doing well**	**¿How has this been achieved?**
❍ In 2003, minerals contributed close to 36% of GDP.	❍ The mean annual per capita gdp growth rate es 5%.	❍ Solid institutions have played a fundamental role: ● Planning for development ● The elite strengthens institutions ● Prudent macroeconomic management ● Defined property rights
❍ Mining comprises around 70 to 80% of total exports.	❍ The highest growth rate of the economy in the world in the last 30 years.	❍ "Absorbing" capacity: revenues from exploitation are reinvested in the country; the Dutch Disease has been combated.
❍ Diamonds have been the engine of growth, which, on average, has represented 6% inthe latest years.		❍ Constant investement in exploration for the discovery of new deposits, attracted by stable contracts.
Brasil		
Mining is important	**The economy is doing well**	**¿How has this been achieved?**
❍ Transformation of minerals contributes 8% to GDP and primary mining activities 3% of GDP. 7% of global investments in mining are performed in Brazil.	❍ The most industrialized economy in the region.	❍ Increasing investments in geophysical research and an emphasis in universities in related careers.
❍ Mining exports represent 22% of total exports, surpassing manufacturing and chemical products.	❍ An important exporter of mining equipment.	❍ National Development Plan (1988) and Pluri-Annual Mineral Production Plan (1994).
❍ The extractive industry has the highest growth rate (8.2% in 2000).		❍ Attracting investments.
❍ Reserves in 70 minerals (ranks fifth in the world).		❍ Productive linkages (mining equipment exporter).
		❍ Mining clusters around bauxite exploration and production.
Perú		
Mining is important	**The economy is doing well**	**¿How has this been achieved?**
❍ Mining sector participation in the gdp represents 6 to 7%%.	❍ Average growth rates during recent years have been 6%, to a great extent, due to the mining sector.	❍ Modernization of large-scale mining with foreign capital. A new era of investment and exploration is taking place.
❍ In 2005, mining exports represented 56% of total exports (Peruvian Central Reserves Bank).		❍ Mining clusters: sale of services, consumables, supplies and mining products.
		❍ As of the 90s, the Government seeks economic stability. ● Tax and foreign exchange stability ● Tax deductions for investments in infrastructure and employee well-being ● Freedom to remit profits abroat ● Free trade.

Fuente: Australian Bureau of Statistics, Reserve Bank of Australia, Hancock (2001), Power (2002), Wright y Czelusta (2007). Hilson (2000), Lapalme (2003), Dungan (1997), Natural Resources Canada (2000). Buitelaar (2001), Robilliard (2006), Wright y Czelusta (2007), Aroca (2001), García *et al.* (2001). Solomon (2000), Maipose (2003), World Bank (2006), Wright y Czelusta (2007), Iimi (2006) , Matshediso (2005). Barreto *et al.* (2002), Banco Mundial (2006), World Bank (2007), Batista (2001)

within a context where mining represents 47% of exports and around 8% of the GDP, with an average growth of the sector that has exceeded 11% per year during the last decade.

Another case of significance in the regional context is that of Peru. After having experienced great State intervention in the mining sector during the 70s and devastating subsequent macroeconomic instability in the 80s, which produced the loss of capital for many mining companies, as well as the cessation of investments, as of the decade of the 90s, Peruvian mining has exhibited exemplary performance. The issuance of a law for the promotion of mining activities in 1991 generated tax, foreign exchange and administrative stability for the activity, as well as the elimination of restrictions to ownership by foreigners in the sector.

As a result of these policies, the area dedicated to mining in Peru increased from 10 million hectares in 1990 to 34 million hectares in 2000. Even though there have been certain tax adjustments in recent years, the overall framework established in the decade of the 90s for mining activities has remained stable. At present, mining accounts for over 50% of all Peruvian exports and its boom has gone hand in hand with an overall growth of the economy that has exceeded 6% over the last few years, one of the highest in the region.

Lastly, the case of Botswana, where mining represents between 70% and 80% of exports and contributes around 35% to GDP, is worth mentioning. What is striking is that, even though this is one of the countries in the sample that depends mostly on mining, its economic performance has been amazing. Botswana is part of a select group of eleven developing economies that has experienced a growth rate exceeding 7% per annum for over a quarter of a century, according to an analysis performed by Michael Spence, the Nobel Prize winner in Economics in the year 2001, published at the beginning of this year.[12] Such an achievement has been the result of proper management of an economy that is highly dependent on natural resources, which demonstrates that economic development and mining growth can, in fact, go hand in hand.

---

[12] See, for example, Spence M., Why China grows so fast and What drives high growth rates? in The Wall Street Journal, January 23 and 24, 2007.

3.3. Mining and development: elements for an effective strategy

In the previous sections we have seen some of the proposals aimed at neutralizing the problems that are commonly cited regarding the role of mining in economic development, as well as the experiences of certain countries that have been able to reconcile a vigorous mining sector with the existence of dynamic and booming economies. These two discussions contribute certain interesting reflections on the features that an economy should have in order to permit strong mining activity to go hand in hand with solid economic growth.

Table 3 shows a summary of the main characteristics of the countries that have had successful experiences in this sense, and presents a contrast with those countries with economies that have not been able to reconcile the two objectives. From the comparison that is shown, one can conclude that the countries that have had good economic performance, hand in hand with strong mining, have had favorable circumstances at four levels: macroeconomic, institutional, sectorial, and in human resources.

Successful countries, such as Canada, Australia, Chile and Brazil, have exhibited stable macroeconomic environments that have permitted the neutralization of possible harmful effects of international prices for *commodities*, as well as the symptoms of the Dutch disease. At the same time, these countries have solid institutions that eliminate the potential corruptive power of the revenues that are generated during a boom in a primary sector and that also close spaces for illegal activities to take place, by means of a strong State presence.

Table 3. Success Cases in Mining

	Zambia	Nigeria	Australia	Chile	Canadá	Botswana	Brazil	Perú
Human resources	x	x	✓	✓	✓	x	✓	x
Solid institutions	x	x	✓	✓	✓	✓	✓	¿?
Linkages	x	x	✓	✓	✓	x	✓	✓
Clusters	x	x	✓	✓	✓	x	✓	✓
Macro stability	x	x	✓	✓	✓	✓	✓	¿?

Source: Analysis performed by the authors.

When analyzing the sectoral dimension, one finds that these economies have developed mining activities that have significant linkages with other productive activities, which have permitted pulling increased employment and value added, and which have promoted the surge of productive clusters around mining development poles. Lastly, in all of the success cases, specific policies for the formation of human capital have been promoted, which have permitted raising the level of productivity and technological capabilities for the productive activities in mining and its surrounding clusters.

As can be observed in the graph, this characterization contrasts with the cases of Nigeria and Zambia, two economies where mining development has not gone hand in hand with a good overall economic performance.

It should be noted that Colombia does not possess most of the features that characterize the successful cases. Even though the country has had notable macroeconomic stability, which has been acknowledged for many years, its institutions suffer a large degree of fragility that has translated into a low presence of the State in vast areas of the country, as well as of a perception that is of concern regarding the levels of relative corruption, which have been indicated in international studies.[13] In the last chapter of this report, we shall again go back to these issues in a broader context, when we undertake the discussion on relative competitiveness of Colombian mining.

[13] Colombia ranks 68 among 179 countries.

CHAPTER TWO

Mining in Colombia

As was discussed in the previous chapter, mining has had a notable boom around the world during the last few years. Several developing countries, including several Latin American countries, have taken advantage of this boom to drive their mining sector, precisely in a situation in which new analytical focuses appear, alerting about the positive role that mining can play in the development process.

In this context, in the recent past, Colombia has started to join a select group of countries that are recognized for their mining potential. However, it is evident that the Colombian mining potential has been underexploited, as well as overexploited, if one analyzes the country in relative terms within the Latin American context. This is largely due to the limited capital resources that have attracted by Colombia vis-à-vis other economies in the region.

Any debate that seeks to assess the competitive situation of the mining sector within the international context, as well as the necessary policies to improve it, needs to begin with a proper diagnosis of its contribution to the economy. This chapter describes the importance of the mining sector in the Colombian economy, excluding the hydrocarbon sub-sector. For such purpose, mining participation in the GDP, employment generation, value of exports, Foreign Direct Investment (FDI) flows, payments on account of royalties, and its contribution to the Nation's current revenues, are analyzed.

However, the economic contribution of an activity is not limited to its direct impact on the aforementioned variables. Al productive processes generate dynamics in the sectors that provide it with inputs, as well as in those that use their products in new transformation processes. As a result, this chapter also analyzes the productive linkages of the sector with the rest of the Colombian economy, using Fedesarrollo's computerized general equilibrium model.

In the midst of the evident under-exploration and under-exploitation of the Colombian mining sector, there are various levels of development

in various sub-sectors. As a result, this chapter also presents an analysis of the composition of mining in the country, examining the case of sub-sectors such as coal, nickel, gold, and construction materials.

Lastly, based on an econometric model for a representative sample of countries, the importance that the mining sector can have on economic development is confirmed. In the framework of the conceptual discussion set forth in the previous chapter, the results suggest that there is evidence in favor of the alternative paradigm that assigns a predominant role to fostering mining as one of the bases for development.

1. Historical Background[14]

In order to be able to analyze the perspective of mining performance in Colombia and its contribution to national economic development, it is necessary to assess the historical context in which mining activity has evolved. As we will see in subsequent paragraphs, mining has played a fundamental role in the country's economic and regional development, which makes the situation of relative under-exploitation at present even more of a paradox.

Mining has represented a core economic activity in Colombia since pre-Columbian times. Various indigenous cultures carried out highly valued ceramic work, as well as gold and silversmithing. Early on, mining activities gave rise to regional trade, characterized by the exchange and barter of various minerals. Subsequently, during colonial times, mining grew to large proportions, which led to the trade of African slaves. The persons that benefited the most under the colonial regime were, perhaps, the traders from the department of Antioquia, who transported gold dust to other regions of Nueva Granada and abroad, with the purpose of exchanging it for other merchandise, such as textiles and food.[15] Moreover, the population in uninhabited areas in this region was, to a great extent, engaged in the search for gold.

---

[14] This section is based on the historical background of mining in Colombia presented in the 1998 National Mining Census (DANE - Colombian National Statistics Bureau).

[15] Jaime Sierra (1989), *"Antioquia en la época de la independencia."*

During the period of the Republic, mining activity, represented almost in its entirety by the exploitation of gold and precious stones, already enjoyed an advantageous position vis-à-vis other basic sectors such as agriculture. Advanced trade in the region of Antioquia produced significant surpluses, which, accumulated by the trading class, permitted the creation of the Sociedad Minera (Mining Society) in Antioquia.

The favorable evolution of mining in the past has led to gold exploitation, production and exports to be classified as the oldest economic activities and one of the most important ones for the country.[16] During a good part of the Nineteenth Century, exports of this metal, together with silver and platinum exports, permitted balancing the trade balance and became a significant source to attract foreign investment. Through the most recent years of that century, precious metals continued to be the only significant products in Colombian mining.

In the early years of the Twentieth Century, other minerals start to gain importance in Colombian mining activities. By 1910, with the appearance of the first steam engines, coal begins to be exploited in small quantities, destined mainly for the manufacturing industry and for the operation of locomotives. The first few years of the 1930s saw the beginning of the exploitation of several construction materials, such as limestone, gypsum, clay and gravel, which were used in the newly formed construction industry. Moreover, other minerals that represented consumables for the production of fertilizers, glass and plastics started to be exploited.

The international Great Depression of the 1930s spread its influence on the prices of certain basic products, such as coffee and other raw materials that represented an important proportion of Colombian exports. It was then that the importance of mining, represented principally by gold, became more evident in counteracting the reduction that other products were experiencing.

The international crisis at the end of the thirties represented a profound breaking point in Colombia's economic history. Industry started to grow

---

[16] Banco de la República. Center for Economic Growth Studies (2002), *"Economic Growth in Colombia in the Twentieth Century."*

stronger, with 9% annual growth rates, and the production of cement, which was 17 times greater than that which was recorded 10 years before, needs to be underscored.[17]

In the decade of the 1950s, important productive linkages are generated between mining and the rest of the economy. In those years, the vertical integration of coal as an consumable for the production of developing industries begins to become evident, as in the case of cement, paper, and to a greater extent, the first thermal electricity generation plants.[18]

In 1982, the production of ferronickel began in the country, after a small deposit of iron was found in Córdoba, which, after having been studied in detail, rendered the conclusion that it contained high levels of nickel. Nowadays, the ferronickel produced in Colombia is recognized around the world as the one with the best quality on the market.

The mining sector, with the profile that we see today, and whose contribution has become fundamental for the Colombian economy, consolidates itself in the 80s with the beginning of operations of large coal exploitations in La Guajira and Cesar, as well as the installation of the plant at Cerro Matoso in Montelíbano, projects that entailed large investments in technology and a growing contribution to the Colombian economy.

2. Recent Mining Performance

After having exhibited modest performance in the 90s, as of the beginning of that decade, Colombian mining has recorded significant dynamics. This fact is evidenced in that the sector has had growth rates that exceed those exhibited by other productive segments such as manufacturing, energy, personal services, agriculture and livestock, forestry and fishing.[19] At present, in the year 2006, mining (without including hydrocarbons), contributes approximately 2.8% to Colombia's GDP, which represents 70.8 billion constant 2004 pesos.

---

[17] Juan José Echavarría (1999), *"Crisis and Industrialization: the lessons of the 30s."*

[18] DANE. National Mining Census 1988.

[19] UPME (2006).

That relative dynamism coincides with the overall boom in mining and *commodities* in general around the world and is reflected in other economic variables. Although mining is an activity that is intensive in physical capital and technology, employment generation by the sector in Colombia registered an increase that went from 120,000 jobs in 2001 to 180,000 jobs in 2004. On the other hand, mining exports reached 5 billion dollars in 2006, which represents a 21% contribution to total exports. In the meantime, direct foreign investment in the sector was calculated at 2,157 billion dollars for the year 2005, the year with the highest amount of FDI recorded in the last eleven years.

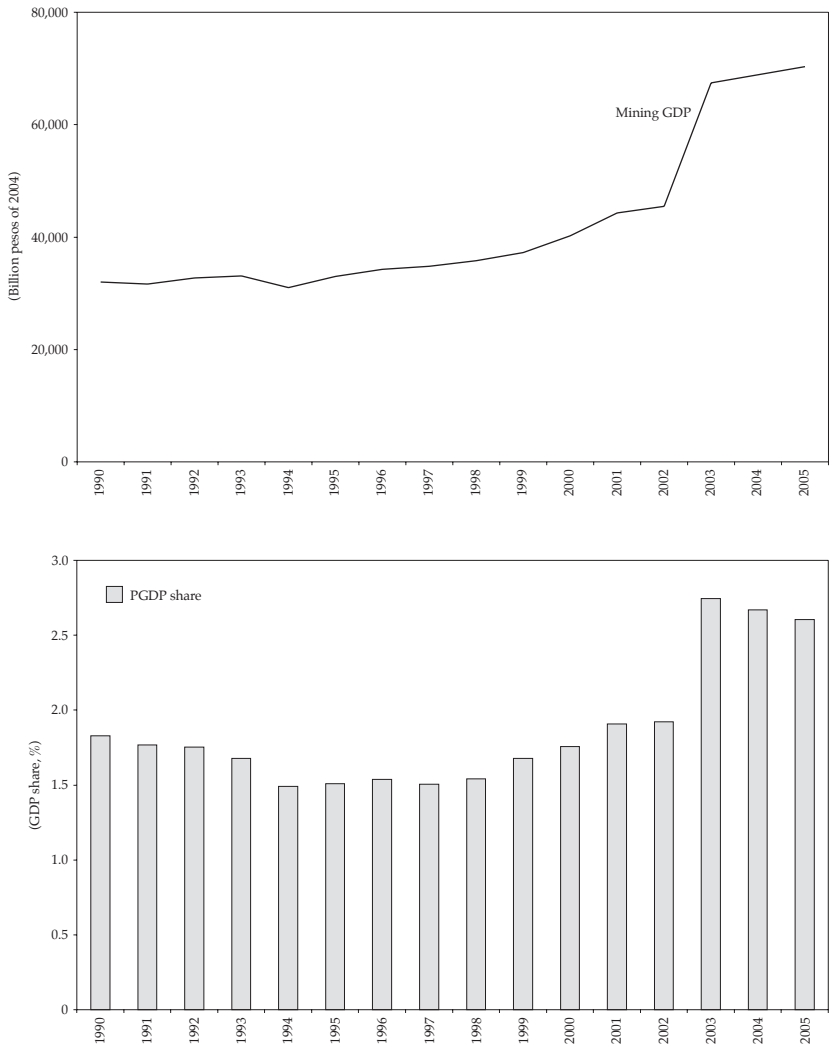
Despite the evident dynamism registered by Colombian mining since the beginning of the decade, as of the year 2005, one observes a relative stagnation in the variables that were analyzed. Mining exports alone exhibit a slight increase after the maximum participation of 22% that was reached in 2003 and the subsequent drop to 19%, which suggests that the sectoral policies are not achieving the desired effect of instilling dynamics into mining in the country. Nevertheless, in the background of the reduced relative dynamics with respect to the other variables, there is significant activity undertaken by the companies, which are making significant investments aimed at increasing production volumes, as well as very important infrastructure developments for the sector, as well as significant interest by new companies that invest in the mining sector on a worldwide scale to embark in new exploration activities.

2.1. Production and employment

Even though Colombian mining production has exhibited a significant increase in the recent past, its contribution continues to be quite modest in the international context.

As can be observed in Graph 5, throughout the 90s, mining production exhibited rather slow growth, which implied that the sector had a slight loss in its participation in the national GDP in certain years in the middle of the decade. This situation changed in 2003, when the value of production by the sector increased from 45.5 to 67.4 billion 2004 constant pesos.

Graph 5. Value of Production in the Mining Sector, Excluding Hydrocarbons, and Share of GDP



Source: DANE, calculations by Fedesarrollo.

This notable increase in production meant that the contribution of the mining sector to the GDP went from a level of less than 2% that it had experienced for several years, to 2.8% in 2003. Despite this increase, it is

important to underscore that the participation of the mining sector in the Colombian GDP is significantly lower than that for the countries indicated in the previous chapter, which are considered internationally as cases in which mining has played an important role in economic growth. This relative lag of Colombian mining is much more significant when one considers that, after the significant increase recorded in 2003, its participation in the GDP has fallen slightly in these more recent years, precisely when mining activity around the world is experiencing a significant boom (Graph 5).

Recent evolution in mining production in Colombia is reflected in employment performance in the sector. Mining employment increased rapidly during the first few years of this decade in absolute terms, going from 120,000 to 180,000 jobs during the 2001-2004 period. However, in the last year that was analyzed, one observes a slight reduction in the number of jobs (see Graph 6).

As is the case in mining production, this 50% increase in the number of jobs generated over three years has not been sufficient to increase the share in total employment above a level of 1%, which has been a constant phenomenon in the recent past. It is important to highlight that the sector also generates indirect employment (which is not accounted for in the figures cited), on account of linkages that it makes in the economy and which will be analyzed below.

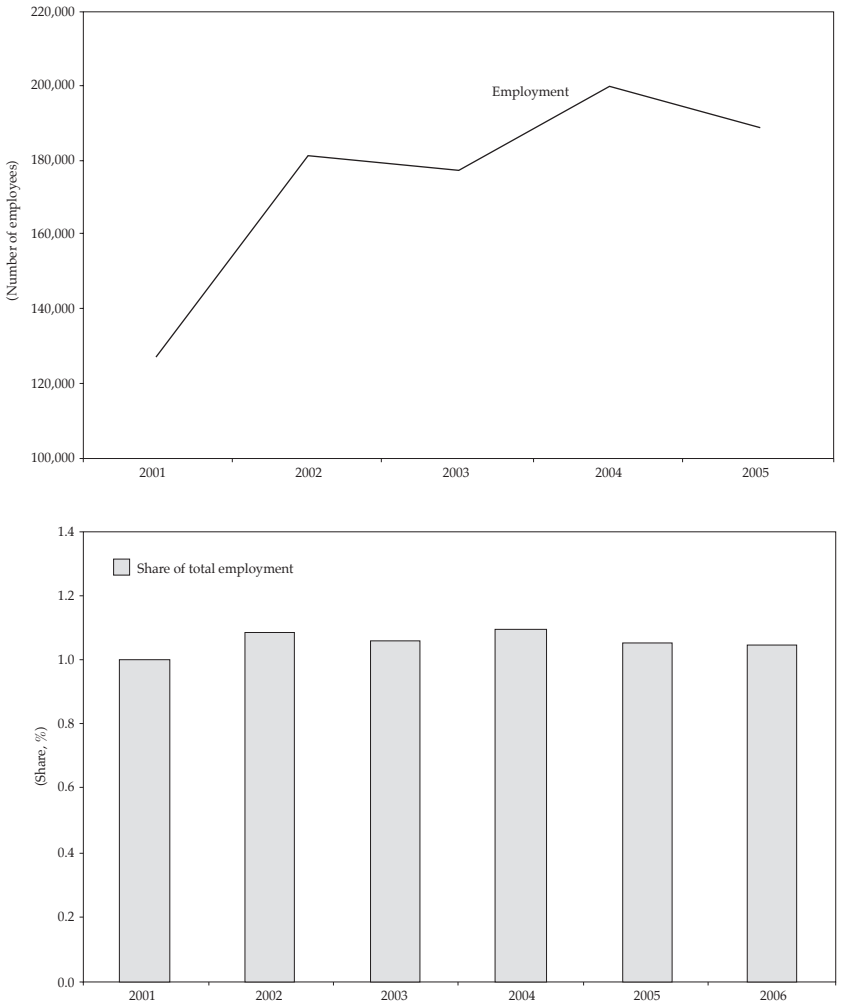
Thus, it is evident that, both production and employment in Colombian mining have had significant progress recently, but these have been insufficient to increase the sector's share in both of these dimensions in the national economy.

2.2. Exports and Foreign Direct Investment

The mining sector represents a fundamental component of Colombian exports. The most recent available figures indicate that 21.3% of total exports are attributed to mining.[20]

[20] At the time that this report was being drafted, the figures cited for the two most recent years are the forecasts presented by the DANE.

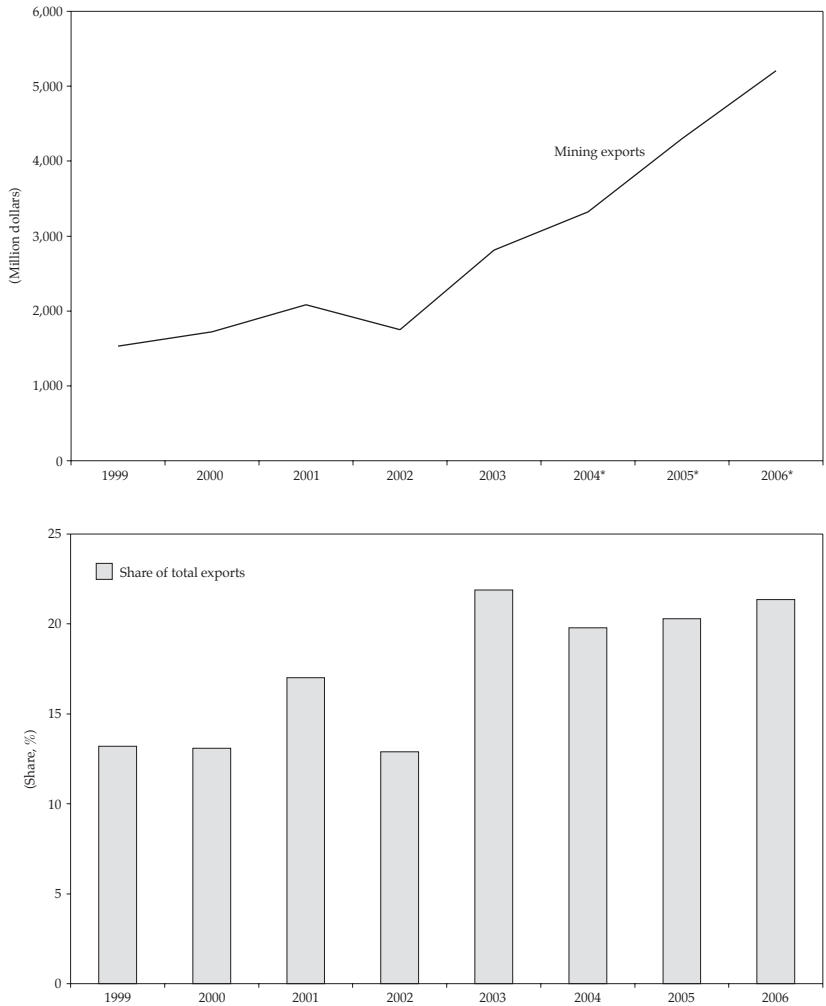
Graph 6. Employment in the Mining Sector



Source: Encuesta Continua de Hogares. DANE.

As opposed to what occurs with the GDP and employment in the sector, sustained growth in the value of exports has, in fact, contributed to the increase in the mining sector's share in the country's total sales, going from 13% in 1999 to 21.3% in 2006. Nevertheless, it is worth noting that mining exports reached their largest share in external sales in 2003 (Graph 7), sub-

Graph 7. Value of Mining Exports

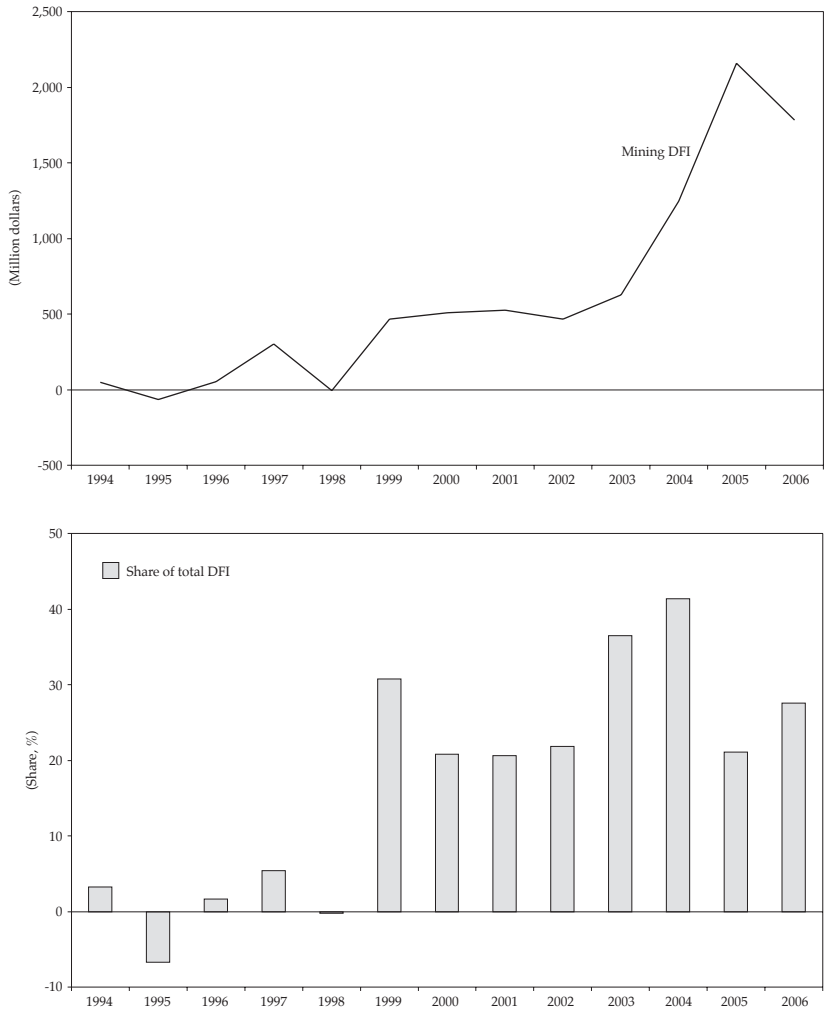


Source: DANE y DIAN.

sequently exhibiting a relative stagnation as of that year. This performance is of concern, bearing in mind that these years were precisely those in which the international market for minerals have exhibited great dynamics, as was explained in the first chapter of this study.

Foreign direct investment in the Colombian mining sector exhibited discrete performance through the end of the 90s. Even though foreign investments in the sector as of the beginning of this century started to register increased growth, it was only as of 2003 that they have had significant dynamics. As is shown in Graph 8, the year 1998 was the one with

Graph 8. Mining: Direct Foreign Investment (DFI)



Source: Banco de la República.

the lowest foreign investment in the sector in the last fifteen years. This coincides with a generalized drop in foreign capital flows to the country as a result of the international financial crisis at that time. Nevertheless, in the years after the crisis, one can observe an increasing trend in FDI, the peak having been reached in 2005.

Mining has played a fundamental role in the flow of FDI to Colombia in recent years. Despite having registered a volatile performance before 1999, in recent years, mining participation in foreign direct investment has been growing and reaches its peak in 2004, with a 41% contribution and 2,157 billion dollars. The data reveals a reduction in this share during the last two years. Estimates indicate that in 2006, mining, without including hydrocarbons, comprised 28% of total direct foreign investment and, as was the case in other variables, there is evidence of stagnation during the last few years. It should be noted that these recent capital flows correspond mostly to projects that have been under development by large mining firms for several years now and, as such, do not necessarily represent the arrival of investors with new exploration projects.

2.3. Revenues for the Nation

The mining sector plays a significant role on account of its contributions to the current revenues for the Nation and also, for certain regions of the country. Specifically, mining contributes to public finances with taxes on income, equity and the IVA, as is the case with all other productive activities, and also with a specific contribution applicable to the sector, represented by royalties.

The mining sector contributes 2.3% of the current revenues of the nation, in accordance with data on collections published by the DIAN for the year 2006. Table 4 shows that participation of the sector has grown in a sustained manner since 2002, and presents its maximum level in 2006 with a contribution of 1.17 trillion pesos. It should be noted that 91% of the contributions made by the sector to the Nation's revenues are represented by income taxes, whilst the remaining 9% is distributed between the IVA and, to a lesser extent, by the equity tax, which is only being collected since 2004.

Table 4. Taxation for the Mining Sector (Millions of pesos)

	2000	2001	2002	2003	2004	2005	2006
Current Revenues of Nation	20,126,537	25,177,166	27,393,539	31,578,625	36,937,140	42,517,876	51,475,000
Mining sector without hydrocarbons	162,072	193,391	143,132	430,699	786,370	833,086	1,176,034
Participation of the mining sector	0.81	0.77	0.52	1.36	2.13	1.96	2.28

Source: Fiscal Measurement Division. Ecomomic Studies Office. DIAN.

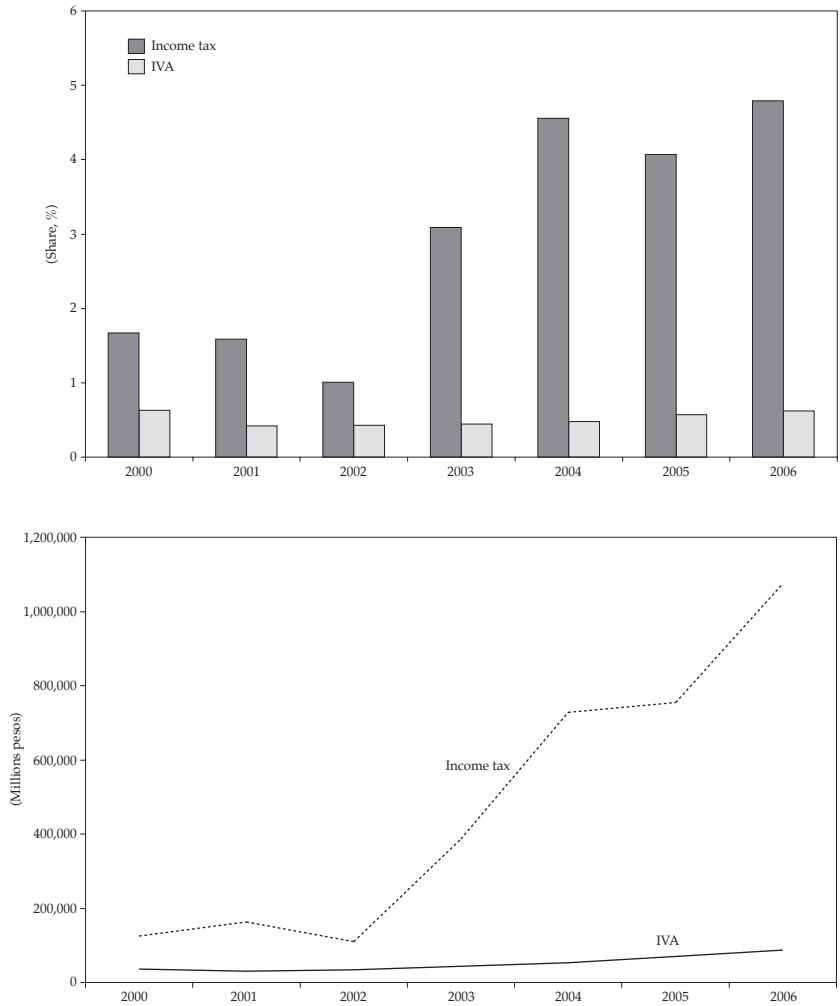
The contribution of mining to public revenues on account of income tax has exhibited notable dynamics. In the year 2000, collections by the DIAN of the contributions made by the mining sector on account of income taxes were $125,781 billion pesos, an amount that has increased in subsequent years. As is shown in Graph 9, this contribution continued growing, reaching $1,074 trillion pesos in 2006, representing approximately 4.8% of the total amount collected in the country on account of income taxes.

As has already been mentioned, the mining sector also contributes to public finances with the value added tax (IVA). Although this contribution does not present values that are as high as the collections made on account of income tax, it does represents0.62% of the total collections made by the DIAN in the country for this tax. This participation has remained constant, in general terms, over the last six years, with a slight increase in 2005 and 2006, as is shown in Graph 9.

On the other hand, mining also makes contributions on account of the equity tax, established in 2004. Table 4 indicates that this contribution is considerably lower than that for the other two aforementioned taxes: it represents 2.6% of the total collections by the DIAN on account of the equity tax in the country. It is important to underscore that, in less than two years, this contribution has doubled, going from 6.400 billion pesos in 2004 to 13.644 billion pesos in 2006.

Royalties represent one of the most important contributions of mining to public finances, particularly to the extent that they represent a fundamental economic benefit for certain departments and municipalities. During the year 2006, approximately 740 billion pesos in mining royalties were distributed, which implies a large advance, bearing in mind that two years before, this collection did not surpass 350 billion pesos.

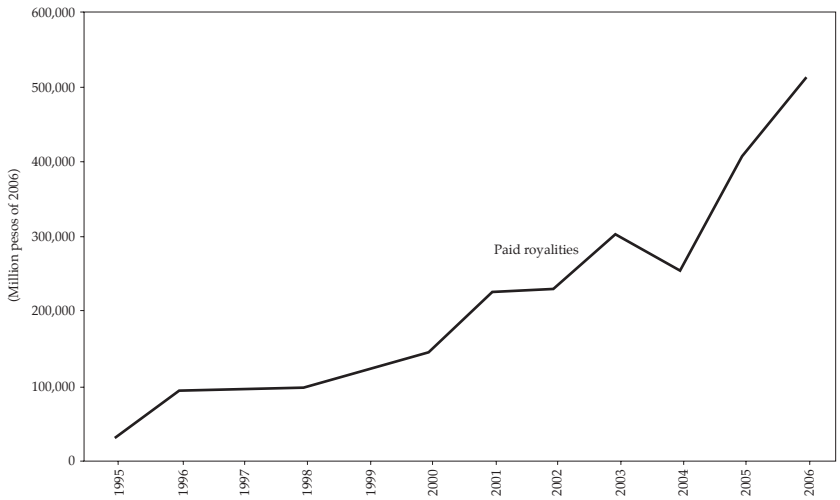
Graph 9. Contribution of the Mining Sector in the Collection of Income Taxes and IVA



Source: DIAN, calculations by Fedesarrollo.

Graph 10 shows the evolution of royalties paid to the various territorial entities. The maximum value is observed in the year 2006, when $512.5 billion pesos were paid to producing municipalities and districts, to port districts and municipalities, to departments, autonomous corporations,

Graph 10. Mining Royalties Paid to Territorial Entities



Source: Royalties National Commission - DNP.

and to Ingeominas. The contributions of mining to the territorial entities clearly indicate a growing trend: whilst in 1995 total payments were $31 billion pesos, today, that amount is sixteen times greater.

A collective review of the figures described through this point in the study renders a paradoxical scene. The growing importance of mining for Colombian public finances contrasts with the relative stagnation that the sector's participation in the national economy has had in recent years in variables such as the GDP, employment, and foreign direct investment. This situation suggests that the State policy for the sector seems to privilege short-term yields rather than the consolidation of solid and booming mining in the mid-term. We will come back to this debate in the last chapter of this report.

3. Impact of Mining on the Rest of the Economy

The purpose of this section is to develop methodologies that permit quantification of the impact that the mining sector has on the rest of the Colombian economy. To attain this objective, it is necessary to bear certain prior consi-

derations in mind. First of all, mining is not an autonomous sector that is isolated from the other branches of the economy; on the contrary, any decision regarding increases or reductions in mining production has implications for other types of goods that directly or indirectly depend on it. Secondly, there are 'indirect' effects from these changes on the rest of the economy, derived from the transfers that these generate for other economic agents, such as, for example, households, the government, or the external sector.

Along these lines, this section presents a brief report on the results of two methodologies that seek to capture the effects, whether direct or indirect, of mining on the rest of the economy ("the rest" being understood to be other productive activities), as well as changes in the patterns of household consumption or in international trade. The two approaches used, the results of which are presented below, are the following: i) forward and backward linkages, and ii) computable general equilibrium models.

3.1. Forward and backward linkages[21]

On account of the availability of information from the national accounts of the DANE, the forward and backward linkages are presented in this exercise for three large branches of mining activities for the year 2005: coal and lignite, peat (number 6 in the national accounts - CCNN); metallic minerals (CCNN 8); and other non-metallic minerals (CCNN 9).

Table 5 allows for the identification of certain peculiar characteristics for each of the large branches of mining in Colombia. First of all, in 2005, the GDP of mining represented 3.0% of the country's total production, equivalent to approximately one fourth of industrial production. Secondly, more than 85% of the gross value of production (GVP)[22] of the coal and metallic

[21] In simple terms, it is said that a *j* sector is part of the "backward linkages" of the *i* sector, if *j* sells, directly or indirectly, part of its production as an intermediate input for *i*. Similarly, *j* is said to be "linked forward" with sector *i* if the latter is used as an input for the production of *j*'s goods. In other words, this methodology basically responds to two questions: What sectors serve as an input for another sector (backward linkages)? and What sectors use the production of a given sector as an input (forward linkages)?

[22] The gross value of production for a specific sector includes both final demand and intermediate consumption.

Table 5. Selected Statistics for Mining Production, 2005 (Pesos of 2005)

Variable/Sector	Coal	Metallic	No-metallic	Total
GDP	4.1 billions	2.8 billions	1.7 billions	8.6 billions
(% of total)	(1.4)	(1.0)	(0.6)	(3.0)
Exports	94.3	85.9	8.3	74.2
(Total sales as % of each sector)				
Domestic use	5.1	3.8	91.7	22.6
((Total sales as % of each sector)	5.1	3.8	91.7	22.6
Households income	0.5 billions	2.0 billions	1.5 billions	4.0 billions
(% of total)	(0.32)	(1.26)	(1.0)	(2.56)

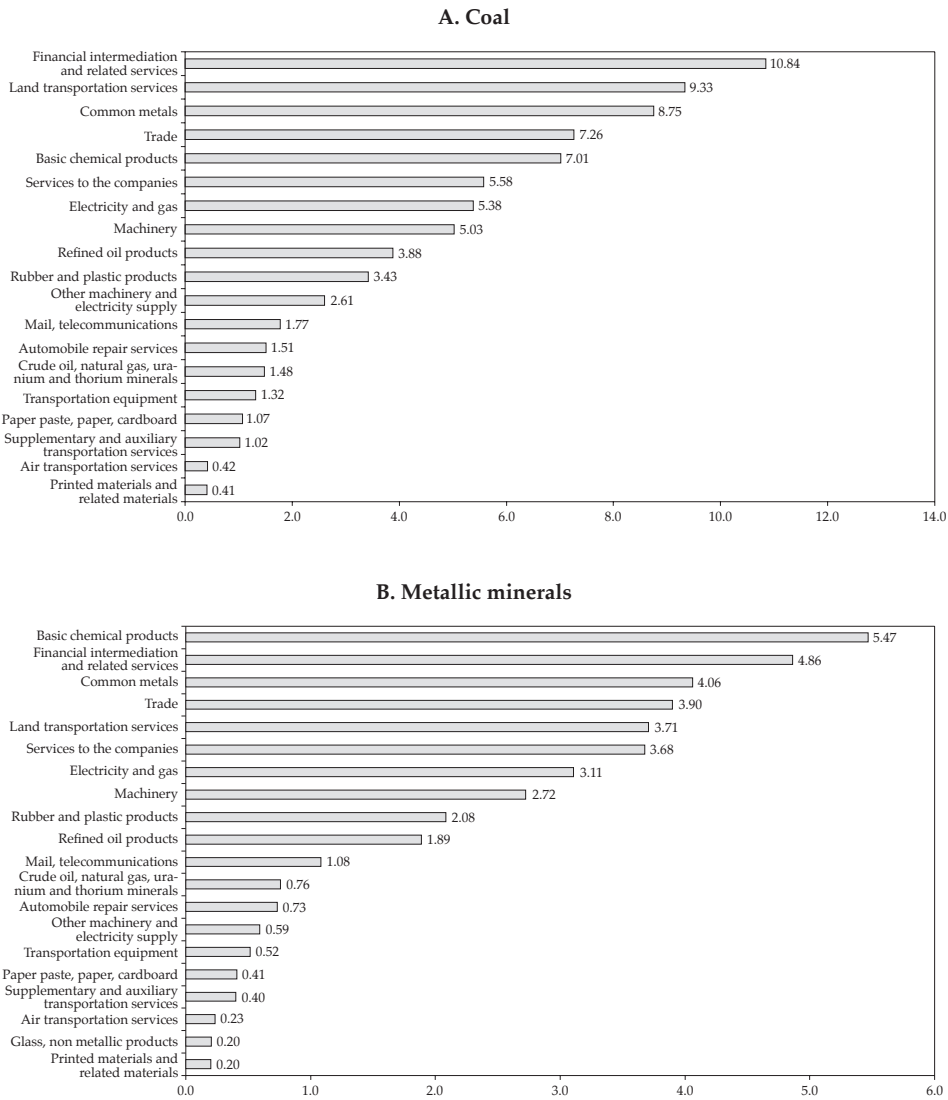
Source: DANE, calculations by Fedesarrollo.

minerals sectors is destined for export, while their use as an input is quite limited. On the other hand, the main use for non-metallic minerals represents an input for other productive activities. Lastly, coal production is the productive branch that engages in the greatest amount of intermediate purchases (30.6% of the total GVP), followed by metallic minerals (17.0%), and non-metallic minerals (12.0%).

Following are the results of the twenty most significant backward linkages for each of the large productive branches. The results suggest that most of the inputs required by mining stem from the services sector, particularly in financial intermediation, transportation, services provided by other companies, and electricity and gas utilities provided by the cities. In reviewing the main linkages, these activities stand out as the most important ones for each sector. For instance, 100 additional pesos in coal production require an increase of 10.8 pesos in the production of financial intermediation services and 9.3 pesos in land transportation services. Other significant activities for coal are common metals and manufactured metallic products (8.8 pesos), trade (7.3 pesos) and basic and manufactured chemical products (7 pesos), among others. Similarly, for metallic minerals and other non-metallic products, the main demands (direct or indirect) are for services, energy, as well as chemical products and petroleum derivatives (Graph 11).

Forward linkages, on the other hand, show a completely different scenario. As mentioned above, most of the production of coal and metallic minerals

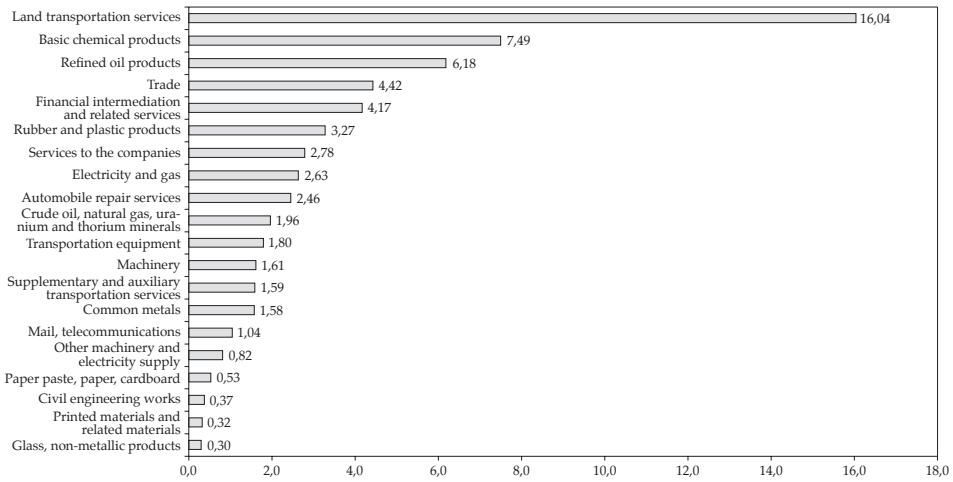
Graph 11. Backward Linkages (Response to 100 pesos in additional production in each sector)



Source: DANE, calculations by Fedesarrollo.

Graph 11. Backward Linkages (Response to 100 pesos in additional production in each sector) ***(Continuation)***

C. Other non metallic minerals

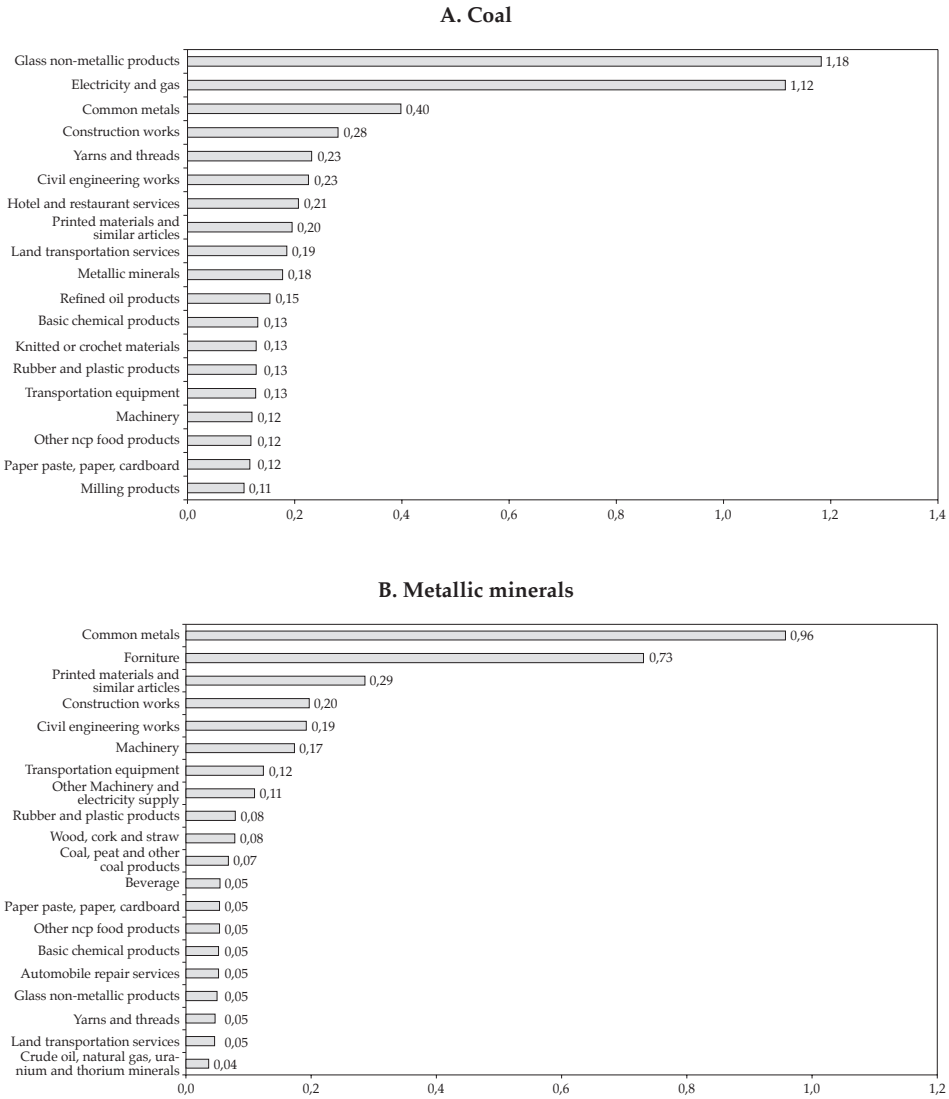


Fuente: DANE, calculations by Fedesarrollo.

is destined for export, reason for which their degree of forward linkages is quite limited. As can be seen in Graph 12, the thrust that coal production could have on activities that use it as an input is rather not significant: in general terms, an increase in coal production only represents increases of less than 1.2 pesos. The main sectors that use coal as an input are the production of glass and other glass products, as well as the energy sector.

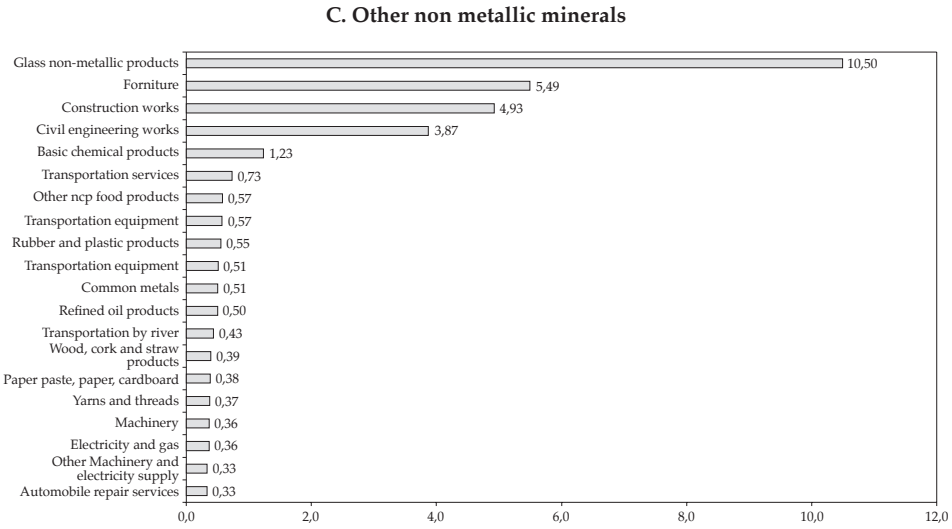
When one observes the performance of metallic minerals, these exhibit a result that is similar to the performance observed in coal production. In fact, the response to an increase of 100 pesos in the gross value of production of metallic minerals implies a moderate increase in the production of common metals and manufactured metallic products ($0.96), furniture and other transportable goods ($0.73), printed materials and other similar materials ($0.29), and in construction works, both in buildings ($0.20) and in civil works ($0.19). As has been mentioned in other sections of the text, this result is evidence of the absence of productive clusters around these activities.

Graph 12. Forward Linkages (Response to 100 pesos of additional production in each sector)



Source: DANE. Fedesarrollo calculations.

Graph 12. Forward Linkages (Response to 100 pesos of additional production in each sector) *(Continuation)*



Fuente: DANE, calculations by Fedesarrollo.

Lastly, in contrast with the case of coal and metallic minerals, forward linkages for the 'other non-metallic minerals' sector exhibit a highly dynamic performance. This is due, to a great extent, to the fact that the greatest portion of its production is dedicated to intermediate consumption in other areas of production. In fact, an increase of $100 in the total production of non-metallic minerals represents an increase of $10.5 in the production of glass and glass products (which includes the production of cement), $5.5 in furniture and other transportable goods, $4.9 in construction works (buildings), and $3.9 in the construction of civil works, among others (Graph 12).

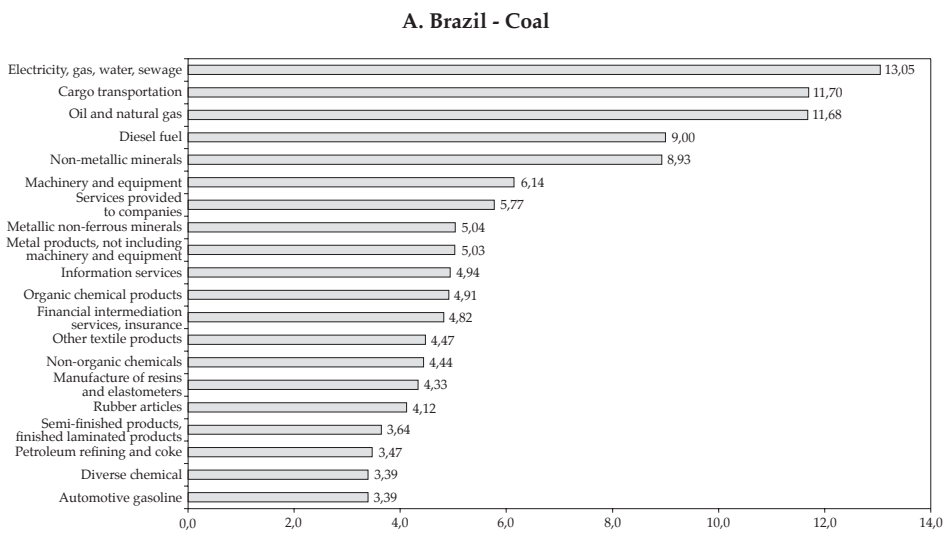
3.2. International comparisons

Another advantage that these types of methodologies offer is the possibility of having a simple form to compare the position of Colombian mining with respect to certain countries that are considered to be successful in the international mining context. For this study, similar forward and backward

linkage exercises were performed for mining activities in Canada and Brazil, based on the national accounts for each of these countries. Albeit the methodology with which each country reports its national accounts implies different breakdowns, the overall results for the exercise permit establishing similar analyses to those obtained for the Colombian case.[23]

The results of backward linkages are presented in Graph 13. It is worth underscoring the way in which, in both of the aforementioned countries, the linkages are similar to those that exist in Colombia, where intermediate services of energy consumption, financial intermediation, transportation and machinery and equipment stand out. These results suggest, initially, that the productive structure of mining in those countries is similar. Nevertheless, it should be noted that, for Brazil, the greatest demand is always

Graph 13. Backward Linkages (Response to 100 reais (or Canadian dollars) of additional production in each sector)

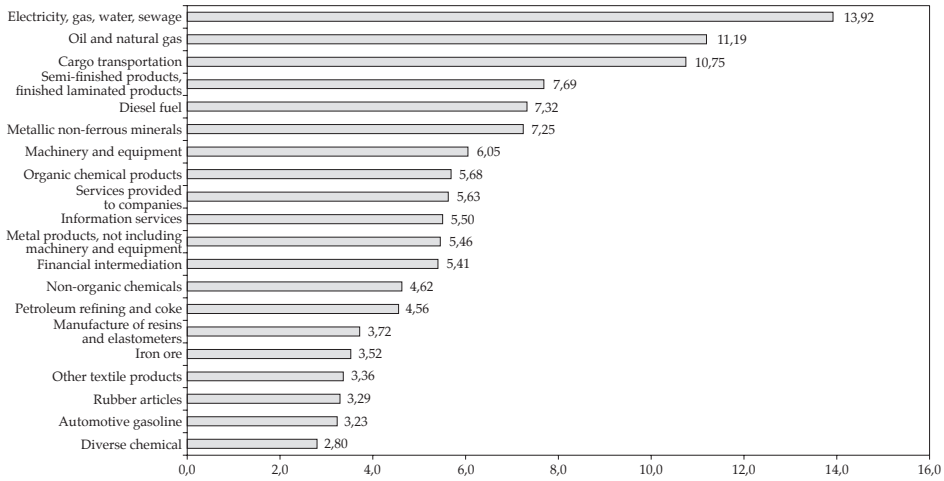


Source: IBGE, calculations by Fedesarrollo.

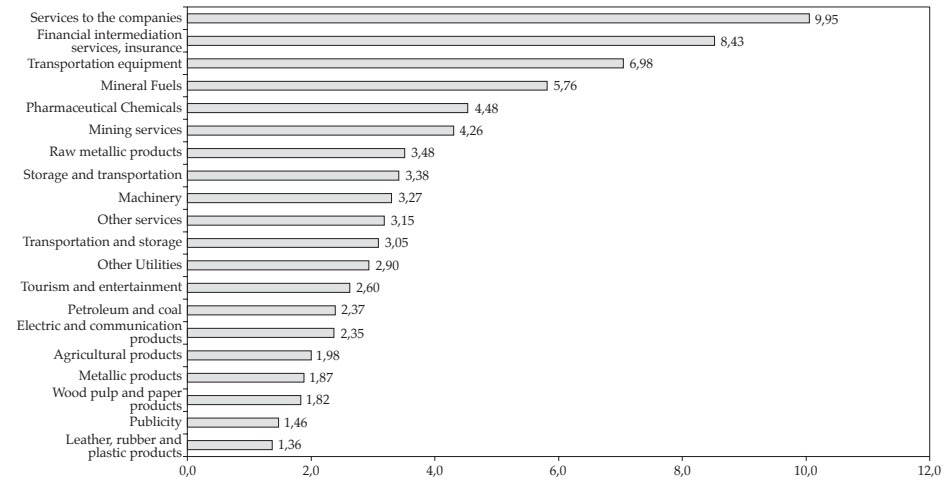
23 Another methodological problem that is worth mentioning is that, for the Canadian case, the statistics do not permit separating the production of coal and hydrocarbons. Thus, these results are not reported in this document.

Graph 13. Backward Linkages (Response to 100 reais (or Canadian dollars) of additional production in each sector) *(Continuation)*

B. Brazil - Non-ferrous metallic minerals



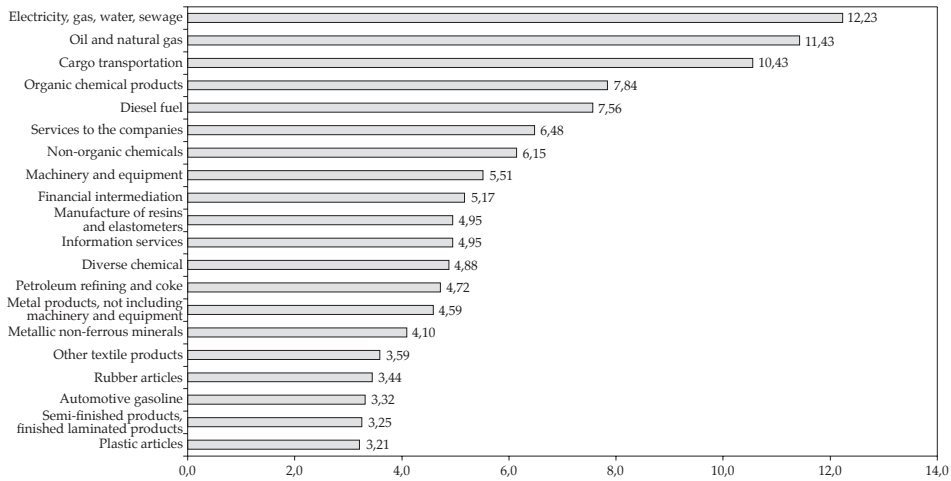
C. Canada - Metallic minerals



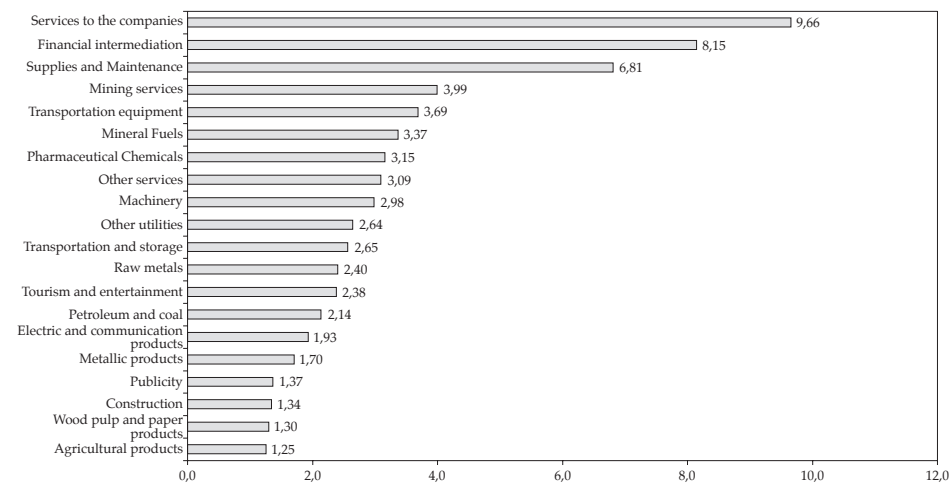
Source: IBGE, calculations by Fedesarrollo.

Graph 13. Backward Linkages (Response to 100 reais (or Canadian dollars) of additional production in each sector) *(Continuation)*

D. Brazil - Non metallic minerals



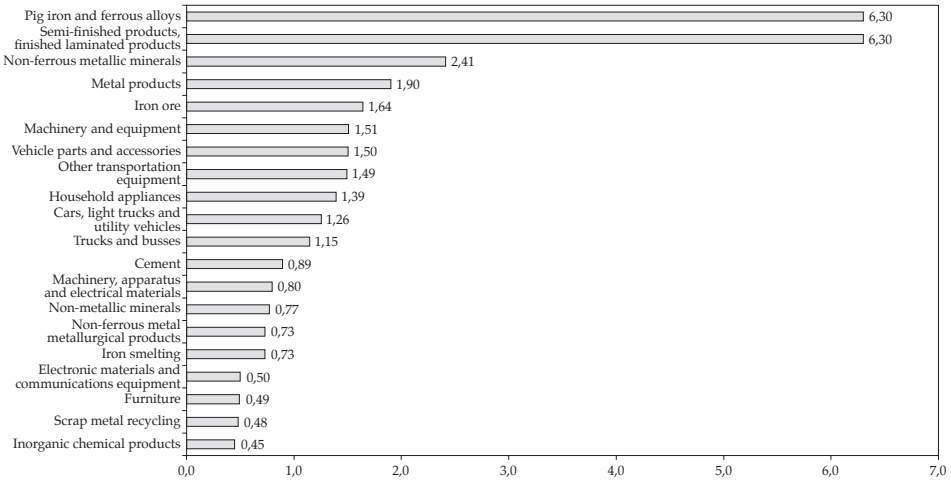
E. Canada - Non metallic minerals



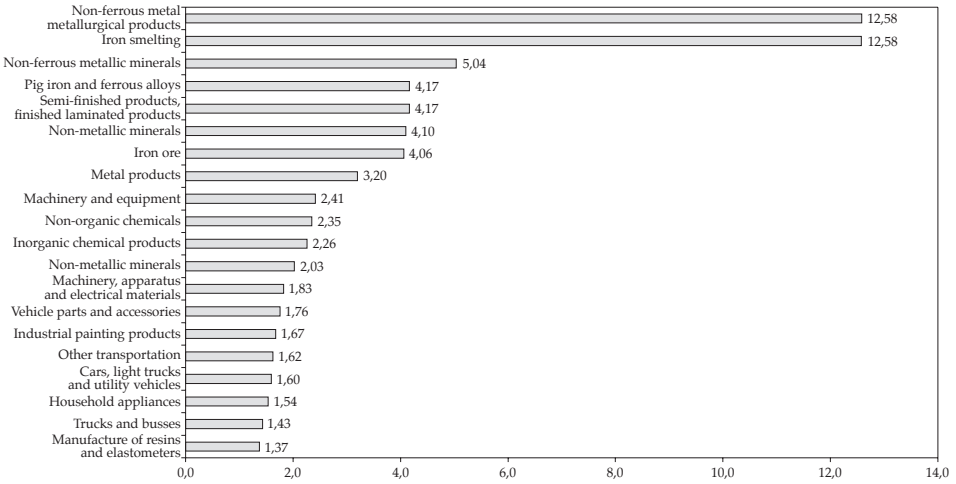
Source: IBGE, calculations by Fedesarrollo.

Graph 14. Forward Linkages (Response to 100 Reais (or Canadian dollars) of additional production in each sector)

A. Brazil - Coal



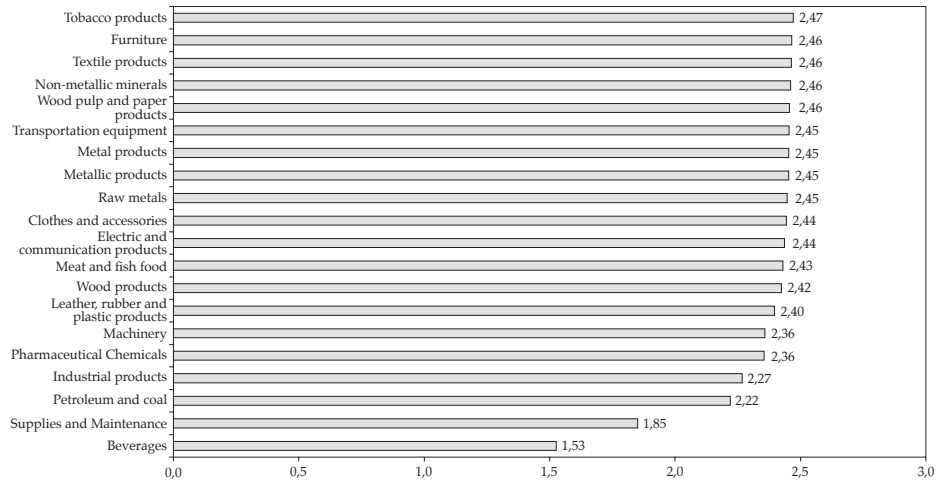
B. Brazil - Non-ferrous metallic minerals



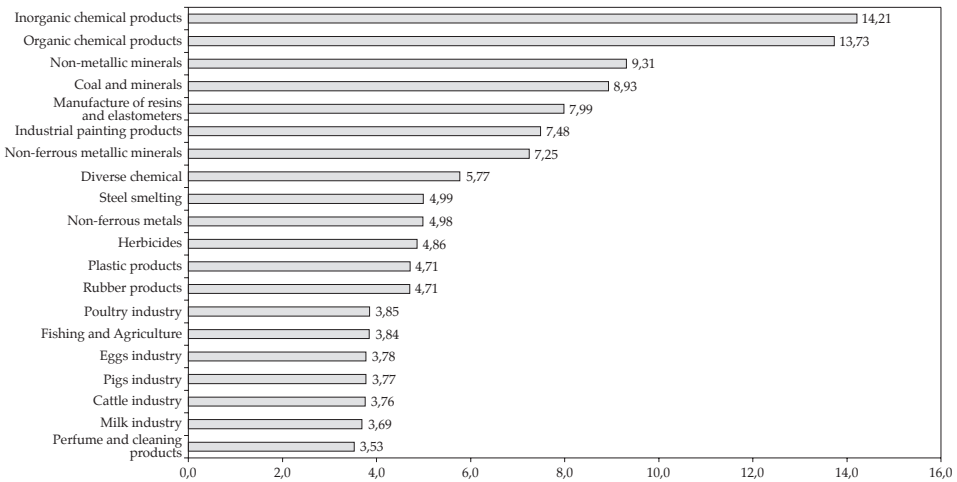
Source: IBGE, calculations by Fedesarrollo.

Graph 14. Forward Linkages (Response to 100 Reais (or Canadian dollars) of additional production in each sector) *(Continuation)*

C. Canada - Metallic minerals

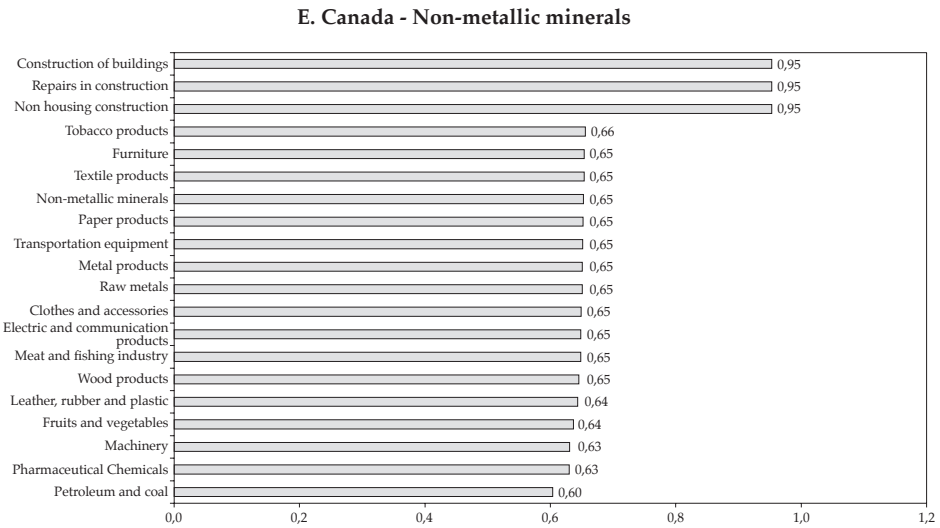


D. Brazil - Non-metallic minerals



Source: IBGE, calculations by Fedesarrollo.

Graph 14. Forward Linkages (Response to 100 Reais (or Canadian dollars) of additional production in each sector) *(Continuation)*



Source: IBGE. Statistics Canada, calculations by Fedesarrollo.

concentrated in energy use, whilst for Canada and Colombia, the principal intermediate consumption is concentrated in the services area.

On the other hand, the comparison of forward linkages shows a totally different scene, particularly when one compares mining production in Colombia with mining production in Brazil. In fact, in the Brazilian case, the presence of production clusters, particularly with industry, represents a decisive factor in the greater impact of mining activity on the rest of the economy. Moreover, increases in coal production foster production in several key sectors of the economy, such as products derived from metallic minerals, the automotive industry, machinery, metallurgical products and chemical products, among others. Non-metallic minerals, on the other hand, do not have a strong impact on agriculture and livestock production.

In summary, forward and backward linkage exercises allow for a first approach to the characterization of mining performance and its relative importance for the rest of the Colombian economy. The results suggest that the main contribution of the large branches of mining activity is associated with

its role as a purchaser of inputs (particularly those that stem from the services sector and the consumption of energy), and not on account of its participation as an input for production in other sectors. When assessing similar exercises for the economies of Brazil and Canada, two countries that can be considered to be successful in mining development, mining stands out, not only in its role as a purchaser of raw materials, but also as a seller of inputs, due to the formation of clusters around their mining exploitation activities.

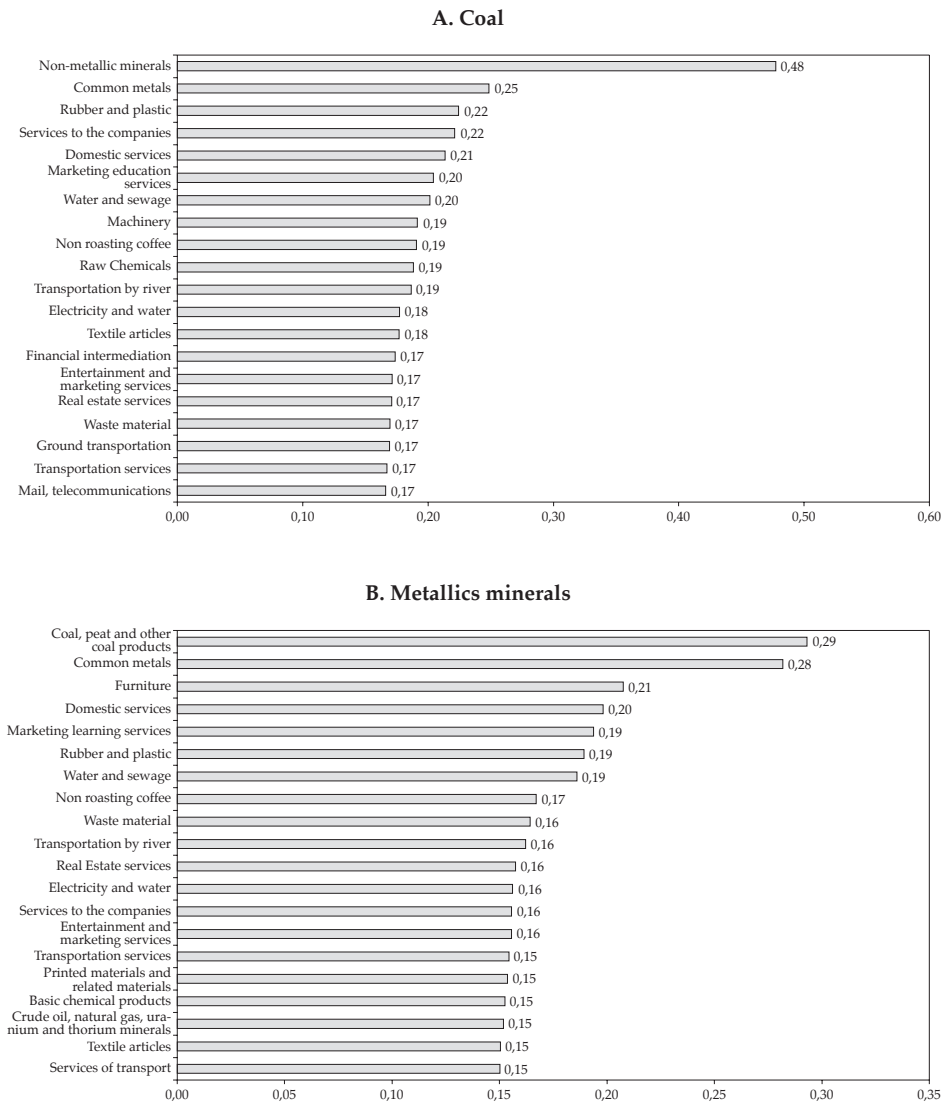
3.3. Computable general equilibrium models

Albeit the results that have been reported in previous paragraphs permit the characterization of interactions between productive activities within the economy, these do not take into account other important aspects, such as, for instance, the impact that changes in mining production produce on household income, which, in turn, translates into increased demand in other sectors, generating a "multiplier effect" for the original shock. This is but one example of how the interaction of mining production and other types of agents in the economy can expand a positive (or negative) shock by one branch of production throughout the whole economy.[24]

Details on the simulation are shown in Graph 15. These differ from those obtained in the exercises for linkages, to the extent that the simulation highlights, even more, the importance that mining represents for the development of the services sector, and, in addition, demonstrates a closer relationship between the different branches of mining activity. In fact, in most of the exercises, among the sectors that benefit the most from increases in production, one finds services to companies, financial intermediation and other personal services (for instance, teaching about markets, real estate services and domestic services). Lastly, as was the case with the exercises on linkages, increases in mining production represent an increase in the consumption of energy, oil, plastic product and chemical product, which, in turn generates increased dynamics in GDP by these sectors. If one considers

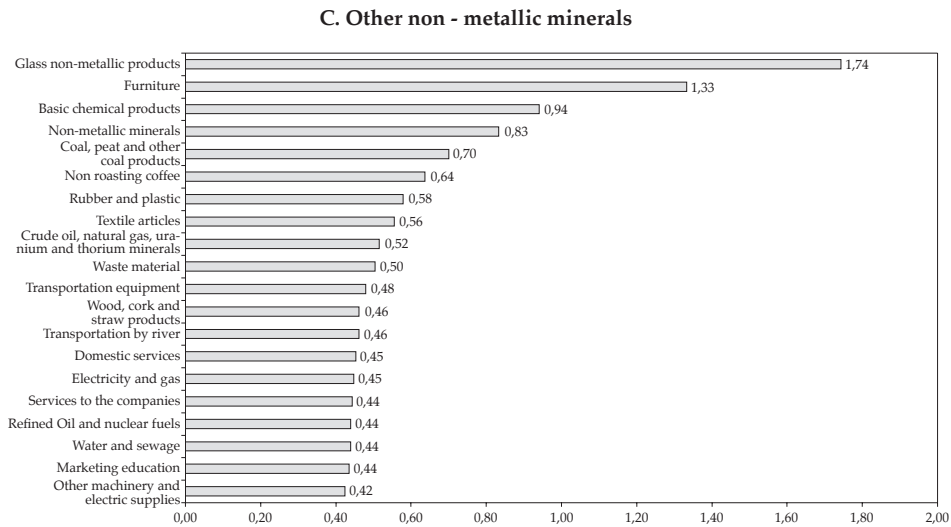
[24] For details on the exercise of the Computable General Equilibrium Model, see Attachment 1 to this study.

Graph 15. Results of the General Equilibrium Model Simulation (percent change in the production associated with an increase in production of sector i)



Source: Calculations by Fedesarrollo.

Graph 15. Results of the General Equilibrium Model Simulation (percent change in the production associated with an increase in production of sector i) *(Continuation)*



Source: Calculations by Fedesarrollo.

that most of the mining products are destined for export, increases in these types of goods imply increased revenues for the economy, which, in turn, entail an increased demand for other tradable and non-tradable goods; in this particular case, entrepreneurial and personal services.

Albeit the comparison of these results with those obtained in the previous section exhibit significant differences, it is worthwhile mentioning that these differences are due to the different purposes that each of them has. Whilst the exercise on linkages concentrates solely on the interactions in the primary stage of production, the CGEM (Computable General Equilibrium Model) avails itself of assumptions and additional information to attend to more complex problems, for instance, consumer behavior, which permit the establishment of additional results and, in general, illustrate, with a broader vision, the possible impact of mining on the rest of the economy.

In conclusion, as was the case with the exercises on linkages, the results of the implementation of Fedesarrollo's CGEM model suggest that, in most

cases, the most benefited productive branches as a result of an expansion in mining are those that are related with the services sector, since, on the one hand, increases in mining production imply an increased demand for intermediate goods and, on the other hand, these types of increases generate additional demands for non-tradable goods, particularly in personal services and services rendered to enterprises.

4. Composition of Mining in Colombia

As has already been mentioned, Colombia possesses an enormous mining potential that is still under-explored and under-exploited. Large-scale mining, represented mainly in the reserves and production of coal, nickel and precious metals, exhibits a prominent international projection. Moreover, medium- and small-scale mining represents a great potential, which, if it were taken advantage of, could become a significant source of income and employment for the country.

Following is an analysis of the country's mining composition (excluding, as in the rest of this study, hydrocarbons), with special emphasis on the coal, nickel, gold and construction materials sectors, given their large relative importance in the overall sector.

The bulk of mining production in Colombia is attributable to the following sub-sectors: coal (51.8% of mining production), nickel (21.2%), gold (14.6%) and construction materials (5.3%).[25] As shown in Graph 16, a good part of the increase in the contribution of mining to the national GDP in recent years is attributable to the expansion in coal.

Direct foreign investment flows during the last three years reveal that approximately 86% of the amount registered for the mining sector in Colombia corresponds to investments in coal projects. The remaining balance is divided among exploration and exploitation projects in precious metals and other minerals.

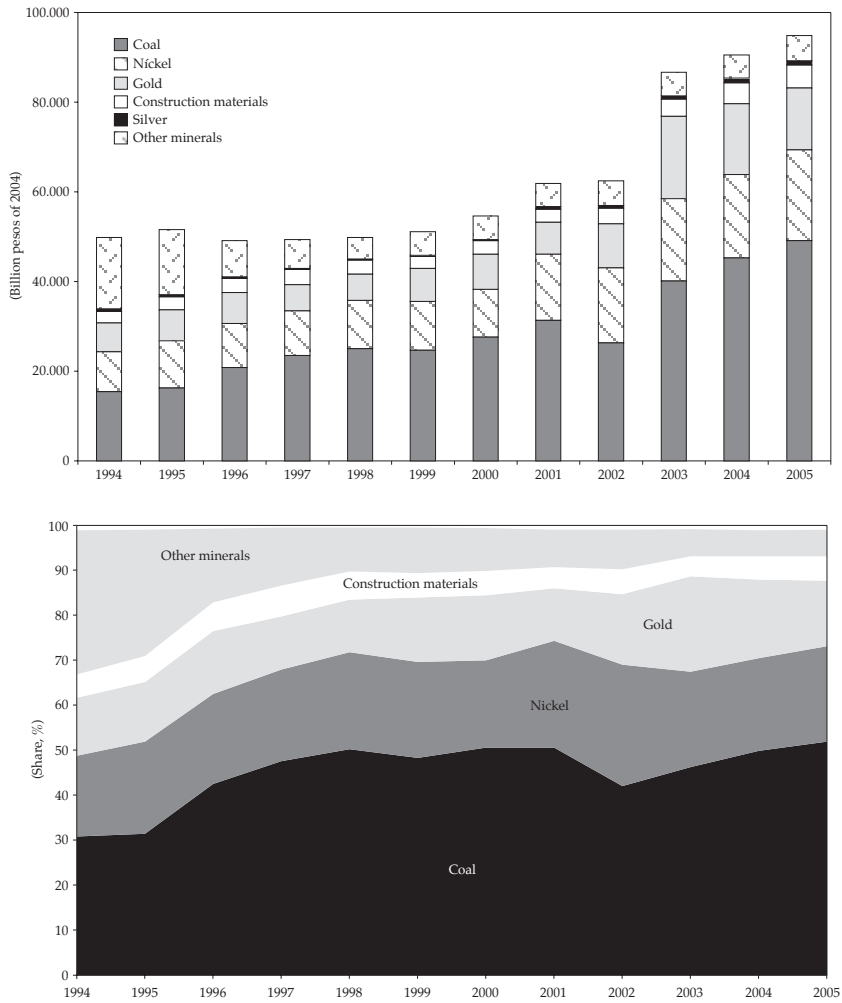
As was mentioned above, collections on account of mining royalties have increased during recent years. In 2006, the royalties distributed were estima-

[25] All of the reported figures correspond to the year 2005.

ted at $733 billion, 77% of which corresponded to contributions by the coal sector, 18% by the nickel sector, and 3.6% by precious metals (Graph 17).

To DIAN tax collections in 2006, as was mentioned above in this report, the coal sub-sector contributes 56.9% of the total taxes paid by mining, followed by nickel, with 35.4%, and, to a lesser extent, by the group of precious metals, in an amount that is close to 2%. It is worth mentioning that these

Graph 16. Minerals: Value of Production

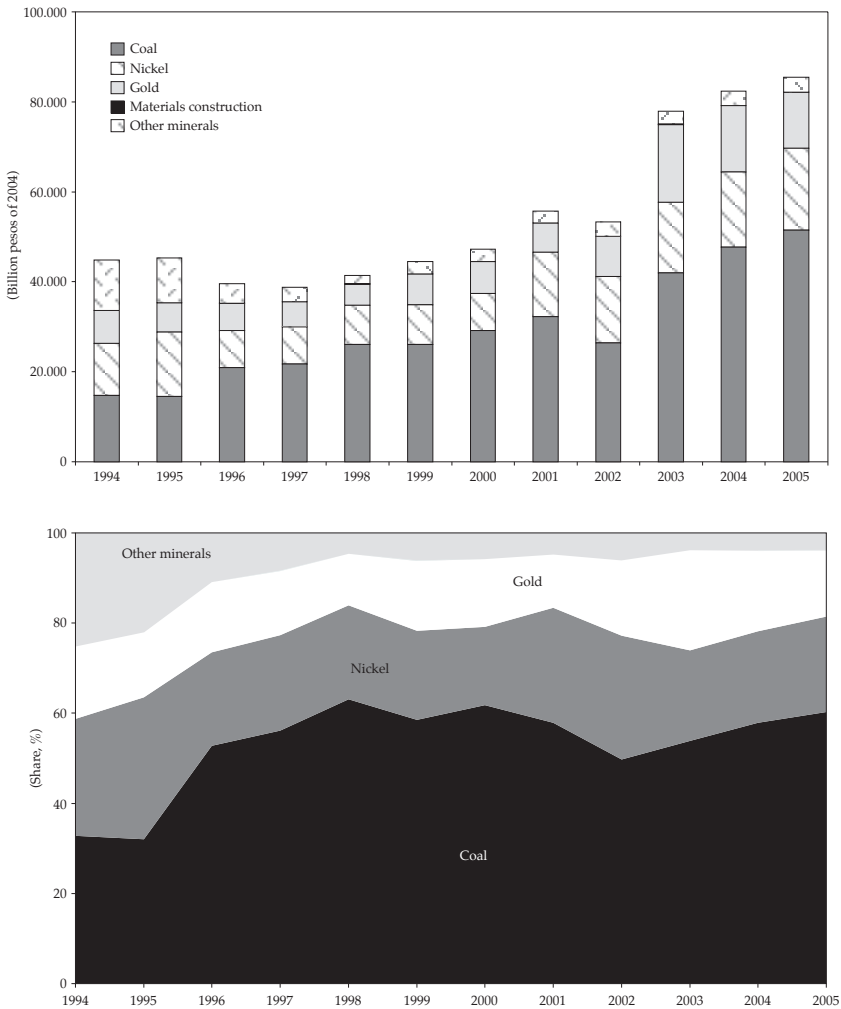


Source: DANE, calculation by Fedesarrollo.

collections also exhibit a rising trend, particularly with respect to payments for income tax, as is shown in Table 4.

Thus, as the coal sub-sector registers the greatest share in production, exports and FDI, it also makes the largest contributions in taxes and royalties by the sector, followed closely by nickel and precious metals.

Graph 17. Minerals: Value of Exports



Source: DANE and DIAN.

5. Is Mining a Key Factor for Economic Development?

In the first chapter of this study, two analytical perspectives were presented with respect to the impact of mining on economic development. The first of these argues that fostering the mining sector can have a nil impact on the rest of the economy, and could even exhibit a negative effect in countries with an abundance of basic resources. The second approach, which we have come to call the alternative paradigm, reexamines the traditional view and concludes that development of the mining sector can generate a positive effect on the economic performance of a country.

In order to assess the validity of this alternative point of view, this section presents an exercise that seeks to identify the role of mining in economic development. The empirical analysis is based on an econometric exercise for 77 countries for the 1960-2000 period, which seeks to identify the impact of several variables on economic growth, such as the importance of mining, the quality of institutions, human capital and a geographical factor.[26]

The purpose of the exercise is to determine if statistical evidence exists or not to support the aforementioned alternative view, whereby mining can go hand in hand with the economic success of a country, either directly or accompanied by other factors, such as institutional development or the level of education. The model was estimated with normal minimum squares, as well as with the use of the methodology of instrumental variables, in order to avoid possible problems of endogeny. The results, which are discussed in detail in Attachment 2 of this study, indicate that there is statistical evidence to state that mining has a positive and significant effect on economic growth, as is suggested in the alternative paradigm.

[26] For more details on the econometric exercise, please refer to Attachment 2 of this report, wherein a detailed description of the variables and their sources are provided.

CHAPTER THREE

Mining and Regional Development

Mining is one of the most important economic activities in certain Departments in the country. Evidence shows that specialization in this sector has generated an important contribution, not only to departmental economic growth, but also to public resources, through the income received on account of royalties.

This section studies the importance of mining (without hydrocarbons) for those Departments whose economy depends significant on the sector. First, for purposes of context, the geographic location of the main producers of coal, nickel, precious metals and construction materials are shown.

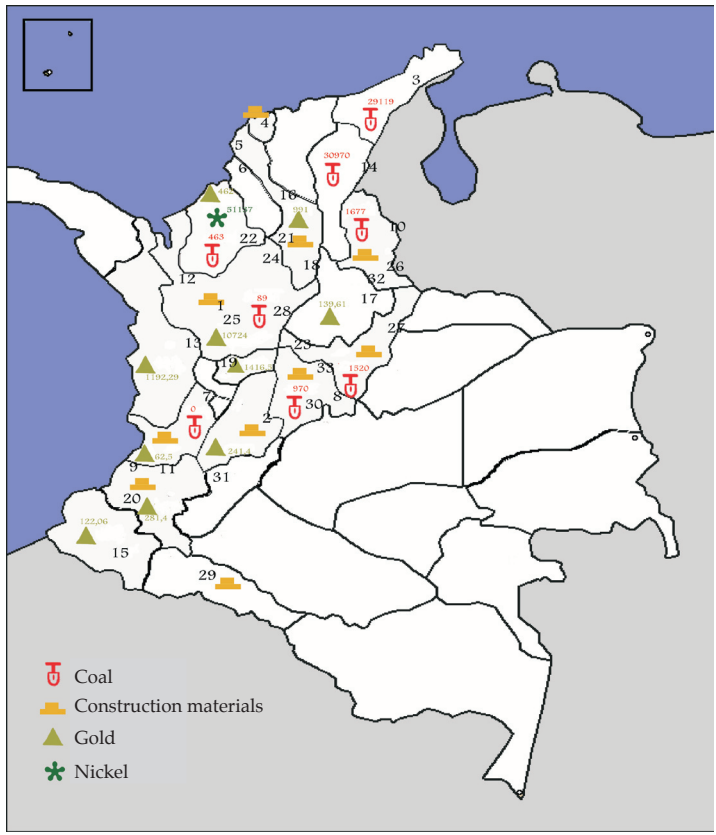
Thereafter, the participation and evolution of mining in the departmental GDP for the period 1990-2005 is described. Moreover, the participation of the main territorial entities receiving royalties during the 1995-2006 period are shown, as well as the distribution of these in the regional and institutional spheres.

Lastly, the estimate of an econometric model is presented, similar to the one used in section II, which is intended to show the importance of mining in departmental growth. The robust results that are presented under diverse specifications in the exercise indicate that statistical evidence exists to support the alternative paradigm in the Colombian case; that is to say, the theorem that indicates that mining has a positive impact on economic development.

1. Geographic Location of the Main Producers

Map 1 shows the main Departments that produce coal, nickel, gold and construction materials in Colombia. It also indicates the participation of each of these Departments in volume of mineral production, as well as the so-called "mining districts." As can be observed, most of the production of these minerals is distributed among the Andean, Pacific and Caribbean regions. Certain Departments located in the rest of the national territory produce some of these minerals, but is smaller quantities.

Map 1. Main Producers in Colombia



District	Minerals	District	Minerals
1. Amagá - Medellín	Coal, construction materials, clays	18. Magdalena Medio	Gold, silver
2. Ataco - Payande	Construction materials, limestone	19. Marmato	Gold, silver
3. Barrancas	Coal	20. Mercaderes	Gold, silver
4. Calamarí - Atlántico	Construction materials, limestone	21. Mojana Bolivarense	Gold, silver
5. Calamarí - Bolivar	Construction materials, limestone	22.Montelíbano	Ferronickel, coal, gold, silver
6. Calamarí - Sucre	Construction materials, limestone	23. Muzo	Emeralds
7. El Devio - Cali	Construction materials, gold, coal, silver, platinum	24. Nordeste Antioqueño	Gold, limestone, clays
8. Chivor	Emeralds	25. Oriente Antioqueño	Construction materials, coal, limestone
9. Costa Pacífica Sur	Gold, silver, platinum	26. Pamplona	Limestone, coal, gold
10. Cúcuta	Limestone, clay, coal	27. Paz del Río	Limestone, coal
11. El Tambo - Buenos Aires	Gold, silver, construction materials, coal	28. Puerto Nare	Limestone, clays
12. Frontino	Gold, silver, platinum, copper, manganese, gypsum	29. Putumayo	Gold, construction materials
13. Istmina	Gold, silver, platinum	30. Sabana de Bogotá	Construction materials,
14. La Jagua	Coal	31. Tesalia - Aipe	Limestone, gold
15. La Llanada	Gold, silver	32. Vetas	Gold and silver
16. Lobos	Gold, silver	33. Zipaquirá	Coal, salt, sands
17. Los Santos	Gypsum, limestone	34. Without a district	-

It should be noted that the data presented in Map 1 is limited, given the restrictions of information that exist in the country. As has been mentioned, the Colombian mining sector has not only been relatively unexploited, but has not been explored sufficiently either. It is probable that, as a result of the lack of geological knowledge that the country still confronts, the opportunity of having a much more developed mining sector, with greater contributions to the Colombian economy and a more prominent recognition in the international sphere is being foregone.

1.1. Mining Districts

In the first chapter of this report, the statement was made that clusters represented one of the features in those countries that have achieved the combination of specialization in the mining sector and economic success. Special emphasis was given to the cases of Canada and Chile, where mining has become an engine for economic development, the merging of technological resources, the availability of human capital, and above all, the generation of significant productive linkages (the production of machinery and services), based on exploration, exploitation and the transformation of minerals.

The characterization of mining districts in Colombia is made in order to identify potential areas for development based on productive concentrations. A mining district is a productive system located where a good number of producers are dedicated to manufacturing or exploiting in the various phases of a homogeneous product.[27]

The process for the identification of a mining district comprises the identification of the more representative minerals in national production and the production volumes that can be considered significant. Subsequently, the geographic areas that exhibit a concentration in mining activities are determined, and these are the ones that are known as mining districts.[28] This characterization is of enormous economic importance, to the extent

---

[27] UPME (2005), *"Mining districts: exports and transportation infrastructure."*

[28] Ibidem.

that a mining development pole can generate economic linkages around the areas of productive concentration.

In accordance with the UPME classification, one can underscore the fact that three mining districts export all of their production: La Jagua, Barrancas and Montelíbano. On the other hand, districts such as Zipaquirá, El Zulia and Paz del Río, satisfy domestic demand and export a small proportion of their production. On the other hand, most of the districts that are specialized in the exploitation of construction materials (see Map 1), only allocate their production for internal consumption.

1.2. Mining Titles

A mining title is a right that the Colombian State grants for the exploration and exploitation of mines that are owned by the State, by means of a mining concession contract that is granted and registered with the National Mining Registry.[29] A mining title does not transfer ownership of the area granted under concession. It merely assigns the right to establish, in an exclusive and temporary manner, within the area granted, the existence of minerals in useable quantities and quality to take advantage of them by extracting them, and to encumber the areas of third parties with the necessary right of way for the efficient exercise of those activities.[30]

A sensitive problem exists in Colombia with the mining registration system. Albeit one can find detailed information about the number of titles granted at the departmental level, indicating the type of mineral and going back several years, this data does not provide much information other than suggesting an evolution in the number of concession contracts. The problem lies in that there is no registry that indicates the proportion of these areas that are, in fact, being exploited.

In other words, the State assigns titles and has a registry for these, but with the existing public information systems, it is not possible to ascertain if the area that was requested under concession, is, in fact being exploited.

---

[29] Law 685 issued in 2001.

[30] Ibidem.

This situation gains greater if one bears in mind that there are indications that certain economic agents acquire mining titles for speculative purposes and not with the specific purpose of developing an exploration or exploitation process. Colombian miners are conscious of this problem and, as such, express their concern on account of the growing level of under-exploitation that may exist and that goes unnoticed.

In the course of this study and in order to try to overcome this deficiency, we attempted to obtain an estimate of actual exploitation as a proportion of the titles assigned, using the statistics on royalties by department. Nevertheless, it was concluded that this measurement would be quite biased, since there are certain cases, as is the case of construction materials, in which royalties are assessed by the municipal mayor's office and, in this sense, there is not adequate registration of these.

Following is a more detailed analysis of the sub-sectors that have already been mentioned in this study, with a special emphasis on the Departments where the main mining districts in the country are located.

1.3. Coal

Coal production is divided into two categories: the production of coking coal and the production of steam coal. Coking coal (coal that is obtained from coke) is used in the iron, steel and metallurgical industry for the production of iron and steel and is produced almost in its entirety in the central area of Colombia. Thermal or steam coal is used for the production of electricity. Colombia is recognized for its production on a worldwide scale, second to countries like Australia, Indonesia, China and South Africa.

There is clear evidence of productive forward linkages in sub-sectors such as coal and metallic minerals in the Colombian economy.[31] For example, coal is an input for the production of several goods and services. The main consumers of coal in Colombia are the iron and steel industry, cement factories, the glass, paper and textile industries, and, of course, thermal electricity generation plants.

---

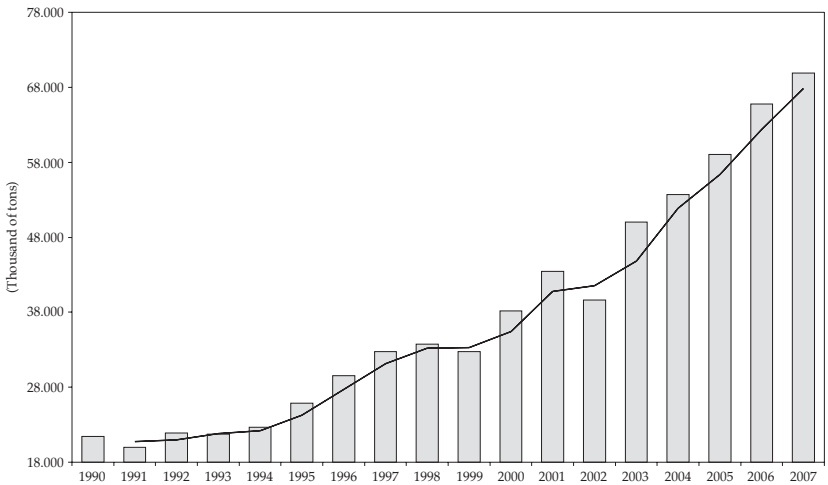
[31] On the concept of 'forward linkages,' see the previous chapter in this report.

Through the first half of the 70s, the coal sector was concentrated on the exploitation performed by small and medium mining concerns. During this period, participation of the mineral in the total value of mining production was 11% and practically all of the production was destined to internal demand.[32] Nowadays, that participation is close to 60%, most of it is exported, and production volumes exhibit a growing trend, as is shown in Graph 18.

The greatest percentage of steam coal reserves in the country is found in the Caribbean region (approximately 90%) and that is where the most important exploitation projects are located: "El Cerrejón" in La Guajira and "La Loma" in Cesar.

Other coal reserves are found in the interior of the country: Antioquia, Boyacá, Cauca, Cundinamarca, Norte de Santander, Santander and Valle del Cauca. However, the extraction in these departments does not exhibit the degree of modernization as that in the projects developed on the Atlantic Coast.

Graph 18. Colombia: Coal Production Volumes



Source: Ingeominas.

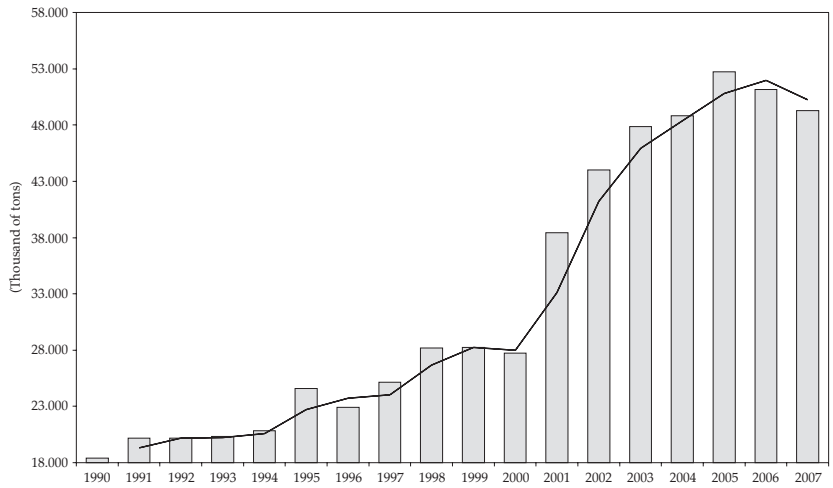
[32] Institute for Economic Studies (1987), *"A mining plan for Colombia."*

1.4. Nickel

The countries that have the greater share in the international sphere in the extraction of nickel and the production of ferronickel are Russia, Canada, Australia and the United States. Colombia has excellent quality nickel reserves and is a producer that is recognized on a worldwide scale. The mineral is extracted in its entirety in the municipality of Montelíbano (Córdoba) and its transformation is also carried out there, at the Cerro Matoso plant.

The production of ferronickel in the country dates back to 1982, when Cerro Matoso went into production (Graph 19). Although in the first few years that the plant operated, it was unable to fulfill the production expectations on account of technical problems,[33] shortly thereafter, this sub-sector became the second source of revenue in the country's exports from the mining sector, a condition that it still conserves nowadays.

Graph 19. Colombia: Nickel Production Volumes



Source: Ingeominas.

33 Guevara *et al.* (2006), *"Cerro Matoso S.A: sustainability of a company in a turbulent environment (1970-2003)."*

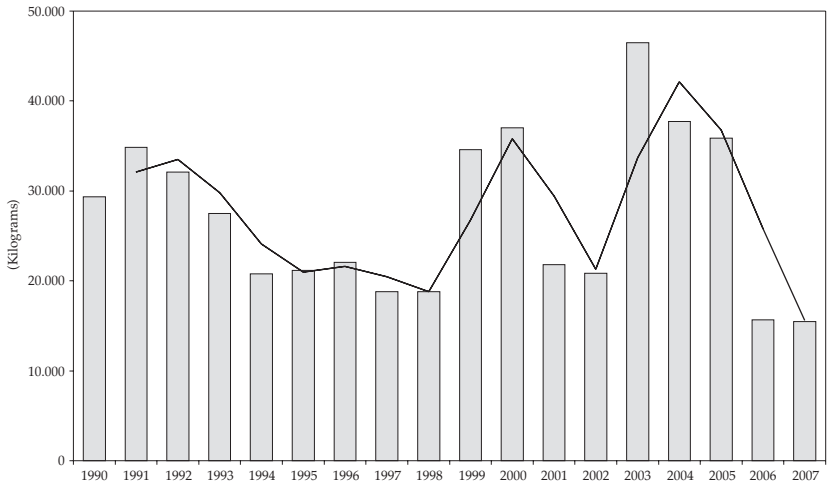
1.5. Gold

Gold has played a very important role in the Colombian economy since the colonial era. However, the value of production and exports has historically been characterized by a fluctuation behavior, explained basically by a strong correlation between the domestic price and the international price. Moreover, the statistics that are available for this sub-sector are deficient and it is probable that they do not completely reflect reality.

In addition to the large gold exploitations, characterized by the intensive use of technology, medium, small and subsistence mining has continued, which, at present, represents a large portion of production in Colombia (Graph 20).

Antioquia is the largest producer of gold in Colombia (representing approximately 68% of national production in 2006), and is also the Department that has the greatest degree of use of technology for the extraction of the mineral.[34] It is followed in importance by Chocó and Bolívar, and

Graph 20. Colombia: Gold Production Volumes



Fuente: Ingeominas.

[34] Jaime Sierra (1989), *"Antioquia in the era of independence."*

to a lesser extent, Cauca, Tolima, Santander, Nariño, Valle del Cauca and Risaralda.[35]

1.6. Construction materials

The production of the construction materials sub-sector comprises clays, limestone for cement production, rock, gravel and sands. These types of elements are used in the production of bricks, ceramic, cement for housing and transportation infrastructure.

Given the nature of construction materials, their transport becomes expensive and, as a result, the markets for these products are clearly regional. For this reason, exports by the sub-sector are virtually non-existent. However, their participation in the value of mining production is close to 6% and exceeds that of other minerals, such as platinum and silver (Graph 21).

Exploitation of large volumes of construction materials is carried out in several departments in Colombia. However, the most representative ones are the departments of Cundinamarca and Boyacá.

2. The Mining Sector in the Regional Context

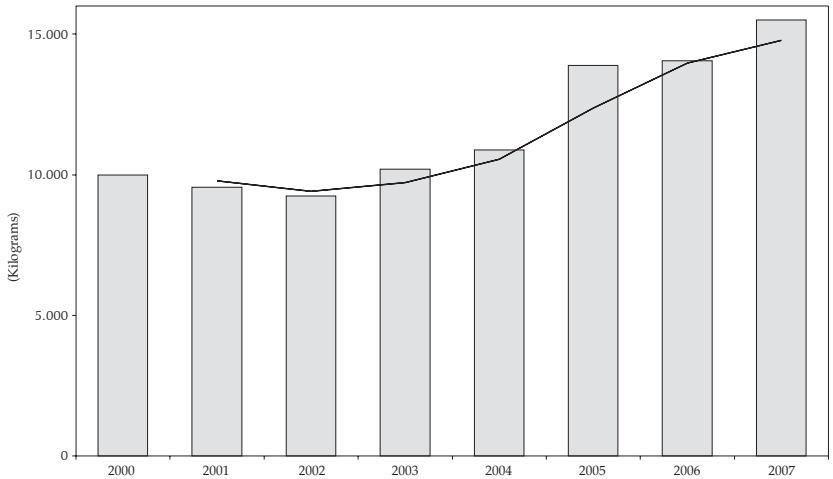
The growing participation of mining in the economy of certain Departments represents a central point in the analysis of regional economic development, to the extent that the sector has a significant importance as a source of income generation on account of exports and taxation.

The progressive contribution of mining to the GDP of some Departments during the last decade is a fact that well worth analyzing. Among the most notable cases are those of La Guajira, Cesar and Córdoba. Graph 22 shows the contribution of the sector to the departmental GDP during the 1990-2005 period for those Departments where mining represents one of the most important economic activities.

---

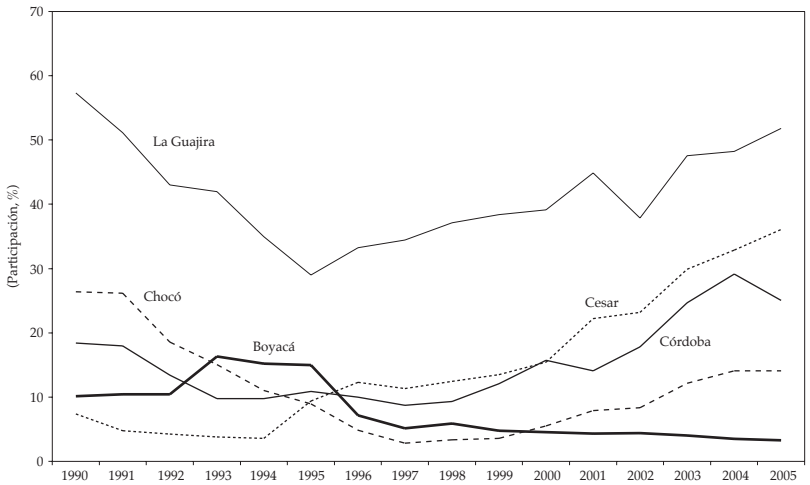
[35] As was indicated in the first part of this section, this report makes reference to the main producers of each mineral, and which, altogether, represent approximately 90% of the country's total production.

Graph 21. Colombia: Volume of Production of Limestone for Cement



Source: Ministry of Mines.

Graph 22. Participation of Mining in the Regional GDP



Source: DANE, calculations by Fedesarrollo.

The most noteworthy case in this context is that of La Guajira, where mining has represented between 30% and 50% of the departmental GDP during the last decade. As reported by Meisel (2007), La Guajira underwent a profound economic transformation as of the 80s.[36] Whilst in 1975, trade represented 58% of the departmental GDP and mining activities only contributed 2%, two decades later, in 2005, the latter rose to a contribution of 51% of the GDP and the trade sector was pushed back to a 5.3% share. Despite the fact that mining, in this particular case has few productive linkages, the growth of the Department has been associated fundamentally with the change in the productive structure, which went from being a clearly commercial economy to a mining one.

Similarly, the case of Cesar is significant, in that mining, which represented 7.3% of the GDP in 1990, went to 36% in 2005. On the other hand, in Córdoba, mining is the second most important activity, second only to agriculture. While, at the beginning of the decade of the 90s, mining contributed 18% to the GDP in Córdoba, for the year 2005, mining increased its share to 25%.

On the other hand, the mining sector has lost economic importance in certain other Departments. For instance, during the first few years of the decade of the 90s, Boyacá had a mining sector that contributed approximately 10% to the GDP and today, it only represents 3% of the GDP.

Chocó, in turn, has always been recognized for the importance of its gold mining in the regional context. In 1990, the share of the sector was approximately 26% and, despite the fact that this contribution to the GDP has decreased to 14%, it continues to be quite significant and the Department is still recognized for its mining potential.

2.1. Royalties

As was mentioned in the introduction to this section, one of the most relevant contributions of the mining sector to regional economies where these activities take place is the payment of royalties. The tables 6, 7 and

[36] Adolfo Meisel (2007), *"La Guajira and the myth of the redeeming royalties."*

8 show the main recipients of royalties distributed by the coal, nickel and precious metal sub-sectors. [37]

The royalties from the coal sub-sector are basically distributed among the Departments of Cesar (37.56%), La Guajira (34.15%), Magdalena (4.95%), Cundinamarca (0.51%) and Atlántico (0.26%). It is worth clarifying that these resources are also distributed to other entities: FONPET[38], Ingeominas, Fondo Nacional de Regalías and, or course, other Departments, either because they participate in the exploitation or because they receive some sort of compensation.

Table 6. Coal: Distributed Royalties

Beneficiary	2004	2005	2006
Antioquia	10.307.802	172.070.753	370.236.152
Atlántico	250.968.605	947.474.307	1.448.150.980
Bolivar	81.416.262	36.650.178	119.524.685
Boyacá	442.126.463	2.340.960.408	4.320.608.853
Caldas	0	0	6.120
Cauca	0	42.704.368	41.151.590
Cesar	50.052.207.655	156.244.957.141	211.518.654.528
Córdoba	8.050.002	345.286.986	1.272.015.927
Cundinamarca	361.517.577	1.736.990.050	2.892.904.522
La Guajira	71.293.410.500	177.745.711.476	192.312.312.797
Magdalena	6.691.593.339	20.868.329.639	27.886.075.205
Norte de Santander	922.506.636	2.546.761.335	5.532.635.490
Santander	0	2.537.086	159.157.087
Sucre	0	15.324.837	20.465.669
Valle del Cauca	37.459.562	113.134.097	97.004.938
Subtotal - Otros	37.097.339.768	105.168.769.898	115.141.218.421
MHCP/carbocol	2.999.171.230	6.272.200.974	
Fondo Fomento al Carbón	505.124.984	920.796.119	894.042.635
Fondo Nacional de Regalías	10.061.654.550	32.488.369.305	37.352.319.810
Ingeominas	1.210.203.642	1.401.100.038	5.457.402.562
Ingeominas Autoridad Minera	3.411.616.451	9.284.319.856	10.852.193.709
DNP - Interventorias	1.364.646.585	3.713.727.961	4.347.397.947
FONPET	16.878.592.032	49.222.408.404	53.994.307.500
4 por mil	666.330.294	1.865.847.241	2.243.554.258
Totales	**167.248.904.171**	**468.327.662.559**	**563.132.122.964**

Source: Ingeominas.

[37] The percentages reported in parentheses in this section correspond to the distribution of royalties made in 2006.

[38] Territorial Entities National Pension Fund.

Table 7. Nickel: Distributed Royalties

Beneficiary	2004	2005	2006
Bolivar	697.073.790	968.506.422	1.231.926.672
Córdoba	47.401.017.744	65.858.436.877	83.771.013.539
Subtotal - Otros	28.389.568.090	39.444.144.184	49.914.362.913
Corporacion Autonoma y Regional	20.950.305.179	29.108.116.592	36.954.440.595
Fondo Nacional de Regalias	1.333.201.237	1.852.334.692	2.351.646.219
Ingeominas Autoridad Minera	1.314.155.501	1.825.872.770	2.202.148.704
DNP - Interventorias	525.662.202	730.349.107	880.859.482
Fonpet	3.961.512.252	5.504.080.232	6.987.748.761
4 por mil	304.731.719	423.390.791	537.519.152
Total	**76.487.659.624**	**106.271.087.483**	**134.917.303.124**

Source: Ingeominas.

Table 8. Precious Metals: Distributed Royalties

Beneficiary	2004	2005	2006
Amazonas	11.206.508	3.099.611	-
Antioquia	15.878.760.788	18.811.908.364	12.133.833.169
Bolivar	2.425.015.933	3.738.849.264	1.524.399.752
Caldas	836.325.813	1.341.056.985	2.042.935.940
Caquetá	425.044	2.181.622	730.323
Cauca	285.578.326	287.032.565	356.365.586
Chocó	3.213.559.427	4.457.320.116	5.497.945.801
Córdoba	5.619.604.577	4.163.212.002	615.216.295
Guainía	108.456.893	92.630.054	15.836.592
Guaviare	101.972	210.236	-
Huila	7.212.571	7.378.516	2.850.157
La Guajira	-	-	94.279
Nariño	212.545.025	156.413.102	164.001.780
Norte de Santander			4.468.556
Putumayo	21.371.723	37.120.999	7.830.637
Quindío	-	1.101.811	1.157.126
Risaralda	47.990.918	30.727.061	38.203.415
Santander	554.416.538	472.464.400	211.861.721
Sucre	527.587.888	10.056.752	-
Tolima	214.793.895	206.260.506	296.450.821
Valle	85.000.893	100.955.619	80.322.241
Vaupés	10.252.579	4.728.857	1.133.072
Vichada	-	-	-
Otros	3.944.016.253	4.640.848.644	3.333.524.393
Fondo Nacional de Regalias	606.121.330	567.843.995	377.066.902
Ingeominas		200.037.323	387.242.019
Ingeominas - Autoridad Minera	827.226.224	926.904.631	595.462.125
DNP - Interventorias	330.890.488	370.761.838	238.184.873
FONPET	2.044.303.229	2.421.653.240	1.630.671.430
4 por mil	135.474.982	153.647.617	104.897.044
Total	**34.004.223.564**	**38.565.557.086**	**26.329.161.656**

Source: Ingeominas.

Royalties stemming from the production of nickel are distributed mainly between the Departments of Córdoba (62%) and Bolívar (0.91%). The remaining percentage balance, as is the case with coal, is distributed among various entities: the CAR, the Fondo Nacional de Regalías and the FONPET being among the ones with the largest share.

In the case of the precious metals sub-sector, the largest percentage of revenues on account of royalties is received by the Departments of Antioquia (46.09%) and Chocó (20.88%), which, in turn, are the largest producers of gold. To a much lesser extent, there are distributions that are made to Caldas (7.76%), Bolívar (5.79%) and Córdoba (2.34%).

Table 9 shows the share received by each territorial entity of the total royalties paid during the 1996-2006 period.[39] The figures indicate that 83% of the amount corresponds to the Departments of Cesar, La Guajira and Córdoba, the first two departments on account of coal exploitation and the third, on account of ferronickel. In contrast, the Departments producing gold or precious metals receive a reduced share and exhibit a diminishing trend in royalties for the period that was analyzed. It is worth noting that this phenomenon could be attributed to the large fluctuations that gold production exhibits (see Graph 20), and its decrease in the last few years.

3. Is Mining a Key Factor for Departmental Growth?

An econometric model was estimated in the second chapter of this report for a sample of several countries, which sought to explain the effect of mining on economic growth. The results obtained render evidence in favor of mining as one of the factors that have a favorable influence on economic growth.

This section estimates a model similar to that in section II, but applied to a sample of Departments in Colombia. The variables used in this case differ somewhat from the previous ones, basically on account of data availability. Nevertheless, the objective continues to be the same one: to determine if there is statistical evidence, or not, to state that mining contributes to departmental growth.

---

[39] The calculation of participation was made based on constant 2006 values.

Table 9. Regional Share of Paid Royalties (Million pesos of 2006)

Department	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Antioquia	6,25	2,20	1,83	6,97	5,03	2,24	2,24	8,10	7,60	4,50	2,26
Arauca	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Bolivar	2,31	1,02	0,47	1,74	0,98	0,97	0,89	1,23	1,13	1,25	0,59
Boyacá	7,51	5,28	2,95	2,55	2,00	1,09	1,82	1,45	0,83	0,89	2,17
Caldas	0,57	0,39	0,51	0,38	0,35	0,12	0,31	0,23	0,38	0,28	0,36
Casanare	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Cauca	0,16	1,18	1,14	0,87	0,73	0,89	0,49	0,47	0,79	0,24	1,03
Cesar	13,80	24,23	23,31	20,34	18,40	24,47	32,97	31,11	26,62	38,50	30,03
Chocó	1,27	0,49	0,59	0,57	0,54	0,55	0,41	0,63	1,21	0,67	0,80
Córdoba	13,69	13,86	14,68	24,17	27,40	9,99	14,05	20,91	24,48	15,26	18,38
Cundinamarca	0,95	1,14	1,44	0,69	0,47	0,85	0,99	0,66	0,17	0,41	0,68
Guajira	48,04	41,82	45,85	36,78	34,70	50,60	35,73	28,35	28,57	31,48	35,03
Magdalena	1,97	2,27	2,52	2,29	2,43	3,10	4,65	3,70	4,31	4,35	5,33
Meta	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
Nariño	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,03	0,02	0,00	0,02
Norte de Santander	0,97	0,98	1,10	0,67	0,27	0,25	1,34	0,50	0,21	0,54	1,01
Putumayo	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00
Santander	0,02	0,01	0,00	0,00	0,03	0,00	0,00	0,01	0,19	0,09	0,08
Sucre	0,00	0,00	0,00	0,00	0,00	0,08	0,04	0,00	0,23	0,01	0,00
Tolima	2,47	5,11	3,60	1,98	6,67	4,79	4,07	2,64	3,27	1,54	2,23
Total	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**	**100,00**

Source: Calculations by Fedesarrollo.

Table 10 presents the results of the estimate of the model with the use of normal minimum squares, where the dependent variable is the per capita GDP growth for the 1970-2002 period. As the theory suggests, the measurements for human capital and institutional performance exhibit a positive and significant association with growth.

The results of the estimate of the model suggest evidence in favor of the so-called alternative paradigm, as was also the case for the estimate for the international sample. In other words, controlling for variables that are characteristic of a classical economic growth model, mining has a positive effect on the economic performance of the Departments.

Despite the estimated effect is not so high in any of the specifications (in comparison with the human capital or institutional variables), the results

Table 10. Econometric Model
Estimate, normal minimum squares

Dependent Variable:* GDP *per capita growth rate 1970-2002
Normal Minimun Square

	(1)	(2)	(3)	(4)
Log initial GDP per cápita	-1,00 **	-0,914 *	-0,866 *	-0,976 ***
	(0,436)	(0,433)	(0,411)	(0,310)
Log initial education	0,454 ***	0,403 ***	0,427 ***	0,074
	(0,113)	(0,108)	(0,106)	(0,103)
Social educaction expenditures PC			2,380	
			(4,323)	
Vote journey participation 2002				0,033 **
				(0,014)
Social services expenditures PC	14,70 ***	7,958 ***		
	(1,814)	(1,322)		
Mining participation in GDP	**0,066 ** **	**0,061 ** **	**0,061 ** **	**0,032 *** **
	(0,023)	**(0,025)**	**(0,022)**	**(-0,010)**
Constant	1,132 ***	1,025 ***	1,092 ***	0,168
	(0,271)	(0,256)	(0,320)	(0,718)
Observations	14	15	14	19
	0,34	0,33	0,68	0,48

Standard errors in parenthesis.
*** Significance 1%; **Significance 5%; *Significance 10%

are robust for any combination of variables included in the model. This fact indicates that the contribution of mining to growth could become a key point at the time of determining the conditions that contribute development to a specific region.

Of course, for the positive impact of mining to growth to become effective, it is necessary to have the concurrence of other factors, the two that are included in the analysis, quality human capital and good institutions, standing out. This finding confirms the results mentioned in the first two chapters of this study regarding the conditions under which mining could produce a positive effect on development.

CHAPTER FOUR

Competitive Position of Colombian Mining

The dynamics that Colombian mining has experienced over the last few years, described in previous sections, has indicated the enormous productive potential that the sector offers. The option of exploiting that potential represents, for Colombia, the possibility of generating more production, employment and fiscal resources in the future, both for the country and for the producing regions.

That potential, however, can only be effective to the extent that the Colombian mining sector is competitive, in relative terms, vis-à-vis other investment alternatives in the region. As was indicated in the first chapter of this study, in recent years, Latin America has become one of the most attractive destinations for mining investment, and, in this context, the possibility of attracting capital flows to the country will depend on its relative competitiveness.

International competitiveness of mining in a country depends on several factors, some of which are associated with public policies, while others are out of their control. Albeit the geological and mining potential represents the essential element to attract the interest of entrepreneurs, the expected profitability of an investment also depends on factors such as assurances regarding the geological and mining potential, infrastructure, the tax environment, legal conditions and their stability.

To the extent that this study offers an economic perspective of Colombian mining, this chapter will deal with the implications of the tax regime for the sector and its influence on competitiveness. Nevertheless, in order to gauge the importance of these implications, it is necessary to analyze them in the context of the other elements that have an influence on the relative competitiveness of the sector. To present a vision of these elements, in this chapter we analyze the results of a recent study undertaken by the Mining and Energy Planning Unit (UPME, its acronym in Spanish), with the firm Econometría Ltda., as well as the most recent survey undertaken by the Fraser Institute, which summarizes the perception of international investors on the competitive situation of Colombian mining. Moreover, we offer a summary of the main bottlenecks that affect the sector's competitiveness.

1. Competitiveness of Colombian Mining in Perspective

As has already been mentioned, relative competitiveness of the mining sector in an economy in a world environment depends on several factors. The first of these is the geological mining potential, which represents an approximation to the mining wealth that can exist in the subsoil of the country in question.

Colombia is part of two promising geological systems: the Guiana Shield, which in other countries has proven to have iron and gold reserves, and the Andean System, which also possesses important mineral resources. However, geological studies have revealed that the Colombian portion of the Guiana Shield seems to be younger than its central area, which is the one that corresponds to the best metallic mineralization in countries such as Venezuela and Brazil. Moreover, the studies suggest that there are large differences between the Central Andes, which span the mountain range from Peru towards the south, and the Andes in Colombia and Ecuador.

Despite these findings, their implications on the mining potential of the national subsoil are still not clear. One circumstance that accentuates this uncertainty is the relative lack of knowledge that exists in Colombia regarding the conditions of the subsoil, as a result of factors such as the difficulties that the tropical environment represents for exploration processes, as well as the backwardness of the State in collating and integrating the partial information that exists.

Despite these limitations, it is possible to carry out a general analysis of Colombia's competitive position vis-à-vis certain Latin American countries with respect to their geological mining potential. The UPME - Econometría Ltda. study regarding competitiveness of Colombian mining presents an index that weighs four aspects that determine the effective potential of the subsoil in a country: the geological environments, knowledge of the subsoil, the level of information, and the mining resource.[40]

---

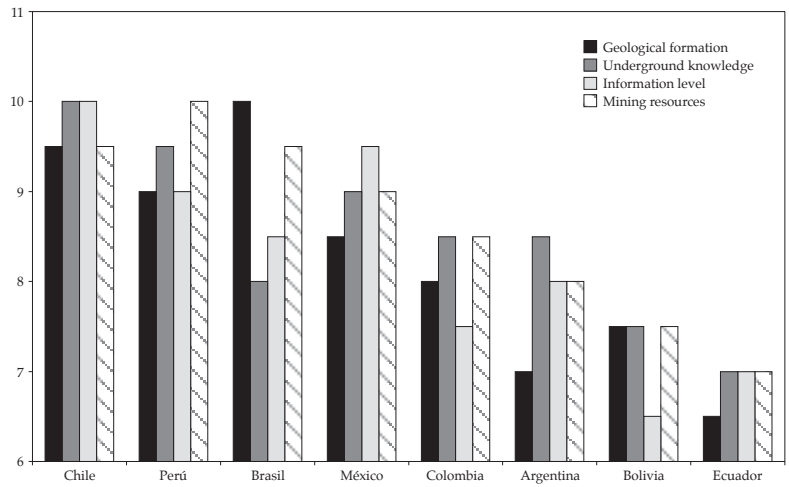
[40] UPME, 2005, "Update on the evaluation of the competitiveness of the Colombian Mining Sector," Econometría.

The results of the calculation of this index are presented in Graph 23. There, one can observe that Colombia occupies an intermediate position among the main mining countries in the region with regard to its geological mining potential, behind Chile, Peru, Brazil and Mexico, and surpassing Argentina, Bolivia and Ecuador.

This study also compares the relative situation of Colombia vis-à-vis the main mining countries in the region with respect to conditions of infrastructure. For such purpose, indicators are weighted that provide an idea of the situation in three dimensions: telecommunications (which comprises telephony, the Internet and computers), transportation (highways, railroads and rural roads) and electricity (generation and consumption). Even though these dimensions have an influence on the various mining activities in different ways, viewing them in a combined manner provides an idea of the relative disincentive that high costs attributable to a deficient infrastructure can represent for mining activities.

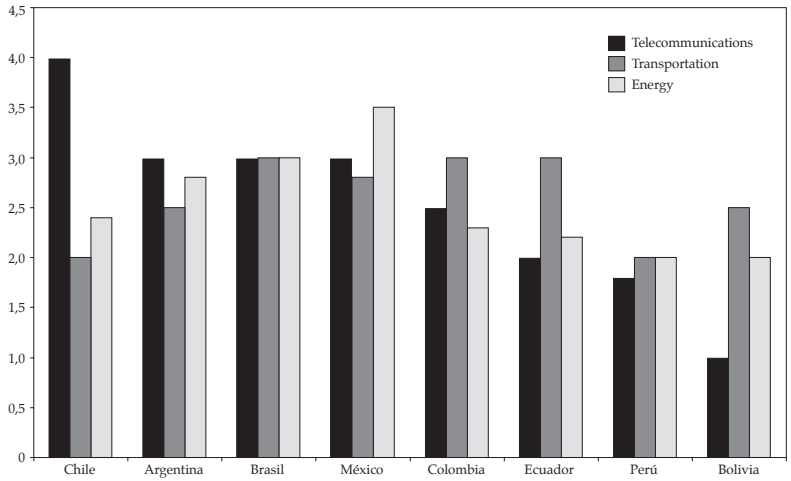
Graph 24 demonstrates that, in matters of infrastructure, Colombia, once again ranks in an intermediate position, behind Brazil, Mexico, Argentina and Chile, and surpassing Ecuador, Bolivia and Peru. It must be noted that the indicators assessed with respect to road infrastructure (kilometers of

Graph 23. Geological Mining Potential Index



Source: UPME (2005).

Graph 24. Status of Infrastructure



Fuente: UPME (2005).

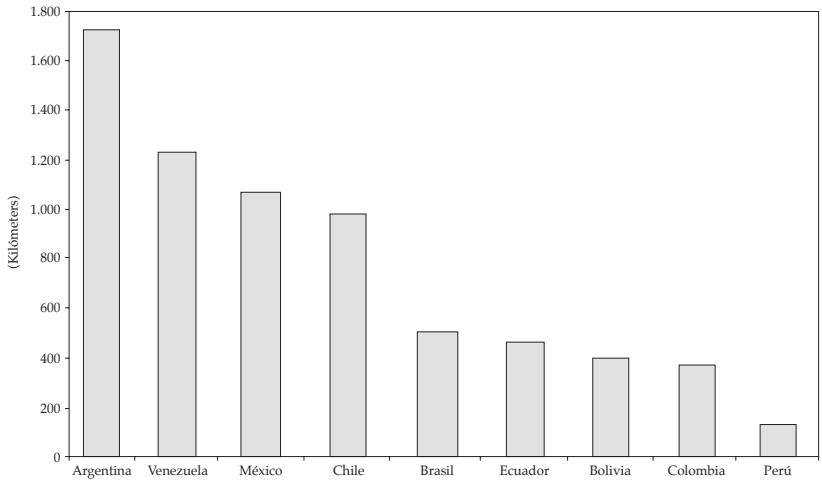
roads per unit of area) are insufficient to provide a clear idea of the situation in the case of Colombia. In fact, it is not the same thing to have a kilometer of road when the road is straight and on flat land than when a road has an irregular design and is across broken territory. Considering Colombia's complex topography, it is evident that the good result of the indicator of kilometers of roads per unit of area masks a more complex reality: the country's transportation infrastructure is totally insufficient for the exploitation and export of resources, such as coal, under competitive conditions.

In fact, as is indicated in the 2007 National Competitiveness Report, Colombia is particularly lagging behind with respect to railroad, port and highway infrastructure, which confirms the results of the Survey undertaken by the World Economic Forum. In the specific case of roads and highways, those that are considered to be in poor or bad condition increased from 22% in 1998 to 29% in 2003.[41] As a result, it comes as no surprise that Colombia ranks in one of the last places among the main economies of Latin America with respect

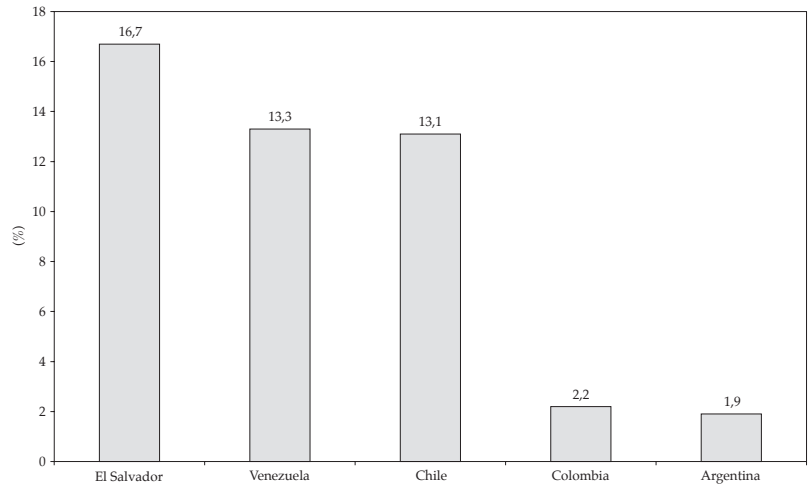
[41] World Bank, 2004 and 2007 National Competitiveness Report, edited by the Private Competitiveness Council, page 74 and subsequent pages.

to the number of kilometers of paved roads per million inhabitants, as can be seen in Graph 25. A similar situation occurs with respect to the percentage of kilometers of four-lane highways, a variable where Colombia also ranks in a very poor position vis-à-vis the main countries in the region (Graph 26).

Graph 25. Paved Road Network per Million Inhabitants, 2004



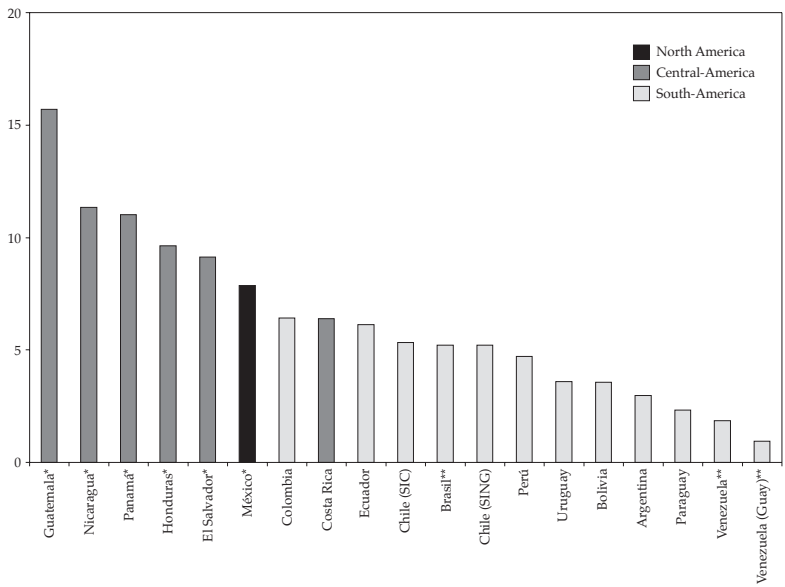
Graph 26. Percent of Kilometers of Lour-Lane Highways



Source: CIA Factbook and Colombian Infrastructure Chamber. National Competitiveness Report.

On the other hand, it is important to clarify that, even though the indicators in the area of Energy for Colombia are not bad, the country has the highest electricity prices for industry in all of South America, as can be observed in Graph 27. The cost differential that Colombia exhibits with respect to the other countries is so large that the margin becomes a factor of dissuasion for investment in the sector. Consequently, it is urgent for the necessary measures to be taken in order to resolutely advance in the reduction of energy prices for the industrial sector, so as to improve Colombia's competitive position in the region. In this sense, an alternative that should be explored is to allow that the taxes paid by the users in the cost of energy (which, in the case of national taxes, amount to 22% and, in the case of municipalities, vary) may be deducted from income tax, an allowance that, to a greater or lesser extent is permitted in several of the countries in the region.

Graph 27. Average Price for Electricity. Industrial Sector Connected at a Voltage of >57.5 KV. October 2006

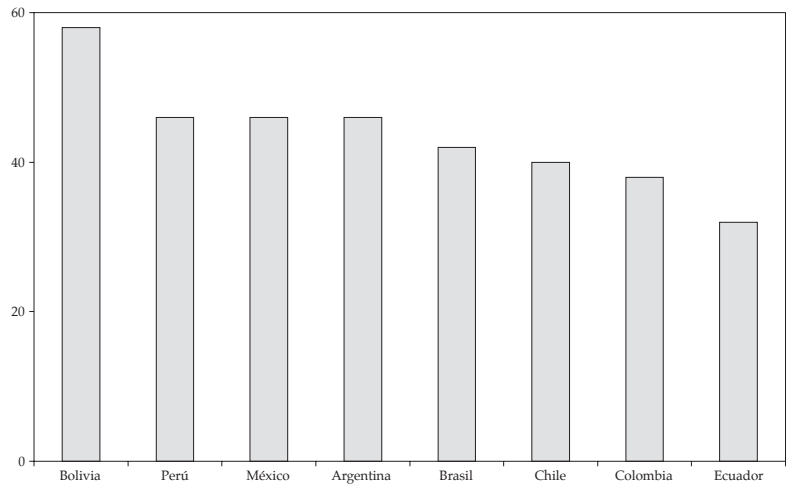


* March 2006.
** December 2006.
Source: Miners' Chamber at the ANDI. Asomineros.

The study published by UPME and Econometría Ltda. regarding about competitiveness of Colombian mining also analyzes the legislation in various Latin American countries and the degree of openness of the existing norms and regulations. This assessment is of great importance, since the ease of access to mining resources in a country depends, to a great extent, on the measure of the degree of openness for entrepreneurial activity in the existing legislation. In this sense, elements such as the determination of the areas in which exploration is permitted and the terms that regulate that activity, the definition of restricted areas, the existence of mining reserves in favor of the State, and the norms in force regarding the payment of royalties, gain importance.

The results of the UPME study are shown in Graph 28 and permit concluding that this factor apparently is not critical for investment decisions in the region, given the great similarity of the indicators for the countries that were assessed. Nevertheless, Colombia, which appears in the next to the last position in the ranking, could improve its competitive position significantly if it had a more favorable legislation, particularly for the exploration phase, with extended time periods and reduced surface levies.

Graph 28. Degree of Openness of the Legal Regime for Mining



Source: UPME (2005).

Once having established the competitive position of Colombian mining in the region in the areas of geological mining potential, infrastructure and the legal regime, it is convenient to analyze its relative situation in terms of the tax regime. It should be noted that the tax norms applicable to the mining sector in Colombia do not differ from those that are in force for the other sectors in the economy, with the exception of the obligation to pay royalties on production and surface levies for the right to use the land, these being charges that technically speaking are not taxes but rather, patrimonial rents to the Colombian State. In any case, it should be noted that Colombia has improved its competitiveness in this aspect with the advances attained in the latest tax reforms: the income tax rate was reduced to 33%, the 7% remittance tax was eliminated, and allowances have been made to amortize 40% of the investments that classify as productive fixed assets. These adjustments represent a significant reduction in the effective tax rate, as is shown in Tables 11 and 12.

Table 11. Tax Conditions*

Country	Company income tax rate	IVA percentaje	Other Surcharges	Non double tax agreements	Contracts stability
Colombia	33	16	Royalties between 1 and 12%	Yes	Yes
Argentina	35	21	Annual lease fees during the first five years of the concession	Yes	Yes
Chile	15	19	Mining patent	Yes	Yes
Bolivia	25	13	Supplementary mining tax applicable on top of common regime applied in percentages in accordance with the mineral and the official quotation for it	Yes	No
Perú	30	18		Yes	Yes
México	32	15	Mining concesion rigths fee	Yes	No
Ecuador	25	12	Royalties of 3% on gross production Surface tax	Yes	Yes
Brasil	34	17	Payments for the authorization of exploitation Annual rate per Ha progressively set as a function of the mineral, the surface area and its location. The bearer of the exploitation concession shall pay a rate of emoluments corresponding to 500 UFIR when the possession of the deposit is granted to him.	Yes	Not available

* The income tax rates and remittance tax rates reported in this study (UPME 2005), were modified in the years 2006 and 2007, respectively.

Source: UPME (2005) and Fedesarrollo update.

Table 12. Total Taxes Paid in Colombia

Taxes	2006	2007	2008
Revenues	100	100	100
Investments in fixed real productive assets	50	50	50
Deduction for fixed productive assets %	30	40	50
Deductible amount (2 x 3)	15	20	25
Base Tax (1 - 4)	85	80	75
Income tax rate (%)	38.50	34.00	33.00
Total taxes paid by the company (5 x 6)	32.70	27.20	24.70
Distributable income (1 - 7)	67.27	72.80	75.20
Tax-free income (for 2006 = 5 - 7 and for 2007 and 2008 = 1 - 7)	52.27	72.80	75.20
Taxable income (8 - 9)	15	0	0
Total taxes paid by the shareholders (10 x 6)	5.77	0	0
Total taxes to be paid (7 + 11)	38.50	27.20	24.70

Source: Ministry of Mines and Energy. Prepares by Fedesarrollo for 2008.

As has been seen in previous paragraphs, despite the fact that Colombia has improved its tax structure recently, the country is in a position that is relatively not very competitive in the regional South American environment in such factors as geological mining potential and infrastructure, on account of its backwardness in rail and road transportation, the costs of electricity and the existing conditions for the promotion of exploration of new mining resources. The overall view of these factors and others that affect the activity, permit the identification of those areas that represent bottlenecks for competitiveness of Colombian mining on the world scene.

Table 13 shows a summary of the relative situation of the Colombian mining sector that considers various elements that influence its competitiveness in a more globalized environment. In the table, the factors that most significantly limit the sector's competitiveness are highlighted in red, where the most limiting factors are those that are marked with a darker hue. This brief review reveals that competitiveness of Colombian mining is affected adversely by elements such as the period for exploration, the value of the surface levies, the value of royalties, the income tax rate and the cost of energy.

Table 13. Comparison of Factors Affecting Competitiveness of the Mining Sector*

	Nigeria	Zambia	Australia	Canadá	Chile	Botswana	Perú	Argentina	Brasil	Colombia
Law	1996	1998	Regional	1996	1983	1999	1992	1997	1996	2001
Regulator	MM	MMDM		Ministry of Industry and Resources	MM/local Judge	MM	MEM	Mining Secretary	MME/Production Dept	MME
Exploration period	3-10 years	2 years	4 years	5 years	2 years	3 years	8 years	3 years	6 years	3 years
Maximun exploration period	10 years	25 years	9 years	Unlimited	Unlimited		Unlimited	Unlimited	Decide by mining authority	5 years
Surface fee (US$/H-year)			1.9-2.1	3.5	0.6		3	0.25	1.14	8 (Up to 2000 Ha) 16 (2000-5000 Ha) 24 (5000-10000 Ha)
Minimum production commitment	YES				NO	YES	YES	NO		NO
Mining title transfer	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Resources of state property	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Mining concesion	YES	YES	YES	YES	Exploration and exploitation	YES	YES	YES	Exploration and exploitation	YES
	Nigeria	**Zambia**	**Australia**	**Canadá**	**Chile**	**Botswana**	**Perú**	**Argentina**	**Brasil**	**Colombia**
Royalties	1-3%	2% on net sales		Provinces: 5-14% on mine mouth price	Copper: > 50 kTm = 5% >12 kTm to 50 kTm = 0,5-4,5%	3-10% on mine mouth price	1-3% on net sales	3% on mine mouth price	0.2-3% on net sales	1-12% on mine mouth price
Income tax	20-30%	30%	30%	25%	15%	15%	30%	35%	34%	33%
Remmittance tax	5%	15%	8%		20%		NO	NO	0-25%	NO
IVA	5-10%	17,50%	10%	6-14%	19%	10%	18%	21%	17%	16%
Capital goods duty		20-40%		0-5%	1,30%		0-4%		14%	0-10%
Accelerated depreciation	100% of investment		NO		3 years	1-25 years	3 years construction 5 years (equipments)	3 years (equipments)		5 years (equipments)
Industry electricity prices (US$Kwh) (Dec 04 with taxes)			0.061	0.049	0.057		0.079	0.033	0.047	0.081

* This table contains the updated information on the overall and mining legislation for each of the countries.

2. The Point of View of International Investors

A demonstration of the potential of the Colombian mining sector and of the growing interest by international investors in its resources is the country's appearance in the most recent edition of the *Survey of mining companies* that the *Fraser Institute publishes*. This study is prepared on a yearly basis and shows the perception of the most important international companies regarding the conditions offered by countries and the most significant mining regions in the world.[42]

The report issued by the Fraser Institute in 2006/2007, which relied on the responses of 333 mining enterprises dedicated to exploration, exploitation and consulting, underscores the entry of Colombia in the assessments of the study. The report indicates that, in the past, Colombia had been perceived as unstable and hazardous country for investment, but notes that recent advances in those fronts have converted into an interesting destination for mining enterprises. The analysis also highlights that reverting an adverse situation like the Colombian one takes time and that only the passage of time will confirm if the recent advances in the business environment in the country will end up representing sustained and structural improvements.

Table 14 shows that the point of view of international investors confirms that competitiveness of the Colombian mining sector confronts significant bottlenecks in aspects such as the tax regime, the regulation on the use of land, and legal and regulatory instability. The results of the study reveal that international investors consider that these factors are dissuasive for investment in the Colombian case, a situation that contrasts with the perception that exists for the cases of Brazil and Chile.

Other specific results of the Fraser Institute survey confirm some of the competitive limitations that we have indicated in previous paragraphs. First of all, one has to highlight that Colombia receives a rating that is quite low in the *Policy potential index* indicator, which shows the effects that public policies have on mining activity, including such aspects as stability and enforcement of the norms, taxation, political stability, labor aspects, security

[42] Fraser Institute Survey of Mining Companies 2006/2007.

Table 14. Selected results of the Fraser Institute study

	1	2	3	4	5
	Regulations and Restrictions in the use of land colombia				
Colombia	6	42	29	10	13
Brasil	33	45	15	3	5
Chile	40	43	11	0	6
	Uncertainty regarding the administration and use of existing regulations				
Colombia	8	28	34	8	23
Brasil	20	36	31	3	10
Chile	43	34	16	2	5
	Tax regime				
Colombia	5	42	21	16	16
Brasil	17	24	41	14	3
Chile	19	48	19	3	10

Note: Meaning of the responses: 1: promotes investment, 2: is not a dissuasive element for investment, 3: slightly dissuasive, 4: strongly dissuasive, 5: would not invest on account of this factor.
Source: Fraser Institute Annual of Mining Companies 2006/2007.

and infrastructure. In this indicator, Colombia receives a rating of 25 out of 100 possible points, which ranks it in position 55 among 65 countries and regions analyzed (Table 15).

Table 15. Policy Potential Index: Colombia 2006/2007

Policy potential	Current mineral potential	Mineral potential under best practices
55/65	38/65	14/65

Fuente: Fraser Institute Annual of Mining Companies 2006/2007.

A sample of the ground that Colombia still has to cover in order to advance in the development of its mining sector is represented by the result that the country obtained in the two other main indicators in the study. The *Current Mineral Potential Index* weighs the effects of public policies contemplated in the previously mentioned indicator, with the mining potential of the

subsoil in each country or region. In this case, Colombia rises significantly in the ranking, reaching position 38 among the 65 countries and regions analyzed, which reveals the positive perception that international investors have regarding the country's resources.

Lastly, the *Mineral Potential under Best Practices Index* shows the perception that international entrepreneurs have regarding what would happen in the countries and regions assessed if public policies were to be fine-tuned to the point that they reach the best international standards. In this case, Colombia ranks in position 14 among the 65 countries and regions assessed, surpassing the main mining countries in Latin America, with the exception of Brazil. This position gives an idea on how much international competitiveness of the Colombian mining sector could improve if the country were to adopt the public policies that overcome the aforementioned bottlenecks, without any need to modify the perception of its geological and mining potential.

CHAPTER FIVE

Impact on other Types of Variables

A perception has existed traditionally that mining activities play a predatory role on the economies where they are carried out. This point of view suggests that mining activities are limited to the extraction of resources, without generating benefits for the well being of society. In previous chapters of this document, it has been demonstrated that mining has a positive economic and fiscal impact on regions where it is carried out, provided that it is undertaken in a proper manner and that the revenues from royalties are used properly. In addition, this section seeks to analyze the impact of mining activities on other dimensions, such the social, labor and environmental spheres.

Specifically, it is convenient to make an assessment of the impact of mining activities on the well being of society and the measures that mining companies undertake to correct and prevent the negative effects that may arise in the performance of their activities. These dimensions correspond to what has been framed in recent years around the world in the concept of Entrepreneurial Social Responsibility (RSE, its acronym in Spanish). In this context, this section seeks to identify the present role of mining companies that operate in Colombia with respect to RSE. To do so, it starts out with a review of a conceptual framework that seeks to pin down the concept of RSE. Subsequently, international and national standards that have been developed for RSE practices will be studied. In a third part, the Colombian situation in this respect is studied, as well as the perception of the mining companies, based on the Social Responsibility Survey of the Colombian National Association of Entrepreneurs (ANDI) for 2007. Lastly, some case studies of mining companies in this area are presented.

1. Conceptual Framework

A sole definition for RSE does not exist. For example, *the International Organisation of Employers* (IOE) defines it as the duty that companies have to integrate social and environmental aspects into their businesses, as well as

their relationships with the stakeholders, in a voluntary manner. On the other hand, for the United Nations, RSE is the duty that a company has to abstain from creating negative consequences for society, the environment or the economy in which it carries out its activities[43]. Moreover, the Colombian Entrepreneurial Responsibility Center (CCRE, its acronym in Spanish), defines it as the response capability that a company has in the face of the effects and implications of its actions on the various groups with which it interacts.

This diversity of approaches to RSE is the result of the relative newness of the issue and of its coverage on a large diversity of aspects, such as the labor, social and environmental areas[44]. In order to establish a more concrete context for discussion purposes, this chapter shall be guided by the RSE definition approved in Colombia by Standardization Committee 180 of the Colombian Institute for Technical Standards and Certification (ICONTEC, its acronym in Spanish). In this context, Entrepreneurial Social Responsibility (RSE) is:

> "The voluntary commitment assumed by organizations with respect to the agreed expectations that, in matters of comprehensive human development, are developed with the stakeholders and that, beginning with fulfillment of the legal provisions, permit organizations to ensure economic growth, social development and ecological equilibrium."

In this context, RSE in Colombia integrates social, environmental and sustainable economic development aspects. Moreover, it is also clear that it is not understood to be philanthropy, charity or paternalism, but rather that the concept comprises actions whereby, both the companies, and society, benefit.

In the international discussion on RSE, one can identify four stages of development, in accordance with the coverage of the concept: compliance, as well as the first, second and third generation stages (see Table 16). In

---

43 World Investment Report of the United Nations (2007).

44 According to the 2007 WIR, through 2003, the three most important areas covered by entrepreneurial social responsibility were the protection of human rights, the protection of the environment and labor protection. As of the year 2004, at the Eleventh United Nations Conference on Trade and Development (UNCTAD), a new dimension was introduced: economic development.

Table 16. Stages in the Evolution of Entrepreneurial Social Responsibility

Third Generation Formulation of a new model that is rooted throughout the national economy	❒ Multi-stakeholder standards and alliances ❒ RSE institutional development ❒ Active RSE advocacy and promotion ❒ RSE public policies for SMEs
Second Generation Company strategic RSE	❒ Focus on competitive sustainability ❒ Effective models for dialogue and response for social actors ❒ Value chains and SMEs ❒ Sectoral standards
First Generation Low level Short term	❒ Philanthropy and volunteering ❒ Short-term risk management (measures to contain the reactions of one or more stakeholders)
Compliance Abiding by the laws and regulations in force	Fulfillment of the norms in force: ❒ Taxes ❒ Health, safety and employee rights ❒ Consumer rights ❒ Environmental regulations

Source: International Center for Human Development.

this process, the concept of RSE evolved from the mere compliance with the existing norms in the various areas (*i.e.*, taxes, employee rights, consumer rights, and environmental norms), to the search for a new model that boosts the institutional framework, defends and develops the active promotion of RSE practices, generates public policies for SMEs, and creates multi-stakeholder standards and alliances. As mentioned by Flores *et al.* (2007) in the latest report of the Inter- American Development Bank with respect to this issue, this model does not only acknowledge the importance of RSE for the environment and for interested parties, but also leads to ensuring that responsible businesses attain positive benefits.

A review of these stages in the evolution of v highlights an important aspect. The more the debate on RSE advances, the clearer it becomes that its actions do not represent a paternalistic attitude, but rather a focus on cooperation, where the goals are achieved by means of the contribution of society, government and enterprise. What this means is that companies should not seek to stand in for the government through their actions, but rather, are to supplement and support the government in reinforcing the government's legitimacy.

In view of institutional weakness in developing countries, RSE has gained great importance for national and foreign investment. In fact, many multinational companies have opted for developing these practices despite the fact that social responsibility has not arisen in some emerging countries as an obligation, but rather are of a voluntary nature. Although these actions imply committing significant resources, this type of expense does not just benefit the country where it made, but can have a positive influence on entrepreneurial performance.[45]

2. Standards

2.1. International Standards

Several multilateral organizations have made progress in defining certain principles that can serve as a guide for transnational companies in the task that they are to fulfill in matters of RSE. Over the last few years, important initiatives in this direction have been undertaken. The first is the Declaration of Principles Related with Multinational Companies and the Social Policy of the International Labor Organization (*MNE Declaration*), which set forth principles to guide the global operations of companies and their social policies, seeking to contribute to economic and social development.

Secondly, in 2000, the OECD updated a guide on RSE practices for multinational companies that had originally been created in 1974. 39 countries have signed an agreement that commits them to ensure these principles (among these 39, 30 countries are member States of the OECD, and the others are Argentina, Brazil, Chile, Estonia, Israel, Latvia, Lithuania, Romania and Slovenia).

A third initiative arose in 1999 with the creation of the Global Pact at the World Economic Forum in Davos (Switzerland), the operational phase

[45] A study published in 1999 in the Business and Society Review showed that 300 large corporations discovered that, upon making their commitment to honor their code of ethics, they exhibited a performance that was three times greater than that of those companies that did not do so, based on the parameter of value added on the market. Moreover, at the request of IBM Corp., Professor David Lewinat UCLA studied 156 companies, in order to determine the relationship between RSE and corporate performance. The study demonstrated that most of the firms that promote RSE, obtain significantly higher rates of return on their investments. These quotes were taken from Mayorca *et al.* (2001).

of which began in 2000. This is the broadest pact that has been set forth on this issue by civil society, seeking that companies apply a set of fundamental values with respect to Entrepreneurial Social Responsibility. The Global Pact contains 10 principles that are developed in four areas: human rights, the labor market, the environment and anti-corruption practices (Table 17). These areas are based on the Universal Consensus of the International Labor Organization *(MNE Declaration)*. Participation in the Pact is voluntary and is based on public accountability and on the interest of the companies themselves.[46]

Cuadro 17. Principles of Global Compact of United Nations

Principle 1 (Human Rights): Companies are to support and respect thr protection of human rights that are proclaimed in the international milieu.

Principle 2 (Human Rights): Companies are to make sure that they are not accomplices in abuses to human rights.

Principle 3 (Labor Market): Companies are to respect the freedom of association and the effective recognition of the rigth to collective bargaining.

Principle 4 (Labor Market): Companies are to eliminate all forms of forced or compulsory labor.

Principle 5 (Labor Market): Companies are to effectively abolish child labor.

Principle 6 (Labor Market): Companies are to eliminate discrimination with respect to labor and occupation.

Principle 7 (Environment): Companies are to support preventative methods with respect to evironmental problems.

Principle 8 (Environment): Companies are to adopt initiatives to promote increased environmental responsibility.

Principle 9 (Environment): Companies are to promote development and publicity of harmless technologies for the environment.

Principle 10 (Anti-corruption): Companies are to work against all forms of corruption, including extortion and suborn.

Source: United Nations.

[46] Información actualizada de: http://www.unglobalcompact.org/HowToParticipate/index.html

In April 2006, the General Secretary of the United Nations launched another initiative under the name of "Principles for Responsible Investment (PRI)." The process for the creation of these principles was led by the Global Pact and the United Nations Financing Program for the Environment (these principles are signed by the investors, whilst the global pact is signed by the companies[47]). These principles create a context for institutional investment aimed at integrating environmental, social and governance considerations into the investment process. The PRI are relevant, since it is the first time that RSE practices are enabled to generate greater future returns for companies on account of improvements generated in these areas.

The most recent initiative has been the alliance between the Global Pact and the *Global Report Initiative* (GRI) in 2006. The GRI is a global initiative that seeks to provide information on the economic, environmental and social development aspects of all global organizations. The alliance between both mechanisms seeks to provide more comprehensive accountability, as well as a framework of transparency for the commitment of companies with the Global Pact.

a. The Case of Mining

In the specific case of mining, an important initiative arose in 2003. The International Council of Mining and Metals ICMM, and the World Union for Nature WUN, agreed that the ICMM would be entrusted with promoting good practices in mining. Thus, the Guidelines for Best Practices (GBP) arise, prepared in response to this commitment. The purpose of the GBP is to help develop environmental knowledge and to indicate to companies at what time support by specialists in biodiversity is indispensable[48]. The Guidelines offer a series of practical modules for companies to be able to understand the interaction between their activities and biodiversity, assess the proba-

---

[47] Como es obvio, algunas veces empresas y inversionista son el mismo, caso en el cual idealmente deberían firmarse ambos compromisos.

[48] The GBP is supplemented with a volume prepared by the WUN and the ICMM in 2004 called "The Integration of Mining and the Conservation of Biodiversity: Case Studies around the World."

bility that their activities may have a negative impact on biodiversity and mitigate the possible negative impacts on the environment.

The GBP underscores the importance of biodiversity and emphasizes the participation of interest groups in the identification, evaluation and mitigation of the impacts on biodiversity. Moreover, the Guidelines provide principles for managing biodiversity in the various phases of mining projects: i) the development phase of the project (which includes exploration, pre-feasibility and feasibility, as well as construction); ii) the operations phase (which includes the main mining facilities and ancillary infrastructure); and iii) final planning and implementation. The Guidelines describe the systems, tools and processes and provides guidelines for their practical application.

Another important milestone took place in 2007 with the publication by CEPAL of the document "Good Mining Practices: The Case of the Peñoles Group in Mexico." The document shows how the mining industry responds to questions that have arisen throughout the years with respect to mining exploitation around the world. Specifically, it describes concrete cases in which the mining industry has been receptive to these criticisms, developing important codes of conduct that correct the negative effects of their activities, thus positively influencing the well being of society. The document registers the progress that has taken place in Colombia, Peru, Chile, Spain and Mexico in this sense. Specifically, the document sets forth that the times in which mining activities left footprints and scars on the planet are gone, and that avant-garde practices demonstrate that it is possible to carry out mining in a sustainable manner. The document also indicates that for mining, the challenge persists to disseminate the information on social and economic benefits in its areas of influence more broadly. According to CEPAL, these types of initiatives will allow for the modification of the myth that exists regarding the negative impact that mining activities generate.

2.2. *International Norms and Certifications*

In order to provide incentives for the best quality RSE practices and to generate tangible benefits for the most responsible companies, national and international entities have established the creation of certifications in this

area. In recent years, the ISO 9000 and ISO 14000 certifications have been created in order to certify best practices in quality and environmental protection, respectively. Whereas the ISO 9000 standards family seeks to ensure the quality of the goods and services that a company produces[49], ISO 14000 is created to certify its environmental management and provide a 'green seal' for the products. This last standard does not set environmental goals for the prevention of contamination, but rather, establishes tools focused on production processes that minimize the externalities generated on the environment[50].

In the social area, *Social Accountability International* (SAI) created the SA 8000 certification with the purpose of promoting improved labor conditions. In order to obtain this certification, companies need to fulfill certain minimum conditions to achieve a safe and healthy labor environment for their employees. The SA 8000 contains criteria that prohibit child labor and forced labor, requires ensuring health and safety for the workers, respect for the right of their employees to form labor unions and collective associations, prohibits discrimination, defines the conditions for the payment of work hours, specifies certain norms for disciplinary codes, the form for remuneration, and management systems for the companies.

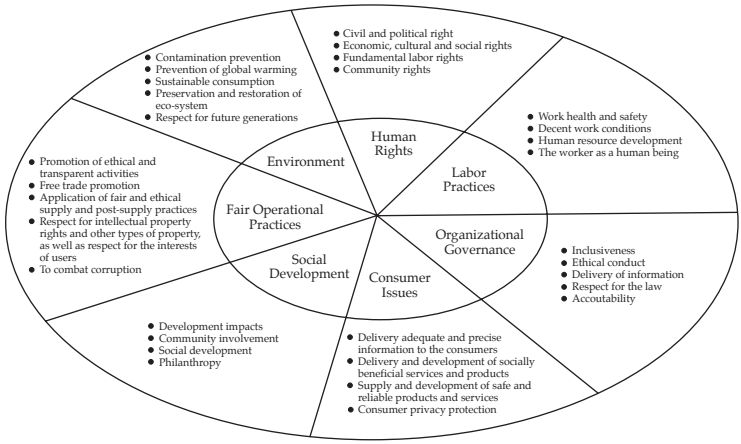
As a consequence of the experience generated by the application of these three standards, the idea arose of creating a sole standard that would act as a Guide of state-of-the-art recommendations for RSE practices. The ISO 26000 standard, the design of which is to be ready in 2009, will establish a common guideline for concepts, definitions and evaluation methods for RSE practices. Specifically, the norm will revolve around issues of the environment, human rights, labor practices, corporate governance, fair operational practices, consumer issues, and social development (see Graph 29).

---

[49] There is also the ISO 9001 certification, which certifies the quality in design, production, installation and post-sale service; ISO 9002 is more restrictive, in that it only certifies production and installation; ISO 9003 comprises inspection and final assays, and, lastly, ISO 9004 establishes the requirements for a quality system.

[50] The standard comprises five points that regulate environmental management systems, environmental audits, environmental performance assessments, the analysis of life cycle, and the regulation for awarding environmental labels.

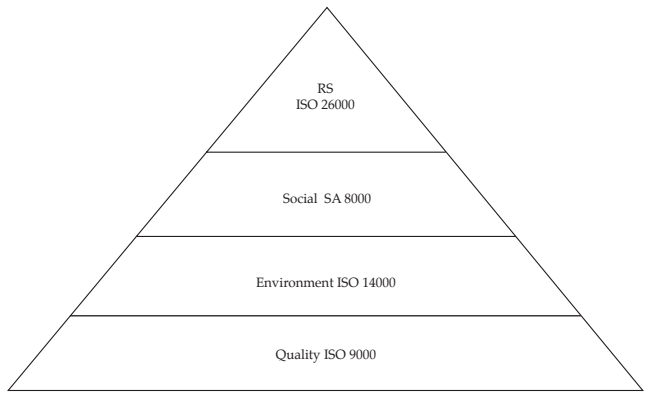
Graph 29. Central issues for the ISO 26000 Guideline



Sources: International Center for Human Development.

In terms of importance of these three sets of standards, ISO 26000 will prime in hierarchy over ISO 9000, ISO 14000 and SA 8000 (see Graph 30). In this form, the best practices move in the direction set forth by the ISO 26000 Guidelines.

Graph 30. Hierarchy for the RSE Standards



Sources: International Center for Human Development.

2.3 National Standards

The discussion on Entrepreneurial Social Responsibility in Colombia began with the creation of the first foundations by certain companies in the decade of the 60s[51]. Subsequently, towards 1977, the companies Fabricato and Enka in Antioquia set out to measure their social management by means of the first social balance, an initiative that was completed in 1981, when the ANDI prepares the first model for a social balance, based on the French model. Later on, with the 1991 Constitution, the concept of the social function of private property was introduced, which guarantees individuals with the right to private property and underscores the importance that the latter is to be at the service of society[52]. Based on these advances, the Entrepreneurial Social Responsibility Committee at the ANDI is set up, with the purpose of making companies aware of this issue[53].

The committee is entrusted with disseminating experiences, documenting and making RSE known throughout the country, as well as the development of tools, together with the entrepreneurs to measure the impact of these actions (*i.e.*, social balances).

Years later, the Colombian Entrepreneurial Responsibility Center (CCRE, its acronym in Spanish) was created, under the initiative and with the contributions of the Fundación Social and the Fundación Interamericana. The CCRE consolidates itself as a non-profit non-governmental organization that works on research, development and promotion of RSE in Colombia[54]. Its objective is to promote research to build management systems in RSE and organizational ethics.

---

[51] In 1960, Codesarrollo was created in Medellín, in 1962, the Fundación Carvajal was created in Cali, in 1963, the Fundación Corona was created in Medellín, and in 1964, the Fundación FES was created in Cali.

[52] Article 58 of the Political Constitution of Colombia.

[53] In this Committee, RSE is defined as the commitment that companies have to contribute to development, well being and improvement in the quality of life of the employees, their families and the community in general.

[54] For more information, please access the following link: http://www.ccre.org.co/

In addition to the CCRE, there are two other institutions in Colombia that promote social responsibility actions. On the one hand, there is the Council for Sustainable Entrepreneurial Development (CECODES), which represents the Colombian chapter of the *World Business Council for Sustainable Development* (WBCSD), which brings together 200 leading companies around the world. This organization provides orientation to companies in the implementation of practices that allow for continuous improvement and equilibrium between economic, social and environmental objectives, and cooperates with the government and authorities in the issuance and implementation of policies and norms that promote sustainable development in Colombia.[55]

On the other hand, ICONTEC assumed the guideline of promoting the culture of social responsibility among Colombian companies. Together with COMFAMA (Antioquia Workers' Compensation), ICONTEC created Standardization Committee 180 for RSE, which comprises 160 companies and is entrusted with establishing RSE standardization in Colombia[56]. The purpose of the Committee is to establish the requirements that companies are to fulfill in order to be socially responsible and present them as a technical guideline. The objective is not to create a norm, but rather to provide orientation to those organizations that, in a voluntary manner, want to work on this issue. The design process for the technical guideline has been supplemented with the preparation, in parallel, of the ISO 26000 guideline.

3. Situation in Colombia

3.1. Overall Situation

In the year 2004, the National Management Office for Social Responsibility at the ANDI created a survey to identify specific advances in the country in this front. This initiative has gained significant relevance in the entrepre-

[55] For more information, please access the following link: http://www.cecodes.org.co/cecodes.htm

[56] The Committee is divided into three sub-committees, located in Bogotá, Cali and Medellín.

neurial world, as demonstrated by the fact that, between 2003 and 2006, the number of interviews conducted increased from 93 to 204.

The Survey reveals six interesting features in the Colombian entrepreneurial tissue for 2006. To begin with, 98.5% of the companies surveyed consider that the private sector should assume social responsibilities that go beyond those that are legally required. In fact, 91% of the companies surveyed state that they are developing some type of social responsibility action. This result reveals that, in Colombia, RSE practices have surpassed the first generation orientation within this group of companies.

Secondly, the survey permits the identification of the main beneficiaries of social responsibility actions. As is shown in Graph 31, among the most important internal recipients of the companies are the workers, which were the recipients of 93.5% of the resources of the surveyed companies.

The items to which the greatest part of the investment is directed among these beneficiaries are: housing (19.2%) and food (17.6%). On the other hand, the most important external recipient of resources is the community, that 74.7% of the companies invested in. Investments in the community, in general, are directed to infrastructure (30.9%), the environment (19.6%) and education (15.74%), while smaller investments are destined to childhood (0.43%), peace (0.28%) and senior citizens (0.04%).

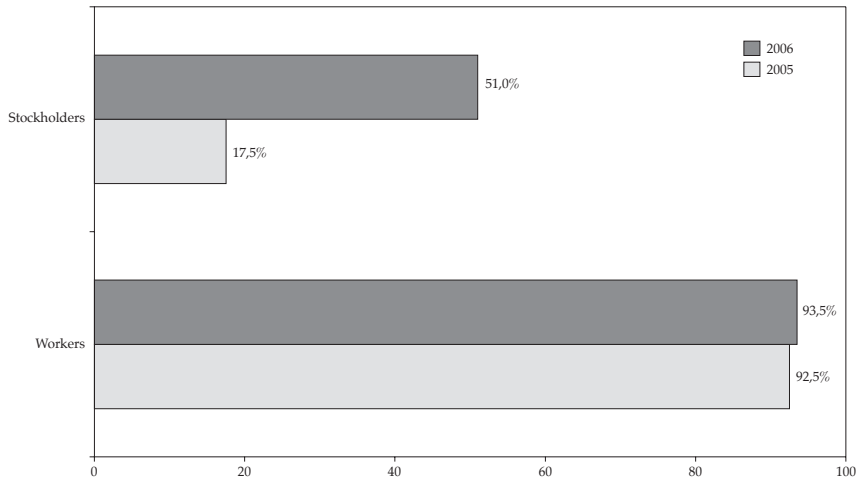
The Survey also shows the areas where investments in social responsibility are channeled. The three most important ones are education or training of the human resource, health, and recreation. In the second place, are the investments directed to environmental protection, housing and culture (see Table 18).

Moreover, the Survey permits identifying that, despite the fact that investments in RSE by companies has been increasing (especially those that are directed to the community), their level as a percentage of sales has remained relatively stable over the last four years (see Graph 32). Specifically, for the year 2006, the companies destined 2.7% of their sales to activities associated with RSE.

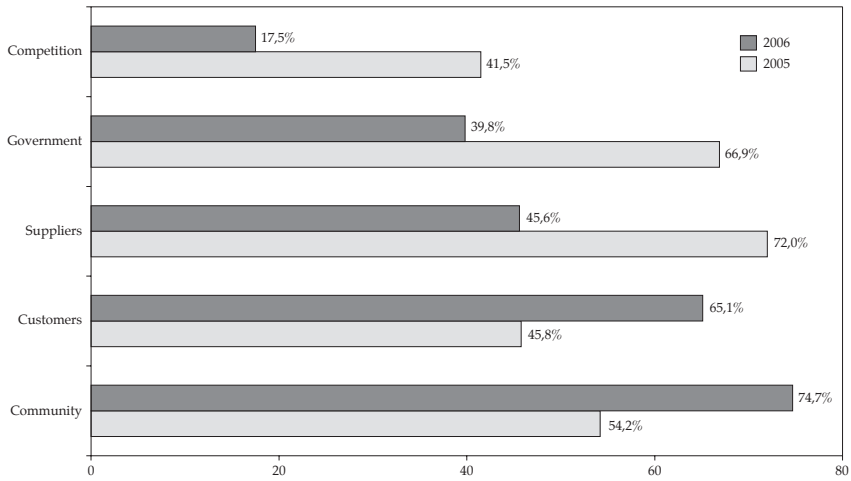
In addition, it was found that 84% of the companies interviewed, in 2006, had at least one quality certification (*i.e.*, ISO 9000, ISO 14000, among others). The above demonstrates that national practices are not too significantly distant from international practices. Moreover, we were able to confirm

Graph 31. Recipients of RSE actions

A. Internal recipients



B. External recipients



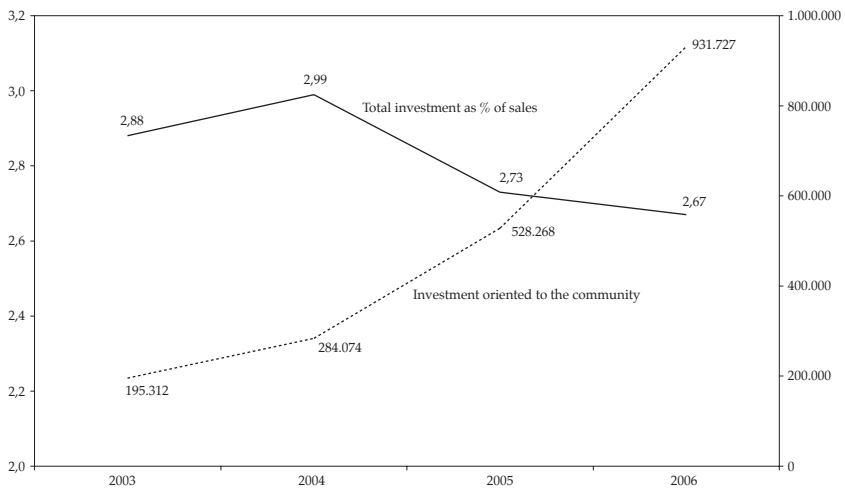
Note: The amounts correspond to the percentage of interviewed companies that invested resources in each of the items.
Source: Responsibility Survey of the ANDI 2006.

Table 18. Areas of Investment in RSE (% of companies that invests in each area)

Education	76.2
HR formation and training	76.4
Health	68.0
Recreation	66.4
Environmental protection	65.6
Housing	52.5
Culture	47.5
Nutrition	34.4
Formation in values	34.4
Support for vulnerable population groups	27.0
Mend of social fabric	26.2
Others	25.4

Source: Encuesta de Responsabilidad de la ANDI, 2006.

Graph 32. Investments in RSE Directed to the Community vs. Investments in RSE as a Percentage of Sales



Source: Calculations made by the authors. Responsibility survey of the ANDI 2006.

that entrepreneurs consider it convenient to include practices aimed at RSE among their activities (see Table 19).

Lastly, the Survey permits assessing the knowledge that entrepreneurs have with respect to the Social Pact. Somewhat over half of the entrepreneurs know about the Pact (57.1%) and 34.3% have already adhered to this initiative. With respect to the four pillars that make up the Pact (*i.e.*, human rights, labor rights, environmental protection and anti-corruption practices), 54.2% of the companies carry out programs or activities related with human rights, 78.4% of the companies have employees that belong to labor unions, 90% carry out programs aimed at environmental protection, and 92% of the companies surveyed have developed mechanisms to promote honesty and prevent corrupt practices. According to figures provided by ANDI, there are around 150 companies that are already a part of the Global Pact in the national territory.

In conclusion, Colombian companies are advancing in accordance with the parameters set forth by the Global Pact and there is an ever-increasing awareness on the importance of these types of practices. However, it is worth mentioning that Social Responsibility at the ANDI does not include a significant part of the Colombian entrepreneurial reality, since, for instance, it does not include the effect of informal companies. It is quite probable that, in this latter group of companies there is not the same degree of aware-

Table 19. Perceptions of the Companies with Respect to RSE Practices Codes and Audits

Question	2006 (%)	2005 (%)	2004 (%)	2003 (%)
Do you believe thah companies should voluntary establis codes of conduct as part of RSE?	98	96	98	97
Do you believe that rse should be governed by corporate governance codes?	84	85	92	85
Are you in favor of independent firms carrying out audit tasks regarding compliance with entrepreneurial ethics?	77	79	79	81

Note: The data show the percentage of companies that answered affirmatively.
Source: Responsibility Survey of the ANDI 2006.

ness regarding RSE, since, as has been demonstrated in previous studies, informal companies are, in general, small and young[57]. Thus, it should be clarified that the high level of entrepreneurial informality in the country (which reaches 46.22% within the group of micro-enterprises) represents a strong obstacle to the development of RSE practices in Colombia.

3.2. Situation of Mining Companies

Considering that the ANDI Survey represents an important source of information regarding the perceptions and practices of entrepreneurs in Colombia, the observations of the survey pertaining to the mining sector were filtered and analyzed[58]. The fundamental objective of this exercise was to be able to offer a comparison of the practices in the sector in terms of RSE, with those developed throughout the country. Among the 152 observations in the ANDI Survey, 8 mining companies were identified. As could be expected, this group of companies represents the most important firms in the sector, and, as such, the conclusions of this section reflect the actions of the companies that are at the forefront of these practices in mining.

The data permits highlighting that the mining companies maintain trends that are similar to those for the rest of the economy in three aspects. To begin with, it was found that for all of the companies surveyed, social responsibility should go beyond the legal obligations that are required. Secondly, as can be seen in Graph 33, in the group of mining companies, the main recipients of the RSE resources are the workers and the community.

In the third place, it was found that mining companies, in general, use the same instruments as the rest of companies to carry out RSE actions. Among the three mechanisms that are used the most to do so, both groups resort to donations in kind, social investment, and strategic alliances (see Table 20).

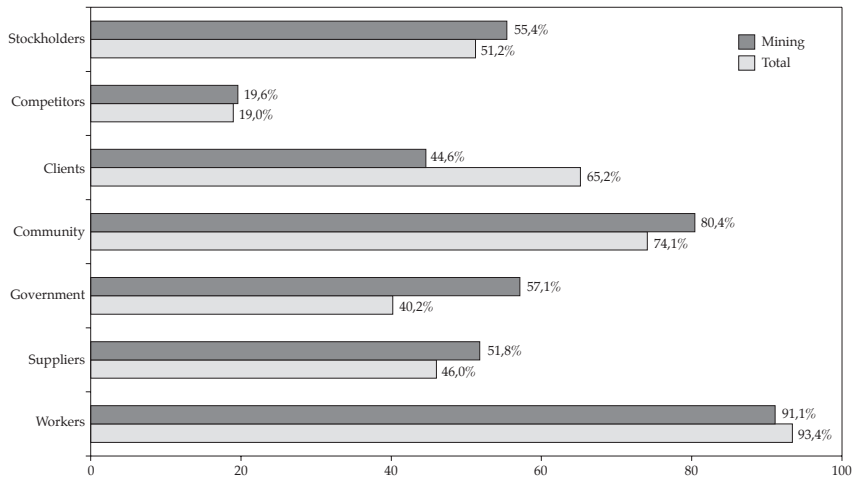
---

[57] For a more detailed characterization of entrepreneurial informality, see Cárdenas and Rozo (2007) and Santa María and Rozo (2008).

[58] Some of the observations were already in the initial sample, and for purposes of this study, the survey was directed, in adddition, to other companies in this sector.

With respect to the areas of investments undertaken by mining companies, there are certain differences with the investment patterns for the rest of companies. Albeit education is the area of investment in which most companies invest in (77.9% of the total and 83.3% of the mining sector) in both groups, the mining companies tend to channel more resources

Graph 33. Stakeholders with Whom Mining Companies Undertake Social Responsibility



Note: The data shows the percentage of companies that responded affirmatively.
Source: Entrepreneurial Social Responsibility Survey of the ANDI 2006.

Table 20. Mechanisms whereby RSE is carried out

	Mining (%)	Total (%)
Strategic alliances	79.7	37.3
Social Marketing	15.6	17.0
Volunteer	15.6	20.6
Sponsorships	35.9	30.8
Social investment	79.7	43.3
Donations in kind	70.3	37.8
Donations to entrepreneurial foundations	39.1	31.3
Others	9.4	5.8

Note: The data show the percentage of companies that responded affirmatively.
Source: Responsibility Survey of the ANDI 2006.

to the cultural field, environmental protection, the reconstruction of the social tissue, and support for vulnerable population groups. This expense implies an effort by these companies in resources that aimed at increasing education and training of the human resource (see Table 21).

Moreover, aspects were identified in which the mining companies surveyed exhibit better practices than the rest of companies in the country. For instance, 87.5% of the mining companies make investments in programs or activities to provide incentives for respect for human rights, while this percentage is close to 55% for all of the companies in the sample. Similarly, it was found that all of the mining companies surveyed implement programs to protect the environment and have mechanisms to prevent corrupt practices. For the total sample, these percentages are 55% and 91%, respectively. Lastly, it is found that mining companies undertake collective bargaining with their workers to a greater extent than the rest of companies (71% vs. 31%).

Table 21. Areas of investment by mining companies and by the economy as a whole

Areas of investment	Mining (%)	Total (%)
Housing	66.7	51.4
Health	66.7	67.9
Education	83.3	77.9
Nutrition	33.3	35.7
RH training	50.0	76.4
Culture	83.3	48.6
Recreation	66.7	68.6
Public services	33.3	17.1
Environment protection	83.3	57.1
Ethical values formation	33.3	33.6
Mend of social fabric	50.0	26.4
Support to vulnerable people	50.0	28.6
Justice strength	16.7	8.6
Productive linkages	16.7	15.7
Others	33.3	20.0

Note: The data show the percentage of companies that responded affirmatively.
Source: Responsibility Survey of the ANDI 2006.

With respect to the knowledge that the surveyed companies have regarding international initiatives in RSE, it was identified that 5 of the 8 firms interviewed know the initiative of the Global Pact, 3 of these having adhered to it. These figures demonstrate that, despite the fact that the mining companies surveyed carry out RSE practices, there are some that are not aware of important initiatives that exist on this issue, such as the United Nations Global Pact. Furthermore, only 25% of these companies have adhered to the declaration of ethical principles of Colombian entrepreneurs, whereas this percentage for the total national sample is 50%.

Summarizing, the figures cited permit concluding that the mining sector in Colombia is in line with national RSE practices in most aspects. Nevertheless, mining companies are more conscious of the importance of investing in aspects that are sensitive for the country, such as the social tissue or vulnerable population groups. It must be highlighted here, once again, that these figures correspond to the responses provided by the largest companies in the sector. Thus, this data does not reflect the high degree of heterogeneity that characterizes the entrepreneurial fiber of this sector, given that it excludes the perception and practices of the smaller companies.

4. Specific Cases in the Mining Sector

This sub-section seeks to delve deeper into the development of RSE in certain specific cases of companies in the mining sector. Bearing in mind the limitations of information regarding other companies in the sector, this analysis does not have the intent of deriving general conclusions, but rather to identify some of the leading practices in Colombian mining. In order to span diverse productive activities, following are the cases, which correspond to the coal industry (Cerrejón), gold (Mineros S.A.), ferronickel (Cerro Matoso) and cement (Cemex).

Albeit the Entrepreneurial Social Responsibility of the other large-scale mining companies that operate mines and carry out exploration activities in Colombia are not mentioned, it is important to highlight that all of these companies have their specific RSE programs, which are presented in detail in their respective annual Social Balance reports.

4.1. Cerrejón

Cerrejón is a coal mining operation that is carried out in La Guajira. The Cerrejón mining activity is carried out along a 50 kilometer stretch along the valley of the Ranchería River, covering a surface of 68,700 hectares, with proven resources of close to 2.140 billion tons and recoverable reserves of 930 million tons of coal[59]. The company maintains an integrated operation that includes the mine, the railroad and the port.

The Cerrejón mining operation represents 45% of the GDP of La Guajira, and 6% of Colombia's exports. This permits the company to employ 4,424 persons, most of whom come from La Guajira, and 99% of whom are Colombians, and in addition, generates contracts with 3,877 persons.

One of the company's main strategic objectives in the area of RSE is to promote and support sustainable development in the communities located in the area of influence of its operations. Specifically, the company carries out actions in the four areas indicated by the Global Pact and fulfills the ten guiding principles of the Pact.

With respect to **labor relations**, the company follows the practices of the SA 8000 standard, which, as was shown above, is the most advanced norm until such time as the ISO 26000 guideline is issued. The above implies that, in the company, forced labor, child labor (the youngest employee is 20 years old) and discrimination are prohibited. A relevant project that the company carries out in this field is the Ayatajirawa Program, which is directed to the indigenous communities that live and work in the Riohacha garbage dump. With this program, 90% of the women and children have stopped working on the separation of solid wastes.

With respect to **environmental management**, Cerrejón was certified in 2003 with the ISO 14001 standard and OSHAS 18001[60]. Moreover, the mine has an air quality monitoring network that comprises 18 stations for sampling total suspended dust particles and breathable dust (PM-10), in accordance

[59] Information taken form the company's sustainability report.

[60] The OSHAS 18001 standard certifies industrial safety, occupational health and hygiene in the company.

with the provisions of the national legislation. Two other programs that are carried out at the mine in this area are worth highlighting: the program for the rehabilitation of hectares, and the program for control and protection of wildlife. The program for the rehabilitation of areas program covers 2,278 hectares and over one million trees have been planted. On the other hand, the program for control and protection of wildlife is carried out in a preventative manner in the displacements from the exploitation at the mine and in the rehabilitation areas, to ensure their conservation.

Moreover, Cerrejón recently signed an agreement with the Inter American Development Bank (IDB) whereby it seeks to provide its contribution to control environmental contamination by means of the reduction of gases in its production. This is a green coal production strategy aimed at reducing the emissions of gases that produce the greenhouse effect in the planet[61].

With respect to actions directed to the **protection of human rights**, the company has guidelines in its policies for health, safety, environment and the communities that ensure their protection, and has undertaken 11 negotiations with the labor union. Furthermore, Cerrejón conducts an exercise in training on human rights and International Humanitarian Law in the various military posts that are located in the area of influence of the complex, through the Center for Studies on Training and Analysis on Human Rights from Costa Rica.

Lastly, in the area of **transparency**, Cerrejón carries out a policy that combats corruption. In its communications system, the company has a 24-hour hotline to denounce fraud. Moreover, the company conducts the program known as *Sembremos las Regalías (Lets plant the royalties)*, in order to prevent corruption in the destination of royalties. For this purpose, it has set up citizen vigilance groups, by means of agreements with the Controller General of the Nation and the Departmental Controller.

It is worth mentioning that the company invested US$6.3 million in social management in 2007, which implied a growth of 80% in this type of investments. These funds made it possible to build and furnish the Center for Municipal Educational Resources at Fonseca (12,000 benefited students),

---

[63] Sustainable Responsibility Magazine, Number 9, page 56.

the continuation of the Cerrejón Scholarships for Excellence, directed to the 10 best high school graduates from La Guajira every year[62], the continuation Kamüsuchiwo ethnic education program[63] and the development of health brigades, among other projects.

Lastly, it should be underscored that the company makes significant fiscal contributions to the country and to the regions in the form of taxes and royalties. In 2007, Cerrejón paid an average of US$161.7 million in taxes to the nation and transferred US$134 million to the department of La Guajira (42%), to the producing municipalities[64] (32%), to the port municipality (10%) and to Ingeominas (16%). It should also be mentioned here that despite the funds that the municipalities receive with respect to the mine, these continue exhibiting a lack of basic services and have a precarious infrastructure. One conclusion of this brief analysis, which is consistent with studies that have been performed in the past in the country, is that the system for the use of royalties presents high levels of inefficiency.

This information shows that Cerrejón is making important contributions to the well being of the La Guajira society, not only through the payment of taxes and royalties, but also through its RSE programs. Furthermore, it should be highlighted that most of its practices are in line, not only with national standards, but also with international standards.

4.2. Mineros S. A.

Mineros S.A. is a company engaged in the operation of alluvial gold exploitation using mechanical buckets and suction dredges. The company's area of influence is concentrated in the municipalities of El Bagre, Nechí and Zaragoza in the sub-region of the lower Cauca Valley in the Department of Antioquia.

---

[62] The scholarship provides financing for university studies for these students at any university in the country.

[63] Bilingual (Spanish - Wayuu) inter-cultural program, that benefits over 2,000 Wayuu children.

[64] Albania, Maicao, Hatonuevo and Barrancas.

The approach that the company has adopted to carry out its RSE practices in the ***external*** area is to foster local development. This is understood to be a participative, organized, planned and agreed-to process, whereby the actors (the government, the communities, and the company) seek to use the local resources in a sustainable manner, so as to generate greater social wellbeing. In this context, the company interacts with the local actors, seeking to cooperate with support and without interfering with or replacing the National and Regional Government. Specifically, the company has a social intervention model that is based on four pillars: **governance, the environment, social development and economic development**.

With respect to **governance**, the company has identified serious problems in this dimension in the region. A governing class exists that has little capability to govern, lack of transparency in managing public resources, an absence in social and community participation, the presence of armed actors, drug trafficking and demobilized persons. For these reasons, one of the pillars of the company's actions is directed to fostering governance in the region. The company's strategic lines to attain this objective are: to provide support for local management for the exercise of good governance and to foster citizen participation for the management of political, economic and social development. For instance, among other actions, the company supports efficient management of the local development plans, the creation of citizen vigilance groups to care for the fiscal resources, and cooperates in the creation of Houses of Justice[65].

In the sphere of the **environment**, the company's strategic lines are to improve basic sanitation (*i.e.*, drinking water and liquid and solid waste management), sustainable mining, rural development in degraded areas, and strengthening municipal environmental management. To develop basic sanitation, the company directs actions to create improvements for water treatment and purification, generates environmental education to protect

[65] Some of the other actions include support for the preparation of an educational video on the potential and problems for development in the Lower Cauca, participation in the civil and military brigade in 3 districts in the region, support for the community action boards and for the agreements with the military forces and the police, in financing territorial security activities.

and maintain the water sources in the region in good condition, provides environmental education, and fosters community participation with respect to the spillage of contaminant elements into the rivers. With respect to liquid residue management, the company supports the construction of proper technologies for managing residual waters and provides education on the sources of contamination for pure waters. Lastly, in order to strengthen municipal environmental management, it supports the incorporation of planning systems and comprehensive management of wastes, research and the incorporation of proper technologies for the collection, treatment and final disposal of wastes of various origins, and supports environmental education processes. Furthermore, the company has the ISO 14001 environmental management certification.

To foster social development, Mineros S.A. supports public health and education in the region. Among the actions aimed at improving educational levels, the company seeks to create a better use of institutional resources and to generate more opportunities for the young population. In this context, among other actions, the company has supported the local health directorship in El Bagre to carry out health brigades (over 700 people were taken care of in these brigades), provided support to the University of Antioquia to undertake a study to characterize a common bacteria in El Bagre known by the scientific name of Haementaria sp, provided support for the Nuestra Señora del Carmen Hospital, that provides transportation services in the region for equipment and personnel, and sponsored the medical services and educational activities in the area of sexual health.

On the other hand, with respect to education, the company provided support for the rural communities with transportation for the construction of pedagogical farm schools, provided consulting for the performance of technological projects for 36 students, sponsored scholarships and aid for the education of children of retired personnel (99 scholarships and 8 special education grants were awarded), as well as support in the provision of educational services with loaned company facilities. Moreover, the company has obtained the ISO 9001 quality certification.

Fourthly, in the area of **economic development**, the strategic lines used by Mineros S.A. are the strengthening of institutions to support economic growth and diversification, and, on the other hand, enhancements in the

structure and dynamics of the local economy. In this way, the company fosters local entrepreneurial initiatives and improvements in infrastructure in the region. For example, the company supports the creation of small economic units that provide services to the company and, in parallel, carries out economic activities in rubber and cocoa in Caucasia, for the provision of technical assistance and plant material to the population in the undertaking of these productive activities in over 100 hectares. Furthermore, the company grants recovered productive land plots with over 100 hectares. Moreover, the company grants recovered land plots that have been recovered from the mining activity to farmers in the region. These land plots also have housing facilities and crops in production.

On the other hand, with respect to the company's *internal* social responsibility policies, the employees at the plant have access to complete health services, housing (for free inside the camp), transportation (the monthly cost of transportation for the workers and their families is $33,000 pesos), food (a 50% subsidy for each meal), and training (on the emergency plan, industrial safety, occupational health, healthy living, posture hygiene, among others).

In summary, Mineros S.A.'s investments and activities seek to generate a structural change in the local development of the region, beginning with the construction of better institutions and greater citizen awareness. As is evident, these types of actions bring together important efforts that transcend the financial dimension and that only bear fruit in the long term.

4.3. Cerro Matoso

Cerro Matoso is a company that integrates a nickel extraction mine with the ferronickel smelting process. The area where Cerro Matoso has the greatest influence is concentrated in the municipality of Montelíbano, in the Department of Córdoba. However, the company's actions reach out even to the municipalities of La Apartada and Puerto Libertador.

Cerro Matoso exercises its ***external*** Social Responsibility through activities that it carries out by means of the Fundación San Isidro, the financing of which is provided by the company. The Foundation is a non-profit private entity that works on the basis of four general guidelines:

- to contribute to the growth of the local economy;
- to promote a responsible community that directs its own development;
- to develop plans that are focused on improving the community's environmental awareness;
- to contribute to strengthening education and health in the communities in the area of influence (i.e., the municipalities of Montelíbano, La Apartada and Puerto Libertador).

With respect to **growth of the local economy**, the Foundation carried out several actions in 2006. To begin with, it undertook a program for the creation of companies and employment generation that incubated 9 companies, representing 98 new formal jobs, granted loans in the amount of 910 million and contributed financial support for 3 trade shows and exhibitions in the region. Moreover, a training program was undertaken in an alliance with the National Learning Service (SENA, its acronym in Spanish), which benefited 1,838 persons in 2006. In addition, guild programs were created, which permitted the creation of 10 guilds and associations (*e.g.*, ASOCUR, ASPROESA and the Association of Natural Fibers in Montelíbano). Lastly, work was undertaken in agricultural and livestock development (*e.g.*, the San Jorge chain of minor and aquatic species).

To achieve progress in the **promotion of a responsible community**, the company (through the Foundation) participates in the process to restructure and legalize the community action boards in the three municipalities in its area of influence. It has provided training for 272 community action boards, has trained 220 community mothers as citizens, mothers and educators, and has cooperated in the institutionalization of the Monthly Meeting of Community Leaders, organized by the municipal administration of Puerto Libertador, among other actions.

Thirdly, in order to improve the **environmental competencies and awareness**, the company has supported the initiative to convert the *Montelíbano Thematic Park* into an open space for the conservation of natural resources. Moreover, the company has the ISO 14001 certification for environmental management.

Lastly, to **contribute to strengthening education and health**, the Foundation supports five programs. First of all, together with the mayors' offices, the company fosters the development of sports activities and contests in parks in the municipalities of Monte Líbano and Puerto Libertador, and undertakes health promotion programs together with the Pan American Health Organization (benefiting 450 families in the region). Moreover, it finances the educational support plan that benefits 150 children in primary and secondary school with work materials and snacks, as well as 20 youths in universities located in Antioquia, Atlántico and Córdoba, with registration fees and maintenance. The company also adapted the San Juan de Bosco School and continued with developing an institutional alliance with the Education Secretariats of the Master Plan. This Plan seeks the enhancement of quality education by means of three strategies: teacher training, support for rural education, and recognition for teachers that are committed with society. On the other hand, the company created the Center for Educational Resources in Montelíbano (CREM, its acronym in Spanish) in 2002. The CREM has instructors, computer rooms with state-of-the-art technology, physics and chemistry laboratories and libraries and, according to data available for 2007, serves around 14,000 students in public schools in the municipality. Given its great success, it is being expanded to neighboring municipalities and support for the Ministry of National Education is being considered to extend it to other municipalities in the country.

Moreover, in 2006, the company carried out other projects that are worth highlighting: i) cooperated in the construction of sewage system in the 27 de Julio neighborhood in Montelíbano, together with the Mayor's Office; ii) created the Center for Productive Development for Garment Manufacturing (CDPC, its acronym in Spanish) in alliance with the Mayor's Office at Montelíbano, the San Isidro Foundation and Asicor[66] (a project that will generate 40 new jobs in the area); and iii) contributed 52.5% of the funding for the surfacing of the Montelíbano-Cerro Matoso road.

CMSA's measured contributions in the communities where it has influence, in accordance with a study undertaken by ECONOMETRIA, have represented

[66] The Project Operator.

improvements in the NBI index for quality of life at Montelíbano / La Apartada and Puerto Libertador, of 22.3% and 21.2%, respectively in the 1985 to 2005 period.

On the other hand, Cerro Matoso carries out several internal programs that take care of the well being of its employees and their families, such as: the creation of the Montelíbano Educational Foundation (a school with a high academic level[67]), health prevention programs (through the Fundación Panzenú) and training for workers (49 hours per person on average in 2006), among other actions. Lastly, the company possesses the ISO 9001 quality certification and the OHSAS 18001 certification for the industrial safety and occupational health system.

As is demonstrated in this brief summary, the social actions of the Cerro Matoso company have contributed significantly to the development of the municipalities of Montelíbano, La Apartada and Puerto Libertador and represent an axis for their development. Moreover, in general, the company works jointly with the regional governments to reach the attainment of their social objectives, which demonstrates that that it is clear on its social duty to support the State and not to supplant it.

4.4. Cemex

CEMEX is a multinational company with operations in over 50 countries and over 67,000 employees around the world. The company entered in Colombia in 1996 with the acquisition of Cementos Diamante and Cementos Samper and, at present, possesses 23 concrete production plants and 4 cement producing plants in the country. These plants generate employment for 1,447 Colombians. In 2007, CEMEX in Colombia invested US$ 2.6 million in its main social programs and benefited around 28,325 persons.

CEMEX produces, distributes and commercializes cement, pre-mixed concrete, aggregates and construction materials for clients in five continents. These

[67] The school has received the Andrés Bello award, won the first place in youth leadership in Córdoba (granted by the Universidad de la Sabana), has four semi-finalists in the contest for the best economic essay of the Banco de la República and received the first place in the mathematics Olympics at the Universidad de Antioquia.

products represent the foundations for construction projects of all kinds, which house persons and connect communities throughout the world.

CEMEX has been a signatory of the World Pact of the United Nations since 2004. Moreover, the company's operations have the ISO 9000 quality management certification. In Colombia, CEMEX has prioritized its ***external*** RSE agenda in the areas of **housing, education, the environment** and **attention to disasters**. In addition, it carries out activities aimed at fostering culture and art.

With respect to the area of **housing**, CEMEX has two programs with national coverage: *Patrimonio Hoy* and *Colombia Hogar. Patrimonio Hoy* is a program of micro-credits in kind, whereby families make small weekly contributions for the advance purchase of materials. In the fifth week, the program doubles the contributions and delivers to the member the equivalent amount in construction materials for improvements in his housing. This micro-credit is performed without any requirements, without interest, since the essence of the program is based on trust. The members are to join in groups of 3 persons, thus promoting solidarity among our members. During the following five weeks, the families amortize the micro-credit and begin a new cycle of contributions and larger loans, until they complete the basic plan of seventy weeks or seventy installments. Other benefits are that the prices are frozen, professional construction advice is given, and materials are delivered at no additional cost. At present, the program has offices in Bogotá, Zipaquirá, San Gil, Ibagué, Cartagena, Cúcuta, Bucaramanga, Cali and Medellín. In March 2008, the program had 3,000 beneficiaries.

On the other hand, the *Colombia Hogar* program is an initiative that has the objective of improvements for new housing for the beneficiaries of the type 1 and 2 social interest housing program, granted through workers compensation. The program delivers directly, as a donation, an incentive of $250,000 pesos that is redeemable in construction materials. It is expected that the program will benefit 80,000 families. Through March 2008, 4,000 incentives had been given.

Secondly, to support **education**, the company, in an agreement with the SENA, has trained 23 young persons in the area of Payandé (Tolima) as construction technicians in concrete structures. Furthermore, with an inves-

tment of approximately 100 million pesos, the company built a computer room in Payandé, complete with 35 computers. With the *Computadores para Educar* (Computers for Education) Program of the Ministry of Communications, in 2008, four computer rooms will be built that will benefit around 1,500 children in Los Patios, Bucaramanga, La Calera and Ibagué. Also, in the Mexico neighborhood in the locality of Tunjuelito, together with the Corporación Día del Niño, a toy and fun library was inaugurated in December 2005, known as the House of Culture, which has benefited around 800 children.

UNICEMEX is a training program for the improvement of competencies and entrepreneurial capabilities of clients (that is to say, distributors, hardware dealers, master builders, technicians, engineers and architects) to help them develop their business enterprises. This program has trained close to 30,000 Colombians that are involved in the construction sector. In 2007, together with the Universidad Javeriana and the Colombian Institute for Cement Producers, 31 master builders graduated as specialists in concrete construction.

In the area of **environmental management**, CEMEX makes donates books that contribute to finance environmental foundation programs (*e.g.* Fundación Natura and the Instituto Alexander von Humboldt, among others). Moreover, the company has initiated reforestation programs in Ibagué, Cúcuta and Bucaramanga (Programa Cercas Verdes - Green Fences Program) and carries out an urban agriculture program in the San Benito neighborhood. The program provides counseling and technical evaluation for close to 30 families, to create an urban agriculture productive chain.

Lastly, in the area of **attention to disasters**, CEMEX joined the Colombiatón program, with the donation of materials for the reconstruction of the floods suffered in the marginal neighborhoods of Cartagena[68]. Moreover, in the development of an agreement entered into with the DPAE (Dirección de Prevención y Atención de Emergencias - National Directorship for the Prevention and Attention of Disasters), CEMEX designed and operates a

[68] Colombiatón is an initiative of the Presidency of the Republic, to attend to the needs of relocating victims of the floods, and some of the largest companies in the country joined this initiative.

system of monitoring and early alerts on the behavior of the Tunjuelo River and its flow. This system permits the authorities and the community to react in a timely manner in the event of emergencies. Moreover, together with the Bogotá Waterworks and Sewage Company and participation by another cement company, CEMEX built a structure to regulate the river flow, which permits the regulation and mitigation of floods.

With respect to ***internal*** management, close to 3,000 persons benefit from the programs that the company offers at the national level (*e.g.*, for retirees, employees and contractors). Among the services offered, there is recreation (Colombia en Familia), Olympic games, sports schools and programs for retirees[69].

Altogether, as in the other cases already analyzed in this section, the actions undertaken by the CEMEX company are fundamental for the development of the communities in which it operates. It should be noted that the company works together with other actors and with the government in order to join efforts in achieving the goals.

5. Conclusions on the Entrepreneurial Social Responsibility Practices of Colombian Mining

The analysis carried out in this chapter of the document permits the identification of three important conclusions:

- RSE has been evolving in Colombia and its importance in the entrepreneurial sphere is ever increasing. Moreover, one can perceive that Colombian authorities are paying more attention to the relevance of these types of practices. Specifically the formation of Standardization Committee 180 to create a national guide for these types of practices represents an important initiative.

[69] Colombia en Familia is a program whereby the worker and his family travel to different destinations in the national territory. The Olympic games are geared to the workers, and the sports schools to their children. This program was developed in Ibagué. Lastly, the programs for retirees are directed to improve their health and to manage their free time, creating networks of alliances and self-help groups (1,135 retirees have benefited).

- In matters of RSE, the practices of the mining sector possess broad levels of diversity. On the one hand, there are the large companies that carry out practices that are at the forefront in Colombia, on which we have vast information. And on the other, there are the small informal companies that generate social and environmental problems. Although there is not enough information on this last group of companies, it is important to drive them to follow the RSE practices that the large companies in the sector carry out.

- RSE practices of the large companies in the sector are in line with national RSE practices in most aspects. However, mining companies are more conscious of the importance of investing in issues that are sensitive for the country, such as the social fiber and vulnerable population groups. It should be noted that there is less information in the companies in the sector regarding national and international initiatives regarding this issue.

- The analysis of the specific cases studied in this chapter leaves important lessons for the mining sector:

  - the RSE activities carried out by these companies are fundamental for the local development of the regions of influence of each of the mining operations;
  - the impact of mining activities transcends the economic dimension in Colombia;
  - the activities of the large mining companies are, in general, properly directed towards improving society's well being;
  - the actions of these companies pertinently support the government actions and do not seek to supplant them;
  - nevertheless, in some cases, there is evidence that the actions do not seek to foster structural changes in the regions, so that this is the direction in which efforts in the future should be focused;
  - the RSE projects should always be undertaken with involvement and cooperation by the Government and by the community, for their results to be lasting.

BIBLIOGRAPHY

Afrodad (2007), *The impact of Wrong Policy Advice in Zambia.*

ANDI (2007), "Encuesta sobre Responsabilidad Social". Gerencia de Comunicaciones y Responsabilidad Social. Bogotá, Colombia.

Alexeev, Michael and Robert Conrad (2005), "The Elusive Curse of Oil", Department of Economics Indiana University, *mimeo*.

Aroca, Patricio (2001), "Impacts and development in local economies based on mining: The case of the Chilean II region", *Resources Policy* Vol 27 Pag 119-134.

Auty, Richard (2000), "How Natural Resources Affect Economic Development", *Development Economics Review* Vol 18 Pag 347-364.

Banco Mundial (2004), "Colombia: Recent Economic Developments in Infrastructure (REDI) Balancing Social and Productive Needs for Infrastructure. Finance, Private Sector and Infrastructure Unit Latin America and the Caribbean", Vol 1, Noviembre 2004.

Bastida, Elizabeth, Ricardo Irarrázabal and Ricardo Labó (2005), "Mining Investment and Policy Developments: Argentina, Chile and Perú", *mimeo.*

Cárdenas, Mauricio y Valerie Mercer-Blackman (2007), "Análisis del sistema tributario colombiano y su impacto sobre la competitividad", *Cuadernos de Fedesarrollo* No 19, Fedesarrollo, Bogotá.

CEMEX (2007), "La Responsabilidad Social: Una prioridad de CEMEX"

Cerrejón (2007), "Reporte de Sostenibilidad 2005".

Cerro Matoso S. A.(2007). "Balance Social 2006".

Chami, Jorge (2001), "Estrategia de desarrollo de *clusters* basados en recursos naturales: el caso de bauxita en el norte de Brasil", Red de Reestructuración y Competitividad, División de Desarrollo Productivo y Competitividad, Serie desarrollo productivo No. 105, CEPAL, Santiago de Chile.

Chaparro, Eduardo (2007), "Buenas Prácticas del Sector Minero: El caso del Grupo Peñoles en México". Serie Recursos Naturales e Infraestructura No. 125. CEPAL.

Consejo Internacional de Mina y Metales. "Guía de buenas prácticas para la minería y biodiversidad".

Consejo Privado de Competitividad (2007), "Informe Nacional de Competitividad 2007".

Davis, Graham (1998), "The minerals sector, pectoral analysis, and economic development", *Resources Policy* Vol 24(4) Pag 217-228.

Davis, Graham and John Tilton (2002), "Should developing countries renounce mining? A perspective on the debate", Colorado School of Mines, Working Paper.

Fraser Institute Survey of Mining Companies 2006/2007.

Galvin, Wilson (2000), "Sustainable development policies in Canada's mining sector: an overview of government and industry efforts", *Environmental Science & Policy* Vol 3 Pag 201-211.

Garcia, Patricio, Peter Knigths and Jhon Tilton (2001), "Labor productivity and comparative advantage in mining: The copper industry in Chile", *Resources Policy* Vol. 27 Pag 97-105.

Glave, Manuel y Juana Kuramoto, "Minería, Minerales y Desarrollo Sustentable en el Perú" en *Minería y Minerales de América del Sur en la Transición al Desarrollo Sustentable*, Internacional Institute for Environment and Development.

Hancock, Meter (2001), "Sustainable Development and the Australian Minerals Sector", Information and Research Services, *Working Paper* No. 24-2001.

Iimi, Atsushi (2006), "Did Botswana Escape from the Resource Curse?", International Monetary Found, IMF *Working Papers* 06-138.

Lagos, Gustavo, Hernán Blanco, Valeria Torres y Beatriz Bustos, "Minería, Minerales y Desarrollo Sustentable en Chile", en *Minería y Minerales de América del Sur en la Transición al Desarrollo Sustentable*, Internacional Institute for Environment and Development.

Lapalme, Lise-Aurore (2003), "La dimensión social del desarrollo sostenible en la industria minera", Documento informativo, División de Integración de Políticas de Desarrollo Sostenible, Natural Resources Canada.

Leyes, Decretos y demás normas jurídicas de Australia, Canadá, Chile, Colombia, Perú, Nigeria, Zambia, Botswana.

Market Research Centre (2005), "The Mining Equipment and Services Market in Brazil". International Trade Canada.

Matshediso, I.B. (2005), "A review of mineral development and investment policies in Botswana", *Resources Policy* Vol. 30 Pág 203-207.

Mayorga, Pila y González, Volmar (2001), "Responsabilidad Social de la Empresa: elementos teóricos y experiencias". Fundación Corona.

Mining Journal, "Nigeria an exciting new mining destination".

Mineros S.A. (2007), "Informe Social 2006". Segunda Edición, julio.

Mobbs, Philip (2004), "The mineral industry of Zambia". *mimeo.*

Naciones Unidas (2006), "World Investment Report 2006. FDI from Developing and Transition Economies: Implications for Development". Nueva York y Ginebra.

Natural Resources Canada (2000), "Canadian Suppliers of Mining goods and Services: Links between Canadian mining companies and selected sectors of the Canadian economy".

O'Faircheallaigh, Ciaran (1986), "Mineral taxation, Mineral Revenues and Mine Investment in Zambia". *American Journal of Economics and Sociology* Vol. 45 Pag 53-67.

Power, Thomas Michael (2002), *Digging to Development? A Historical Look at Mining and Economic Development. Oxfam America Report*.

Polo, César (2006), "Los ejes centrales para el desarrollo de una minería sostenible", División de Recursos Naturales e Infraestructura, Serie recursos naturales e infraestructura No. 107, CEPAL, Santiago de Chile.

Prado, Oscar (2005), "Situación y perspectivas de la minería metálica en Argentina", División de Recursos Naturales e Infraestructura, Serie recursos minerales e infraestructura No. 91, CEPAL, Santiago de Chile.

Responsabilidad y Sostenibilidad N. 9 (Diciembre 2007). Una publicación de Gatos Gemelos Comunicación. Bogotá, Colombia.

Saavedra, Isis (2005), "Inversión extranjera directa en América del Sur: Los casos de Brasil y Chile", Instituto de Relaciones Internacionales, Universidad de Viña del Mar.

Sala-i- Martin, Xavier and Arvind Subramanian (2003), "Addressing the Natural Resource Curse: An Illustration from Nigeria", International Monetary Fund, IMF *Working Paper* No. 03-139.

Solarte, Roberto (2004), "Responsabilidad Social en Colombia: Retos desde la Complejidad y la Búsqueda de la no Exclusión". Pontificia Universidad Javeriana. Bogotá, Colombia.

Solomon, Michael (2000) "Growth and diversification in mineral economies: Planning and incentives for diversification", Research prepared to UNCTAD by The Mineral Corporation.

Stijns, Jean Philippe (2001), "Natural Resource Abundance and Economic Growth Revisited", Department of Economics University of California at Berkeley.

The World Bank(2005), *Where is the Wealth of the Nations? Measuring Capital for the XXI Century*, Washington D.C.

UPME (2005), "Actualización de la evaluación de la competitividad del sector minero colombiano", Econometría.

World Bank and International Finance Corporation (2002), *Mining and development. Treasure or Trouble? Mining in Developing Countries.*

ATTACHMENTS

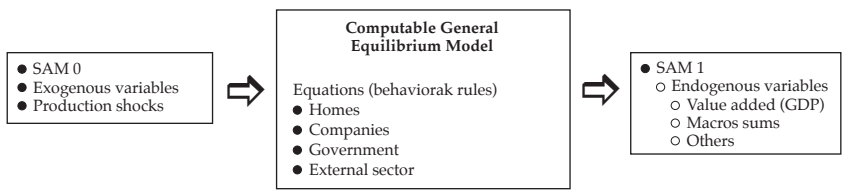
Attachment 1. General Aspects of the Exercise of the Computable General Equilibrium Model

The impact of the interactions that occur among the various productive sectors in the economy can be dealt with using the computable general equilibrium models (MEGC, their acronym in Spanish, CGEM in English), which, in general lines, try to describe the behavior of an economy by means of two components.

The first component is a set of mathematical ratios that simplify the behavior of the agents that participate in the economy of a country or a region, for instance, producers, consumers, government and the external sector. The second component is related with statistical information that summarizes all of the transactions of the agents within the economy, contained in a Social Accounting Matrix (SAM). Based on those two sources of information, the SAM, and the performance equations in the model, it is possible to establish scenarios in which the response of the agents to specific shocks associated with increases in mining production can be quantified.

The use of general equilibrium models for the analysis of the impact of a policy or of a change in a specific activity consists of several stages, which are described in Diagram 1. First of all, one obtains the SAM that reflects the initial equilibrium of the economy and the scenario that characterizes the production shocks in the specific sector, which, together with certain previously defined exogenous variables, are used as inputs for the CGEM. Subsequently, based on the application of the model, the responses of the variables of interest (endogenous variables) to the shocks that are generated are calculated, based on the existing differences between the values in the new equilibrium status and the previous one.

Diagram 1. Analysis Methodology



At this point, it is worthwhile to bear several considerations in mind. On the one hand, the CGEM implemented by Fedesarrollo uses a Social Accounting Matrix (SAM) that contains 59 sectors, a representative type of household, and two trade partners: the United States and the Rest of the World. On the other hand, on account of the way in which the model is defined, it is not possible to directly affect the production of each of the branches of mining, reason for which we opted for generating a scenario of increases in international prices for this type of products, so as to obtain the increase in the desired value of production for the exercise; in this case, an increase of approximately 1 billion 2001 pesos.

Attachment 2. Details Of The Econometric Exercise For The Countries In The Sample

General aspects for the exercise

For purposes of this study, an exercise was undertaken that seeks to identify the role of mining in economic development. The empirical analysis is based on an econometric exercise for 77 countries for the 1960-2000 period, which seeks to identify the impact on economic growth of various variables, such as the importance of mining, the quality of institutions, human capital, and a geographic factor.[1] The objective for the exercise is to determine if there is statistical evidence or not to support the aforementioned alternative point of view, that mining can go hand-in-hand with a country's economic success, whether in a direct manner, or accompanied by other factors, such as institutional performance or the level of education.

Table 1 presents the results of the estimate for the model with normal minimum squares, in which the dependent variable is the per capita GDP rate of growth for the 1960-2000 period. As suggested by the theory, the measurements for human capital and institutional development exhibit a positive and significant association with growth. The negative coefficient associated with the initial per capita GDP level suggests that poor countries tend to grow faster than rich countries; that is to say that there is evidence to state that the model predicts conditional convergence. On the other hand, the inclusion of the geographic variable indicates that this is a factor that exhibits a direct and significant relationship with growth.

Nevertheless, the main objective of this model is to try to predict the impact of the mining sector on economic growth. The results indicate that there is statistical evidence to assert that mining has a positive and significant effect on economic growth, as suggested by the alternative paradigm. It is noteworthy that this result is robust for all of the specifications indicated in the table.

---

[1] For more details, please refer to the attachment to this report where a detailed description is made of the variables and the sources for these.

Table 1. Econometric Model
(Estimate of the Normal Minimum Squares)

Dependent variable: per capita GDP growth rate 1960-2000
Minimum Square Ordinary Regresion

	(1)	(2)	(3)	(4)	(5)
Log GDP per capita initial	-0.008 ***	-0.013 ***	-0.009 ***	-0.006 ***	-0.013 ***
	(0.003)	(0.001)	(0.002)	(0.002)	(0.003)
Log years of education initial		0.007 ***			0.007 ***
		(0.002)			(0.002)
Risk of expropriation		0.004 ***	0.005 ***		
		(0.001)	(0.001)		
Autocracy	-0.008 ***				
	(0.002)				
Government effectiveness				0.009 ***	0.008 ***
				(0.002)	(0.002)
Proportion of population in lukewarm zone	0.020 ***	0.013 ***	0.012 ***	0.012 ***	0.008 *
	(0.003)	(0.003)	(0.003)	(0.004)	(0.005)
Participation of mining exports in GDP	0.024 **	0.033 *	0.026 **	0.040 ***	0.045 ***
	(0.011)	(0.018)	(0.010)	(0.011)	(0.016)
Constant	0.081 ***	0.085 ***	0.043 ***	0.082 ***	0.113 ***
	(0.081)	(0.023)	(0.011)	(0.017)	(0.026)
Observations	77	66	75	77	67
R^2	0.35	0.53	0.48	0.39	0.48

Solid standard errors are presented.
*** Siginificance 1%; ** Siginificance 5%; * Siginificance 10%.

Nevertheless, it is probable that the specification that was used may present problems with regard to the endogenous nature, related either with human capital or the institutional variables. This possibility exists because economic growth can, in and of itself, generate enhanced institutions and a higher level of education. If this were to be the case, when estimating the model with the normal minimum squares method, the estimators would be inconsistent and biased. To try to correct this possible problem, the model was applied, using the methodology of instrumental variables, and the results are reported in Table 2.[2]

[2] The estimate in two stages is a methodology that requires a variable (the instrument) that is correlated with the endogenous variable(s), but that, at the same time does not have a direct effect on economic growth.

Table 2. Econometric Model (Estimate of Instrumental Variables)

Dependent variable: Log GDP per capita 2000
Regresión of instrumental variables

Panel A: second stage estimation	**(1)**	**(2)**
Years of education		0.212 **
		(0.102)
Restriction to the executive	0.173 **	
	(0.094)	
Proportion of population in lukewarm zone	1,446 ***	0.708
	(0.284)	(0.611)
Participation of mining exports in GDP	0.141 **	0.088 *
	(0.055)	(0.050)
Constant	7,839 ***	7,617 ***
	(0.443)	(0.432)
Observations	52	47
R^2	0.61	0.72

	Dependient variables	
Panel B: first stage estimation	**Restrictions to the executive**	**Years of education**
Proportion of population in lukewarm zone	0.273	3,111 ***
	(0.815)	(0.989)
Participation of mining exports in GDP	0.116	0.165
	(0.120)	(0.173)
Density of the population in 1.500	-0.341 **	-0.543 ***
	(0.163)	(0.194)
French legal origin	-1,626 ***	-0.865
	(0.476)	(0.536)
Constant	5,562 ***	4,933 ***
	(0.706)	(0.800)
Observations	52	47
R^2	0.26	0.58

Solid standard errors are presented.
*** Siginificance 1%; ** Siginificance 5%; * Siginificance 10%.

Following Glaeser *et al.* (2004), two instruments were used: the legal origin and the population density in the year 1500 for each country in the sample. Albeit the selection of these variables could appear to be exotic at first glance, given that it is such a distant date, both have a justification, in accordance with the specialized literature. The use of the legal origin as an instrumental variable is based on the fact that the settlers brought

their legal systems with them to the countries they conquered and, as such, this would be a proper element to characterize the legal structure in each country. On the other hand, the population density can also be used as an instrument, considering that, in colonial times, those regions that were densely populated by local persons founded extractive industries, which should be reflected in the institutional performance nowadays.

A more simple explanation of the use of these types of instruments, in addition to the support that recent literature provides on growth, suggests that the institutions that were established in the colonial period marked a definitive difference on the levels of inequity and economic development in the economies around the world. Whilst the regions where institutions based on equitable distribution and exploitation of the land were able to create the necessary conditions for access to means of production and broader education, other societies, like those in most Latin American countries, left power in hands of the burgeoning elite in each country or region. This elite was only concerned about its own well being and denied access to better conditions of life for the large majority. This is a mechanism that has continued reproducing itself through time and, as such, is still maintained. In fact, the gaps of inequality that were founded from the colonial origins tend to be ever increasing, and even, in many cases, it is the legislation that provides support to such inequities.

Paradoxically, the results of the estimate in the first stage indicate that the effect of the variable that measures the importance of the mining sector on institutions is not significant. This deduction contradicts some of the theories mentioned before, in which the mining sector has a "corrosive" effect on the institutions, due to the hypothetical eagerness of the seekers of rents to extract the maximum benefits from the activity.

However, the estimate, in the second stage, produces results that are much more interesting and confirms those obtained in the regression with normal minimum squares: the participation of exports from the mining sector on the GDP has a positive and significant effect on the level of the per capita GDP, as well as on the institutions and the human capital that have been made instrumental.

The results of the exercise undertaken in this section complement the descriptive analysis that was performed on the mining sector in Colombia.

Mining is not only a significant source of revenues for the State and for the territorial entities, but can also become the boost that the economy needs in order to reach higher levels of economic growth.

It has already been seen that several countries have managed to boost their economies by focusing on specialization in the mining sector. The econometric exercise presented in this section has shown that one can achieve more growth with developed mining. Thus, public policies should be inclined for increased development of the sector, since it represents an enormous opportunity for countries with a mining potential, as is the case of Colombia.

Characterization of the Variables

Institutions

Restrictions to the executive: is a measure of the institutional limitations on decision- making by the executive. The variable takes on values between one and seven. A higher number indicates a higher degree of institutional restrictions on the executive. The variable is calculated as the average between 1960-2000.

Autocracy: is a measure based on competitiveness of political participation, competitiveness of executive isolation and the restrictions of the executive. It takes on values between zero and ten, where the higher values indicate a greater degree of institutionalized democracy. The variable is calculated as the average between 1960-2000. Source: Polity IV.

Risk of expropriation: this can also be understood as the risk of "confiscation" of property. It takes on values between zero and ten, the rating being higher when there is a lower probability of expropriation. It was calculated as the average between 1982-1997. Source: International Country Risk Guide.

Government effectiveness: measures the quality of the provision of public utilities, the quality of bureaucracy, the capability of the civil servants, the independence of the judicial branch from political pressures and govern-

ment credibility with regard to policies. This variable is measured in values between-2.5 and 2.5, where higher values indicate a greater government efficacy. The 1998-2000 average is measured. Source: Kaufman et al (2003).

Legal origin: identifies the legal origin or the commercial code of each country (English, French, Socialist, German, Scandinavian). Source: La Porta et al (1999).

Other Variables

Proportion of the population living in temperate areas: percentage of the population in the Koeppen-Geiger temperate zone in 1995. Source: Center for International Development Data Sets.

Population density in 1500: total population divided by the arable land in 1500. Source: McEvedy and Jones (1978).

Years of education: years of education of the total population older than 25 years of age. The average was constructed for the 1960-2000 period. Source: Barro and Lee (2000).

Per capita GDP: Gross Domestic Product over population. Source: Aten *et al*. (2002).

World mining has experienced a notable boom over the last few years. In addition to the notable increase in the price of several mining products on world markets, one can add the dynamics of the investment flows made by large international mining firms. Latin America has not been oblivious to this phenomenon and, nowadays, many countries in the region benefit from a notable increase in foreign investment flows and a significant increase in mining exports. This unusual dynamism has occurred at a time in which a new paradigm has arisen, based on a review of the experience in several countries, which states that mining can be an engine for development.

In this context, certain questions regarding the situation of mining in Colombia and of its economic and social impact in the country and in the regions where it takes place gain particular importance. This study, contracted by asomineros Chamber of the National Association of Colombia Businessmen -andi- delves into this issue and seeks to answer these questions. To this purpose, a review of the new paradigm regarding the role of mining in economic development is presented with an assessment of several success stories. Additionally, it offers an overall vision of the impact of mining activities on the Colombian economy in recent years, undertakes an evaluation of the role of mining on regional development and assesses the competitive position of Colombian mining in an international context. Lastly, it shows the impact of mining on certain additional dimensions of social and regional development.

ANDI
Cámara Asomineros

FEDESARROLLO
Centro de Investigación Económica y Social

ANDI