



Mining in Argentina

**Current situation, potential
and opportunities**

April 2016

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Introduction

Argentina has an important mining tradition spanning over a century, especially focusing on the production of gold, silver, lead, aluminum and copper. The growing global demand for minerals, such as lithium and silicon, makes the country play a new leading role.

Minerals play an active role in our lives. They are present in all the things we use and consume in a proportion greater than imagined. Metals, such as iron, aluminum, copper, zinc and platinum are intensively used by the automotive and electronic industries. Other minerals, such as limestone, sands and silica are used in the construction and paper industry; whereas coal and uranium are used in the energy industry (without considering oil and gas, which despite being part of a separate industry, as they are resources extracted from the soil and rock, may be regarded as included within mining).

According to a study conducted by IDESA (Institute of Argentine Social Development)¹, a vehicle is made up of 67% ferrous metals, and a cellphone, among other materials, contains large amounts of metallic minerals (copper, for example, represents 50%).

These are only some examples of everyday products in which the mining industry has left a permanent mark. In the particular case of Argentina, in relation to the examples given in the preceding paragraph, the automotive and electronic industries are two productive areas showing an increasing share in GDP and in domestic exports. During recent years, as a result of certain policies

that produced distortive effects², both industries have shown an uneven performance that might not reflect their real situation. However, they offer good examples to show the importance of mining for economic development.

In fact, mining is not only a significant activity within the national production structure or system (GDP), but also provides basic supplies necessary for the production of other finished products. Accordingly, based on the most recent input-output matrix (IOM) prepared by the Argentine Institute of Statistics and Census (INDEC) in 1997, it can be concluded that the sales in this sector (*Exploitation of mines and quarries*, according to the classification made by INDEC) have a significant influence in the gross production value (GPV) of the overall economy and some areas in particular, such as the manufacturing (3%), power supply, gas and water (12%) or construction (3%) industries.

The conclusions that may be drawn from the IOM are critical to understand the valuable role of mining in the Argentine economy (see Table 1). According to estimates made by INDEC, the mining industry represents almost 3% of the GPV of the manufacturing industry. GPV is made up of two elements: intermediate consumption or IC

(i.e. supplies demanded from one economic sector to the others) and the production value added or PVA (i.e. the value that the sector involved adds to the IC through the intensive use of production factors, basically capital and workforce). The share of each element in GPV depends on the business activity under analysis. For example, in the case of mining, the PVA represents 69%; therefore, in relative terms (i.e. regardless of its absolute value of production and its share in the national GDP), this is considered a “productive” economic activity. For comparative purposes, the GPV of the industry is made up of a 66% CI (local and imported) and only a 32% PVA. However, this industry represents a share in GDP of more than 16% in absolute terms. In addition, it can be said that the industry accounts for 40% of the GPV of the mining activity, which, in turn, represents 58% of the demand for mining products from all economic sectors (except for the demand for local and external final consumption, and the percentage allocated to the gross formation of capital).

However, the share of mining in the GPV of the industry results, in fact, from calculating the average impact on the GPV of each industrial activity. Therefore, it might be expected that such share shows a significant increase when, for example, the metallurgical, chemical and petrochemical (for which oil and gas are basic supplies), automotive or machine production, metallic and non-metallic minerals industries are

1 “La Minería y su aporte al desarrollo económico nacional” [Mining and its contribution to the national economic development], IDESA, December 2011.

2 The increase in luxury tax applicable to the automotive industry, subsidies, tax exemptions and the excessive promotion of import substitution for the electronic industry provide a clear example of this.

analyzed. In these cases, the share of mining is significantly higher than the average share of the industry; which clearly highlights its importance. This is even more evident when we analyze other sectors where mining represents the greatest share in its GPV: power, gas and water supply (PGWS). In this sector, which is critical for the industry, agribusiness and service provision, based on the IOM, it is estimated that the share of mining in the GPV is over 12%. Such percentage, which is significant in itself, becomes more important when we understand that the IC of PGWS represents 50% of its GPV or that it accounts for around 21% of the total demand for mining products from the other economic sectors.

In addition, holding the results of the IOM in 1997 fixed, we can conclude from *Table 1* that, in aggregate terms, 70% of the GPV of mining is allocated to the IC of all economic sectors (i.e. as production supplies) and that mining provides around 4% of the total intermediate consumption of production supplies.

As regards employment, as it can be seen in the column *Employment* of *Table 1*, based on the IOM, it is estimated that **mining is the productive area that creates the greatest number of indirect jobs per direct job in other areas** (around three additional positions). If it is considered that the economy generates, on average, 1.7 additional

jobs per direct job, the figures obtained by the employment multiplier for the mining industry are even more remarkable (even though, historically, the mining industry has made a small contribution to total employment, according to the statistics on registered employment kept by the Ministry of Labor, Employment and Social Security).

A parallel analysis may be conducted by observing the main ten products (or groups of products) exported by Argentina in 2014. As it can be seen from the table below (*Table 2*), mining, without including mineral fuels, represents a share of around 4.5% in total exports of the first ten groups of products (or 11 %

Table 1
Input output matrix in 1997. Conclusions on mining.
(In percentages and number of jobs created)

AREA	PRODUCTION DATA				SHARE OF MINING IN		DEMAND TO THE MINING SECTOR		EMPLOYMENT
	IC		TAXES ⁽¹⁾	PVA	GPV	IC ⁽²⁾	INTER MEDIA TE	TOTAL ⁽³⁾	MULTIPLIER
	LOCAL	IMPO.							
Agriculture, cattle raising, hunting and forestry	40%	2%	2%	56%	0%	0%	0%	0%	1.5
Fishing	43%	2%	5%	50%	0%	0%	0%	0%	1.8
Exploitation of mines and quarries	28%	2%	1%	69%	-	-	7%	6%	3.0
Manufacturing industry	55%	11%	2%	32%	3%	5%	58%	40%	2.6
Power, gas and water supply	50%	3%	1%	46%	12%	25%	21%	14%	2.7
Construction	47%	3%	2%	49%	3%	6%	14%	9%	1.5
Wholesale and retail sale	26%	1%	1%	72%	0%	0%	0%	0%	1.1
Hotels and restaurants	51%	0%	1%	48%	0%	0%	0%	0%	1.7
Transport, storage and communications	32%	4%	5%	59%	0%	0%	0%	0%	1.4
Financial intermediation	34%	0%	3%	63%	0%	0%	0%	0%	1.6
Real estate, renting and business activities	16%	1%	1%	82%	0%	0%	0%	0%	1.5
Public administration and defense	24%	1%	4%	71%	0%	0%	0%	0%	1.2
Education	10%	0%	2%	88%	0%	0%	0%	0%	1.0
Social and health services	35%	0%	4%	60%	0%	0%	0%	0%	1.4
Other activities	36%	1%	4%	59%	0%	0%	0%	0%	1.3
Households	0%	0%	0%	100%	0%	0%	0%	0%	1.0
TOTAL							100%	69%	1.7

Source: prepared by KPMG based on INDEC data (IOM, 1997).

Note: (1) =Taxes; (2) = It does not include imports; (3) = It is made up of the intermediate demand, final consumption, exports and gross formation of capital (equivalent to the GPV).

if fuels are considered). In addition, according to IOM estimates of the share of mining in the GPV of other economic activities, it can be concluded that most of the groups of products that record the highest export levels depend, to some extent, on mining.

From the historical standpoint, as other productive activities critical for development, mining has kept pace with the national economic growth. As it can be seen from *Figure 1*, which shows growth rates using 10-year moving averages for both mining and GDP during the 1900-2015 period, the acceleration and deceleration cycle of the *Mines and Quarries* category has kept pace with the economy, experiencing some evident deviations during 1956-1972 and in

recent years, which occurred at the same time as the ups and downs of the mining share in GDP.

The information provided so far gives a snapshot of the performance and importance of mining in the national economic development of recent years. This article is intended to provide an overview on the performance of, and changes in, this sector during the 1900-2015 period, while showing different milestones and how mining has contributed to the national economic growth. To that end, this article is divided in two sections: the first one analyzes changes in mining as a productive sector throughout the 1900-1960 period; the second one includes an analysis covering the following fifty years until present days (1960-2015).

Table 2
Ranking of exported products. Year 2014.
(In thousands of U.S. dollars)

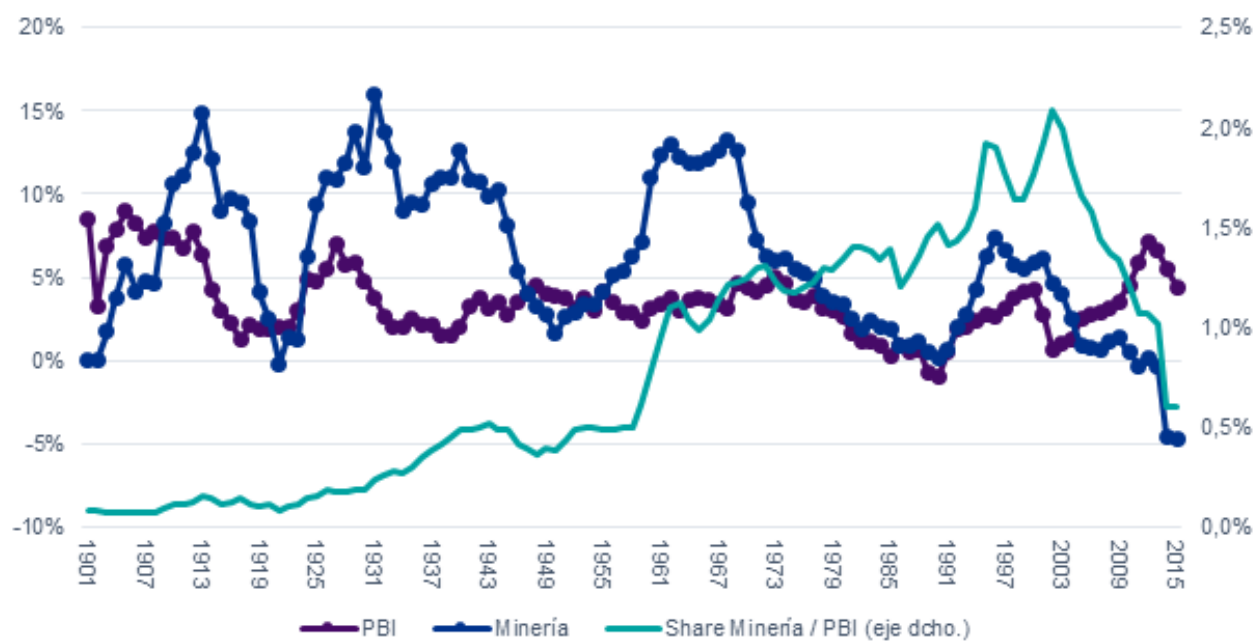
INDUSTRY	PRODUCT	VALUE
-	ALL PRODUCTS	70,000,000 (e)
FOOD	Food industry wastes (mainly flour)	12,846,863
AUTOMOTIVE	Automobiles, tractors, motorcycles and other land vehicles, including their parts	8,332,494
FOOD	Grains	5,236,728
FOOD	Animal and vegetable fat and oil	4,315,794
AGRICULTURAL	Oil seeds and oleaginous fruits	4,211,889
MINERALS	Mineral fuels and distillation products	3,198,117
CHEMICAL	Miscellaneous chemical products	2,201,694
MINERALS	Natural or cultured pearls, precious and semiprecious stones, and the like (*)	2,069,531
-	Non-specified commodities	1,837,521
FOOD	Meat and edible offal	1,836,394

Note: (e) = estimated value; (*) = including gold, which is the most significant in this group.

Source: Prepared by KPMG based on Argentine Ministry of Economy (MECON) and COMTRADE data.



Figure 1
Historical performance of mining gdp and national gdp (1900-2015)
(In %, with 10-year moving averages)



Source: prepared by KPMG based on ORLANDO FERRERES and INDEC data.

First fifty years: 1910-1960

Mining in Argentina dates back to the beginning of the Republic. The first remarkable milestone was the enactment of the Mining Promotion Law in 1813, which was intended to encourage research on, and exploitation of national mineral wealth. Some years later, in 1862, the then current governor of the province of San Juan, Domingo Faustino Sarmiento, commissioned a soil study to determine the mining potential of the soil of such province. Then, during his presidency, the Minister of Domestic Affairs, Dalmacio Vélez Sarsfield, was in charge of the overall inspection of all mining fields of the nation, which enabled to keep a detailed record of the numerous mining deposits throughout the country, where metal minerals show the greatest potential.

Upon the adoption of the Argentine Mining Code in 1887³, the subsoil and its wealth became the property of the State (the “regalian doctrine” was adopted). However, the new regulatory framework allowed private exploitation. In fact, the development of the mining activity, at least during early stages, as well as of the metallurgic industry, which might be considered an industrial link within the value chain of mining, was until the 30’s the result of both local and

foreign private initiatives. In addition, the State had had little influence and involvement in the promotion and development of the mining activity and the tax policies adopted by the State had not boosted mining, either. Nor were there any controls over production or additional rules preventing, for example, monopolistic activities at the domestic level, mainly in metal mining, which was led by companies having a clear link with international large firms.

During the first years of production, mineral extraction activities, mainly conducted in the provinces of San Juan and Mendoza, recorded low levels, if compared with those that may be reached nowadays with existing processes and technology. The number of employees assigned was around 2700 people and, in light of the low production levels, product per man (i.e. a productivity indicator) did not reach significant levels during the first years of the last century. Mining was clearly a fledgling industry with great development prospects.

At the beginning of last century, mining was characterized by metal production cycles. During the first half of the 20th century, this sector experienced a moderate growth as a result of the discovery of tungsten, tin, iron, lead, silver, zinc, copper and oil fields, in response to the two wars that marked this period, leading to severe global economic crises, an also as a result of the fact that the manufacturing industry was undergoing a full development stage. In fact, if we assumed as constant the results of the IOM that would be estimated around 80 years later, by then, mining should have

been important for the economic development of the nation, both in terms of its share in the production value added and its potential to generate direct and indirect jobs.

Both the First and the Second World War, which took place in 1914-1918 and 1939-1945, and the international financial crisis in 1930 were clear drivers of the development and growth of different productive sectors of the Argentine economy by the middle of last century. The three historical events showed a series of factors and circumstances, encouraging the progress of the national economy and helping it move from an agro-exporting economy to an incipient industrial-based economy.

The First World War was a milestone that reversed the production standstill of an economy that was based on primary activities and the export of agricultural and livestock products. Until then, the country’s business relationship with Great Britain had generated all revenues necessary to sustain a moderate economic growth, but which did not leave room for the implementation of other production models, such as import substitution industrialization, which was emerging in the region.

The restrictions imposed by the two World Wars interrupted international trade and capital flows, having a direct impact on most economic activities, including mining and the public investment program, which heavily depended on foreign funds.

To put it in figures, the drop in the national GDP at the beginning of the First World War was around

3 It is the basis of the Argentine mining legislation. Some amendments were made in relation to mineral fuel and nuclear minerals during the 50’s. The latest amendments were introduced through Law No. 22259, enacted in 1980 and intended to encourage private investment. Further amendments were introduced in the 90’s, together with the constitutional reform in 1994, which, in general terms, were aimed at boosting investments (Laws Nos. 21382 and 24196), updating the Mining Code and passing the original ownership of minerals to the provinces, thus enabling the creation of state-owned mining companies at the provincial level.

10% and this situation remained unchanged until the end of the war in 1918. In aggregate terms, the Argentine economy had dropped by 21% from 1914 to early 1918, the industry by 17%, and mining by 25%. Furthermore, the share of mining in the gross product and in national exports was under 0.1%. Such figures and behaviors clearly show the great dependence and sensitivity of Latin American economies to external imbalances, mainly those occurring at that time in the old continent⁴.

In both wars, the effects on European economies and on other economies having a commercial relationship with them were significant.

While European economies had to change their productive structure and reallocate most resources to the arms industry and the maintenance of their armies, the other economies, especially Latin American ones, started to see a substantial increase in the demand for food, raw materials and fuels, among other items, which should have encouraged their participation in world trade and increased their international reserves as well as their household income and trade surplus. However, increases in the international demand for commodities or slightly manufactured goods directly impacted on prices, and supply was far outstripped by demand and could not keep pace with it. The goods affected by the increase in prices during both wars included, in addition to food, several mining products, such as copper, silver, zinc or mineral fuels such as coal and oil (see Figure 2). Accordingly, the changes in the price of the three minerals referred to above show that they have

performed in a similar way during the period covered by the two World Wars. From 1914 to 1918, the prices of silver, copper and oil increased by 78%, 86% and 144%, respectively. Likewise, during the period spanning from 1939 to 1945, the prices of these resources increased by 32% (silver), 7% (copper) and 3% (oil). In line with such increases, domestic prices of mining and energy products rose by 21%.

The two world wars of the past century had a negative impact on local mining

A similar trend was followed by some typically industrial products, as their relative scarcity contributed to increasing the prices of such products, since some of the world's largest economies participated in both wars, thus putting a halt to the production of non-strategic industrial products. This triggered an inflationary process that affected almost all countries and products involved in international trade, though to a different extent. Accordingly, the apparent benefits derived from this context for Latin American economies (mainly those typically engaged in primary production) cannot be properly estimated, unless some of the factors that determined their intensity and extent are described. Firstly, the effects of the two wars that broke out in the last century on the demand and exports of these countries depended on the type of products produced and provided by them to the global market. Secondly, even when inflation of foreign prices might have leaned international trade and its profits towards economies engaged in the production of food

and raw materials, the net benefits received by such economies cannot be estimated if changes in the prices of exported products are not compared with those of imported products.

In the case of Argentina, as it is shown in Figure 3 (chart III), the increase in the prices of products imported during the First World War was higher than that of exported products; therefore the terms of

trade (TOT) for total exports were not very favorable. However, mining exports benefited from a context of price rises, since, from the beginning to the end of the war, prices grew at a very significant annual average rate. The opposite trend was seen during the 1939-1945 period.

During the Second World War, the overall increase in the prices of the products exported was higher than that recorded by the products typically imported by the country. This was triggered by the import substitution industrialization process that the country had initiated some years ago, following the crisis of the 30's to replace the agro-exporting model, which had been a characteristic of the country. In furtherance of this new development model, which would be intensified after the war, Argentina had managed to substitute industrial products that were formerly imported and to reverse the negative effects that the TOT had on trade during the 1914-1918 period. The growth in exports during the Second World War was in line with the changes in prices: while Argentine total exports grew by 54% (in dollars) from the beginning to the end of the war, the exports of mining and energy products grew by 34%.

⁴ During 1913, Argentina allocated around 60% of its exports to its European partners (mainly Great Britain, which represented 25%) and only 5% to the United States. Other countries, such as Bolivia, Chile or Brazil behaved in a very similar way.

Figure 3 also shows that the performance of the mining gross product followed a trend similar to the national GDP during both periods (I). This must be clear. The mining sector generates productive resources and energy supplies that are critical to the overall economic development of a nation. As detailed in the previous section, mining provides essential raw materials to the industry that enable to reduce costs and improve productivity levels, which is translated into a proportional increase in GDP. However, as it can be noted in the second chart (II), the drop in the growth of the mining GDP was in line with the stagnation and plunge in national GDP during both the 1913-1918 and the 1939-1945 periods. Notwithstanding the foregoing, the acceleration and deceleration cycles of the mining GDP have always been more volatile than those related to the national GDP, due to its higher dependence on prices and foreign demand.

From 1920 to 1941, the share of mining in GDP and in national exports went from 0.1% to 0.5% and from 0.1% to 2.2%, respectively (see Figure 3, chart IV). By the early 40's, the production of gold, silver, zinc, lead and copper had reached, in the aggregate, 107,000 tons, while mining exports had surpassed USD 10 billion.

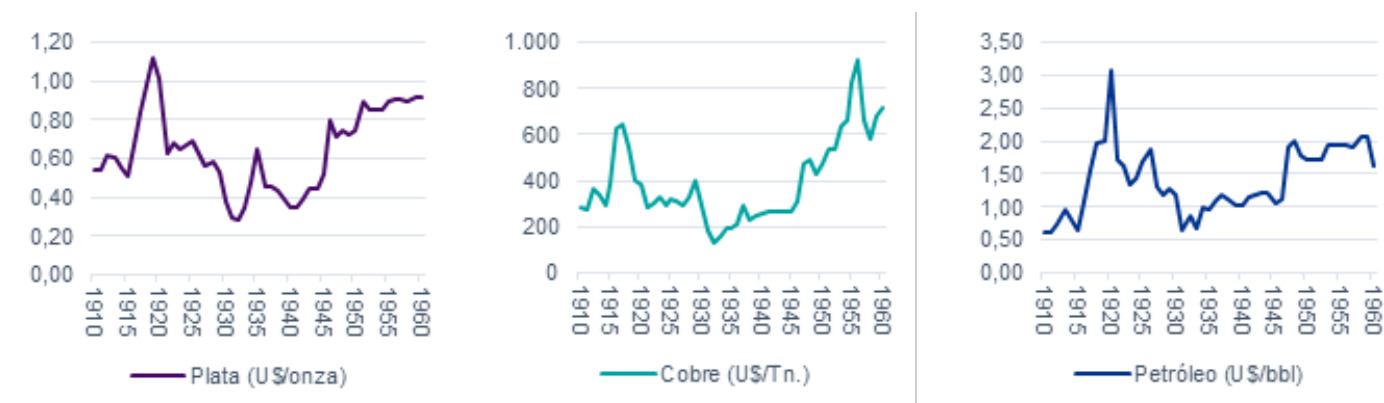
As regards national mining private activity, it is to note that from 1914 to the beginning of the crisis of the 30's, a large number of English mining companies left the country, whereas the inflow of U.S. capital increased significantly, showing a completely opposite trend. The commercial leading position and potential of the United States had already threatened the English position prior to the First World War. Furthermore, the presence of the United States in the international scene progressively increased since such war, mainly in terms of foreign investments. In this new scenario, Argentina initiated

a gradual but sound change in its bilateral commercial relationships, giving priority to the United States, which boosted new investments that were allocated to different industries, such as oil and gas, mining and other primary and secondary activities that promoted national economic growth in the post-war period.

Following the crisis of the 30's and the Second World War, the State was forced to intervene in this activity through publicly-owned businesses⁵ with the aim of continuing to evaluate the soil and exploiting mining resources, as the private sector was unwilling to bear the risks of this activity. However, some private small and medium sized enterprises (SMEs) continued to be present in the subsector of non-metallic minerals (clay, sand, silica, borate, gypsum, among others).

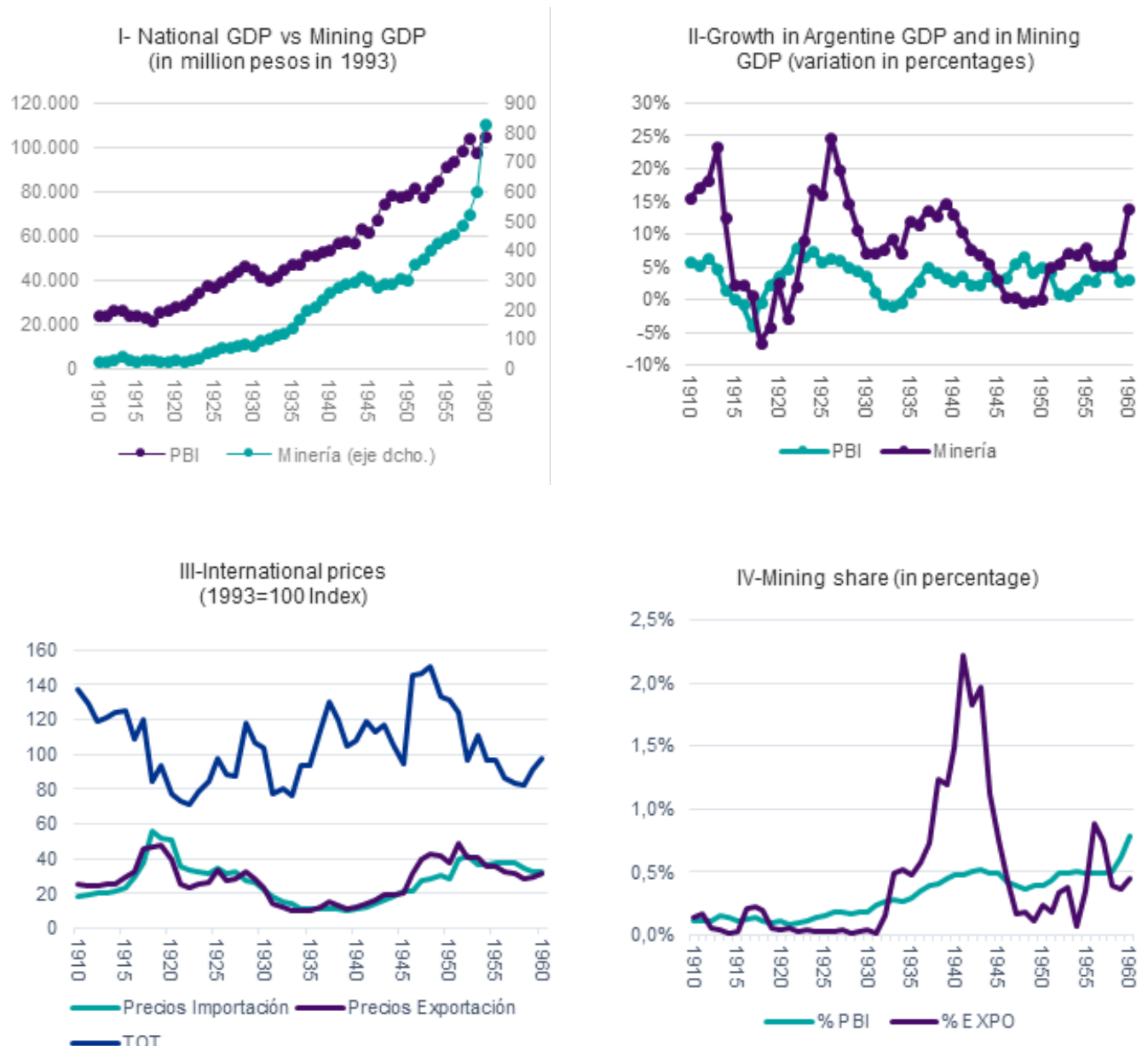
5 The main public bodies in charge of directing investment towards mining within the framework of the ISI model were the Mining Department (*Secretaría de Minería*), the General Department of Military Industries (*Dirección General de Fabricaciones Militares*) and the Argentine Commission of Atomic Energy (*Comisión Nacional de Energía Atómica*) (Tolón Estarellles, 2011).

Figure 2
Changes in the prices of minerals and fuels. 1910-1960 Period.



Source: prepared by KPMG based on ORLANDO FERRERES and INDEC data.

Figure 3
Main performance indicators. 1910-1960 Period.



Source: prepared by KPMG based on ORLANDO FERRES, INDEC and Argentine Ministry of Economy data.

Since then, the development of the mining sector has had a significant presence of the State and has been exclusively oriented to the provision of supplies for the industry. During this stage, the first exploration and prospecting works for iron (in Sierra de Zapla, Jujuy, and Sierra Grande, Río Negro), coal (in Río Turbio, Santa Cruz) and copper (in Tinogasta, Catamarca), among others, were conducted. These two decades and the following decades until 1960 were marked by a continuous industrialization process that required a greater amount of supplies from mining. The production of the mining sector reached an average share of 1.1% in GDP during the 60's and, by the end of such decade, this sector produced around 120 thousand tons of the main minerals (gold, silver, zinc, lead and copper) in the aggregate. In addition, from 1960 to 1969, although the share of mining in GDP was only 1.2%, such sector represented from 2% to 3% of the growth experienced by the national GDP and exports, which clearly shows the increasing performance of this sector and its importance in development policies.

However, despite the growth experienced by the sector, the amounts of mineral required for the purposes of the import substitution industrialization model could not be wholly provided by local production. Therefore, since then and until 1997, the import of the additional raw materials required led to a sustained and traditionally negative balance of trade⁶.

During this period, some specific regulations have been adopted. Such regulations were aimed at improving the business conditions and environment in order to promote mining exploitation. By then, mining was already a provider of supplies critical to industrial development. Such regulations included Decree No. 22477/1956 related to nuclear minerals, Decree No. 5760/1958, and Hydrocarbons Law No. 14773 enacted in 1958 and overturned by Law No. 17319 (new hydrocarbons law regime).

⁶ For instance, the exports of the mining sector in 1964 and 1980 represented around 3% and 43%, respectively, of the exports recorded in 1997.



Last fifty years: 1960-2015

As presented in the previous section, the first half of the last century was not so favorable for national mining production. However, mining as a productive sector has evolved towards a great market of supplies for local production. At the end of the 60's and beginning of the 70's, certain projects for the exploration of metal minerals were carried out, fostered by the increase in foreign prices⁷ and the difficulties encountered by companies abroad (Sarudiansky and Nielson)⁸. Furthermore, during the 80's, a new exploratory wave, mainly for gold, was generated which, despite the detection of metal mineral areas and deposits of interest, did not cause a significant increase in the activity.

Since 1970, as an answer to the domestic crisis faced during that decade and at the beginning of the 80's, the mining GDP was in line with the national GDP's fall. It is estimated that from the beginning of that decade to the return of democracy in 1983, the annual average growth

rate of the sector was 3%. However, the greatest growth in the sector, mainly as regards gold, copper, silver and aluminum production, occurred as from the 90's, given the series of changes introduced to the regulations effective up to that moment. Among these changes, we must highlight those seeking to favor foreign investments in general (Law No. 21382/1993) and particularly in the mining sector (Law No. 24196/1993)⁹, the amendment to the Mining Code (Law No. 24498/1995), and the changes produced jointly with the constitutional reform of 1994, which reoriented the original ownership of natural resources from the State to the provinces and enabled the creation of provincial mining companies¹⁰.

During this period, the new regulatory framework, together with the country's openness and the attractive foreign price structure, fostered the establishment of foreign companies, mainly from Canada and Australia, with a significant rise in the sector's production levels (basically of metal production which, at that

time, already had a share of 60 % in national mining production). In this new context, various mineral deposits were launched, such as Salar del Hombre Muerto (lithium production) and Bajo de la Alumbrera (copper, gold and silver extraction) in Catamarca, and Cerro Vanguardia in Santa Cruz (mainly gold).

Despite the changes produced by the amendments to the mining model regulations that had ruled until the 90's, and by the significant projects launched in the national territory, Argentina did not record any significant variation in its share in the global production of minerals. However, changes had an effect on the sector development, at least compared with the production levels previously evidenced. In this sense, Figure 4 shows a change in the trend experienced by the joint production of gold, silver, aluminum, copper, lead and zinc, mainly after the first half of the 90's.

As noted in the previous figure, the joint production of minerals showed a rise of 104% from 1990 to 1999. At the beginning of the new century (2001), the sum of the production of these minerals reached 500 thousand tons, and the GDP of the mining sector grew at rates ranging from 5% to 7% annually. Furthermore, during this period, Argentina began an active and growing participation in the export of some basic minerals for industrial production, such as copper, gold and other non-metal minerals such as lithium.

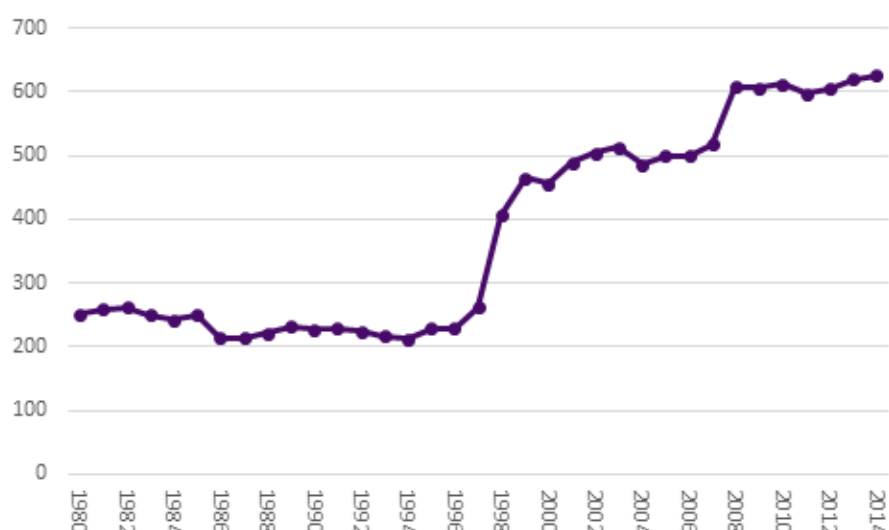
7 From 1970 to 1980, the prices of gold, silver and copper, just to name a few, recorded considerable increases. These increases, jointly with the growth in the price of other tradable goods, drove Argentine terms of trade by 24%, favoring the net inflow of foreign currency. Likewise, these increases generated investments and the production of minerals in our country.

8 As explained by R. Sarudiansky and H. Nielson, an example of this was noted when certain foreign companies conducted copper exploratory activities in our country, due to the nationalization of copper deposits in Chile. With the support of the United Nations, the National State developed the following plans: Cordillerano, NOA, San Luis, Patagonia-Comahue and Misiones, intended to promote and order this new exploratory wave.

9 The Mining Investments Law promoted the increase in investments through strong incentives such as tax stability for a term of 30 years and certain tax benefits (accelerated depreciation, VAT refund and deduction of exploration expenses).

10 Other laws of interest for the mining sector were the following: Law No. 24402/1994 (VAT financing and early refund regime), Law No. 24585/1995 (Environmental protection for the mining activity), Law No. 24585/1996 (Binational Agreement with Chile on Mining Integration and Cooperation) and Laws No. 25161/1999 (on the mineral pithead value) and No. 25429/2001 (Mining Activity, amended by Law No. 24196 on mining investment).

Figure 4
Production of main metal minerals.
(In thousands of tons)



Source: Prepared by KPMG based on O. FERRERES data, U.S Geological Survey and British Geological Survey.

In addition to the previous and preexisting mineral deposits¹¹, other deposits opened such as Veladero (2005, silver and gold extraction) and Gualcamayo (gold and silver) in San Juan, Mina Pirquitas in Jujuy (2009, silver and zinc production), Potasio Río Colorado in Mendoza (2010, currently suspended), Cerro Negro in Santa Cruz (2015, gold) and Pascua Lama, also in San Juan (2013, gold and silver, currently suspended). Other deposits are El Pachón (copper) in San Juan and Agua Rica (gold and copper) in Catamarca, which are expected to begin operations before 2019.

The multiplication of deposits for mineral production, mainly metal minerals, after the implemented reforms, not only transformed the national mining sector production structure, but also, at the same time, drove certain industrial areas which, by the intensive use of these

resources, were favored by a growing domestic market of supplies, to the benefit of the industrialization process, due to the replacement of imports (in general, this new mining model helped both the industry and the construction sector, as explained in the first section on the results of the IOM, 1997).

After the end of convertibility in 2001 and the currency devaluation in 2002, jointly with the growth of China and its pressure on the international demand for supplies, mining became the main recipient of foreign direct investments (FDI), primarily during the period 2002-2005 and then again in 2009 (Tolón Estarellas, 2011). In fact, the impact of mining on FDI went from 1 % in the period 1992-2001 to an average of 4 % in 2002-2004 (Calvo Vismara, 2008). Moreover, as it relates to the industry, its impact on FDI doubled from one period to the other, whereas the highest increases were led by the industry of *common metals and their production* (basically steel

and aluminum production), strongly related to mining.

The start of the already known cycle of increases recorded by prices of most commodities as from 2003, as an answer to the pressures of the main emerging economies on the international demand for supplies and factors (basically China and India), has been defined as the driver of the reemergence or boom of the mining activity in Argentina in the new century, accompanied by the regulatory reforms in the 90's and in 2001. Accordingly, the mega-devaluation of the peso against the dollar in 2002 considerably reduced production costs faced by domestic mining companies which, together with high prices, explains the sector performance during those years.

Figure 5, intended to show the changes in the national contribution to the global production of the main minerals (in this case, gold and silver) and their global prices, evidences the high dependence between both, while explicitly provides a representation of our previous comments. As it can be noted in the different charts (I y II), gold and silver cases are clear. Throughout the last decade, the behavior of these resources in the national production has been related to the changes in global prices and, thus, the local contribution to international production has grown sustainably, mainly after 2006, and jointly with the cycle of increases in the international price of commodities. At the same time, there was a fall in such contribution as from 2012/2013, as an answer to the recent deceleration of international prices. In the case of gold, however, an additional explanation is required. For the last months of 2015, the price of this metal has been falling at a monthly average rate of around 1%, though a certain recovery is seen during the first months of 2016. Some

11 Among the most important ones: Cerro Vanguardia (gold and silver) in Santa Cruz, Sierra de Zapla (iron) and El Aguilar (lead, zinc and silver) in Jujuy, and Sierra Grande in Río Negro (iron).

of the primary factors explaining this behavior (when in prior years, following the positive and growing trend in the price of commodities, gold recorded annual average rates of approximately 20 %, which made the global production increase from 2500 tons at the end of the 90's to almost 3000 in 2014) have been, among others, purchases from China which, according to specialized reports, would have risen by 60%, compared with the figures reported by that country in 2009, and the rise in US interest rates, jointly with the dollar recovery. Considering the previous issues and the correlation between prices and production (or share) no important increases should be expected in national production in the next years, which will have an impact on the contribution of our country to global production (as other countries, of course, can show the same behavior).

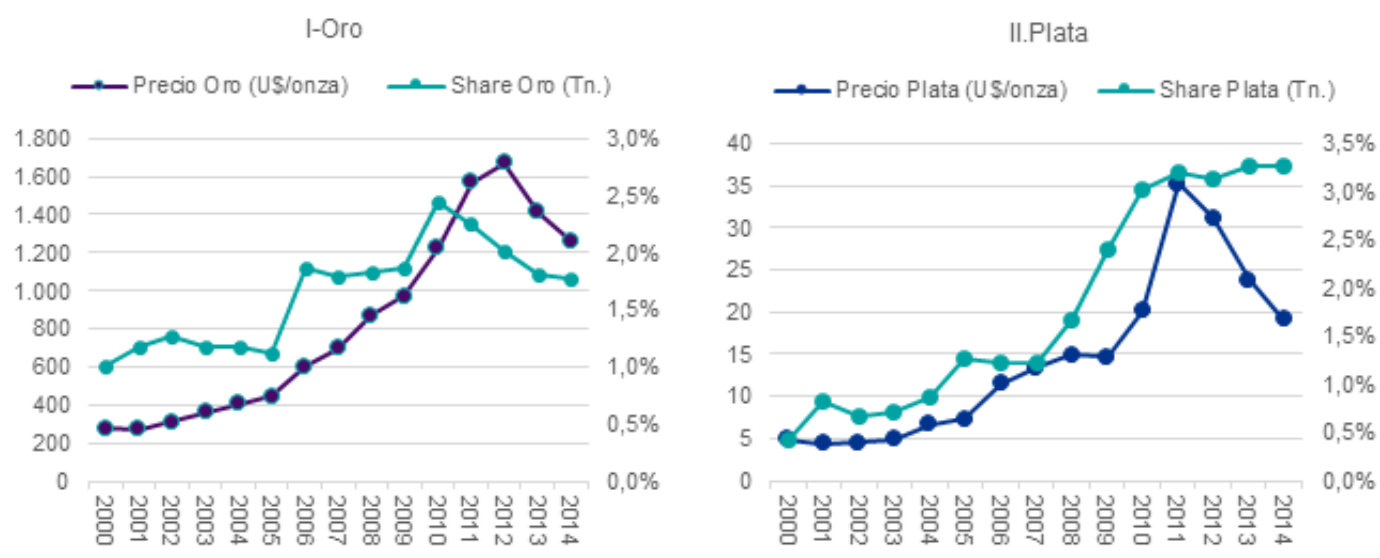
As a result of the processes previously described, mining currently represents around 1% of the GDP¹² (*Mines and quarries*) and 6% of total national exports. In 2014, around 900 aggregate tons of golden and silver were produced, in addition to 625 thousand aggregate tons of aluminum, copper, lead and zinc, being 73 thousand people employed by the whole activity (direct and indirect jobs of the *Mines and quarries* sector), out of which an important portion is engaged in the extraction of metal minerals. If we take into account that, according to data presented, the quantities produced in previous decades represented a portion of those described now, it can be concluded that the growth in the mining sector has been simultaneous, at least locally, to the behavior of most of the other performance indicators (i.e. production, exports and employment, among others).

Regarding exports, imports and the balance of trade (see Figure 6), the sector had been posting a deficit until 1997, when it started to show positive signs and even maintained a surplus in the trading account (= exports – imports) to date. In general terms, it can be asserted that this event, that must be understood as a critical reversal of the foreign trade structure of the sector, has been driven by the contribution of gold and copper to total mining exports¹³. These resources, by themselves, are higher in terms of export value than the demand for the import of minerals from the economy as a whole. Figures enable us to observe that exports of the mining sector have grown by more than 800% between 1997 and 2013 (from US\$ 400 million to US\$ 4000 million). Additionally, it is estimated that during 2014 the mining sector's exports were worth

12 This figure is related to the share in the actual GDP valued at prices of 1993.

13 Copper exports amounted to US\$ 1500 million in 2012, US\$ 950 million in 2013 and US\$ 930 million in 2014. Gold exports amounted to around US\$ 1800 million in 2013 and 2014. The sum of these figures represents between 60% and 70% of total mining exports made in the last years.

Figure 5
National contribution to global production and prices.
(Contribution right axis, prices left axis)



Source: Prepared by KPMG based on ORLANDO FERRERES, WORLD BANK, U.S. Geological Survey and British Geological Survey data.

US\$ 3900 million, and that in 2015 that figure was exceeded. By the end of 2016, the sector's exports are expected to record a share ranging from 6 % to 6.5 % of total national exports.

Moreover, Argentina could have become, after the reforms of the 90's and the investments made in this period, in the 9th global producer of copper and the 14th producer of gold (Bajo de la Alumbrera)¹⁴. Accordingly, after Salar del Hombre Muerto began to operate in Catamarca in 1997, the country started to contribute around 30 % of the lithium globally demanded (Tolón Estarellas, 2011). Although the mining sector is waiting to see the impact that the recent monetary changes announced by the National Government may have, the truth is that throughout these years, the sector went from a sluggish period to a first stage of development

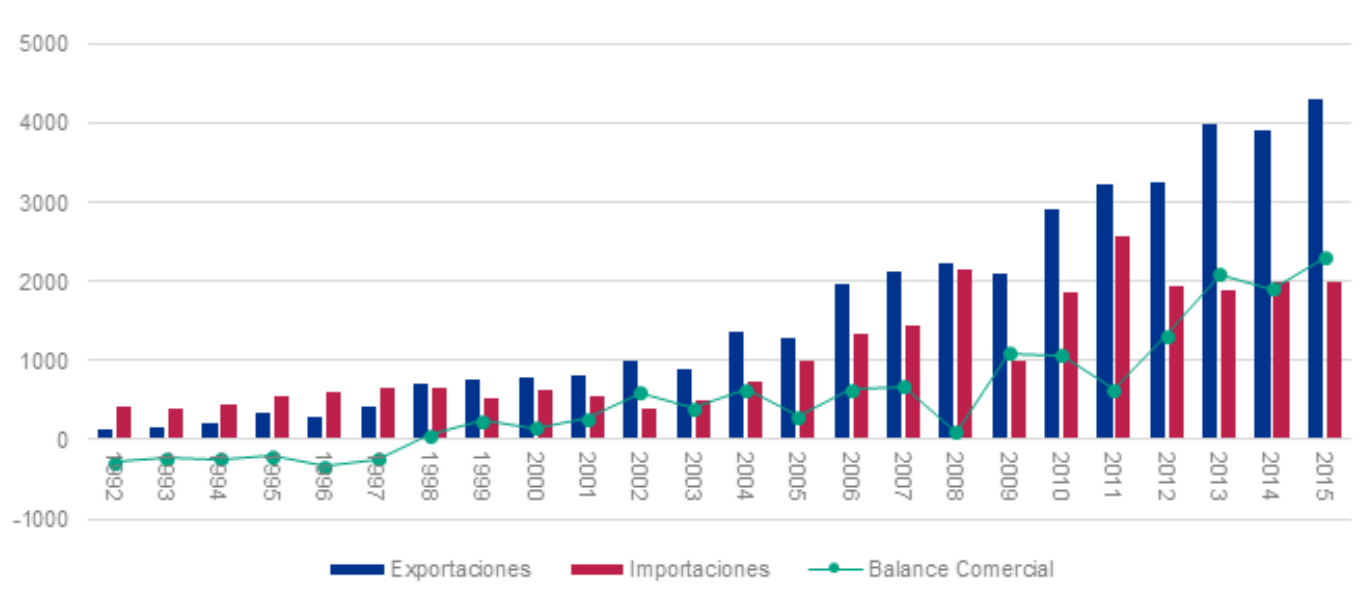
which created the bases for a future sustainable expansion. This is shown by production, investment and export statistics, as well as the influence of the sector in the industrial and general development. The end of the cycle of increases in the price of commodities, added to moderate estimates that have been made on the expected growth for emerging economies, requires a thorough review of medium term growth projections for the sector, particularly if we consider the linkage of mining in the value chain, especially with the industry and infrastructure.

The chart presented as *Table 3* summarizes some of the main variables of the mining sector and their relationship with the aggregate economy. As it can be appreciated, except for the estimate made in 2007 on tax revenues, which has remained constant because no recent statistics are available, most of the variables show a significant growth to date (mainly investment and exports).

As it relates to the mining gross product, the figures presented for the last two years (2014 and 2015) are estimates that may differ from actual figures (not available to the date of this report) due to the following factors: 1) passthrough of international prices to domestic prices; 2) the recent behavior of foreign prices of minerals and commodities which, added to certain local events, may discourage production, making the business lose liquidity; 3) certain macroeconomic problems characterized by high inflation, growing internal costs, impossibility of remitting profits abroad, rise in imports and tax pressure; and 4) investments projected for national mining, mainly foreign direct investments (FDI), which may be delayed and not meet the stipulated terms due to new expectations derived from the behavior of prices and profitability.

14 According to statistics from trustworthy bodies (mainly the U.S. Geological Survey), the national production of gold grew by 2000% between 1990 and 2000. In the last fifteen years (2000-2014), production went up by 95 %.

Figure 6
Mining balance of trade.
(In millions of dollars)



Note: Upon preparing this report, the 2015 import figures were not available. Therefore, these figures are approximate, considering the value for the prior year.

Source: Prepared by KPMG based on CAEM and World Trade Organization (WTO)



Table 3
Mining: summary of main variables

MEASUREMENT	UNIT	PERIOD			
		2000	2013	2014	2015
DIRECT INVESTMENTS	<i>In millions of US\$</i>	270	2,550	1,316	1527 (e)
	<i>As a % of the total</i>	0.1%	0.6%	0.3%	0.3%
EXPORTS	<i>In millions of US\$</i>	778	4000	3,905	> 4000 (e)
	<i>As a % of the total</i>	3.0%	4.9%	5.4%	6%
EMPLOYMENTS (*)	<i>In thousands</i>	12	24	26	26
	<i>As a % of the total</i>	0.10%	0.11%	0.15%	0.15%
EMPLOYMENTS (**)	<i>In thousands</i>	33	73	76.5	77.4
	<i>As a % of the total</i>	0.28%	0.44%	0.45%	0.46%
GDP MINES AND QUARRIES	<i>In millions of \$ 1993</i>	4880	4800	4700 (e)	4670 (e)
	<i>As a % of the total (actual)</i>	2%	1%	1%	1%
TAX REVENUES	<i>As a % of the total</i>	0.43% (***)			

Note: (*) = direct and indirect jobs recorded only for Mining production (Ministry of Labor, Employment and Social Security); (**) = direct and indirect jobs recorded for production in the Mines and quarries area –which includes oil and gas– (Ministry of Labor, Employment and Social Security); (***) = estimate for year 2007, only of tax revenues from income tax on metal mining (Machado et al., 2011); (e) = estimate.

Source: prepared by KPMG, based on INDEC, WTO, Ministry of Labor, Employment and Social Security and CAEM.

Final considerations

As in the case of oil and gas, mining is a critical activity to promote national development and achieve improvements in productivity, competitiveness and to leverage economies of scale. A country without a significant availability of these resources or a country that has simply decided not to exploit them will depend on imports, thus being tied to the volatility of world prices. If, as noted hereinbefore, the economy and production of a country depend on mining, exploiting all its potential is essential to achieve a sustainable growth for the country.

The balance for 2015 was below the expectations of this sector. In addition to the drop in the international prices of the main minerals, which reduced the liquidity of the business, the activity was also affected by macroeconomic problems encountered by Argentina, such as inflation and increased tax pressures as well as permanent social conflicts related to environmental issues. The process aimed at normalizing the main economic and financial variables of the country during last month, which included, among other measures, lifting foreign restrictions on foreign exchange, imports and exports, and allowing the free use of foreign currency, represents an encouraging change in the scenario towards the recovery of the mining activity.

However, beyond any temporary problems caused by internal and external factors, what is true is that Argentina is rich in mineral resources, which positions the country as one of the main producers of copper, lithium, potassium, gold and silver at the world level and as one of the first five generators of foreign currency from exports, which has helped overcome the negative energy balance of trade.

The production of gold, silver, lead, aluminum and copper has stood out within the Argentine mining industry during the last century and to these days. For instance, Argentina ranks 15th in production and reserves of gold at the worldwide level and, based on its potential, it might be among the top ten countries. During the first two decades of the last century, Argentina did

not contribute to global production, but nowadays, it represents 2% of total global production. Silver, a mineral with historical tradition, to which Argentina owes its name, had a similar experience and now represents 3.2% of global production and the country would rank 7th in terms of its reserves. Copper, aluminum and lead have developed in step with the aforementioned minerals. It is worth noting the potential of minerals with an increasing demand at the worldwide level, such as lithium, silicon and graphite. The last-mentioned mineral is critical to the production of lithium-ion batteries (used to provide power to cellphones, tablets and notebooks) and to the development of the steel and aeronautical industries, and has shown a growing impact on the future of nuclear and photovoltaic energy. As regards lithium, it has a great demand potential derived from new storage energy sources and is used in the production of cellphones, batteries and other IT assets. It is forecasted that, with the scale production of the so called hybrid or electric automobiles, the demand and price of lithium will rise in the middle run. Lithium was originally produced in Catamarca, Salta and Jujuy. As regards silicon, according to the statistics of the U.S. Geological Survey, China is the main producer worldwide (over 5 million tons produced in 2014), followed by Russia (699 thousand tons), Norway (369 thousand tons) and the United States (360 thousand tons). Argentina produces 11 thousand tons (0.1% of global production) and is showing an upward trend.

It is necessary that sectorial policies aimed at sustaining and increasing the growth of this strategic activity be implemented. Such policies will help reduce production costs for this industry and other sectors as well as increase productivity levels, competitiveness and investments. Furthermore, this will pave the path towards the increase in exports, the inflow of a greater amount of foreign currency and, therefore, an increase in tax income.

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In the long run, a steady recovery of the demand for minerals in the global market is forecasted, despite the volatility shown in the short run, basically due to the drop in China's activity levels. The major matters of concern of the public-private agenda that the country will have to address in the next years include levying taxes on net income – instead of on gross income – reinvesting earnings, promoting the development of the supply chain, improving infrastructure and logistics, correcting the tax imbalance among the nation, provinces and municipalities, and producing within a context of environmental sustainability and social consensus. A new impetus towards Argentine mining will ensure that the 21 largest mining projects of the country will help promote investments, new exports and generate employment sources in all the stages involved (i.e. feasibility, exploration and exploitation).

Faced with this challenge, the new Argentine Administration has stressed its commitment to the development of a responsible mining activity, preserving the environment as a cornerstone for economic growth, and as a productive activity with potential to generate employment sources. Accordingly, the normalization of the main macroeconomic variables of the country – a process that started with the removal of exchange, export and import restrictions – as well as the creation of policies by the national State, in cooperation with mining provinces and the private sector, are amongst the most critical objectives for the development of a responsible and sustainable mining activity with a significant impact on national economic growth. Now that all conditions seem to be met, there is a need for interests to converge.

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Authors

Néstor García

**Leader Partner of Energy & Natural Resources
KPMG Argentina**

Omar Díaz

**Leader Partner of Mining
KPMG Argentina**

Diego Calvetti

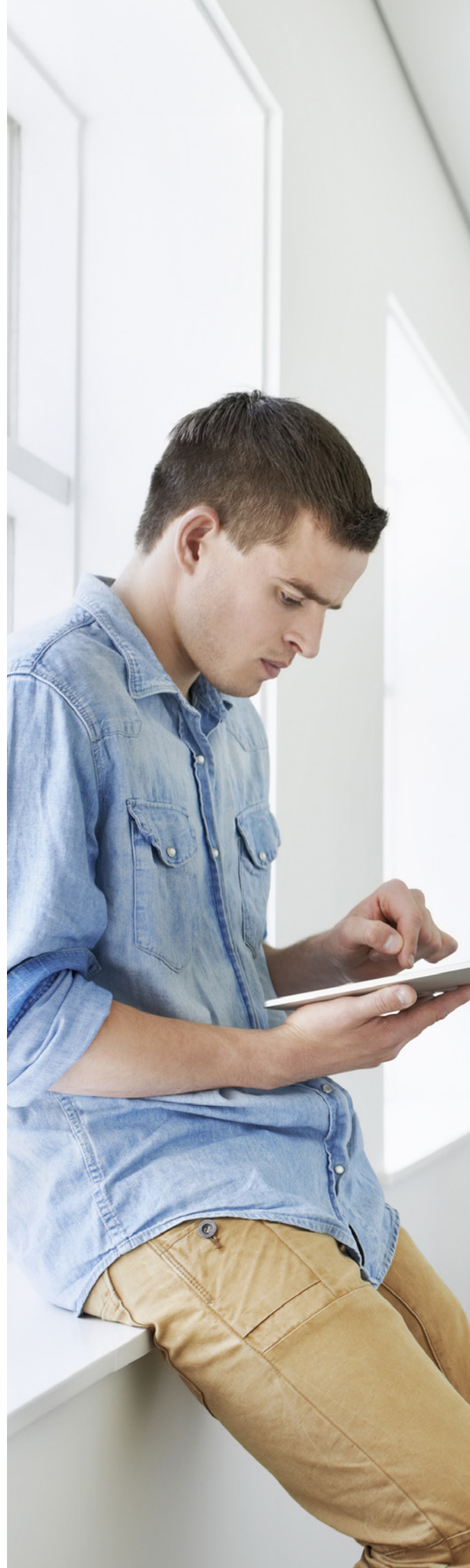
**Leader Partner of Oil & Gas
KPMG Argentina**

Matías Cano

**Manager, Business Intelligence
KPMG Argentina**

Designed by Creative Services Team -
Marketing & Communications - Argentina.

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Contact us

For further information, please visit us online at **enr-kpmg.com.ar**, or contact:

Néstor García
Leader Partner of
Energy & Natural Resources
T: +54 11 4316 5870
E: ngarcia@kpmg.com.ar

kpmg.com.ar



kpmg.com/app



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