Peru. Situation of the mining sector

February 2019
Key messages

The highlight in the Peruvian mining sector is the beginning of a new investment cycle, particularly in copper mines. Investment is mainly concentrated in three projects: Quellaveco (with a total investment of more than USD 5 billion), Mina Justa (USD 1.6 billion), and the expansion of Toromocho (USD 1.3 billion).

The beginning of this new cycle of mining investment takes place in a context where metal prices cover production costs and where financing costs are still relatively low.

Mining investment increased last year to close to USD 5 billion (+26%) and will continue to increase this year, surpassing USD 6 billion. This higher expenditure, which is equivalent to seven tenths of a percentage point of GDP according to our estimates, will give important support to the growth of activity in 2019.

The new cycle of mining investment will have a positive impact on the production of different branches of industry and services. In the past, the production of construction materials, transport materials, and basic chemicals, among others, have moved closely with mining investment.

On the production side, metal extraction stagnated in 2018 due to temporary supply problems in copper mines (exploitation of low ore grade areas, a geotechnical problem in a large mine) and depletion of some gold units.

We estimate that in 2019 mining production will rebound (expansion of just over 4%) due to the normalization of copper extraction and the operating income of the Toquepala (copper) and Marcona (iron) expansions.
Key messages

Later on, as a result of the current investment boom, mining production will continue to increase. In the particular case of copper, production will increase from a current level of MT 2.4 million to more than MT 3 million in 2024.

As in the case of investment, the increase in mining production will have a positive impact on other branches of production, especially manufacturing and services.

In addition to the projects that are currently under construction, there are other projects in the pipeline, i.e., that are completing the required studies. The amount of joint investment in these projects amounts to more than USD 10 billion. There is also another group of projects in the pipeline that have been postponed mainly due to social conflicts.

With respect to the competitiveness of the Peruvian mining sector, it stands out for its geological potential and relatively low production costs. Where there is room for improvement is in the policies that favor investment in the sector, in particular labor regulation, socio-economic agreements with the communities where the projects are located, and in the safety of these.

The Government has been working on policies to reduce procedures and simplify processes in the sector, improve the rules that regulate the activity, promote a more favorable social environment for investment, and make interventions according to the reality of each project. Peruvian mining competitiveness will be greater as these policies materialize.
Key messages

- Finally, on the side of metal prices, these fell in 2018, including copper, in an environment of greater uncertainty about global growth. This increased uncertainty reflected the escalation of trade tensions, particularly between the US and China; more pronounced signs of global growth moderation; and, in that context, the continuation of monetary tightening in the US.

- However, so far in 2019, the price outlook has improved: the US Federal Reserve has adopted a more cautious monetary tightening tone and there are signs of progress in US-China trade negotiations.

- The elements that in the short term will affect the price of copper in our base scenario are the moderation of China’s growth (which demands around 50% of copper production worldwide), the proximity of the end of monetary tightening in the U.S., concerns about the slowdown in global growth that will dissipate (especially in the second half of the year), trade tensions that will no longer escalate, supply problems in some large mines, and inventories that are currently at relatively low levels. In the balance of these elements, we anticipate that the average annual copper price will be between USD 2.80 and USD 2.85 per pound in 2019 (USD 2.96 per pound in 2018). With these prices, the Peruvian mines currently under construction are profitable.

- Later on, the price of copper will find support in the growing demand of industries such as that of electric vehicles.
Recent developments and prospects
The highlight in the Peruvian mining sector is the beginning of a new investment cycle, particularly in copper mines...

Cycle of metallic mining activity: investment and production (USD billions, accumulated in the last four quarters)

* Production valued at the average metal price between 3Q 2011 and 4Q 2018

** Las Bambas (USD 10 billion), Cerro Verde expansion (USD 4.6 billion), Toromocho (USD 3.5 billion), Constancia (USD 1.8 billion), and Toquepala expansion (USD 1.2 billion).

Source: MINEM, BCRP, and BBVA Research
... investment that is concentrated mainly in the central and southern areas of the country...

Investment in new mining projects by geographical area*
(USD millions)

- **Quecher Main**
  - USD 300 million
  - Start of operation: 2019

- **Toromocho expansion**
  - USD 1.3 billion
  - Start of operation 2020

- **Mina Justa**
  - USD 1.6 billion
  - Start of operation 2020

- **Marcona expansion**
  - USD 1.1 billion
  - Start of operation 2019

- **Relaves B2 San Rafael**
  - USD 200 million
  - Start of operation: 2019

- **Quellaveco**
  - USD 5.3 billion
  - Start of operation: 2022

---

*For more details, see appendix 1.

**Iron

---

Source: MINEM, BCRP, and BBVA Research
...and which relies on (i) metal prices covering production costs and (ii) still relatively low financing costs.

Mining investment and copper price

10-Year U.S. Treasury Bond Yield (%)

Cash cost includes extraction cost, crushing, concentration, administrative costs, energy, fuel and freight. It does not consider financial expenses.

Source: MINEM, Bloomberg, press releases and BBVA Research
In this context, mining investment increased to around USD 5 billion last year and will continue to increase in 2019...

Mining investment
(USD billions)

*Projection

Source: MINEM and BBVA Research
The additional mining investment spending that we estimate for 2019 will give important support to the Peruvian GDP growth.

* Figure for 2019 is projected

Source: MINEM, BCRP, and BBVA Research
In the past, fluctuations in mining investment spending have had an impact on production in different economic activities.

There is an interesting correlation between mining investment expenditure and industries such as that of construction materials, chemicals or transport materials.

**Mining investment and production in selected economic activities***

(YoY % chge.)

* A causality analysis confirms the positive relationship between mining investment and production in the sectors shown in the graphs.

Source: MINEM, INEI, and BBVA Research
In this new cycle of mining investment, these economic activities will once again be favored.

Mining investment in...
- Exploration
- Infrastructure
- Equipment

Production of transport materials
Production of basic chemicals
Production of materials for construction
Construction sector
Transport and storage services

+ impact

Source: BBVA Research
On the production side, metal extraction stagnated in 2018.

Copper production
(MT millions, accumulated in the last four quarters)

Metal and copper mining production
(YoY % chge.)

- The boom in metal mining production dissipated in 2017 when the new copper mines reached full operational capacity*.

- In 2018 there were temporary supply problems in copper mines (exploitation of areas with low ore grade, a geotechnical problem in a large mine) and depletion of some gold mines.

*For more details, see appendix 3.
Source: MINEM, BCRP, and BBVA Research.
We estimate that in 2019 mining production will expand again due to the normalization of copper extraction...

... and the entry into operation of the expansions of Toquepala (copper) and Marcona (iron)

* Projection

Source: BCRP and BBVA Research
Later on, as a result of the current investment boom, mining production—and copper in particular—will continue to increase.

* Expansion of the mine. For the production of Chile and China, the Cochilco estimate for 2018 is considered.

Source: MINEM, BCRP, COCHILCO, and BBVA Research
And as in the case of investment, the increase in mining production will have a positive impact on other branches of production.

### Mining production: demand for goods and services from other productive sectors (% of total mining production demand from other sectors)

- **Manufacturing**: 44%
- **Transport and storage services**: 16%
- **Hydrocarbons**: 13%
- **Electricity, gas and water**: 8%
- **Financial services**: 7%
- **Services to companies**: 3%
- **Trade**: 1%
- **Construction**: 1%
- **Other**: 7%

Source: 2007 Input-output table, IPE: “El Valor Agregado de la Minería en el Perú” (The Added Value of Mining in Peru), and BBVA Research

The extraction of minerals demands goods and services from other economic sectors, which in turn require goods and services from other productive activities.
02

Mining projects in the pipeline
Portfolio of mining projects in the study phase

Portfolio of mining projects according to their state of progress* (USD billions)

Total investment
USD 10.5 billion

- Los Chancas
- Trapiche
- Pukaqqa
- San Gabriel
- Zafranal
- Lagunas Norte**
- Corocohuayco
- Magistral
- Pachapaqui**
- Corani
- Santa María*

Legend:
- Copper
- Gold
- Zinc
- Iron
- Silver

*For more details, see appendix 4.
* Expansion
Source: MINEM and BBVA Research
Of this portfolio, more than half corresponds to copper projects, mostly located in central and southern Peru.

Portfolio of mining projects by metal* (% of total portfolio)

- **Cobre**: 61
- **Hierro**: 21
- **Oro**: 11
- **Plata**: 6
- **Zinc**: 1

* In the pipeline because they have not yet been concluded with required studies

Source: MINEM and BBVA Research

Portfolio of mining projects by geographical area*

- **Lambayeque**: Magistral, Pachapaqui**
- **Piura**: Tumbes, Magistral, Pachapaqui**
- **Amazonas**: Corani
- **Cajamarca**: Coroccohuayco
- **Ayacucho**: Trapiche, Los Chancas
- **Huancavelica**: Pukaqqa, Los Chancas, Pampa de Pongo, Moquegua
- **San Martin**: Santa María**, Lagunas Norte**
- **La Libertad**: Magistral, Pachapaqui**
- **Ancash**: Magistral, Pachapaqui**
- **San Martín**: Magistral, Pachapaqui**
- **Pasco**: Magistral, Pachapaqui**
- **Junín**: Magistral, Pachapaqui**
- **Pasco**: Magistral, Pachapaqui**
- **Huánuco**: Magistral, Pachapaqui**
- **San Martín**: Magistral, Pachapaqui**
- **Ucayali**: Magistral, Pachapaqui**
- **Ica**: Magistral, Pachapaqui**
- **Lima**: Magistral, Pachapaqui**
- **Junín**: Magistral, Pachapaqui**
- **Pasco**: Magistral, Pachapaqui**
- **Magistral**: Pachapaqui**
- **Loreto**: Magistral, Pachapaqui**
- **Madre de Dios**: Magistral, Pachapaqui**
- **Ucayali**: Magistral, Pachapaqui**
- **Apurímac**: Magistral, Pachapaqui**
- **Ayacucho**: Magistral, Pachapaqui**
- **Huancavelica**: Magistral, Pachapaqui**
- **Cusco**: Magistral, Pachapaqui**
- **Madre de Dios**: Magistral, Pachapaqui**
- **Ucayali**: Magistral, Pachapaqui**
- **Apurímac**: Magistral, Pachapaqui**
- **Ayacucho**: Magistral, Pachapaqui**
- **Huancavelica**: Magistral, Pachapaqui**
- **Cusco**: Magistral, Pachapaqui**

* In the pipeline because they have not yet been concluded with required studies

** Expansion

Total investment
USD 10.5 billion
But there is also another portfolio of projects that have been postponed mainly because of social conflicts.

Mining projects that have been postponed mainly because of social conflicts

- Río Blanco (USD 2.5 billion)
- Conga (USD 4.8 billion)
- Galeno (USD 3.5 billion)
- Tía María (USD 1.4 billion)

Total USD investment: 12 billion (expenditure equivalent to 5% of GDP)

- Communities adjacent to the project have their activities threatened (agriculture, livestock) by possible contamination. They oppose the projects.
- Political cost of moving projects forward could be significant.

Source: MINEM, press releases, and BBVA Research
03

Competitiveness analysis of the metal mining sector in Peru
Main factors that determine the competitiveness of the mining sector

Mining Competitiveness Index (MCI)

01 Availability of the resource

02 Policies that encourage investment in the sector

- Regulation
- Tax regime
- Human capital
- Infrastructure
- Safety
- Social conflicts

Production costs

03 Cost
Competitiveness indicator of the mining sector

Collects a sample of 15 countries that rank at the top in the global copper, gold, zinc and silver reserves share.

**Mining Competitiveness Index (MCI)**

| 01 | Mining potential   |
|    | (availability of the resource) |
| 02 | Policy perception   |

*Prepared by the Fraser Institute. The Mining Competitiveness Index is built on the basis of surveys of executives related to the mining sector. The index corresponds to the percentage of respondents who indicate that it is attractive to invest in mining. The indicator was constructed with a weight of 60% for Mining Potential and 40% for Policy Perception (40% of respondents indicate that their decision to invest is determined by the policies applied in the sector).

Source: Fraser Institute, 2017
Peru has significant mining resources...
Peru has significant mining resources.

Peru: position in the global ranking of metal reserves*

1st Silver
3rd Copper
3rd Zinc
7th Gold

*For more details, see appendix 5.
Source: U.S. Geological Survey, 2018
In the indicator that measures the availability of the mining resource (geological potential), Peru dropped two positions in 2017.

**Mining Potential Index**

*Corresponds to the percentage of respondents who indicate that it is attractive to invest in mining when considering the country's mineral resources (geological potential).*

Source: Fraser (BBVA Research preparation)
But to be competitive in mining it is not enough to have reserves of the resource...
In the indicator that measures how policies implemented in the mining sector are perceived, Peru improved two positions in 2017.

### Policy Perception Index* (%)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chile</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kazakhstan</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brazil</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zambia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>South Africa</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bolivia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Congo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Corresponds to the percentage of respondents who indicate that it is attractive to invest in mining considering the policies implemented in the country’s mining sector.

Source: Fraser (BBVA Research preparation)
In this context, the MCI of Peru maintained its position in the 2017 ranking.

<table>
<thead>
<tr>
<th>Mining Competitiveness Index (MCI)* (%)</th>
<th>Ranking position</th>
<th>MCI: ranking position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chile</td>
<td>1°</td>
<td></td>
</tr>
<tr>
<td>Peru</td>
<td>2°</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>3°</td>
<td></td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Estados Unidos</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Russia</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Indonesia</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Mexico</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Sur Africa</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Congo</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Zambia</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>Brasil</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Bolivia</td>
<td>15</td>
<td></td>
</tr>
</tbody>
</table>

* Corresponds to the percentage of respondents who indicate that it is attractive to invest in the country's mining sector. The indicator was constructed with a weight of 60% for the Mining Potential and 40% for the Policy Perception. Source: Fraser (BBVA Research preparation)
What policies should be improved to make investment in the Peruvian mining sector more attractive?

Policy Perception Index questions*

1. Uncertainty regarding the administration, interpretation or application of existing regulation
2. Tax regime
3. Legal system
4. Commercial barriers
5. Human capital
6. Uncertainty regarding environmental regulation
7. Uncertainty regarding disputed land claims
8. Political stability
9. Quality of geological data
10. Regulatory duplication and inconsistencies
11. Uncertainty about protected areas
12. Infrastructure quality
13. Safety level
14. Socio-economic agreements with communities
15. Labor regulation/employment agreement and workers’ unions

Peru’s position in the ranking for each aspect evaluated within the Policy Perception Index**
(position out of a total of 15 countries)

* Prepared on the basis of the surveys carried out by the Fraser Institute. Considers the percentage of respondents who answered “Yes, it encourages investment” in each of the aspects evaluated (15 questions).
** Sample of 15 countries that rank at the top in the global copper, gold and zinc reserves share.
Source: Fraser (BBVA Research preparation)
Main factors that determine the competitiveness of the mining sector

Mining Competitiveness Index (MCI)

01 Availability of the resource

02 Policies that encourage investment in the sector
- Regulation
- Tax regime
- Human capital
- Infrastructure
- Safety
- Social conflicts

03 Cost
Low costs favor mining investment in Peru, which is important in an environment where prices have fallen.

### Cash cost of the main copper-producing countries* (USD per pound)

<table>
<thead>
<tr>
<th>Country</th>
<th>Cash Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congo</td>
<td>1.73</td>
</tr>
<tr>
<td>EE.UU</td>
<td>1.72</td>
</tr>
<tr>
<td>Argentina</td>
<td>1.60</td>
</tr>
<tr>
<td>China</td>
<td>1.55</td>
</tr>
<tr>
<td>Australia</td>
<td>1.50</td>
</tr>
<tr>
<td>Canadá</td>
<td>1.50</td>
</tr>
<tr>
<td>Chile</td>
<td>1.48</td>
</tr>
<tr>
<td>Promedio</td>
<td>1.42</td>
</tr>
<tr>
<td>Rusia</td>
<td>1.27</td>
</tr>
<tr>
<td>Brasil</td>
<td>1.19</td>
</tr>
<tr>
<td>Perú</td>
<td>1.16</td>
</tr>
</tbody>
</table>

* 2015. In the case of Chile, in particular, the data is from the first half of 2018 and is considered a sample of 21 operations, representing 90% of the country’s mining production. The cash cost includes costs of extraction, crushing, concentration, administrative costs, energy, fuel and freight; it does not include financial costs.

Source: Cochilco, Wood Mackenzie. Preparation: OSINERGMIN

### Electricity rates for industrial customers* (cUSD/KWh)

<table>
<thead>
<tr>
<th>Country</th>
<th>Electricity Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panamá</td>
<td>18</td>
</tr>
<tr>
<td>Bolivia</td>
<td>15</td>
</tr>
<tr>
<td>El Salvador</td>
<td>15</td>
</tr>
<tr>
<td>Brasil</td>
<td>15</td>
</tr>
<tr>
<td>Colombia</td>
<td>14</td>
</tr>
<tr>
<td>Chile</td>
<td>13</td>
</tr>
<tr>
<td>Costa Rica</td>
<td>13</td>
</tr>
<tr>
<td>Uruguay</td>
<td>12</td>
</tr>
<tr>
<td>México</td>
<td>11</td>
</tr>
<tr>
<td>Guatemala</td>
<td>10</td>
</tr>
<tr>
<td>Ecuador</td>
<td>10</td>
</tr>
<tr>
<td>Perú</td>
<td>9</td>
</tr>
<tr>
<td>Argentina</td>
<td>8</td>
</tr>
<tr>
<td>Paraguay</td>
<td>5</td>
</tr>
</tbody>
</table>

* 2015. Source: OSINERMING
The Government is working to increase the attractiveness of the mining sector.

Objectives of the sector to 2021

01. Ensure continuity of current operations
02. Make viable the projects in the pipeline in joint work with the communities
03. Encourage new explorations
04. Promote mining formalization
05. Manage mining environmental liabilities in their entirety

What are the strategies to reach them?

- Regulatory review
- Reduction of procedures and processes
- Promote a sound social environment
- Interventions differentiated per project

Source: MINEM
What are the strategies to achieve this?

### Reduction of procedures and processes
- An accompaniment strategy is being implemented for new projects and current operations through a close multisectoral coordination, with more dynamic processes through the use of the Electronic Government.
- Creation of the Directorate General for Mining Promotion and Sustainability (August 2018). One of its functions is to simplify procedures and make it easier to obtain permits.

### Regulatory review
- Regulatory improvements are being promoted and work is underway to update and identify necessary changes in current legislation, with a regulatory impact analysis and a participatory regulatory process.
- Creation of the Center for Convergence and Good Mining and Energy Practices* (August 2018). It is a space for the State, the private sector and civil society to dialogue about the activities of the sector.

### Promote a sound social environment
- A new social conflict management system is being developed, promoting the Social Advancement Fund (FAS).
- Creation of mining-energy information committees. They seek to diminish the asymmetry of information between communities, the State, and the private enterprise. The first center located in Moquegua (Quellaveco project) was recently created.

### Interventions differentiated by project
- It seeks to develop strategies differentiated in such a way that each of the mining projects in the pipeline is viable taking into account their particularities, their own reality.
- For example, in the case of environmental liabilities, there are new projects that face resistance from the population because older adjacent projects polluted the area. In these types of cases, state intervention seeks to clean up the contaminated area in order to reduce the resistance of the population.

Source: MINEM and press releases
These strategies are added to the current legal framework for the promotion of the mining sector.

<table>
<thead>
<tr>
<th>Tax stability contracts</th>
<th>Definitive return of the general sales tax (IGV)</th>
<th>Early recovery of the IGV*</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Companies may enter into legal stability agreements with the State in order to maintain the validity of a certain regulatory regime for as long as it is agreed in that agreement.</td>
<td>- It is a tax benefit to the holders of the mining activity during the exploration phase.</td>
<td>- It’s a tax benefit during the pre-productive stage.</td>
</tr>
<tr>
<td>- The enjoyment of the stability benefit applies under the following conditions: (i) 10 years for a minimum investment of USD 20 million; (ii) 12 years for an investment of USD 100 million (USD 250 million for ongoing operations); and (iii) 15 years for a minimum investment of USD 500 million.</td>
<td>- To this end, mining concessions must enter into an exploration investment contract with the State.</td>
<td>- It consists of the return of the IGV that taxed local imports or purchases of new capital goods, intermediate goods, services and construction contracts.</td>
</tr>
<tr>
<td></td>
<td>- Repayment includes all imports or purchases of goods, loans or use of services and construction contracts.</td>
<td>- The scheme is open to natural or legal persons investing in any economic sector.</td>
</tr>
<tr>
<td></td>
<td>- Mining and hydrocarbon companies will continue to receive this tax benefit until December 31, 2019.</td>
<td>- They must meet the following requirements: (i) the project must generate third category income; (ii) the investment in the project must be at least USD 5 million; and (iii) the project must require a pre-productive stage of at least 2 years.</td>
</tr>
</tbody>
</table>

* Law 1423.
Source: MINEM
Copper price outlook
In the second half of 2018 the prices of metals decreased, among them copper, ...

Copper price*
(USD/lb.)

Metal prices
(average annual level, % chge. with respect to the previous year)

Zinc 2017 2018
Cobre 1 6
Plomo 27 -3
Plata 38 -8

* Data as of December 31
Source: Bloomberg
... due to increased uncertainty about global growth in an environment where...

Perception of risk
(VIX*, in basis points)

Trade tensions escalate, especially between the US and China.

Signs of global growth moderation are becoming more pronounced (second half of 2018)

FED continues to raise its policy rate.

* VIX (Chicago Board Options Exchange Market Volatility Index)
Source: Bloomberg and BBVA Research
So far in 2019, however, the outlook improved: Fed is more cautious and there are signs of progress in the US-China trade negotiations.

* VIX (Chicago Board Options Exchange Market Volatility Index). Updated to February 13
Source: Bloomberg and BBVA Research
What elements affect our forecasts for the price of copper in the short term? China’s growth, but also...

**China: GDP**
(YoY % chge.)

<table>
<thead>
<tr>
<th>Year</th>
<th>GDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>7.3</td>
</tr>
<tr>
<td>2015</td>
<td>6.9</td>
</tr>
<tr>
<td>2016</td>
<td>6.7</td>
</tr>
<tr>
<td>2017</td>
<td>6.8</td>
</tr>
<tr>
<td>2018</td>
<td>6.6</td>
</tr>
<tr>
<td>2019</td>
<td>6.0</td>
</tr>
<tr>
<td>2020</td>
<td>5.8</td>
</tr>
</tbody>
</table>

**FED**
It is close to ending the upward cycle of its policy rate.

**Concerns about global growth**
In our scenario these are moderate, especially in the second half of 2019.

**Trade tensions**
In our base scenario we do not consider additional increases in tariffs.

**Physical supply/demand balance**
Deficit in 2019 and 2020 due to lower production in a large mine located in Asia.

**Inventories**
At relatively low levels.

Source: Bloomberg and BBVA Research

China demands around 50% of global copper production.
In the balance of these items, we expect some downward correction in the copper price for the short term.

Copper price (USD/lb., annual average level)

Source: BCRP and BBVA Research
Later on, the price of copper will find support in the increased demand from industries such as that of electric vehicles.

**Use of copper by vehicle type**

<table>
<thead>
<tr>
<th>Type of vehicle</th>
<th>Use of copper (kilograms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional vehicle</td>
<td>23</td>
</tr>
<tr>
<td>Hybrid electric vehicle</td>
<td>40-60</td>
</tr>
<tr>
<td>Hybrid electric bus</td>
<td>89</td>
</tr>
<tr>
<td>Battery-powered electric bus</td>
<td>224-369</td>
</tr>
</tbody>
</table>

Source: International Copper Association and Cochilco

**Number of electric vehicles in the world**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of electric vehicles (million units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2013</td>
<td>0.0</td>
</tr>
<tr>
<td>2014</td>
<td>0.5</td>
</tr>
<tr>
<td>2015</td>
<td>1.0</td>
</tr>
<tr>
<td>2016</td>
<td>1.5</td>
</tr>
<tr>
<td>2017</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: International Energy Agency (IEA)

**Number of electric vehicles in the world**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of electric vehicles (million units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>0.0</td>
</tr>
<tr>
<td>2018</td>
<td>0.5</td>
</tr>
<tr>
<td>2019</td>
<td>1.0</td>
</tr>
<tr>
<td>2020</td>
<td>1.5</td>
</tr>
<tr>
<td>2021</td>
<td>2.0</td>
</tr>
</tbody>
</table>

Source: International Energy Agency (IEA)

France will put an end to the sale of diesel and gasoline cars by 2040.  
July 2017

UK to ban new gasoline and diesel vehicles by 2040  
July 2017

Denmark wants to ban the sale of gasoline and diesel cars by 2030.  
October 2018
### Appendix 1. Projects in the pipeline in the new mining investment cycle

**Total investment: USD 9.8 billion**

<table>
<thead>
<tr>
<th>Project</th>
<th>金属类型</th>
<th>Total Investment: USD</th>
<th>Company</th>
<th>Location</th>
<th>Annual production</th>
<th>Entry into operation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Quellaveco</strong> (Copper)</td>
<td></td>
<td>5.3 billion</td>
<td>Anglo American (60%) and Mitsubishi (40%)</td>
<td>Moquegua</td>
<td>300,000 MTF/Cu</td>
<td>2022</td>
</tr>
<tr>
<td><strong>Mina Justa</strong> (Copper)</td>
<td></td>
<td>1.6 billion</td>
<td>Marcobre</td>
<td>Ica</td>
<td>102,000 MTF/Cu</td>
<td>2021</td>
</tr>
<tr>
<td><strong>Toromocho expansion</strong> (Copper)</td>
<td></td>
<td>1.3 billion</td>
<td>Chinalco</td>
<td>Junín</td>
<td>75,000 MTF/Cu</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Quecher Main</strong> (Gold)</td>
<td></td>
<td>300 million</td>
<td>Yanacocha</td>
<td>Cajamarca</td>
<td>200,000 Oz</td>
<td>2019</td>
</tr>
<tr>
<td><strong>B2 San Rafael</strong> (Tin)</td>
<td></td>
<td>200 million</td>
<td>Minsur</td>
<td>Puno</td>
<td>4,000 - 5,000 MTF</td>
<td>2020</td>
</tr>
<tr>
<td><strong>Marcona expansion</strong> (Iron)</td>
<td></td>
<td>1.1 billion</td>
<td>Shougang</td>
<td>Ica</td>
<td>10 million MT</td>
<td>2018</td>
</tr>
</tbody>
</table>

**Source:** MINEM and BBVA Research
Appendix 2. Direct impact of metal mining*

- **Exports**: 60% of the value of exports
- **Private investment**: 11% of private investment
- **GDP**: 10% of the total production
- **Use**: 5% of the employed workforce
- **Tax revenues**: 5% of the tax revenues

* Data from 2017
Appendix 2. Importance of metal mining in exports

Exported value: share in 2017 (%)
- Non-traditional exports: 26
- Other traditional exports: 13
- Mining: 61

Share within mining exports in 2017 (%)
- Cobre (Cobre): 50
- Oro (Oro): 30
- Zinc (Zinc): 9
- Plomo (Plomo): 6
- Hierro (Hierro): 2
- Otros (Otros): 3

27 billion USD

*Other: silver, molybdenum, tin.
Source: BCRP
Appendix 2. Importance of metal mining in private sector investment

Mining investment (2017) 4 billion USD
Private investment 11%

Regional share in mining investment, 2017 (%)

Source: MINEM and BCRP

Source: MINEM
Appendix 2. Importance of metal mining in national production

GDP: sectoral share in 2017 (%)

- Agropecuario: 5
- Construcción: 6
- Comercio y Servicios: 60
- Manufactura: 12
- Minería metálica: 10
- Otros: 6

Regional share in copper production, 2017 (%)

- Arequipa: 21%
- Madre de Dios: 13%
- Cusco: 19%
- Ancash: 18%
- Lima: 9%
- Huánuco: 7%

Source: BCRP
Source: MINEM
Appendix 2. Importance of metal mining in the generation of employment

190,000

Direct jobs* generated by mining

For each direct job 4** indirect jobs are created.

5% of the Economically Active Population (EAP) employed (2017)

---

Distribution by region of direct jobs generated by the mining sector in 2017 (%)

- Arequipa: 28,480
- Junín: 19,004
- La Libertad: 18,994
- Cajamarca: 17,379
- Lima: 14,728
- Pasco: 12,973
- Ancash: 12,544
- Apurímac: 11,374
- Ica: 8,749
- Moquegua: 8,495
- Cusco: 7,833
- Ayacucho: 6,980
- Tacna: 5,865
- Puno: 5,683
- Huancavelica: 3,983
- Callao: 2,755
- Otros: 1,035

---

* Illegal mining is not considered.
** The calculation prepared by MACROCONSULT (input-output table of 2007, basic prices) is considered.
Source: MINEM
Appendix 2. Importance of metal mining in tax revenues

Tax revenues linked to mining production* (% of tax revenue)

- Tax revenues from mining currently represent 5% of the total.
- In the coming years, tax revenues related to mining will increase due to higher profits from projects currently underway.

* Income tax (3rd category), royalties, lien and special tax on mining.
** Projection as of October.
Source: BCRP and BBVA Research
Appendix 3. The boom in metal mining production dissipated in 2017, when the new copper mines reached full operational capability.

Copper production in selected mines
(annual, MT thousands)

1: Production was reduced in 2018 due to a geotechnical problem in one of the walls of the Ferrobamba pit.
Source: MINEM, BCRP, and BBVA Research
## Appendix 4. Concessioned projects portfolio

### Pampa de Pongo

- **Investment:** USD 2.2 billion  
- **Company:** Jinzhao Mining Perú S.A.  
- **Location:** Arequipa  
- **Metals:** Iron (15 million FMT Fe)

**Current situation:**
- The following studies are available: Engineering Study, Environmental Impact Study.
- In January 2018, the company presented the first modification of the Environmental Impact Study, which is being evaluated by SENACE.
- The company is looking for partners for the development of the project. Explorations are also being carried out to determine copper resources.

### Corani

- **Investment:** USD 585 million  
- **Company:** Bear Creek Mining S.A.C.  
- **Location:** Puno  
- **Metals:** Silver (approx. 8 million ounces)

**Current situation:**
- The Engineering Study has been approved.
- The Environmental Impact Study has been approved.
- The operating activities have been approved.
- The project operator is conducting an evaluation of capital and operational savings, as well as time reduction.
- There is a risk that new authorities will delay the start of construction.

Source: MINEM
Appendix 4. Concessioned projects portfolio

Zafranal

Investment: USD 1.157 billion
Company: Compañía Minera Antapaccay S.A.
Location: Arequipa
Metals: Copper (75,000 FMT Cu) and Gold (25,000 oz Au)

Current situation:
- The feasibility studies have been approved.
- The company is preparing its detailed EIA of the project, which is expected to be completed during the third quarter of 2019.
- The company has not yet submitted its application for operating activities.

Pukaqaqa

Investment: USD 706 million
Company: Nexa Resources Perú. S.A.A.
Location: Huancavelica
Metals: Copper (40,600 FMT Cu)

Current situation:
- During the second quarter of 2018 the social license was obtained to start the drilling campaign. In addition, the pre-feasibility study of the project is underway.
- The EIA has been approved.
- The project operator has not yet submitted its application for an Operating Permit.

Lagunas Norte

Investment: USD 640 million
Company: Minera Barrick Misquichilca S.A.
Location: La Libertad
Metals: Gold (240,000 oz Au)

Current situation:
- It is the first stage of the project that would extend the useful life of the mine by 10 years. The Engineering Study has been approved.
- An update of the EIA was presented in September 2018.
- The project does not contemplate a new operating permit and approval of the mine plan.

Source: MINEM
## Appendix 4. Concessioned projects portfolio

<table>
<thead>
<tr>
<th>Project</th>
<th>Investment: USD</th>
<th>Company:</th>
<th>Location</th>
<th>Metals:</th>
<th>Current situation:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coroccohuayco</strong></td>
<td>590</td>
<td>Compañía Minera Antapaccay S.A.</td>
<td>Cusco</td>
<td>Copper (100,000 FMT Cu)</td>
<td>- Expansion of the Antapaccay mine. The feasibility studies have been approved.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- The company is in the process of modifying the EIA of the project that is currently in operation.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- The project operator has not yet submitted the application for an Operating Permit.</td>
</tr>
<tr>
<td><strong>Magistral</strong></td>
<td>480</td>
<td>Nexa Resources Perú S.A.A.</td>
<td>Huancavelica</td>
<td>Copper (40,600 TMT Cu)</td>
<td>- The EIA and feasibility studies have been approved. The company is in the process of preparing its engineering studies.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- The project operator has not yet submitted the application for an Operating Permit.</td>
</tr>
<tr>
<td><strong>Santa María (expansion)</strong></td>
<td>120</td>
<td>Compañía Minera Poderosa S.A.</td>
<td>La Libertad</td>
<td>Gold (36,000 oz Au)</td>
<td>- The EIA and the feasibility and engineering studies have been approved.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- The project does not contemplate a new operating permit and approval of the mine plan.</td>
</tr>
</tbody>
</table>

Source: MINEM
## Los Chancas

**Investment:** USD 2.8 billion  
**Company:** Southern Perú Copper Corporation  
**Location:** Apurímac  
**Metals:** Copper (100,000 FMT Cu)  

**Current situation:**  
- The pre-feasibility studies have been approved.  
- In August 2018 the company submitted the EIA for evaluation.  
- The project operator has not yet submitted the application for an Operating Permit.  
- According to the studies, they are analyzing if it is more convenient to carry out the processing of the minerals by leaching, which is a more economic process and of low initial capital (CAPEX), but where molybdenum or gold is not recovered; or if the flotation alternative is chosen, where the three metals can be recovered, but the initial capital will be greater.

## Trapiche

**Investment:** USD 700 million  
**Company:** El Molle Verde S.A.C.  
**Location:** Huancavelica  
**Metals:** Copper (65,000 FMT Cu)  

**Current situation:**  
- It is in the pre-feasibility stage.  
- In August 2018, the company submitted an EIA update for evaluation.  
- The project operator has not yet submitted its application for an Operating Permit.  
- The company is working to strengthen relations with the community of Mollebamba in order to lay a solid foundation for the project.

## San Gabriel

**Investment:** USD 431 million  
**Company:** Compañía de Minas Buenaventura S.A.A.  
**Location:** Moquegua  
**Metals:** Gold (200,000 oz Au)  

**Current situation:**  
- The EIA has been approved. The company expects to obtain approval of its pre-feasibility studies.  
- In October 2017, the company submitted to MINEM its request for approval of the mining plan for preparation and development activities.

---

**Source:** MINEM
## Appendix 4. Concessioned projects portfolio

### Río Blanco
- **Investment:** USD 2.5 billion
- **Company:** Zijin Mining Group (45%), Tongling Non-Ferrous Metals Group Holding (35%) and Xiamen C&D Co. Ltd (20%)
- **Start of construction:** Undefined
- **Location:** Piura
- **Metals:** Copper (200,000 FMT Cu)

**Current situation:**
- The feasibility study has been approved.
- The company has not submitted the Environmental Impact Study.
- The company has been coordinating with various ministries in order to strengthen the presence of the State in the area and improve relations between communities.

### Conga
- **Investment:** USD 4.8 billion
- **Company:** Newmont Mining Corporation (51%), Grupo Buenaventura (44%) and Sumitomo Corporation (5%)
- **Start of construction:** Undefined
- **Location:** Cajamarca
- **Metals:** Gold (680,000 Oz) and Copper (54,000 FMT)

**Current situation:**
- The project has come to a halt at the feasibility stage due to socio-economic conflicts in the area of influence.

### Tía María
- **Investment:** USD 1.4 billion
- **Company:** Grupo México
- **Start of construction:** Undefined
- **Location:** Arequipa
- **Metals:** Copper (120,000 FMT)

**Current situation:**
- The company has the engineering studies and the Environmental Impact Study of the project.
- The company is currently working with the State to obtain the construction permit, which has not been granted due to the social conflicts in the Tambo Valley.
- The conflicts are due to people’s concern about impacts on the area and water use. Southern Copper ruled out in its EIA the use of the Tambo river basin as a source and offered a solution through the use of desalinated seawater.

Source: MINEM
Appendix 5. First place in global silver reserves

### Share in global silver reserves (%)

- Perú: 17%
- Polonia: 17%
- Australia: 17%
- Rusia: 10%
- China: 7%
- México: 7%
- Chile: 5%
- Estados Unidos: 5%
- Bolivia: 4%

Source: U.S. Geological Survey, 2018

### Regional share of silver reserves* (%)

- Perú: 94%
- Tumbes: 22%
- Piura: 15%
- Amazonas: 15%
- Lambayeque: 14%
- La Libertad: 12%
- Ancash: 7%
- Pasco: 4%
- Huancavelica: 3%
- Ica: 3%
- Madre de Dios: 3%
- Ucayali: 3%
- Moquegua: 7%
- Tacna: 15%
- Pasco: 15%
- Ayacucho: 15%
- Madre de Dios: 15%
- Pasco: 15%

Source: MINEM

* Probable and proven reserves.
Appendix 5. Third place in global copper reserves

Share in global copper reserves (%)

- Chile: 22%
- Australia: 11%
- Perú: 10%
- México: 6%
- Estados Unidos: 6%
- China: 3%
- Indonesia: 3%
- Zambia: 3%
- Congo: 3%
- Canadá: 1%

Regional share of copper reserves* (%)

- 95%
- 8%
- 7%
- 19%
- 29%
- 16%

Source: U.S. Geological Survey, 2018

* Probable and proven reserves.
Source: MINEM
Appendix 5. Third place in global zinc reserves

Share in global zinc reserves (%)

- Australia: 28%
- China: 18%
- Perú: 12%
- México: 9%
- Kazahs: 6%
- India: 5%
- Estados Unidos: 4%
- Canadá: 2%
- Bolivia: 2%
- Suecia: 2%

Regional share in zinc reserves* (%)

- Tumbes: 46%
- Amazonas: 16%
- Loreto: 12%
- San Martín: 9%
- La Libertad: 6%
- Madre de Dios: 4%
- Puno: 2%
- Tacna: 2%

* Probable and proven reserves.

Source: U.S. Geological Survey, 2018
Appendix 5. Seventh place in global gold reserves

**Share in global gold reserves (%)**

- Australia: 18%
- Sur Afría: 11%
- Rusia: 10%
- Estados Unidos: 6%
- Indonesia: 5%
- Brasil: 4%
- Perú: 4%
- Canadá: 4%
- China: 4%
- Uzbekistan: 3%
- Méjico: 3%
- Nueva Guinea: 2%
- Kazakhstan: 2%

**Regional share in gold reserves* (%)**

- Tumbes: 38%
- Piura: 4%
- Lambayeque: 28%
- Amazonas: 6%
- Loreto: 6%
- La Libertad: 3%
- Ancash: 4%
- Huánuco: 3%
- Pasco: 3%
- Lima: 2%
- Junín: 5%
- Ayacucho: 3%
- Cusco: 3%
- Madre de Dios: 3%
- Ucayali: 6%
- San Martín: 10%
- Maynas: 11%
- Tumbes: 18%

* Probable and proven reserves.

Source: U.S. Geological Survey, 2018

Source: MINEM
Appendix 6. Global demand for copper continues to rise. China is the main demander and the sectors that most use this metal are construction and the electricity network.

**Global refined copper consumption (millions of MT)**

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2017</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10</td>
<td>25</td>
</tr>
</tbody>
</table>

**Copper consumption, 2017 (share, % of total)**

- China: 40%
- Europa: 10%
- R.Mundo: 15%
- EE.UU: 5%
- Japón: 5%
- Corea del Sur: 5%
- Taiwán: 5%
- India: 5%
- Turquía: 5%

**Refined copper consumption by property (share, % of total)**

- Conductividad eléctrica: 40%
- Estética maleable: 20%
- Transferencia de calor: 10%
- Transferencia de señal: 10%

**Refined copper consumption by sector (share, % of total)**

- Construcción: 40%
- Red eléctrica: 20%
- Consumo general: 10%
- Transportes: 5%
- Maquinaria industrial: 5%

Source: Cochilco
Peru: situation in the mining sector

February 2019