Mining & Money

Financial flows research methodology

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Introduction

Forests & Finance is an initiative by a coalition of campaign and research organisations, including Rainforest Action Network, TuK Indonesia, Profundo, Amazon Watch, Milieudefensie, CED Cameroon, Repórter Brasil, BankTrack, Sahabat Alam Malaysia, Friends of the Earth US and Observatório da Mineração. Collectively, we seek to prevent financial institutions from facilitating environmental and social abuses common in forest risk commodities and mining. We seek to achieve this through improved financial sector transparency, policies, systems and regulations.

This Methodology note describes the research methodology used for the financial data featured on *Mining & Money*.

This Methodology note outlines the types of finance included in the study, the calculated elements in the corporate financing research, and financial research data sources. This research included three categories of calculated elements: the corporate financing research: 1) financial institution financing contributions, 2) segment adjusters, and 3) geographical adjusters.

This Methodology note is organised as follows: Section 1 gives an overview of the companies selected for the research, Section 2 describes the types of finance included in the study; Section 3 presents the data sources used to conduct the study; Section 4 provides the time scope applied to the study; Section 5 details the methodology used to calculate the financing contributions where these were not provided; Section 6 explains the methodology applied to attribute the identified financing to the relevant groups; Section 7 provides details on how the segment activities of companies were analysed to adjust the financing contributions to more accurately reflect the value of financing directed towards the sectors in focus; Section 8 explains how the geographic spread of companies operating in multiple relevant geographies is accounted for, and Section 9 provides a brief description of some of the limitations of the data.

1 Company selection

Mining & Money focuses on 130 companies active in the following 10 transition minerals – minerals considered essential for the energy transition:

- Aluminium/bauxite
- Chrome
- Cobalt
- Copper
- Graphite
- Iron
- Lithium
- Manganese

- Nickel
- Zinc
- Gold*
- Potash*

Note: Gold and potash are featured in the Mining & Money data, not included in the scope of analysis of the current report.

For each of the selected minerals, the research identified the largest producers and companies holding the largest reserves. The companies were identified using industry reports (e.g. Fitch Quarterly Reports), US Geological Survey (USGS) data, trade journals, and other relevant sources to identify the main companies engaged in the exploration and extraction of each mineral. Company publications, presentations and other disclosures, as well as media archives and alternative industry reports and trade journals, were used to complete as far as possible an overview of current production and/or reserves data.

Table 1 gives an overview of the selected companies.

Table 1   Selected companies with mineral for selection

Group	Aluminium	Chromium	Cobalt	Copper	Gold	Graphite	Iron	Lithium	Manganese	Nickel	Potash	Zinc	Total
Afarak Group		x											1
African Rainbow Minerals (ARM)		x								x			2
Albemarle								x					1
Alcoa	x												1
Aluminium Corporation of China (Chinalco)	x												1
Ambatovy										x			1
Aneka Tambang (ANTAM)										x			1
Anglo American				x			x		x	x			4
Anson Resources								x					1
Aoyu Graphite Group						x							1
Arcadium Lithium								x					1
ArcelorMittal							x						1
Assmang							x		x				2
Assore		x							x				2
Aurania Resources					x								1
Australian Mines			x							x			2
Bauba Resources		x											1
Belo Sun Mining Corp					x								1
BHP Group							x			x		x	3
Black Rock Mining						x							1
Boliden										x		x	2

Group	Aluminium	Chromium	Cobalt	Copper	Gold	Graphite	Iron	Lithium	Manganes	Nickel	Potash	Zinc	Total
Brazil Potash											x		1
BTR New Material Group						x							1
China Minmetals Corporation (CMC)				x									1
China Molybdenum (CMOC Group)			x										1
China North Industries Corporation (NORINCO)			x										1
China Railway Group (CREC)			x										1
CITIC Group				x									1
Cleveland-Cliffs							x						1
Companhia Siderúrgica Nacional (CSN)							x						1
Compania Minera Antamina												x	1
Corporación Nacional del Cobre de Chile (Codelco)				x									1
CVK Madencilik		x											1
Ecograf						x							1
Emirates Global Aluminium	x												1
Equinox Gold					x								1
Eramet								x	x	x			3
Etablissement Gallois						x							1
Eurasian Resources Group			x	x									2
Evion Group						x							1
Extrativa Metalquimica						x							1
First Quantum Minerals				x						x			2
Fortescue							x						1
Freeport-McMoRan				x									1
Ganfeng Lithium Group								x					1
General Nickel Company			x										1
Glencore	x	x	x						x	x		x	6
Global Ferronickel Holdings										x			1
Greenwing Resources						x							1
Grupo México				x								x	2
Halmahera Persada Lygend (HPL)										x			1
Harita Group										x			1
IGO Limited										x			1
Industrial Development Corporation									x				1
Ivanhoe Mines				x									1
J&F Investimentos									x				1

Group	Aluminium	Chromium	Cobalt	Copper	Gold	Graphite	Iron	Lithium	Manganes	Nickel	Potash	Zinc	Total
Jiangxi Copper				x									1
Jilin Jien Nickel			x										1
Jinchuan Group			x										1
JiuQuan Iron & Steel Group (JISCO)			x										1
Jupiter Mines									x				1
Kalagadi Manganese									x				1
Kalahari Resources									x				1
KAZ Minerals				x									1
Kgalagadi Alloys									x				1
KGHM Polska Miedz				x									1
Korea Mine Rehabilitation and Mineral Resources Corporation (KOMIR)										x			1
La Générale des Carrières et des Mines (Gécamines)			x										1
Libero Copper				x									1
Lithium Americas								x					1
Lundin Mining				x						x		x	3
Lygend Resources & Technology										x			1
MARBL JV								x					1
Mason Resources						x							1
Merafe Resources		x											1
Metalloinvest							x						1
Metallurgical Corporation of China (MCC)			x							x		x	3
Mineral Resources							x	x					2
Mineral Resources Madang (MRML)			x										1
Mineral Resources Ramu (MRRL)			x										1
MOIL									x				1
Nacional de Grafite						x							1
Newmont Corporation												x	1
NextSource Materials						x							1
Nickel 28			x										1
Nickel Asia Corporation										x			1
Nickel Industries										x			1
Ningxia Tianyuan Manganese Industry Group (TMI)									x				1
NMDC							x						1
Norilsk Nickel (Nornickel)			x	x						x			3

Group	Aluminium	Chromium	Cobalt	Copper	Gold	Graphite	Iron	Lithium	Manganes	Nickel	Potash	Zinc	Total
Norsk Hydro	x												1
Northern Graphite						x							1
Ntsimbintle Holdings									x				1
Odisha Mining		x											1
OM Holdings									x				1
Palamina				x									1
Panoramic Resources			x										1
Pilbara Minerals								x					1
Qingdao Black Dragon						x							1
Qinghai Salt Lake Industry								x					1
Ramu Nickel Cobalt Project			x										1
Red Hill Iron Ore Joint Venture							x						1
Renascor Resources						x							1
Rio Tinto	x						x						2
RS Mines						x							1
Rusal	x												1
Samancor		x							x				2
San Cristobal Mining												x	1
Sarytogan Graphite						x							1
Savannah Resources								x					1
Serabi Gold					x								1
Sevestral							x						1
Shalina Resources			x										1
Sherritt International Corp			x							x			2
Sibanye Stillwater		x											1
Sichuan Yahua Industrial Group								x					1
SMB-Winning Boke Bauxite Mining Project	x												1
Sociedad Química y Minera de Chile (SQM)								x					1
Solaris Resources				x									1
South32	x								x	x		x	4
Sovereign Metals						x							1
Sumitomo Corp										x			1
Sumitomo Metal Mining				x									1
Syrah Resources						x							1
Talga Group			x	x		x							3

Group	Aluminium	Chromium	Cobalt	Copper	Gold	Graphite	Iron	Lithium	Manganes	Nickel	Potash	Zinc	Total
Teck Resources				x								x	2
Tharisa		x											1
Tianqi Lithium								x					1
Tirupati Graphite						x							1
Triton Minerals						x							1
Tsingshan Holding Company										x			1
Vale			x	x			x			x			4
Vedanta		x										x	2
Volcan Compañía Minera												x	1
Volt Resources						x							1
Votorantim												x	1
Wheaton Precious Metals			x										1
Yacimientos De Litio Bolivianos (YLB)								x					1
Yildirim Holding		x											1
Zhejiang Huayou Cobalt			x					x		x			3
Zijin Mining Group				x								x	2

2 Types of finance

This section describes the types of finance included in the research. Financial institutions can invest in companies through a number of modalities. Financial institutions can provide credit to a company. This includes providing loans and the underwriting of share and bond issuances. Financial institutions can also invest in the equity and debt of a company by holding shares and bonds. This section outlines the different types of financing, how they were researched and the implications for the study.

2.1 Corporate loans

The easiest way to obtain debt is to borrow money. In most cases, money is borrowed from commercial banks. Loans can be either short-term or long-term in nature. Short-term loans (including trade credits, current accounts, leasing agreements, et cetera) have a maturity of less than a year. They are mostly used as working capital for day-to-day operations. Short-term debts are often provided by a single commercial bank, which does not ask for substantial guarantees from the company.

A long-term loan has a maturity of at least one year, but generally of three to ten years. Long-term corporate loans are in particular useful to finance expansion plans, which only generate rewards after some period of time. The proceeds of corporate loans can be used for all activities of the company. Often long-term loans are extended by a loan syndicate, which is a group of banks brought together by one or more arranging banks. The loan syndicate will only undersign the loan agreement if the company can provide certain guarantees that interest and repayments on the loan will be fulfilled.

There are multiple reasons to acquire a loan, the two most common and broad categories are:

- **Project finance**

  One specific form of corporate loan is project finance. This is a loan that is earmarked for a specific project.

- **General corporate purposes / working capital**

  Often a company will receive a loan for general corporate purposes or for working capital. On occasion while the use of proceeds is reported as general corporate purposes, it is in fact earmarked for a certain project. This is difficult to ascertain.

2.2   Share issuances

Issuing shares on the stock exchange gives a company the opportunity to increase its equity by attracting a large number of new shareholders or increase the equity from its existing shareholders.

When a company offers its shares on the stock exchange for the first time, this is called an Initial Public Offering (IPO). When a company's shares are already traded on the stock exchange, this is called a secondary offering of additional shares.

To arrange an IPO or a secondary offering, a company needs the assistance of one or more (investment) banks, which will promote the shares and find shareholders. The role of investment banks in this process therefore is very important.

The role of the investment bank is temporary. The investment bank purchases the shares initially and then promotes the shares and finds shareholders. When all issued shares that the financial institution has underwritten are sold, they are no longer included in the balance sheet or the portfolio of the financial institution. However, the assistance provided by financial institutions to companies in share issuances is crucial. They provide the company with access to capital markets and provide a guarantee that shares will be bought at a pre-determined minimum price.

2.3   Bond issuances

Issuing bonds can best be described as cutting a large loan into small pieces and selling each piece separately. Bonds are issued on a large scale by governments, but also by corporations. Like shares, bonds are traded on the stock exchange. To issue bonds, a company needs the assistance of one or more (investment) banks which underwrite a certain amount of the bonds. Underwriting is in effect buying with the intention of selling to investors. Still, in case the investment bank fails to sell all bonds it has underwritten, it will end up owning the bonds.

2.4   (Managing) shareholdings

Banks can, through the funds they are managing, buy shares of a certain company making them part-owners of the company. This gives the bank a direct influence on the company's strategy. The magnitude of this influence depends on the size of the shareholding.

As financial institutions actively decide in which sectors and companies to invest, and are able to influence the company's business strategy, this research will investigate the shareholdings of financial institutions of the selected companies. Shareholdings are only relevant for stock listed companies. Not all companies in the study are listed on a stock exchange. The company selection has tried to take this into account by including the major companies in the relevant sectors. However, some ownership forms may dominate in certain sectors under analysis. Additionally, some ownership forms are more prominent in some countries.

Shareholdings have a number of peculiarities that have implications for the research strategy. Firstly, shares can be bought and sold on the stock exchange from one moment to the next.

Financial databases keep track of shareholdings through snapshots, or filings. This means that when a particular shareholding is recorded in the financial database, the actual holding, or a portion of it, might have been sold, or more shares purchased. Secondly, share prices vary from one moment to the next.

2.5   (Managing) investments in bonds

Banks can also buy bonds of a certain company. The main difference between owning shares and bonds is that owner of a bond is not a co-owner of the issuing company; the owner is a creditor of the company. The buyer of each bond is entitled to repayment after a certain number of years, and to a certain interest during each of these years.

3   Data sources

During the financial data collection process, this research utilised financial databases (FactSet, Dealogic, Pitchbook), project finance database IJGlobal, company reports (annual, interim, quarterly) and other company publications, company register filings, as well as media and analyst reports.

4   Research period

Corporate loans, credit and underwriting facilities provided to the selected companies was researched for the period January 2016 to June 2025. The report only covers the period January 2016 to December 2024. Investments in bonds and shares of the selected companies were identified through FactSet and Profundo Pension Fund Portfolio at the most recently available filing date in July 2025.

5   Financial institution financing contributions

Financial databases often record loans and issuance underwriting when these are provided by a syndicate of financial institutions. Company reports and publications, company register filings, and the media will also provide information on loans provided bilaterally, i.e. between one bank and the company in question. The level of detail per deal often varies. Some sources may omit the maturity date or term of the loan, the use of proceeds, or even the exact issue date. Financial databases often do not report on the proportions of a given deal that can be attributed to the participants in deal. In such instances, this research calculated an estimated contribution based on the rules of thumb described below.

5.1   Loans and underwriting services

Individual bank contributions to syndicated loans and underwriting (bond & share issuance underwriting) were recorded to the largest extent possible where these details were included in financial database, or company or media publications.

In many cases, the total value of a loan or issuance is known, as well as the number of banks that participate in this loan or issuance. However, often the amount that each individual bank commits to the loan or issuance has to be estimated.

Profundo has developed a methodology based on a beta regression model to estimate the financial institutions' contributions based on the available information. Specifically, when the fees charged by each financial institution are available, this research estimates each financial

institution's contribution as a proportion of the total fees received by all financial institutions. Then, the estimated proportion (for instance, if Bank A received 10% of all fees) is applied to the total deal value (assuming a deal of US$10 million, Bank A would be assigned a contribution of US$1 million or the 10% of US$10 million).

When the deal's fee data is missing or incomplete, this research used the bookratio approach. The bookratio determines the deal's distribution between the different financial institutions involved as lenders, depending on their roles.

The beta regression model considers the following variables:

- The number of total participants
- The ratio between bookrunners and other participants

$$Book\ ratio := \frac{number\ of\ bookrunners}{number\ of\ participant}.$$

- The role of the financial institution (bookrunner or not)
- The type of financing: Corporate loan, Revolving credit facility, bond issuance and share issuance.

Given the above variables, the bookratio methodology fits a beta regression model of the form:

$$Proportion\ per\ financial\ institution = g^{-1}(x_i^{\intercal}\beta),$$

where g^{-1} is the inverse of the Logit function, x_i is each of the variables considered and β are the parameters to estimate.

5.2   Shareholding

The number and values of shares held by financial institutions are reported in financial databases, they were not subject to adjustment.

5.3   Bondholding

The number and values of bonds held by financial institutions are reported in financial databases, they were not subject to adjustment.

6   Group attribution of identified project financing

This research identified financing to the selected groups as presented in Table 1. For each group, financing was researched at the group level, but also for the relevant subsidiaries (entity in which the group has or controls more than half of its stock) and financial vehicles (special purpose entity created by the group for the securitization of debt).

When financing is identified for a project/entity, the financing needs to be attributed to the relevant group(s) which is/are owning this project/entity. The methodology applied is based on the financial consolidation principles defined by IFRS 10, 11 and 12. Under these standards:

- An investor which has the control over an investee will use the full consolidation method.
- An investor which does not have the control over an investee will use the equity method.
- When a joint arrangement exists between several investors over an investee, the investors will use either the proportional consolidation (joint operation) or the equity method (joint venture).

The definition of control is detailed by IFRS 10. It does not solely depend on the percentage of control (percentage of voting rights). According to IFRS 10, "An investor controls an investee if and only if the investor has all the following:

- Power over the investee,
- Exposure, or rights, to variable returns from its involvement with the investee,
- The ability to use its power over the investee to affect the amount of the investor's returns.

Power usually arises from an entity's voting rights. However, an investor without a majority of voting rights may still possesses sufficient substantive rights that grant it power, allowing the investor to use the full consolidation method. Conversely, an investor could have a majority of voting rights, and still not use the full consolidation method.

Given the irregular nature of the consolidation method applied, a simplified methodology was developed, and applied to the research. This methodology involves the application of the full consolidation method for groups owning more than 50% of an entity/project, the equity method for groups owning a minority share (<50%) and the proportional consolidation method for any joint arrangement. This methodology is illustrated in Figure 1.

Figure 1   Group attribution of identified project financing
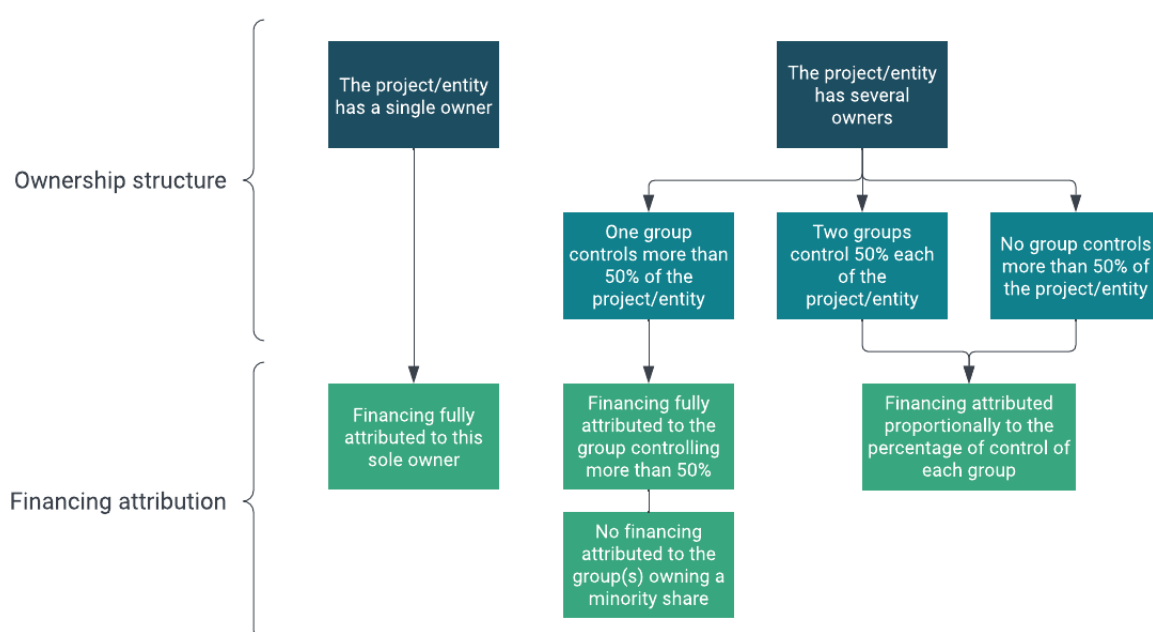
Source: Profundo

7 Segment adjusters

Many mining companies have diversified portfolios, including different minerals. Therefore, the *Mining & Money* research identified the proportion of business activities that can reasonably be attributed to the upstream extraction and midstream processing of the specific selected minerals. The proportion of business activities related to the focus metals was calculated for all identified borrowers/issuers for each year a financial relationship was identified. These proportions are known as "segment adjusters" since their application to identified financing "adjusts" the original value to reflect the "segment" value more accurately.

7.1 Sources

Segment adjusters were developed using the segment reporting in annual reports to the fullest extent possible, complemented by further information from company publications and websites and estimations where necessary.

7.2 Calculation

Segment adjusters were developed for all companies and every year for which financing was identified. Where no data could be identified for one or multiple years, the segment adjuster from the most recent previous year was applied.

Where financing was identified at the subsidiary level, this research identified the segment activities using company publications. Where financing was identified for a financing vehicle, the group-level adjuster was applied.

The following financial indicators were used in order of preference: *segment capital expenditures / additions to non-current assets, segment liabilities, segment assets, segment revenues, and segment profit/loss.*

7.3 Example

This sub-section illustrates how a segment adjuster is developed for a company and applied to identified financing.

Company A attracted a US$100 million loan in 2023. The company had three reportable operating segments: 1) Lithium mining, 2) Nickel mining, and 3) Coal mining. The Lithium adjuster is based on the first segment and the Nickel adjuster on the second. Since Coal is not included in the scope of Mining & Money, it is excluded from the research. In 2023, 75% of Company A's capex was for Lithium, 20% for Nickel, and 5% for coal.

Therefore, US$75 million was attributed to Lithium for Company A in 2023, and US$20 million was attributed to Nickel.

8 Geographic adjusters

Many mining companies have diversified portfolios and are active in multiple geographies. Therefore, the *Mining & Money* research identified the proportion of business activities that can reasonably be attributed to different countries for the companies' upstream extraction and midstream processing activities for the relevant selected minerals. The proportion of business activities at the country level was calculated for all identified borrowers/issuers for each year a financial relationship was identified. These proportions are known as "geographic adjusters" since their application to identified financing "adjusts" the original value to reflect the "geographic" value more accurately.

A similar approach for calculating geographic adjusters was used as with segment adjusters (see section 7).

Where financing was identified at the subsidiary level, this research identified the location of its activities using company publications. Where financing was identified for a financing vehicle, the group level adjuster was applied.

8.1 Sources

Geographic adjusters were developed using the segment, geographic and general reporting in annual reports to the fullest extent possible, complemented by further information from company publications and websites and estimations where necessary. Geographic adjusters were applied to segment adjusters.

8.2 Calculation

The following financial indicators were used in order of preference: *geographic capital expenditures / additions to non-current assets, geographic liabilities, geographic assets, geographic revenues, and geographic profit/loss.*

The combined segment and geographic adjusters were applied to each identified financial relationship identified.

In other words, the values that are attributable to the specific minerals and countries in question, e.g. the value of financing to cobalt in the DRC, or the value of financing attributable to nickel in Indonesia.

9 Data limitations

The financial research is subject to a number of limitations:

9.1   Loans

Information from the financial databases used primarily includes syndicated lending, i.e. two or more financial institutions providing a loan to one company together. Usually, the financial databases do not have data on bilateral lending, i.e. direct loans between one bank and one company.

Bilateral lending was researched using company reports, company registries, and media archives, among others. However, these sources still have data gaps. Many companies do not disclose their bankers, or not in sufficient detail to include in the analysis. This is the result of different requirements in different jurisdictions, and whether or not the company is listed on the stock exchange.

9.2   Bond & shareholdings

Financial databases collect data on bond and shareholdings from fund filings, company reports, and stock exchanges. As a result, share and bond holdings data coverage is generally better for asset managers and the asset management arms of insurance companies and banking groups.

Other financial institutions that do not offer asset management activities, such as pension funds and insurance companies, are not required to publish their investment portfolios. Those who publish their portfolios are not always covered by the financial databases. Profundo maintains a database of pension fund portfolio disclosures, which is updated at least once a year.

For all bond and shareholdings, actual positions are constantly changing. Bond and shareholders identified during the course of this research may have sold their position, or in other ways changed the composition of their portfolio.