

Forests & Finance financial research methodology

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Introduction

[Forestsandfinance.org](https://forestsandfinance.org) aims to highlight the role that finance plays in enabling tropical deforestation. It is the result of extensive research and investigations by a coalition of campaign and research organisations including Rainforest Action Network, TuK INDONESIA, Profundo, Amazon Watch, Repórter Brasil and BankTrack. Collectively, these organisations and their allies seek to achieve improved financial sector policies and systems that prevent financial institutions from supporting the kind of environmental and social abuses that are all too common in the operations of their forest-risk sector clients. The project assesses the financial services received by over 300 companies directly involved in the beef, palm oil, pulp & paper, rubber, soy and tropical timber (“forest-risk sector”) supply chains, whose operations impact natural tropical forests in Southeast Asia, Brazil as well as Central and West Africa. Financing for more than 230 companies was identified. For more information, please contact info@forestsandfinance.org.

This Methodology note outlines the company selection methodology, 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 organized as follows: Section 1 outlines the company selection methodology; Section 1.3 describes the types of finance included in the study; Section 3 details the methodology used to calculate the financing contributions where these were not provided; Section 4 provides details on how the segment activities of companies was analysed to adjust the financing contributions to more accurately reflect the value of financing directed towards the six focus forest-risk sectors – beef, palm oil, pulp & paper, rubber, soy and timber; Section 5 explains how the geographic spread of companies operating in multiple relevant geographies is accounted for, and; Section 6 describes the methodology used to research financing through Brazil’s National Rural Credit System (Sistema Nacional de Crédito Rural – SNCR).

1 Company selection methodology

The over 300 company groups selected for this study are involved in the upstream segment of the beef, palm oil, pulp and paper, palm oil, rubber soy or timber supply chains in Southeast Asia, Central & West Africa and South America – collectively referred to as ‘tropical forest-risk sectors’. This selection of companies is intended to be a representative sample of companies impacting tropical forests, and is not an exhaustive list of all companies impacting or having the potential to impact tropical forests. Factors that led to their selection include the size of the company and land area of operation, access to information on their financing, and known negative impacts of their operations on tropical forests. The selection of companies is subject to change as companies enter and exit the relevant sectors, and as additional companies are identified through further research.

Although the company selection methodology was generally similar, the company selection methodology is presented separately for each of the three geographies included in the scope of the study.

1.1 South America

The company selection methodology is described for the three forest-risk commodities considered as the most important drivers of deforestation in South America, namely: beef, pulp & paper, and soy. In future updates of Forests & Finance, further commodities may be added.

1.1.1 Beef

Beef companies were selected on the basis of their beef slaughtering capacity in South America. Information on beef slaughtering capacity was garnered from companies’ publications and websites, and trade journals. The following beef companies were included in the study:

- BRF
- Fribal
- Frigol
- Frigon - Irmaos Goncalves
- JBS
- Marfrig
- Masterboi
- Mataboi
- Mercurio
- Minerva
- Prima Foods
- Vale Grande/Frialto

1.1.2 Pulp & paper

Pulp & paper companies were selected on the basis of their production capacity in South America. Information on production capacity was garnered from companies’ publications and websites, and trade journals. The following pulp & paper companies were included in the study:

- Suzano (Fibria)
- Klabin
- CMPC
- Sinar Mas (Eldorado acquired by Paper Excellence (APP affiliate))
- Oji Group (Cenibra)
- Smurfit Kappa
- Stora Enso (Veracel)
- Royal Golden Eagle (Bracell)

1.1.3 Soy

Soy companies were selected on the basis of the annual soy planted areas in South America. Information on production capacity was garnered from companies' publications and websites, and trade journals. Additionally, given the important role of agro-commodity traders combined with the high level of small-scale production of soy, agro-commodity traders known to source from Brazil were also selected. The following soy companies and traders were included in the study:

- Adecoagro
- Archer Daniels Midland
- Bom Jesus
- Brookfield Asset Management (Fazendas Bartira)
- Bunge
- Cargill
- COFCO
- Cresud (Brasilagro)
- Grupo Amaggi
- Grupo Bom Futuro
- Itochu (Fuji Oil)
- Louis Dreyfus Company
- Mitsubishi Corp (Agrex do Brasil)
- Mitsui & Co (Agricola Xingu)
- Olam Group
- Pengxin (Belagricola)
- SLC Agricola
- Terra Santa

1.2 Central & West Africa

The company selection methodology is described below for each of the three forest-risk commodities most relevant for Central & West Africa, namely: palm oil, rubber and timber.

This study prioritized the selection of companies active in the TRIDOM region which covers Cameroon, Gabon and the Republic of Congo. TRIDOM gets its name from the Tri-National Dja-Odzala-Minkébé protected areas, each of which is located in a different country. The huge TRIDOM forest covers 178,000 km², or 10% of the whole Congo Basin rainforest. It is a biodiversity hotspot and 97% of the TRIDOM is still forested. Companies active in TRIDOM were selected on the basis of government concession maps. Further companies were added through screening in Orbis and media archives.

Additionally, companies operating in the relevant sectors in other Central & West African nations were identified as these are subsidiaries or affiliates of forest-risk companies also operating in Southeast Asia. Examples include Olam Group, Sinar Mas affiliate Golden Veroleum, Batu Kawan subsidiary Equatorial Palm Oil, and Bolloré affiliate Socfinaf, among others.

Companies operating in the following countries are currently included: Cameroon, Gabon, Republic of Congo, Democratic Republic of Congo, Liberia, Côte d'Ivoire, Ghana and Nigeria. In future updates of Forests & Finance additional companies operating in these countries, as well as companies operating in other countries in the Central & West African regions may be added as they are identified through further research or come to light through issues raised by civil society organizations.

1.2.1 Palm oil

Companies active in TRIDOM were selected on the basis of government concession maps. Further companies were added through screening in Orbis and media archives. Additionally, companies operating in the palm oil sector in other Central & West African nations were identified as these are subsidiaries or affiliates of forest-risk companies also operating in Southeast Asia. Further, given the important role of agro-commodity traders combined with the high level of small-scale production of in Central & West Africa, agro-commodity traders known to source from the regions were also selected.

The following palm oil companies were selected:

- Archer Daniels Midland
- Atama
- Batu Kawan (Equatorial Palm Oil)
- Bolloré (Socfin Africa)
- Bunge
- Cargill
- COFCO
- Eco Oil
- Feronia
- Itochu (Fuji Oil)
- Olam Group
- SG Sustainable Oils Cameroon
- Siat Group
- SIFCA
- Sime Darby
- Sinar Mas
- Wilmar Group

1.2.2 Rubber

Companies active in TRIDOM were selected on the basis of government concession maps. Further companies were added through screening in Orbis and media archives. Additionally, companies operating in the rubber sector in other Central & West African nations were identified as these are subsidiaries or affiliates of forest-risk companies also operating in Southeast Asia. Further, given the important role of agro-commodity traders combined with the high level of small-scale production of in Central & West Africa, agro-commodity traders known to source from the regions were also selected.

The following rubber companies were selected:

- Bolloré (Socfin Africa)
- Olam Group
- Siat Group
- Sinochem (Halcyon Agri)

1.2.3 Timber

Companies active in TRIDOM were selected on the basis of government concession maps. Further companies were added through screening in Orbis and media archives.

The following timber companies were selected:

- Bois et Scierie du Gabon S.A.
- Bois Scierie de l'Ogooué (BSO)
- Cameroon United Forest
- China Forestry Group Corp
- COFCO (Sunly, Sunry)
- Commerce Foresterie Entretien
- Compagnie Africaine d'Exploitation des Bois (CEAB)
- Compagnie Forestière Assam (COFA)
- Congo Deja Wood Industry (CDWI)
- Cora Wood
- Danzer
- Decolvenaere
- Entreprise Nynoise de Batiment (ENB)
- Fabrique Camerounaise de Parquet (FIPCAM)
- Forestry Development Gabon (FDG)
- Gabon Transformation Bois Boulende (GTBB)
- Goa Yan
- GWZ Wijma Cameroun
- Interbois Cameroun
- Jiangsu Shengyang Industrial
- Jiangsu Shengyang Wood Industry Group
- KHLL Forestry
- La Forestière d'Exploitation et d'Export (FOREEX)
- La Rosière
- Pasquet
- Pengrui International Trade
- Pengxin
- PMF WOOD
- Precious Woods
- Rain Forest Management (RFM)

- Rimbunan Hijau Group
- Rougier
- Royal Company Group
- Sebac
- SG Sustainable Oils
- Shengyang Group
- SIAEFG
- Société de Distribution Nouvelle d'Afrique (Sodinaf)
- Société de Mise en Valeur du Bois SA (Somivab)
- Société de Transformation Intégrée des Bois du Gabon (STIBG)
- Societe d'exploitation DES Bois DU Cameroun (SEBC)
- Societe d'Exploitation Forestiere Yuang Dong (SEFYD)
- Société Équatoriale d' Exploitation Forestière (SEEF)
- Société Forestière des Bois Tropicaux (SFBT)
- Société Forestière Eboume Ebaka Sarl (SFEES)
- Société GRACOVIR Sarl
- Société Industrielle de Mbang (SIM)
- Société Industrielle des Bois MJP et Frères Sarl (SIBM)
- Société Industrielle et Forestière du Congo (SIFCO)
- Société Multi-Services Plus sarl
- Sodinaf
- STE Bois ET Derives d'afrique
- Tian Bei Foret (TBF)
- Transformation Tropicale du Sud (TTS)
- Vicwood Group
- Wan Chuan Timber Sarl (WCTS)
- Wang Sam Resources and Trading Company Congo (WSR)
- Xing Wang Bois
- Yulin

1.3 Southeast Asia

The company selection methodology is described for each of the four forest-risk commodities most relevant for Southeast Asia, namely: palm oil, pulp & paper, rubber and timber.

Companies operating in the following countries are currently included: Cambodia, Indonesia, Laos, Malaysia, Myanmar, Papua New Guinea, Thailand and Vietnam.

1.3.1 Palm oil

Palm oil companies operating in Southeast Asia were selected on the basis of their planted area. Information on planted areas was garnered from companies' publications and websites, trade journals, as well as the Indonesian Industrial Forest register (*hutan tanaman industri (HTI)*). The following companies engaged in palm oil were included in the study:

- Albukhary Group
- Anglo-Eastern Group
- Archer Daniels Midland
- Artha Graha Group
- Asian Plantations Group
- Austindo Group
- Bakrie Group
- Barito Pacific Group
- Batu Kawan Group
- BHR Group
- BLD Group
- Bolloré/Socfin
- Boon Siew Group
- Boustead Group
- BSS Group
- Cargill
- Carson Cumberbatch Group
- Cepatwawasan Group
- Charoen Pokphand Group
- Chin Teck Group
- Citra Borneo Indah Group (CBI Group)
- Daesang Corporation
- Darmex Agro Group
- Djarum Group
- DSN Group
- DutaLand Group
- Fangiono Agro Plantation (FAP Agri)
- Felda Group
- Ganda Group
- Genting Group

- Global Palm Resource Holdings
- Golden Land Group
- Gozco Group
- Hap Seng Group
- Harita Group
- Hayel Saeed Anam Group
- IJM Group
- Innoprise Group
- IOI Group
- Izzisen Global
- Jardine Matheson Group (Astra Agro Lestari)
- Java
- Johor Group
- Kencana Agri Group
- Kim Loong Group
- Korindo
- Kretam Group
- Kwantas Group
- Lam Soon
- LG International
- Maxim Global
- Medco Group
- Merbau Jaya Indah Raya
- Mewah International
- MP Evans
- Musim Mas Group
- Noble Group
- NPC Resources Group
- Olam Group
- Panca Eka Group
- Perkebunan Nusantara Group
- Pinehill Pacific
- POSCO
- Prosper Group
- Provident Agro Group
- PTT Group
- Puncak Niaga Holdings
- QL Resources
- R E A Holdings
- Rajawali Group
- Rimbunan Hijau Group
- Roda Mas Group
- Royal Golden Eagle Group
- Salim Group
- Samling Group
- Sampoerna Agro (Sampoerna Group)
- Samsung C&T Corp
- Sarawak Oil Palms
- Sarawak Plantation Group
- Sele Raya Group
- Shin Yang Holding
- Sime Darby Group
- Sinar Mas Group
- Sipef
- Sungai Budi Group
- Surya Dumai Group
- Ta Ann Group
- Tanah Makmur Group
- Tanjung Lingga Group
- TDM
- TH Group
- Tianjin Julong
- Tiga Pilar Sejahtera Group
- Triputra Group
- Tsani Hutani Abadi
- TSH Group
- United International Enterprises
- United Malacca Group
- United Plantations
- Univanich Palm Oil
- Wah Seong Group
- Wilmar Group
- Wings Group
- WTK Group
- ZTE

1.3.2 Pulp & paper

Pulp & paper companies operating in Southeast Asia were selected on the basis of their concession size. Information on concession size was garnered from companies' publications and websites, trade journals, as well as the Indonesian Industrial Forest register (*Hutan Tanaman Industri* (HTI)). The following pulp & paper companies were included in the study:

- ADR Group
- Alas Kusuma Group
- BAFCO Investa
- Bumi Raya Group
- Djarum Group
- Garuda Kalimantan Lestari
- Green Garden Group
- Indoco Group

- Industrial Forest Plantation
- International Timber Corporation Indonesia
- JK Paper
- Kertas Basuki Rachmat Indonesia
- Korindo
- Marubeni
- Moorim
- Nusantara Energi
- Oji Group
- Panca Eka Group
- Perum Perhutani
- Rimba Hutani Lestari
- Royal Golden Eagle Group (APRIL, Asia Symbol)
- SCG Packaging
- Sentosa Bahagia Bersama
- Sinar Mas Group (APP)
- Sun Paper Group
- Timur Djaja Group

1.3.3 Rubber

Rubber companies operating in Southeast Asia were selected on the basis of their concession size. Information on concession areas was garnered from companies' publications and websites, trade journals, as well as the Indonesian Industrial Forest register (*Hutan Tanaman Industri* (HTI)) and the Forest Concession register (*Hak Pengusahaan Hutan* (HPH)). Many of the selected palm oil companies, also have natural rubber operations. Where this was the case, a rubber segment adjuster was also applied (see section 4 for further details)

The following rubber companies were included in the study:

- Bakrie Group
- Barito Pacific Group
- Batanghari Group
- Batu Kawan Group
- Bolloré/ Socfin
- BSS Group
- Felda Group
- Hainan State Farms
- Harum Group
- Hijau Artha Nusa
- Hoang Anh Gia Lai Group
- Incasi Raya
- Indokaret
- Itochu
- Lee Rubber
- Olam Group
- Perkebunan Nusantara Group
- RCMA Group
- Salim Group
- Sampoerna Group
- Siat Group
- Silva Lampung Abadi
- Sinochem Group
- Sipef
- Southland Holding
- Sri Trang Group
- Sumitomo Rubber Industries
- Thai Eastern Group
- Thai Hua Rubber
- Tong Thai Rubber
- Top Glove
- Triputra Group
- Vietnam Rubber Group
- Von Bundit

1.3.4 Timber

Timber companies operating in Southeast Asia were selected on the basis of their concession size. Information on concession areas was garnered from companies' publications and websites, trade journals, as well as the Indonesian Industrial Forest register (*Hutan Tanaman Industri* (HTI)) and the Forest Concession register (*Hak Pengusahaan Hutan* (HPH)). The following timber companies were included in the study:

- ADR Group
- Alas Kusuma Group
- Algro Group
- Andalas Group
- Artha Graha Group
- Asa Karya Group

- BAFCO Investa
- Barito Pacific Group
- Batasan Group
- Benua Indah Group
- Bina Benua Group
- Bina Kayu Lestari Goup
- BMI Group
- Bolloré
- Bumi Raya Utama Group
- Bumi Teknokultura Unggul Tbk (BTEK)
- CBI Group
- Darma Putera Wahana Pratama (DEWATA) Group
- Daya Tani Kalbar
- Dharmarosa Group
- Diva Perdana
- Djarum Group
- Djayanti Group
- Dwima Group
- Evergreen Fibreboard
- Georgia-Pacific Group (Koch Industries)
- GPS Group
- Hanurata Group
- Hasnur Group
- Hendratna Group
- Hutanindo Group
- Integra Group
- International Timber Corporation Indonesia
- Intracawood
- Izzisen Global
- Kandelia Group
- Karunia Hutan Lestari Group
- Katingan Timber Group
- Kawedar Group
- Kayu Lapis Indonesia (PT KLI)
- Kayu Mas Group
- Kodeco Group
- Korindo
- Lyman Group
- Maxim Global
- Mega Masindo Group
- Mujur Timber Group
- Nusantara Energi
- Oceanias Timber Product
- Olam Group
- Omega Prima Utama/KTC Group
- Pacific Fiber Indonesia
- Perum Perhutani
- Poleko Group
- Priceworth International
- PT Tansa Trisna/ Far East Delta
- Rante Marion Huntuss Group
- Rimba Raya Lestari
- Rimbunan Hijau Group
- Roda Mas Group
- Salim Group
- Sampoerna Group (Samko Timber)
- Samling Group
- Sele Raya Group
- Shin Yang Holding
- Siak Raya Group
- Sinar Wijaya Group
- Sumalindo Group
- Sumatera Timber Utama Damai (PT STUD)
- Sumber Mas Group
- Sumber Mitra Jaya (SMJ) Group
- Sumitomo Forestry
- Ta Ann Group
- Tanjung Lingga Group
- Tanjung Raya Plywood
- Teluk Nauli Group
- Tirta Mahakam Resources
- Tirta Mahakam Resources
- Triputra Group
- Uniseraya Group
- Vietnam Rubber Group
- Wah Seong Group
- Waroeng Batok Industri
- WTK Group

The selection above shows that a number of companies are active in more than one of the focus forest-risk commodities and multiple geographies. Section 4 details how the segment activities of companies was analysed to adjust the financing contributions to more accurately reflect the value of financing directed towards the relevant focus forest-risk sectors. Section 5 explains how the geographic spread of companies operating in multiple relevant geographies is accounted for.

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.

2.1.1 Project finance

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

2.1.2 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 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 Financial institution financing contributions

During the financial data collection process, this research utilized financial databases (Bloomberg, Refinitiv (formerly known as Thomson EIKON), TradeFinanceAnalytics, and IJGlobal), company reports (annual, interim, quarterly) and other company publications, company register filings, as well as media and analyst reports. Corporate loans, credit and underwriting facilities provided to the selected companies was researched for the period 2013-2023 (September). Investments in bonds and shares of the selected companies were identified through Refinitiv, Thomson EMAXX and Bloomberg at the most recently available filing date in September 2023.

The BNDES Transparency portal and Brazil's Central Bank portal were used to identify additional financial flows to forest-risk companies in Brazil. Further details on the latter can be found in section 6. The BNDES Transparency portal was used to identify direct and indirect loans provided both to the selected companies in Brazil (see section 1.1), as well as other companies in Brazil engaged in the six forest-risk sectors covered by Forests & Finance (see section 4.2 for further details on sectors selected from the BNDES data). This methodology was used as BNDES plays a key role in financing agriculture in Brazil. The research identified over 16,000 forest-risk companies that received finance from the Brazilian Development Bank BNDES. To simplify the search options, these have been grouped together. All companies which received less than US\$ 5 million in the period January 2013 to July 2023, have been grouped together. For a full list of all the recipients, the full dataset can be downloaded.

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.

3.1 Loans & 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 are the 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.

In the first instance, this research attempted to calculate each individual bank's commitment on the basis of the fee they received as a proportion of the total fees received by all financial institutions. This proportion (e.g. Bank A received 10% of all fees) was then applied to the known total deal value (e.g. 10% x US\$ 10 million = US\$ 1 million for Bank A).

Where deal fee data was missing or incomplete, this research used the bookratio. The bookratio (see formula below) is used to determine the spread over bookrunners and other managers.

$$\text{Bookratio: } \frac{\text{number of participants} - \text{number of bookrunners}}{\text{number of bookrunners}}$$

Table 1 shows the commitment assigned to bookrunner groups with our estimation method. When the number of total participants in relation to the number of bookrunners increases, the share that is attributed to bookrunners decreases. This prevents very large differences in amounts attributed to bookrunners and other participants.

Table 1 Commitment to assigned bookrunner groups

Bookratio	Loans	Issuances
> 1/3	75%	75%
> 2/3	60%	75%
> 1.5	40%	75%
> 3.0	< 40%*	< 75%*

* In case of deals with a bookratio of more than 3.0, we use a formula which gradually lowers the commitment assigned to the bookrunners as the bookratio increases. The formula used for this:

$$\frac{1}{\frac{\sqrt{\text{bookratio}}}{1.443375673}}$$

The number in the denominator is used to let the formula start at 40% in case of a bookratio of 3.0. As the bookratio increases the formula will go down from 40%. In case of issuances the number in the denominator is 0.769800358.

Forests & Finance can present the underlying deals dataset for verification of deals and contributions when requested. This dataset includes data sources and dates of access.

3.2 Shareholding

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

3.3 Bondholding

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

4 Segment adjusters

This section explains the methodology by which segment adjusters for the six forest-risk supply chains in the scope of the Forests & Finance research project were calculated and applied.

Segment adjusters were developed for all companies and every year for which financing was identified. As it is not possible to consistently breakdown the supply chains of the analysed companies into up-, mid- and downstream segments. This research therefore developed sector adjusters for whole supply chains, with the understanding that the impact of upstream operations (potential deforestation and human rights issues) is driven by the demand from the mid- and downstream segments. Exceptions to this are the palm oil and soy supply chains, where these commodities are used input for a broad variety of other products. These final products are not considered in the scope of this research.

These segment adjusters were not applied to project finance. When project finance was identified, this research investigated the purpose of the identified project finance to determine whether or not it fell within the scope of this research, and how to attribute it, e.g. as palm oil or pulp & paper. When there was insufficient detail, project finance was treated with the segment adjuster. When the identified financing had multiple use of proceeds, the deal was treated as financing for general corporate purposes.

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. 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.*

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 segment adjusters, including source, details of the methodology and indicators used, and segment definitions of the companies in question, are available on the Forests & Finance website.

4.1 Example calculations

4.1.1 Share issuance to a palm oil and timber company

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

In July 2012, Rimbunan Hijau Group subsidiary Jaya Tiasa Holdings issued shares worth US\$104 million which were underwritten by CIMB Group and RHB Banking. CIMB underwrote US\$78 million, while RHB Banking underwrote US\$26 million.

Jaya Tiasa has four reportable operating segments: Logs Trading; Manufacturing; Oil Palm, and; Others. The timber adjusters is based on Logs Trading and Manufacturing segments, as the latter is purely focused on wood products. The palm oil adjuster is based on the Oil Palm segment. Details for the segment additions to non-current assets / capital expenditures were available and thus used. Using these segment definitions and figures, 77% of Jaya Tiasa's capital expenditures were in palm oil in 2012, while 23% were in timber.

Therefore, US\$80 million of the US\$104 share issuance was attributed to palm oil, with the remaining US\$24 million attributed to timber. At the individual financial institution level, US\$60 million of CIMB's US\$78 million contribution was attributed to palm oil, while US\$18 million was attributed to timber. For RHB Banking US\$20 million was attributed to palm oil, while US\$6 million was attributed to timber.

4.1.2 Shareholdings of a palm oil and rubber company

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

In July 2020, Malaysian Employees Provident Fund held shares worth US\$ 720 million in IOI Group.

IOI has three reportable operating segments: Plantation; Resource-based Manufacturing, and; Other operations. The Plantation sector is defined as the "Cultivation of oil palm and rubber and processing of palm oil." The Resource-based manufacturing sector is defined as "Manufacturing of oleochemicals, specialty oils and fats, palm oil refinery and palm kernel crushing."

The palm oil adjuster for 2020 is therefore was based on the following calculation:

$$=((279.1*(176156/177279))+121.7)/(279.1+121.7+23.9) = 93.956\%$$

Where 176,156 is the palm oil planted area, and 177,279 is the total planted area. This planted area ratio is applied to the capital expenditures in the Plantation segment (RM 279.1). Capital expenditures from the Resource-based Manufacturing segment (RM 121.7) are not adjusted. And Capital expenditure for the Other operations segment (RM 23.9) are not included.

The rubber adjuster for 2020 is therefore based on the following calculation:

$$=(279.1*(475/177279))/(279.1+121.7+23.9) = 0.176\%$$

Where 475 is the rubber planted area, and 177,279 is the total planted area.

Therefore, the Employees Provident Fund was estimated to have US\$ 676.3 million in palm oil related holdings of IOI and US\$ 1.3 million in rubber related holdings at the most recent filing date in July 2020.

4.2 BNDES data

As mentioned above, the research retrieved BNDES' direct and indirect financing of agriculture operations data from the BNDES Transparency portal. Financing to the sub-sectors presented in Table 2 were included in the study. Identified financing was attributed to the relevant sectors. No further segment adjusters were calculated or applied.

Table 2 BNDES sectors included in Forests & Finance

Sector	Subsector CNAE - Portuguese	Sub sector CNAE - English
Beef	CRIACAO DE BOVINOS	Cattle breeding
Beef	CRIACAO DE BOVINOS PARA CORTE	Breeding cattle for cutting
Beef	CRIACAO DE BOVINOS PARA LEITE	Creation of cattle milk
Beef	CRIACAO DE BOVINOS, EXCETO PARA CORTE E LEITE	Cattle breeding, except for cutting and milk
Beef	FRIGORIFICO - ABATE DE BOVINOS	Refrigerator - Cattle slaughter
Palm oil	CULTIVO DE DENDE	Palm oil cultivation
Pulp & paper	FABRICACAO DE CELULOSE E OUTRAS PASTAS PARA FABRICACAO DE PAPEL	Manufacture of cellulose and other pulp for paper manufacture
Pulp & paper	FABRICACAO DE CELULOSE E OUTRAS PASTAS PARA FABRICACAO DE PAPEL	Manufacture of cellulose and other pulp for paper manufacture
Rubber	FAB DE ARTEFATOS DE BORRACHA NAO ESPECIFICADOS ANTERIORMENTE	Manufacture of rubber articles not specified previously
Soy	COMERCIO ATACADISTA DE SOJA	Soy wholesaler
Soy	COMERCIO ATACADISTA DE SOJA	Soy wholesaler
Soy	CULTIVO DE SOJA	Soy cultivation
Soy	CULTIVO DE SOJA	Soy cultivation
Timber	COLETA PROD NAO-MADEIRA NAO ESPEC ANTERIOR EM FLORESTA NATIVA	Non-spec non-spec prod collection in native forest
Timber	CULT ESPECIES MADEIR EXCETO EUCALIPTO ACACIA-NEGRA PINUS E TECA	Cultivation species wood except eucalyptus acacia-negra pinus and teca

Timber	EXTRACAO DE MADEIRA EM FLORESTAS NATIVAS	Wood extraction in native forests
Timber	EXTRACAO DE MADEIRA EM FLORESTAS PLANTADAS	Extraction of wood in planted forests
Timber	PROD PROD NAO-MADEIRA NAO ESPEC ANTERIOR EM FLORESTAS PLANTADAS	Prod non-spec non-spec prod in planted forests
Timber	SERRARIAS COM DESDOBRAMENTO DE MADEIRA EM BRUTO	Sawmills with raw wood following
Timber	SERRARIAS SEM DESDOBRAMENTO DE MADEIRA EM BRUTO - RESSERRAGEM	Sawmills without raw wood spreading - reserve
Timber	SERVIÇO DE TRATAMENTO DE MADEIRA REALIZADO SOB CONTRATO	Wood treatment service performed under contract

5 Geographic adjusters

As section 1 showed, a number of the selected companies are active in more than one geography. To account for this, geographic adjusters were developed for all companies and every year for which financing was identified. A similar approach for calculating geographic adjusters was used as with segment adjusters (see section 4).

These geographic adjusters were not applied to project finance. When project finance was identified, this research investigated the location of the identified project finance to determine whether or not it fell within the scope of this research, and how to attribute it, e.g. as palm oil or pulp & paper. When there was insufficient detail, project finance was treated with the geographic adjuster. When the identified financing had multiple use of proceeds, the deal was treated as financing for general corporate purposes.

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.

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.

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.*

For the producers, geographic production figures and planted area were used where available. For example, Kuala Lumpur Kepong has 13,007 ha palm oil planted area in Liberia, out of a total palm oil planted area of 213,377 ha (6%). This percentage was then applied to the Kuala Lumpur Kepong palm oil adjuster of 93% to come to a palm oil adjuster in Central & West Africa of 5.6%.

For the large commodity traders, including Archer Daniels Midland and Cargill, given the lack of commodity and geographic specific data, geographic adjusters were estimated using annual global production figures per geography. For example, 88.4% of global crude palm oil was produced in Southeast Asia in 2019, and 2.9% was produced in Central & West Africa. These percentages were then applied the palm oil segment adjusters of the traders in the respective geographies and relevant year. Similarly, 37% of global soy bean production, for example, was produced in Brazil in 2019. This percentage was then applied to the soy segment adjuster for the traders in 2019 in Brazil.

The geographic adjusters, including source, details of the methodology and indicators used are available on the Forests & Finance website.

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

6 Brazil Central Bank program data

In 1965, the Brazilian government established the National Rural Credit System (SNCR). The main purpose of the SNCR was to provide rural credit at low interest rates in order to assist producers finance agricultural outputs and machinery, as well as operating costs and the marketing of their produce. Approximately two thirds of the SNCR credit is obtained from the legal requirement that banks operating in Brazil devote a portion of the deposits they hold to providing rural credit lines. Given the nature and scale of this program, and the data availability, Forests & Finance has included financing through this particular program as “Brazilian Agricultural Finance Program” in the Group name in the financing data. Under the Forest-risk client name, the state level financing can be found. Forests & Finance has included all financing through this program provided by commercial banks, development banks and government agencies. Financing provided by cooperatives have been excluded at this stage.

The Central Bank of Brazil maintains data on the financing through this program per financial institution, per state, per year. It also includes data on financing per commodity, per state, per year. As it does not provide either company specific financing from financial institutions, or commodity specific financing from financial institutions, this research has estimated the financing per commodity per financial institution.

First, the proportions of total financing per year, per state to the relevant commodities was calculated. I.e. the proportion of total rural credit in Distrito Federal in Centro-Oeste in 2019 provided to soy (26.7%). This was then applied to the total financing of Banco do Brasil in Distrito Federal in Centro-Oeste in 2019 (US\$ 23.72 million). The outcome is then an estimated US\$ 6.3 million of soy financing by Banco do Brasil in Distrito Federal in Centro-Oeste in 2019.

These calculations were done for all commercial banks, development banks and government agencies, for each of the six forest-risk commodities covered by Forests & Finance, for each year.