

THE SOVEREIGN TRANSITION TO SUSTAINABILITY

UNDERSTANDING THE DEPENDENCE
OF SOVEREIGN BONDS ON NATURE

THE CASE OF BRAZIL

Discussion Paper | July 2019



Planet Tracker

CONTENTS

About Planet Tracker	4
Planet Tracker Sovereign Bonds Programme	4
Acknowledgments	4
Executive Summary	5
Section 1 Sovereign Sustainability Transition	7
Section 2 Nature Dependency of Exports	9
Section 3 Understanding Supply and Demand Drivers	10
Section 4 Emerging Insights	14
Lexicon	15
Disclaimer	16
References	17



ABOUT PLANET TRACKER



Planet Tracker is a non-profit financial think tank aligning capital markets with planetary limits. It was launched in 2018 by the Investor Watch Group whose founders, Mark Campanale and Nick Robins, created the Carbon Tracker Initiative.

Planet Tracker was created to investigate market failure related to ecological limits. This investigation is for the investor community where, in contrast to climate change, the limits are poorly understood and even more poorly communicated, and not aligned with investor capital.

Planet Tracker Sovereign Bonds Programme

Planet Tracker is launching a new programme of thought leadership that explores the relationship between sovereign bonds, natural capital and environmental risks, and the macroeconomics - sovereign health - of a country and its key soft commodities.

Our first focus is on key Latin American countries, specifically Brazil and Argentina, where we will explain how natural capital intersects with sovereign bond risk.

Over time, we will expand the programme to analyse sovereign health applying similar quantitative and qualitative models to additional countries in Latin America as well as globally.

Our research focuses on how changes in environmental health, such as soil degradation, deforestation and variability in extreme weather impact the underlying public treasury balances of these countries and their subsequent ability to service sovereign bond liabilities.

Acknowledgments

Planet Tracker would like to thank Nick Robins, Professor in Practice - Sustainable Finance, Grantham Research Institute, London School of Economics, for his expert contributions to this report.



EXECUTIVE SUMMARY



Brazil's governance strength in managing the country's exposure, sensitivity and adaptation ability to natural capital sustainability is a growing factor for domestic and international sovereign bond investors currently holding \$870 billion in sovereign debt, maturing 2019–30.

Planet Tracker hypothesises in this discussion paper that a 'chain of impact' exists between natural capital sustainability and macroeconomic health.

If left unmanaged, Brazil's deteriorating natural capital sustainability, a contributing factor to soft commodity production efficiency, is set to impact Brazil's economy which from 2008–17 was bolstered by \$259 billion of soft commodity exports. Of Brazil's total exports, 12% were soybean related products and 2% from beef.

Indicators measuring this 'chain of impact' between nature and the economy include balance of payment volatility, USD trade receipts, employment and social security payment contributions, and corporate tax receipts.

Nature Dependent Soft Commodities Exports



Of all the countries in the G20, Brazil's exports are second most dependent on natural capital. Soft commodities that rely on natural capital in their production – nature dependent soft commodity exports – from 2008–17 were nearly 40% of Brazil's total exports generating \$897 billion. In relative terms 40% or 4x higher than the G20 average of 10%.

These exports are threatened by diminishing production due to climate and nature based factors coupled with a global trend away from biodiesel fuel towards sustainable alternatives.

G20 countries' nature dependant soft commodity exports were \$10.4 trillion, 10.3% of total G20 exports in 2008–17

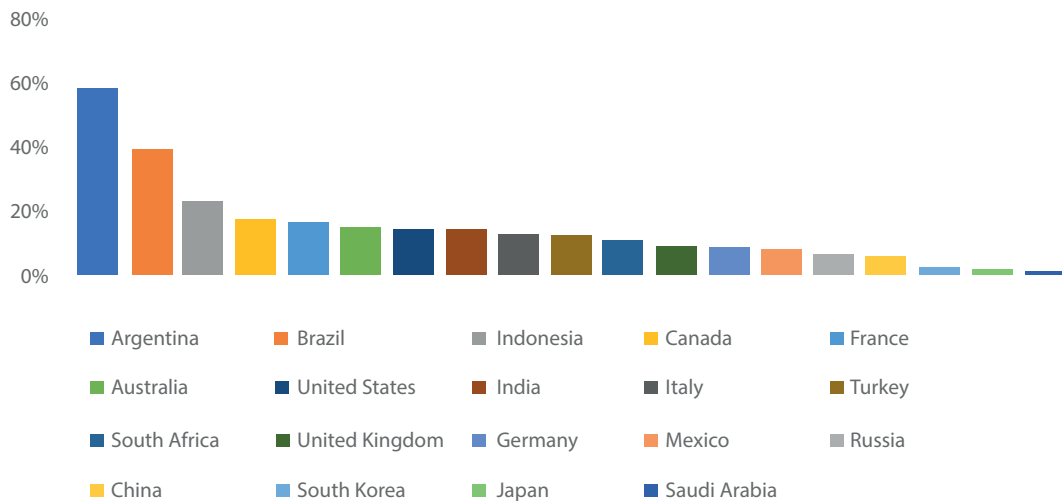


Figure 1: G20 Nature Dependent Soft Commodity Exports, 2008–17.



Fragile Environment Puts Pressure on Agri-Loans

Brazil's agribusiness sector is in part funded by public payments through a subsidised agri-credit lending system. The Government pays public funds in the form of low-cost agricultural credit to accredited banks, who subsequently use the funds to issue loans to agribusinesses who are responsible for soft commodity production.

A decline in natural capital sustainability generally decreases soft commodity production for these agribusinesses including soybean and beef. This affects their profit and loss accounts and balance sheet, reducing their ability to repay loan liabilities to accredited banks. Consequently, accredited banks are left less able to repay Government agricultural credit creating a public capital loss for the Government to which sovereign investors are exposed.

Declines to natural capital health are the result of environmental sustainability factors notably climate-related disasters, such as erosion and drought and creates significant environmental costs, including deforestation and soil degradation.

Emerging Insights Towards A High Road Scenario

This discussion paper seeks to explore how Brazil is at a crossroad in the nexus between natural capital sustainability and macroeconomic health.

We believe that sovereign bond investors can better support Brazil's government to improve natural capital resilience thus protecting nature dependent soft-commodity exports. Transferring the emerging insights in this paper into actions supporting this assessment include:

Investor Support for a Green Economy:

Investor engagement on governance execution by the Government of Brazil and specifically senior parties at the Banco Central do Brasil supporting policies addressing Brazil's natural capital exposure, resilience and adaptation ability, can offer support towards managing the balance of payment volatility.

Certify All Soybean Production as Sustainable:

The Government of Brazil should aim to certify its soybean production as sustainable applying globally accepted independent third-party reputable certification standards so as to directly mitigate natural capital supply side and product exclusion demand side risks.

Measuring Natural Capital Exposure:

Engage with Banco Central do Brasil on publishing their total agri-credit exposure to accredited specific banks.

More Natural Capital Analysis:

Call on credit rating agencies to increase their explicit analysis on natural capital supply side risk impacts on sovereign bond yields / defaults/ repayments.



SECTION 1

SOVEREIGN SUSTAINABILITY TRANSITION

Nature is the Foundation of Business Prosperity

Planet Tracker has found that investors are increasingly recognising the importance of healthy and stable natural capital in order to provide energy, food and fresh water to meet the requirements of a global population expected to reach 9.8 billion by 2050.

In 2019 the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) published a global report in part assessing how economies and industrial sectors have used nature to generate economic value, whilst at the same time highlighting environmental costs and externalities arising from this value creation.

With more than a third of the world's land surface and nearly 75% of freshwater resources devoted to crop or livestock production, agriculture is one industrial sector closely examined by IPBES.

By 2018, the \$2.6 trillion annual economic value of agricultural crop production was threefold greater than in 1970. Soft commodities, such as coffee, cocoa, wheat, sugar, soybean and livestock, are fundamental for feeding society, employing 28% of the global workforce, and creating the backbone for many economies including within the G20 (see below).

For many countries, overall macroeconomic health depends on soft commodity production and trade. Agriculture is however simultaneously the major driver of global natural capital depletion as:

- Global food crop production has increased 300% since 1970 and 50% of global agricultural expansion has occurred at the expense of forests contributing towards 60% loss of terrestrial biodiversity.
- 33% of degraded soils result from agriculture production which also discharges up to 30% of greenhouse gas (GHG) emissions.
- Land degradation has reduced productivity in 23% of the global terrestrial area, and between \$235 billion and \$577 billion in annual global crop output is at risk as a result of pollinator loss.

As natural capital declines, Planet Tracker is working with capital markets to measure the extent to which macroeconomic health, also referred to as sovereign health, depends on the sustainable management of natural capital.

Sovereign health is measured, for example, by Credit Rating Agency (CRA) indicators including, but not limited to, GDP, trade balance of payments (BoP), exports, public finances and expenditure, currency and employment. Going forward CRAs are showing positive signs of directly incorporating natural capital measures into their analysis – for example via Moody's 'external vulnerability' assessments.



Capital Markets are Waking Up to Sovereign Health Risks

Planet Tracker is assessing how declines in natural capital create increased credit risks for sovereign investors. In agriculture-based economies, declines in natural capital can decrease production impacting on industry revenue, tax contributions, employment, and soft commodity exports resulting in falling treasury receipts.

Since 2015 capital markets have increasingly recognised that ESG risks may be material, which is why this report is focusing on the E (environmental risks). For example:

- The UN Principles for Responsible Investment (PRI): Globally by 2019, 146 investors collectively managing \$29 trillion of assets including sovereign bonds have signed the UNPRI ESG in Credit Ratings Statement, including Fitch Ratings, Moody's, and Standard & Poor's (S&P).
- S&P Risk Atlas: Created by S&P Global Ratings, the ESG Risk Atlas provides a country level appraisal and outlook of ESG factors.
- Stock Exchange Engagement: By June 2019, 14 global stock exchanges including London, Shanghai, Luxembourg, Borsa Italiana, Japan Exchange Group, and Frankfurt had launched a dedicated green bonds section.
- Mainstreaming ESG Analysis into Sovereign Credit Ratings: Fitch Ratings, Moody's, and S&P, the three major global credit rating agencies which cover 95% of the sovereign credit ratings' market, have all adopted ESG sovereign rating frameworks.

It is incumbent on sovereign states and their investors to ensure that sustainable management of natural capital is a government and investor priority. Capital markets place a high value on governance strength in their economic assessments. Strong governance commitment and demonstrated ability to deliver on climate and nature sustainability is a crucial starting point in determining a country's exposure, sensitivity and adaptation ability to natural capital volatility.

In an era of greater capital market engagement on climate and nature, for example the Task Force on Climate-related Financial Disclosures (TCFD), sovereign credit issuers should also have a duty to disclose, at the least, climate and nature related aspects of land use change.

SECTION 2

NATURE DEPENDENCY OF EXPORTS

Capital markets use balance of payment volatility as one measure to gauge sovereign bond investments and macroeconomic health. BoP record economic transactions including the trade of goods between a country and the rest of the world.

Many export and import trade products calculated towards BoP rely on 'dead' natural capital (fossil fuels and non-renewable hard commodities) and 'living' natural capital (renewable soft commodities) in their production. These are 'nature dependent exports'.

Nature dependent soft commodity exports across the G20 generated \$10.4 trillion of BoP receipts and formed 10.3% of total G20 exports in 2008–17.

The growth of Brazil's agribusiness sector has come at a significant environmental cost including deforestation, soil degradation, erosion, drought and grassland desertification. The expansion of soybean plantations and cattle pastures are the core drivers of these costs in Brazil's Amazonian, Cerrado and Caatinga biomes. The Satellite Monitoring Project for the Amazon Forest (PRODES) estimated that from 2007–16, 78,000,000 hectares of native Amazon vegetation alone has been lost, an area more than twice the size of Germany. Of this deforested total, 65% was attributed to low-efficiency pastures and 35% to the expansion of soybean, corn and cotton monoculture and double cropping systems.

Natural capital degradation is relevant for sovereign bond investors as it decreases crop and livestock resilience to drought, flood, erosion, and disease compromising production growth and yield (Section 3).

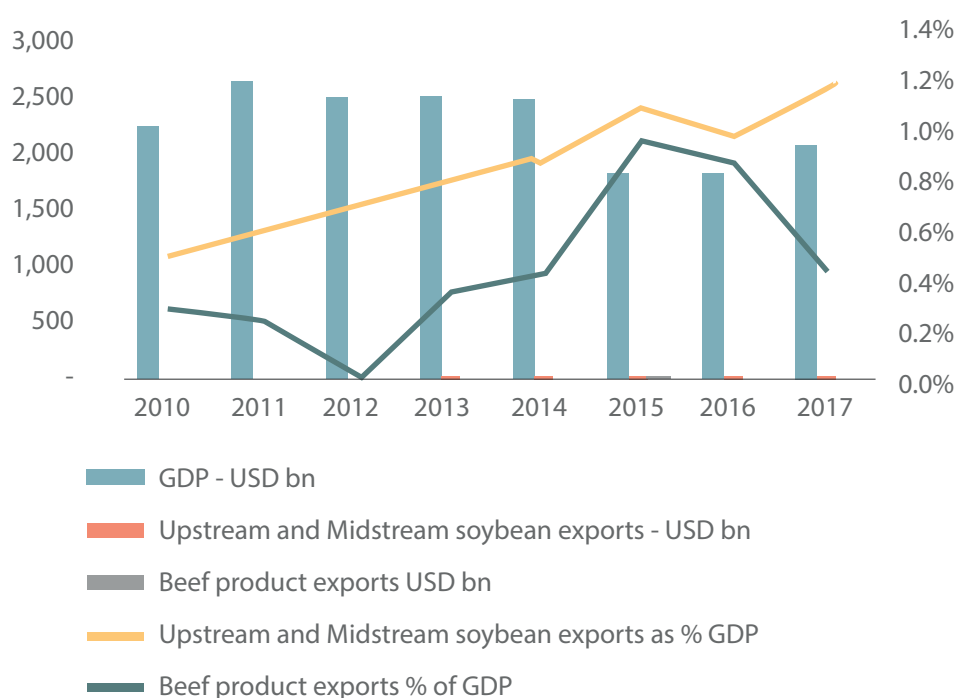


Figure 2: Upstream and Midstream Soybean and Beef Product Revenues as a Percentage of GDP 2010-17.



Whilst market analysis generally focuses on the governance strength of Brazil, this discussion paper offers emerging environmental insights relevant to assessing Brazil's sovereign health.

Brazil's economy is heavily dependent on agribusiness which from 2008–17 accounted for 40% of Brazil's total exports generating \$897 billion. Also, from 2008–17, \$259 billion – 12% – of Brazil's total exports were from soy; \$44 billion – 2% – from beef.

These included products directly produced at the intersection of natural capital and sovereign health, unimpeded by natural capital supply-side or demand-side constraints.

SECTION 3 UNDERSTANDING SUPPLY AND DEMAND DRIVERS

As shown in Figure 3, Planet Tracker utilises a natural capital supply and demand model to measure how nature dependent exports related to sovereign health.

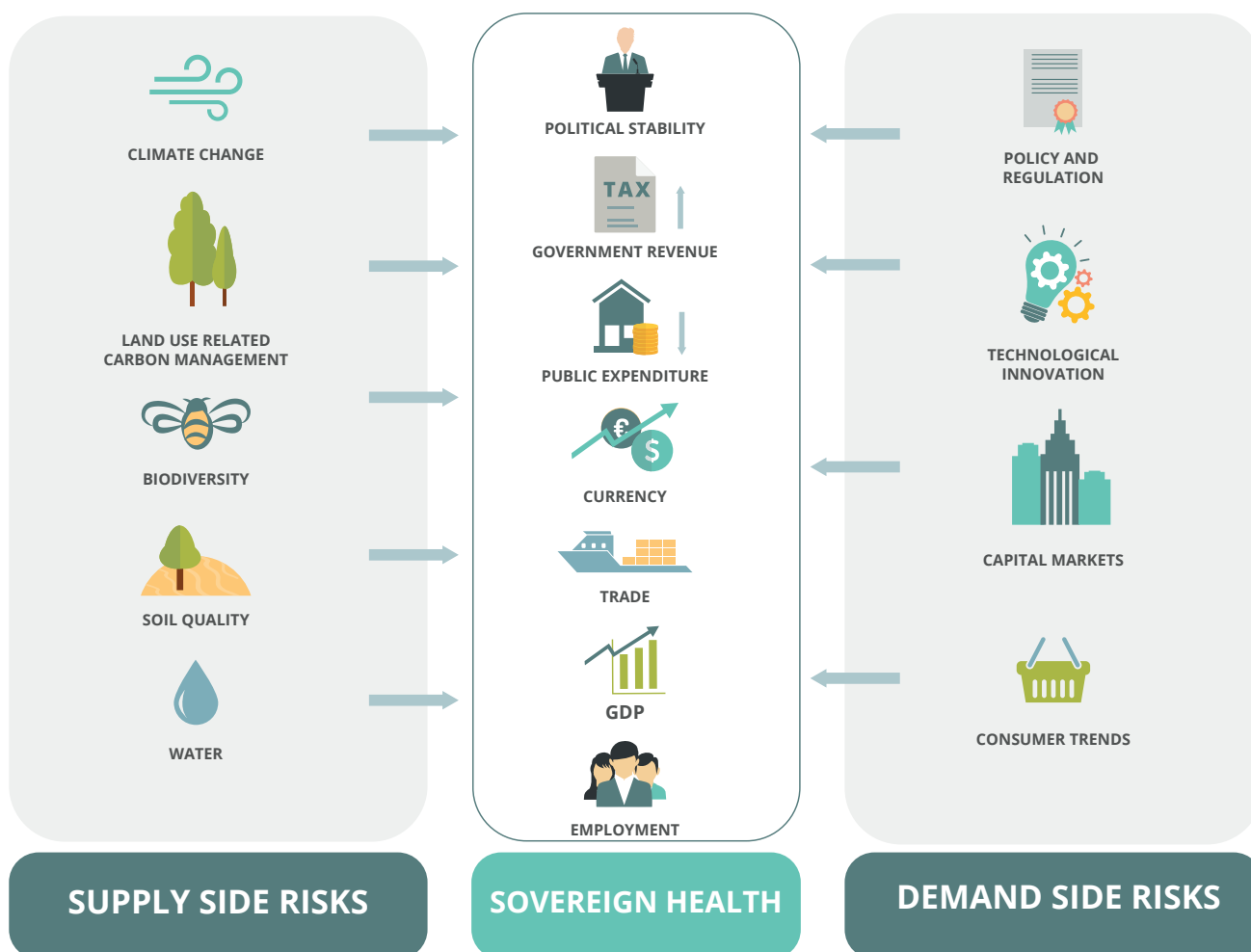


Figure 3: Planet Tracker Supply-Side, Demand-Side, and Sovereign Health Model.

In this model, generic supply-side risks include functional services, non-renewable materials, physical materials and biodiversity.

These generic risks can be broken down into the following categories with those highlighted in **bold** addressed in this discussion paper:

- **Climate change**
- **Land-use related carbon management**
- Water
- Biodiversity
- Soil quality

Generic demand-side risks include policy and regulation, capital markets, technological innovation and consumption trends. The risks discussed in this report are highlighted in **bold**:

- **Policies and regulations**
- **Capital market alignment with natural capital**
- Technological innovation
- Consumer behaviour change, trends, and forecasts

Planet Tracker’s research hypothesises that a ‘chain of impact’ exists between nature and sovereign health at the intersection between these supply-side and demand-side risks.

Supply Drivers

Climate Change:

Between 2008–19, a total of 92 recorded climate-related natural disasters (floods, drought, and landslides) caused \$14 billion worth of damage to the agricultural sector costing the macroeconomy in lost tax contributions and agri-loan defaults.

As a result, agribusinesses are less able to repay agri-loans and increasing defaults, weakening sovereign bond repayment capability and default risk.

Planet Tracker suggests investors sovereign credit analysis factors historical deforestation in Brazil and its implications for natural capital related risks to soft commodity supply and demand despite the Government’s recent positive strides to stop deforestation and increase sustainable agricultural practices through a series of policy, monetary and fiscal measures.

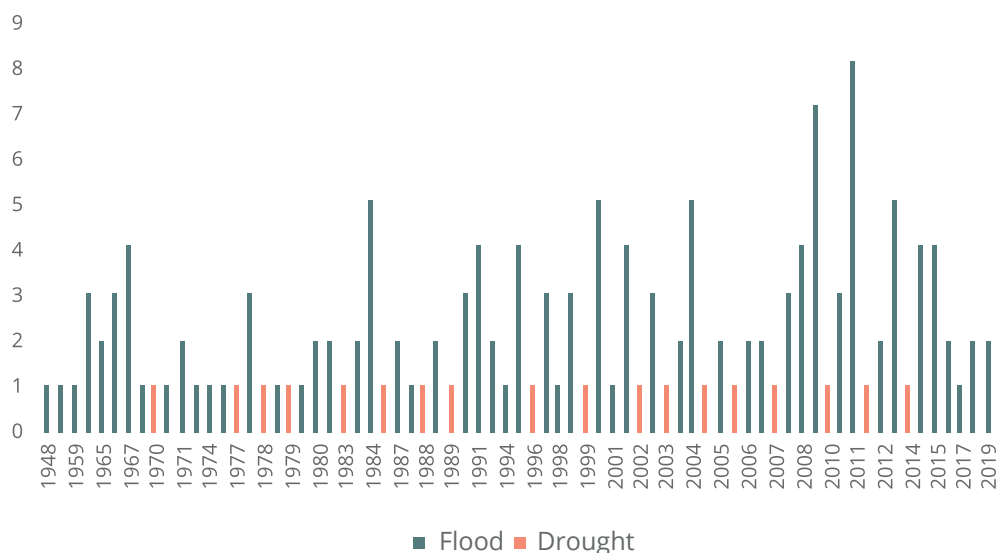


Figure 4: Brazil Flood and Drought Frequency, 1958–2018.



Demand Drivers

Policies and Regulations – European Union Renewable Energy Directive II:

While soybean and livestock production (supply side) is under pressure exports are also threatened by international regulations designed to encourage sustainability. The EU Renewable Energy Directive II will exclude soybean biodiesel entering the EU between 31 December 2023–30 which has been sourced from areas with tree cover loss since 2008. The Directive could decrease Brazilian midstream and upstream soybean and beef exports to the EU between 2023–30 by \$10.2 billion in total.

Capital Market Alignment with Natural Capital – Bank Credit Risks:

Banco do Brasil and accredited banks are currently exposed to enhanced credit default risk resulting from agri-loans issued to overleveraged soft commodity majors, which receive 51% of all subsidised government agri-credit.

Policies and Regulations – Subsidised Agri-Loans:

The Brazilian agribusiness sector is based on a system of subsidised agricultural credits funded by Sovereign Bond investors whose capital is channelled by the Brazilian Treasury through the National System of Rural Credit (SNCR) to accredited banks and then to the commodity majors who are responsible for production in the form of agricultural loans.

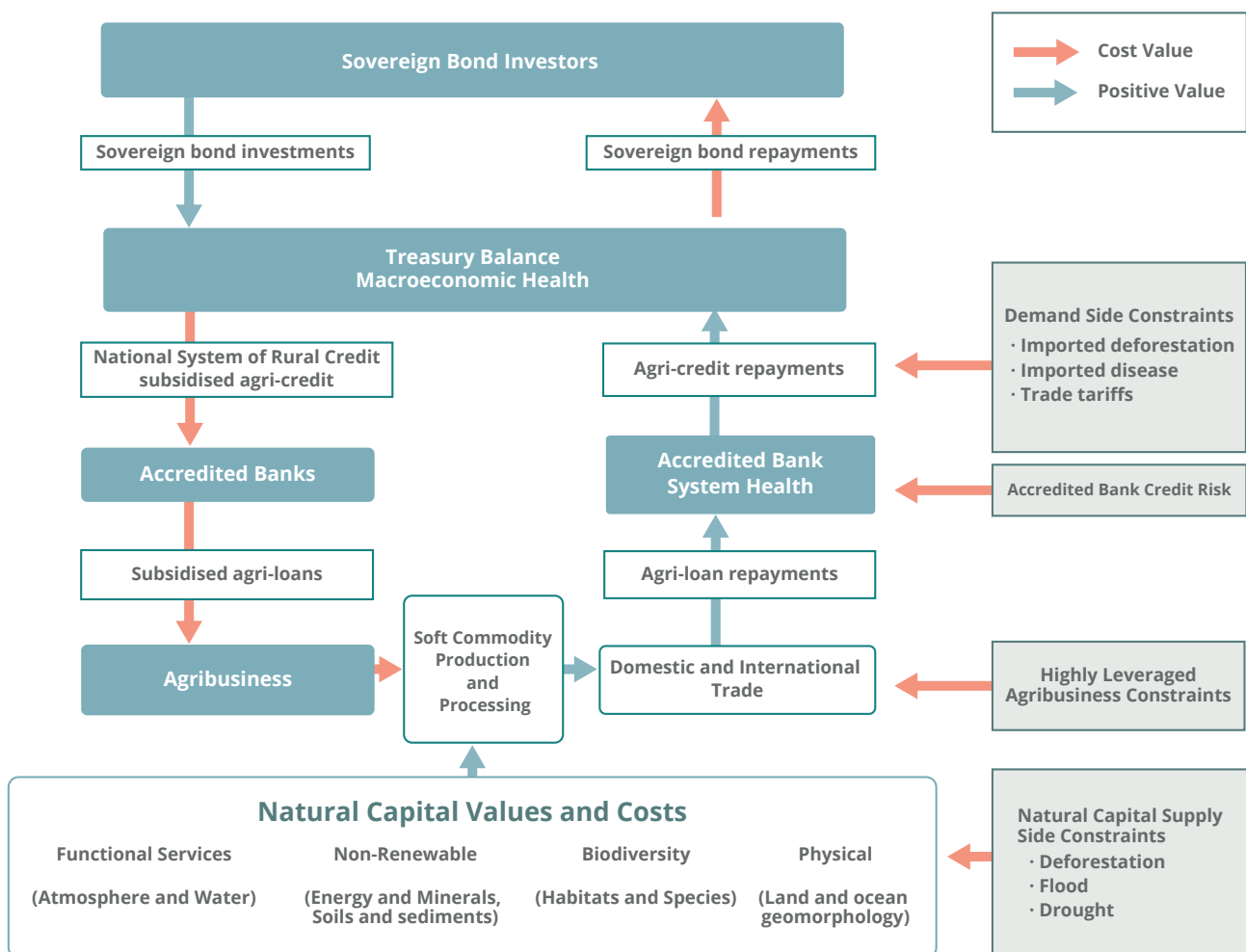


Figure 3: Finance Flows between Brazilian Treasury and Soft Commodity Producers.

Capital Market Alignment with Natural Capital - Liquidity:

Banco Central do Brazil and the accredited banks are now exposed to high default risks, due to the over-leveraged soft commodity majors' decreased capacity to repay.

The Government's bond repayment capability decreases and default risks increase if Banco do Brasil cannot repay agri-credit to the Government.

At the close of 4Q18, Minerva's 12-month net debt to adjusted EBITDA ratio was 6.8x. As of June 2019, Minerva's 5-year credit default swap (CDS) spread was 174 basis points, 15% greater than Brazil's sovereign debt CDS spread, indicating that Minerva had a 0.82% probability of credit default over the next 12 months

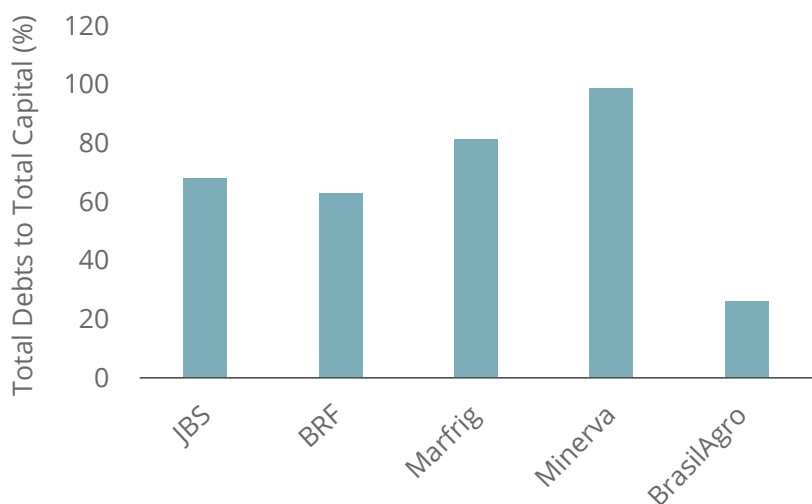


Figure 4: 2018 Total Debt to Total Capital (%) for Select Brazilian Agriculture Companies.

Capital Market Alignment with Natural Capital - Public Finance:

Planet Tracker consolidated the revenue, current tax income, deferred tax income and EBIT for 16 Brazilian soybean and beef agribusinesses between 2008-18 and forecasts 2019-20. Analyses shows (Figure 5) that these companies had an average current income tax to earnings ratio of 0.5% for the period 2008-18 and an average current income tax to EBIT ratio of 9.2% across the same period.

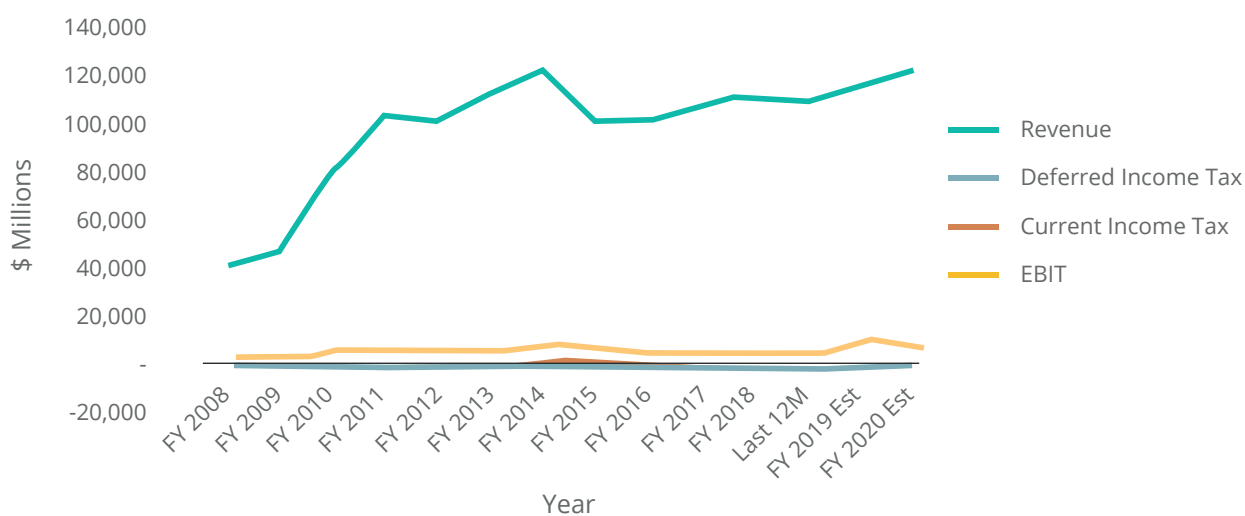


Figure 5: Consolidated Revenue, Current Tax Income, Deferred Tax Income and EBIT for 16 Brazilian Agribusinesses 2008-18 and Forecast 2019-20.



SECTION 5

EMERGING INSIGHTS

The Government of Brazil and specifically, leading policy authorities with responsibilities towards environmental and economic resilience in the Banco Central do Brasil and its sovereign investors, should factor and price in natural capital risks.

Planet Tracker suggests further analysis is required to assess governance strength in relation to natural capital sustainability and fundamental issues such as deforestation, water availability and soil health.

At domestic and international level actions can be taken to support a sustainability transition or 'high road scenario' versus the business-as-usual 'low road scenario'. In a high-road scenario Brazil mitigates soft commodity embedded exports and soybean supply-side and demand-side risks to reinforce its sovereign health.

In a low-road scenario Brazil's soft commodity embedded exports and soybean supply-side and demand-side risks surge, resulting in increases in both the cost of capital, as investors price in declining health of natural capital, and trade regulation which restricts importing Argentinian products related to tree cover loss and deforestation.

Planet Tracker has identified the following actions for further assessment supporting a transition towards a high road scenario:

Investor Support for a Green Economy:

Investor engagement on governance execution by the Government of Brazil and specifically senior parties at the Banco Central do Brasil supporting policies addressing Brazil's natural capital exposure, resilience and adaptation ability can offer support towards managing balance of payment volatility

Certify All Soybean Production as Sustainable:

The Government of Brazil should aim to certify its soybean production as sustainable applying globally accepted independent third-party reputable certification standards to directly mitigate natural capital supply side and product exclusion demand side risks.

Measuring Natural Capital Exposure:

Engage with Banco Central do Brasil on publishing their total agri-credit exposure to accredited specific banks.

More Natural Capital Analysis:

Call on credit rating agencies to increase their explicit analysis on natural capital supply side risk impacts on sovereign bond yields / defaults/ repayments.

In Q4 2019 Planet Tracker is launching a major report on
The Sovereign Transition to Sustainability: Understanding the Dependence of Sovereign Bonds.

For further information please contact:

Matt McLuckie
Director of Research - Planet Tracker
matt@planet-tracker.org



LEXICON

Biodiesel: Biodiesel refers to a vegetable oil or animal fat-based diesel fuel consisting of long-chain alkyl (methyl, ethyl, or propyl) esters. Biodiesel can be used in standard diesel engines, and so is distinct from the vegetable and waste oils used to fuel converted diesel engines. Biodiesel can be used alone or blended with conventional diesel in any proportions.

Credit rating agencies: A credit rating agency (CRA) rates a debtor's ability to pay back debt by assessing timely principal and interest payments, and likelihood of corporate or sovereign default.

Crush capacity: This is the volume of soybeans that can be processed by refineries annually.

Deforestation: The clearance, clearcutting, or removal of a forest or stand of trees from land. Deforestation can involve conversion of forest land to farms, ranches, or urban use. The removal of trees may result in habitat damage, biodiversity loss, erosion and aridity, and can have adverse impacts on the capture and storage of carbon dioxide and water by biological processes.

Environmental, social and governance (ESG): ESG refers to the three categories of factors used to measure the sustainability and ethical impact of an investment in a company.

Gross domestic product (GDP): GDP as an aggregate measure of production equal to the sum of the gross values added of all resident and institutional units engaged in production plus any taxes, and minus any subsidies, on products not included in the value of their outputs.

Indirect land-use change: Indirect land-use, defined in the EU Renewable Energy Directive II (RED II), occurs when the cultivation of crops for such products as biofuels, bioliquids and biomass fuels displaces traditional production of crops for food and feed purposes.

Natural capital: Natural capital is the stock of renewable and non-renewable natural resources (plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people. These benefits are commonly known as ecosystem services.

Soft commodity embedded exports: Soft commodity embedded exports are defined using the Harmonized Commodity Description and Coding System (HS). Soft commodity embedded exports have a direct reliance on soft commodities, which rely upon natural capital in their production. Soft commodities are commodities that are grown, rather than mined/extracted. They include coffee, cocoa, sugar, corn, wheat, soybean, fruit and livestock. On the other hand, commodities that are mined, such as oil, gas, minerals, and precious metals are known as hard commodities.

Sovereign credit rating: This gives investors insight into the level of risk, including economic and political risks, associated with investing in a country. High-quality ratings improve a country's access to external debt markets and foreign direct investment. A sovereign credit rating highlights the potential for a government to be unable to meet its debt obligations. Investors review a country's credit rating and its component parts, such as its debt service ratio, domestic money supply, import ratio and export revenue.



DISCLAIMER

Investor Watch's reports are impersonal and do not provide individualized advice or recommendations for any specific reader or portfolio. Investor Watch is not an investment adviser and makes no recommendations regarding the advisability of investing in any particular company, investment fund or other vehicle. The information contained in this research report does not constitute an offer to sell securities or the solicitation of an offer to buy, or recommendation for investment in, any securities within any jurisdiction. The information is not intended as financial advice.

The information used to compile this report has been collected from a number of sources in the public domain and from Investor Watch licensors. While Investor Watch and its partners have obtained information believed to be reliable, none of them shall be liable for any claims or losses of any nature in connection with information contained in this document, including but not limited to, lost profits or punitive or consequential damages. This research report provides general information only. The information and opinions constitute a judgment as at the date indicated and are subject to change without notice. The information may therefore not be accurate or current. The information and opinions contained in this report have been compiled or arrived at from sources believed to be reliable and in good faith, but no representation or warranty, express or implied, is made by Investor Watch as to their accuracy, completeness or correctness and Investor Watch does also not warrant that the information is up-to-date.

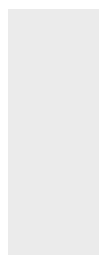
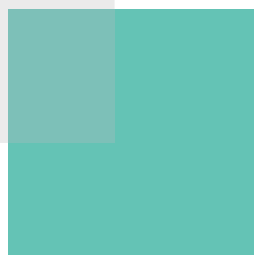
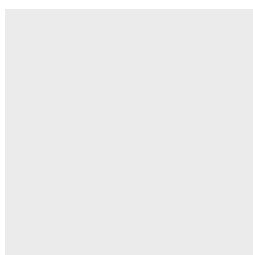


REFERENCES

Endnotes

- I Observatory of Economic Complexity, MIT (2019).
- II World Bank (2018). World Development Indicators Data Bank.
- III IPBES (2018)
- IV Rockström et al (2018). Food in the Anthropocene: the EAT– Lancet Commission on healthy diets from sustainable food systems.
- V Rockström et al (2018). Food in the Anthropocene: the EAT– Lancet Commission on healthy diets from sustainable food systems.
- VI The Intergovernmental Science-Policy Platform on Biodiversity & Ecosystem Services (2019).
- VII UN Principles for Responsible Investment (2019). Shifting Perceptions: ESG, Credit Risk and Ratings.
- VIII S&P Risk Atlas (2019).
- IX Climate Bonds Initiative (2019).
- X Fitch (2018). Sovereign Rating Criteria.
- XI Moody's (2018). Sovereign Bond Ratings.
- XII S&P (2019). Sovereigns: Sovereign Rating Methodology.
- XIII Launched in 2016, the UNPRI ESG in Credit Ratings programme provides leading analysis aiming to promote understanding of practices, identify gaps in the consideration of ESG factors in credit risk analysis, and find ways to address those gaps.
- XIV The Caatinga is the 'white forest' consisting of dry shrubs in the Northeast of Brazil, widely considered to be an extension of the Cerrado. The Caatinga is considered the frontline of soybean and pastureland expansion in Brazil.
- XV IPAM (2017). A Pathway to Zero Deforestation in the Brazilian Amazon.
- XVI Classified as less than one cow per hectare.
- XVII IPAM (2017). A Pathway to Zero Deforestation in the Brazilian Amazon.
- XVIII EM-DAT (2019).





info@planet-tracker.org