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How asset-intensity has impacted the ability of Commodity Trading Firms to earn exceptional profits during the Coronavirus crisis, on year 2020

The case of Glencore and Trafigura

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by

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Executive Summary

The energy sector was one of the industries hit hard by the Covid-pandemic: after unprecedented demand destruction of crude oil and global storage reaching their limit capacity, the price of West Texas Intermediate (WTI) went negative for the first time in history on April 2020. With the crude oil forward curve forming a super contango, commodity trading firms with access to storage facilities did capitalize on this market imbalance to earn record profits.

One such trading company is Trafigura, a trading house operating under an asset-light Business model, which realized a record Net income of $1'599 million. In the same market context, one would expect Trafigura's direct competitor, the mining company Glencore, which operates under an asset-intensive Business model, to have achieved the same record levels of profitability. However, Glencore closed the financial year with a Net loss of -$3'946 million. Glencore's CEO attributed this loss to significant Impairment losses of $5'715 million caused by the economic activity slowdown and increased levels of uncertainty.

From this assertion, the author inferred that Impairment losses are positively correlated with the proportion of fixed assets owned by a company, and that asset Impairment losses are negatively correlated with earnings. Hence, the research question of this paper is: *"How has asset intensity impacted the ability of commodity trading companies to earn record profits during Covid-19? "*

This research is conducted based on two main assumptions: firstly, Glencore's asset-intensive Business model undermined its ability to earn record Net profits; Secondly, Trafigura's asset-light Business model was the main driver of its record Net profit. To carry out this research, *Net income* is defined as the dependent variable, and Financial metrics such as Profitability and Efficiency ratios as the independent variables. The data was extracted from Glencore and Trafigura's Consolidated annual financial statements. The period under observation is 2013- 2020. In this paper, 2020 is referred to as the year of the Covid-pandemic or Coronavirus Crisis.

The quantitative analysis is organized into three parts: part I offers an overview of the evolution of key balance sheet positions, profitability, and efficiency ratios of Glencore and Trafigura. Part II tests the statistical significance of the assumptions.

Part III presents the statistically significant predictors of Glencore's and Trafigura's Net income using Pearson's coefficient correlation analysis. Finally, an attempt is made to build a reduced Multiple Linear Regression model that can best predict Glencore's and Trafigura's Net income.

The findings of this research are as follows: Part I reveals that Glencore's Operating margins (EBIT and EBITDA) have remained relatively stable since 2007 and that the deterioration in Glencore's Net income is not due to asset inefficiency, i.e., the high proportion of fixed assets, but rather to the declining profitability ratio, i.e., the *Net income* earned in relation to sales achieved. For Trafigura, the conclusion is that, on the whole, turnover levels, profitability, and performance ratios have remained fairly constant and that the exceptional performance during the Covid pandemic was an isolated event.

In the second part, the first hypothesis testing demonstrates that despite Glencore's Net loss and Trafigura's record Net profit during the Covid pandemic, there is NO statistically significant difference in the Net profit achieved by these competitors; the test of the second hypothesis confirms the claim that Glencore's Operating profit (EBIT) is superior to that of Trafigura. This outcome corroborates the conclusion in Part I that Glencore has no major operational inefficiencies and that asset intensity has not prevented Glencore from earning exceptional profits during Covid-19.

In Part III, the Pearson's coefficient correlation analysis reveals two key findings: firstly and surprisingly, for Glencore and Trafigura, PPE levels or asset intensity is a variable not statistically significant and weakly correlated with the Net income. Secondly, for both Glencore and Trafigura, Impairment losses are a variable statistically significant and highly correlated with Net income. The expected negative correlation between Impairment losses and Glencore's Net income was observed. However, unexpectedly, in the case of Trafigura, a positive correlation was observed between Impairment losses and Net income. This divergent outcome raised the question of the role and impact of Impairment losses on earnings.

This paper's conclusion is that in the case of Glencore, the observed negative correlation reflects a pattern similar to "big bath" behavior which describes a company that registers Impairment losses in a period when its profits are already lower than expected, thus allowing it to improve its future profits. As for Trafigura, the observed positive correlation fits the concept of "income smoothing," which describes a company that, in its desire to maintain steady earnings growth, records Impairment in periods of exceptionally high earnings.

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1. Introduction

The Covid- pandemic has affected negatively the overall industries, but some businesses were more hurt than others. This was the case of firms that rely on personal interaction, such as fitness centers, accommodation, and food services. These industries reported a decline in turnover of over 50%. (Bloom, Dhingra, Levell 2020)

Nouail (2021, p. 19) reports that the beginning of 2020 was particularly difficult for raw materials and commodity producers, especially those involved in an extractive nature. The fall in commodity prices was abrupt, and between 1 January and 31 March 2020, in the metals industry, the price of copper plummeted by almost 20%, while the prices of aluminium and nickel fell by 16% and 18% respectively. The only exception was gold, for which the price grew strongly. The energy sector was also hit hard by economic uncertainty, with the price of Brent crude falling from around $67/barrel on 1 January to just under $15/barrel on 31 March 2020. For West Texas Intermediate (WTI), the situation was even more dramatic, with negative prices of -$37.63 at the close on 20 April 2020.

If under normal market conditions at least the end users, i.e., governments or companies, would seek to benefit from these particularly low prices, this was not the case as the Lockdown cancelled out the need for such commodities.

However, as per the author (Nouail 2021, p. 20) commodity trading firms did benefit from the drop in price of the commodities, mainly the firms trading oil, provided that they had access to storage facilities.

An article published in Forbes, goes further arguing that *“like clockwork, traders' profits have always risen during or just after volatile periods of falling oil prices”, and* that "*more surprising than traders' strong profits is that they might not be very surprised at all."* (Carpenter 2020)

Hume (2021) reported that "*commodity traders emerged from the Coronavirus crisis as one of the biggest winners*" and that trading houses have “*been able to earn massive profits by navigating the ups and downs of volatile commodity markets*”.

Trafigura, one of the biggest players in the oil trading, is one example of a commodity trading firm which reported a sharp increase on the Net profits during 2020. According

to its CEO the profit was led by an "*exceptionally strong performance in physical oil trading"*. (Hume 2021)

If on the one hand, Trafigura's turnover decreased from $171'474 million in 2019 to $146'994 million in 2020, the Gross margin increased by 142%, and the Net profit rose by 84%, on the other hand.

In the same market context, we would expect that Trafigura's direct competitor Glencore, to have achieved the same levels of profitability and performance.

According to the consolidated financial statements, Glencore's turnover in 2020 amounted to $142,338 million, effectively identical to Trafigura's turnover ($146,994 million in 2020). However, in terms of profitability, one can observe a massive disparity between the two companies: Glencore reported a negative Net income of -$3,946 million as opposed to a Net income of $1,599 million for Trafigura.

A preliminary research question *would be to determine the reasons behind this difference in Net income between Glencore and Trafigura if they had realized similar turnover levels in year 2020.*

Part of the answer was provided by Glencore's CEO, who attributed the loss to an extraordinary asset Impairment amounting to $5'715 million. Impairment losses are intended to account for the loss in value of long-lived assets,[1] so that their booking value is not higher than their fair or market value.

Therefore, one can deduce that the huge Impairment loss incurred by Glencore is indicative of the fact that Impairment expenses are positively correlated to the proportion of fixed assets owned by a company and, that asset Impairment is negatively correlated to earnings.

In effect, if we examine the business model of Trafigura and Glencore, we notice that, although they compete on the same commodities: industrial metals, iron ore, petroleum, and coal, they operate with different business models: with an asset-light balance sheet, Trafigura has remained more of a classical commodity trader. Its assets are predominately composed of current assets, such as inventories and Trade Receivables. Trafigura's proportion current and fixed assets are 80% and 20%, respectively.

[1] Such as tangible assets (PPE – Property, Plant and Equipment).

Glencore, on the other side, has moved into a more asset-intensive business model. In 2013, Glencore took over the mining company Xstrata, becoming the world's biggest exporter of coal for power plants and the largest zinc producer. Through this merger, the newly formed group Glencore Xstrata International PLC achieved total control of high- quality mining resources combined with a robust trading and logistic platform. As of 2020, the positions of current and non-current assets are respectively: 35% and 65 %. (Glencore and Xstrata merger deal 2012), (Baines, Hager 2021, p. 13)

In light of this marked difference in the asset structure of Glencore and Trafigura and their divergent Net income during the Covid-pandemic, we may question whether asset intensity was the main source of this difference in profitability, on the one hand, and the effect of Impairment losses on a firm's profitability, on the other hand.

Hence, over the course of this paper, we will conduct the research on the basis of two central assumptions:

(1) Glencore's asset-intensive business model and the resulting Impairment losses undermined its ability to earn record Net income during the Covid-pandemic ;

(2) Trafigura's asset-light business model, and consequently lower size of Impairment losses, enabled it to reap record Net income during the Covid pandemic ;

The remainder of this paper is organized as follows: the Theoretical Foundations section introduces: (i) the role of commodity traders, (ii) how they add value to the economy and exploit arbitrage opportunities to earn profits; and (iii) an overview of the business profile of Glencore and Trafigura, as well as their respective Business model. At the end of this section, the reader will have acquired the necessary insights to immerse in the Methodology section conducted through quantitative analysis.

The quantitative analysis is organised in three parts: part I offers an overview of the evolution of key balance sheet positions, profitability and performance ratios of Glencore and Trafigura. Part II tests the statistical significance of the hypotheses set in this research. Part III presents the statistically significant predictors of Glencore and Trafigura's Net income, on the one hand, and the Multiple Linear Regression model that can best predict Glencore and Trafigura's Net income, on the other hand.

The paper concludes with a summary of the findings and final observations. It will follow an indication of research limitations and possible future research gaps.

2. Theoretical Foundations

2.1 The role of commodity traders and their contribution to the economy

According to Nouail (2021, p. 20) the role of commodity traders *"is to reconcile, in time and space, sellers (producers / exporters) and buyers (users / importers) on the international physical markets and, in this capacity, to assume a certain number of risks, particularly commercial and price risks."*

In addition, "*commodity trading firms help move commodities from a raw state to one that people can consume. This involves transforming commodities in three important ways: in space, time, and form".* (Pirrong 2015, p. 19)

Traders seek to identify the most valuable transformations, undertake the transactions necessary to achieve these transformations, and engage in the physical and operational actions required to complete them. (Pirrong 2014, p. 7)

Risk management is also an integral part of the operations of commodity trading companies: they manage risk not only to safeguard the operations they undertake, but also they provide risk management services to their customers.

2.2 How commodity traders benefit from volatility

While the common belief is that no one can benefit from the volatility of commodity prices, especially pure producers or end consumers, commodity experts know that commodity traders tend to perform exceptionally well in a highly volatile market.

This is due to the fundamental role of a commodity trader, which is to find and exploit *"arbitrages opportunities"*. Arbitrage occurs when the value of a transformation, exceeds the cost of that transformation. (Pirrong 2014, p. 8)

Volatile economic conditions enhance arbitrage opportunities (value creation). For example: (1) supply and demand shocks can result in geographical imbalances that create spatial arbitrage opportunities for traders; (2) greater volatility also renders storage more valuable, thus generating intertemporal arbitrage opportunities; (3) volatility in prices, create temporary mispricings originating trading opportunities; (4) economic imbalances such as revolutions, wars, rapid growth concentrated in a particular country (e.g. China) are some examples of events that stimulate trade and increase arbitrage opportunities.

In times of market turmoil, commodity traders, like the *invisible hand*, react to price signals and move commodities from places of abundance to places of scarcity, to be used at their highest value. This results in more efficient allocation of resources. (Pirrong 2014, p. 9)

Another reason commodity traders benefit from volatility is their access to information: with incomparable global reach to information along trade flows, traders are the first market participants to obtain insight into many market-relevant data streams, offering them a lead in the *"price discovery"* process.

In times of high market volatility, this price discovery gap tends to widen, and traders capitalize on the disorientation of other market players. Put simply: increasing informational asymmetries offer commodity traders the possibility to seize profit opportunities through arbitrage, speculative trading, or the enhanced provision of Risk management services to less informed entities. (Baines, Hager 2021, pp. 18–19)

2.3 How traders benefit from falling prices of oil in a volatile market?

The ability of traders to make exceptional profits in a volatile market with falling oil prices is linked to how oil is bought and sold and the formation of the contango forward curve. As the adage says: "*contango is a trader's best friend."* (Carpenter 2020)

For a better understanding of the functioning of a market in contango, the concept of forward curve must first be introduced.

2.3.1 Forward Curves

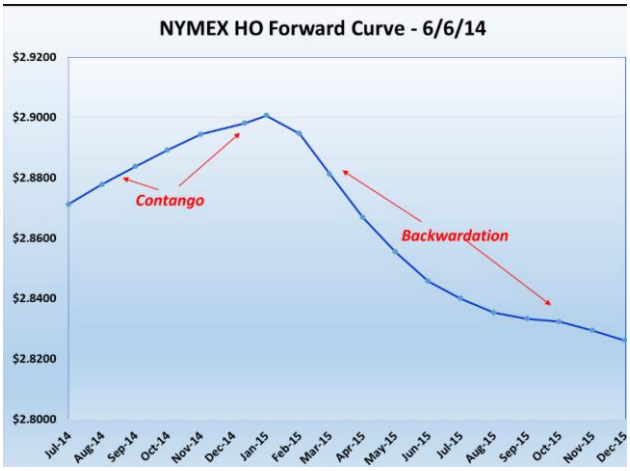
The forward curve or term structure of the markets is a snapshot of what a commodity is currently worth today for a transaction or delivery in the future. These transactions take the form of a future contract or forward contract.

Traders use the forward curve as a tool to gather information about the market sentiment and the potential direction of the market. The shape of the forward curve is crucial to energy market participants. There are two dominant structures: backwardation and contango. (CME Group 2022)

2.3.1.1 Contango and Backwardation

Figure 1, displays the forward curve in Contango and Backwardation.

Figure 1: Forward curve: Contango and Backwardation



Source : https://www.cmegroup.com

The front part of the futures curve (July 14 to January 15) illustrates the structure of the curve in contango or carry formation.

A contango formation occurs when prices are higher in later delivery months than near or spot months. Generally, a contango formation arises when the market is oversupplied, or demand is low. Contango is caused by other factors such as storage, demurrage, financing, and insurance costs. Contango curve signals to traders that the market does not need all the oil produced. As a result, during periods of contango, stocks usually build up. (CME Group 2022)

The backwardation pattern (January 15 to December 15), suggests that the market is undersupplied or that demand exceeds supply. During a period of backwardation in the market, stocks are typically depleted as an additional supply source to meet demand.

Because forward curve is a model showing how future months are valued relative to the nearby contract month given all of the available market information, this curve is dynamic, implying that it can transition from contango to backwardation or vice-versa.

Factors contributing to this transition are fundamentals such as: supply and demand imbalances, seasonal and weather conditions, geopolitical risk, expected operating impact to supply like refinery and producing maintenance schedules; unscheduled downturns in the refining sector, or economic growth that results in higher demand for energy products.

2.3.2 Super Contango in 2020 and trader's exceptional profitability

Oil experienced a super-contango for the first time in 2008 and then in 2020 during the Covid-19 pandemic. As mentioned above, a contango occurs when the spot price is lower than the futures price. In the case of a super contango, the spot price of a commodity is sharply lower than the futures price.

Super contango occurs under particular circumstances: (1) the inventory space to store the physical commodity is depleted due to the increase in oversupply; as a result (2) as the cost of storage increases, (3) the futures price will increase further if additional storage space is not created.

A super-contango can only be broken by drastically reducing the supply of a commodity, by creating additional storage space, or rapidly depleting stocks. Cutting oil supply is challenging because: firstly, shutting down and restarting oil production is costly, and thus producers try to avoid this drastic step until they have no other option; Secondly, it requires agreements and negotiations, between key oil producers (OPEC+), and lastly, even if cuts are agreed upon, it is not a guarantee that countries will stick to their commitments. There is a strong financial incentive to exceed the targets at the expense of other OPEC members. (IIFL Securities 2020), (Antweiler 2020)

All the circumstances and challenges mentioned above were observed during Covid-pandemic: the disruption of oil demand caused by the forced shutdown, combined with the collapse of the OPEC+ agreement to cut oil supply, resulted in an oversupply of oil. This imbalance between supply and demand caused oil prices to fall sharply. As global oil storage neared its full capacity, the crude oil forward curve shifted into a steep contango as the market pushed for more oil to be stored.(Antweiler 2020)

Consequently, in March 2020, the forward curve of all crude oil benchmarks moved into a super contango: West Texas Intermediate (WTI) fell by 306%, reaching negative levels for the first time in history. The May contract settled at -$37.63 per barrel.

According to Professor Antweiler (Antweiler 2020) "*negative prices are anomalies truly exceptional: negative prices means someone is getting paid to take your oil, not the other way around."*

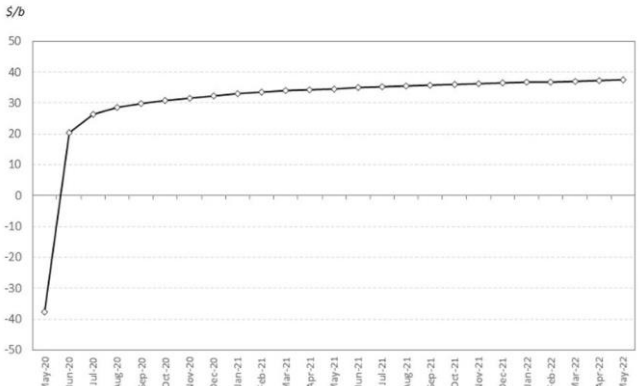
Price differentials between spot and futures contracts for Brent were not as dramatic as those for WTI, as Brent is a waterborne crude oil and is not subject to the same storage constraints as WTI: firstly, WTI crude is produced in landlocked areas and stored in Cushing, Oklahoma, which has a limited storage capacity of 90 million barrels; secondly, all WTI crude contracts are settled by mandatory delivery at the storage hub in Cushing. On 17 April 2020, the Cushing facility was reported to be 77% full and expected to complete by mid-May. (Saefong 2020)

Contrary to the WTI, Brent is cash-settled, and since it is produced near the sea, it can be put on ships immediately, opening up to more storage options available across multiple locations, making delivery easier. (MoneyControl 2020)

2.3.2.1 How do oil traders capitalise on an oil market in contango?

In short, oil traders buy crude oil at the spot price which is lower, put it in storage and sell it at a future date at higher prices. To illustrate:

Figure 2: WTI Futures as of April 20 (May 2020 – May 2022)



Source: https://www.forbes.com/

Let us take the example of the forward curve for WTI Futures (Figure 2) as of April 2020. Suppose the trader bought and took delivery of physical crude oil (at spot) on June 2020 at $20 per barrel and placed it in storage. Next, the trader would have simultaneously sold the equivalent volume of crude oil futures in November 2020 at $30 per barrel. The combination of these two trades (physical + futures) would allow the trader to lock in a Gross profit of $10. The Net profit is obtained by subtracting the cost of storage.

According to Professor Antweiler (2020), during Covid-pandemic, on a similar trade transaction, considering storage cost of approximately $7 per barrel and per year, for any delivery of crude oil in April 2021, the return would amount to 138%. For deliveries in April 2022, there would still a remarkable 41% of return.

According to the expert, *" with returns like these, it is not surprising that storage capacity during Covid-19/ super contango was all complete. These returns on investment exceed any regular type of investment "*. Traders will keep carrying such arbitrage opportunities as long as the profit from this transaction is large enough to cover the storage costs (the cost of carrying). (Antweiler 2020).

If commodity trading companies are well placed to take advantage of turmoil or volatility, it is not without cost: exploiting arbitrage opportunities requires meticulous trade optimization, having the necessary assets and logistics available, as well as sophisticated Risk management techniques because *"commodity trading is a high-volume, low-margin business.*" In the mining sector, margins can average 5%. In the oil trade, however, margins are exceptionally low, in the range of 0.5% to 1%.(Hume 2021, p. 1)

Therefore, to optimize their operations, commodity trading companies have to make strategic business decisions regarding their business model: whether to adopt an asset-light model by leasing or chartering physical assets, such as Trafigura; or conversely, such as Glencore, by diversifying through vertical integration and owning mining assets, for example.

At present, we are turning to a more detailed examination of each company's Business model and the profitability derived from the ability of their Business model to capture arbitrage opportunities during the Covid-19 period.

2.4 Company's Profile and Business models

2.4.1 Glencore

2.4.1.1 Story of Glencore

1974 – 1994 "*Marc + Co AG*"

The story of Glencore dates back to Belgian-born commodities billionaire Marc Rich, who in 1974 circumvented the Arab oil embargo to buy oil from Iran and Iraq for $12 a barrel and sell it at a massive profit to US companies. (Moshinsky 2015)

With the profits earned, Marc Rich established the trading company *Marc + Co AG.* In the beginning, the company focused on the physical marketing of commodities, primarily minerals, metals, non-ferrous and ferrous, and crude oil. (Matteocci 2017)

In 1981, *Marc + Co AG.* diversified into the agribusiness sector by acquiring a Dutch grain trading company and also included coal among its traded products. In 1987, the company further expanded its activities by buying a 27% stake in an American aluminium smelter. A year later, it bought a two-thirds stake in a Peruvian lead and zinc mine. (Matteocci 2017)

In the early 1990s, the United States indicted March Rich for more than 300 years in prison for multiple criminal activities, including tax evasion, racketeering and embargo violations. Rich escaped to Switzerland, remaining on the FBI's most wanted list for several years. Rich's companies were fined $90 million for violating the fiscal regime. (Moshinsky 2015)

In 1993, Rich suffered a $172 million loss and control of his company in a failed attempt to dominate the zinc market. After this incident, a management buyout was carried out for USD 600 million. *Marc Rich + Co AG* was reborn as Glencore in 1994.

1994 – 2012 *"Glencore International plc"*

In 1994, after its inception as Glencore plc, Glencore continued its expansion into mining by purchasing its first stakes in some of Glencore's major production facilities, such as Prodeco, for coal-related products, and Kazzinc, for zinc-related products. (Matteocci 2017).

These investments have positioned Glencore International plc as a dominant player in three business segments: metals and minerals, energy products, and agricultural products. (GlobalData plc 2012)

In 2011, Glencore transitioned from private to public ownership via IPO[2] on the London and Hong Kong Stock Exchanges. This change in ownership was a preliminary step before the takeover of the mining company Xstrata plc in 2013.

1926 – 2012 "*Xstrata plc*"

Xstrata was founded in 1926 in Switzerland as *Südelektra AG* to operate under a business model based on infrastructure and energy projects primarily located in Latin America. The relationship between Glencore and Xstrata goes back to the 1990's when Glencore acquired a 34.5% stake in Xstrata and became one of its major shareholders.

In 1999, Südelektra was renamed Xstrata, and the company began focusing on mining activities. In the early 2000's, as a result of a fast-paced acquisition and investment strategy, Xstrata became one of the world's leading mining groups. The company was a key producer of copper, coking coal, thermal coal, nickel, ferrochrome, vanadium, and zinc, as well as platinum group metals, gold, cobalt, lead, and silver.(GlobalData plc 2012), (Matteocci 2017, p. 42)

2013 – (today) The Merger between "*Glencore International plc* and *Xstrata plc*"

The history of Glencore and Xstrata has been entwined since at least 2002 when Xstrata acquired the Australian and South African coal assets of Glencore, Xstrata's largest shareholder at the time. (Aversano, Ritsatos 2015)

In 2013, Glencore completed the merger with mining Xstrata to form *Glencore Xstrata International plc* with a combined market value of $90 billion. (GlobalData plc 2012)

The new formed Anglo-Swiss multinational commodity trading and mining company is headquartered in Baar, Switzerland, and registered in Saint Helier, Jersey. (Aversano, Ritsatos 2015)

[2] IPO - Initial public offering is the process by which a private company can go public by sale of its stocks to general public.(The Economic times 2022)

The merger has resulted in one of the world's largest commodity companies with more ships than the British Navy, and capable of competing with competitors such as BhP Billiton, Rio Tinto, and Anglo American PLC. It created the world's largest thermal coal exporter, the largest zinc producer, and the third largest copper miner.

The economic success of Glencore and Xstrata is explained by their operating efficiency and effectiveness in markets that frighten risk-averse companies. (Aversano, Ritsatos 2015). In 2021, after 20 years as head of Glencore, Ivan Glasenberg retired. His designated successor is Gary Nagle.

2.4.1.2 Asset-intensive business model

In an asset-intensive business model, the company opts to own the vast majority of its tangible assets or PPE. Glencore, that used to be similar to Trafigura, integrated more asset-intensive transformations activities, such as crude oil production, refining, and processing, but especially mining. As a result, the company began owning more tangible assets. In parallel with the increase in asset intensity, Glencore moved from private to public ownership in year 2012, just before acquiring the mining company, Xstrata.

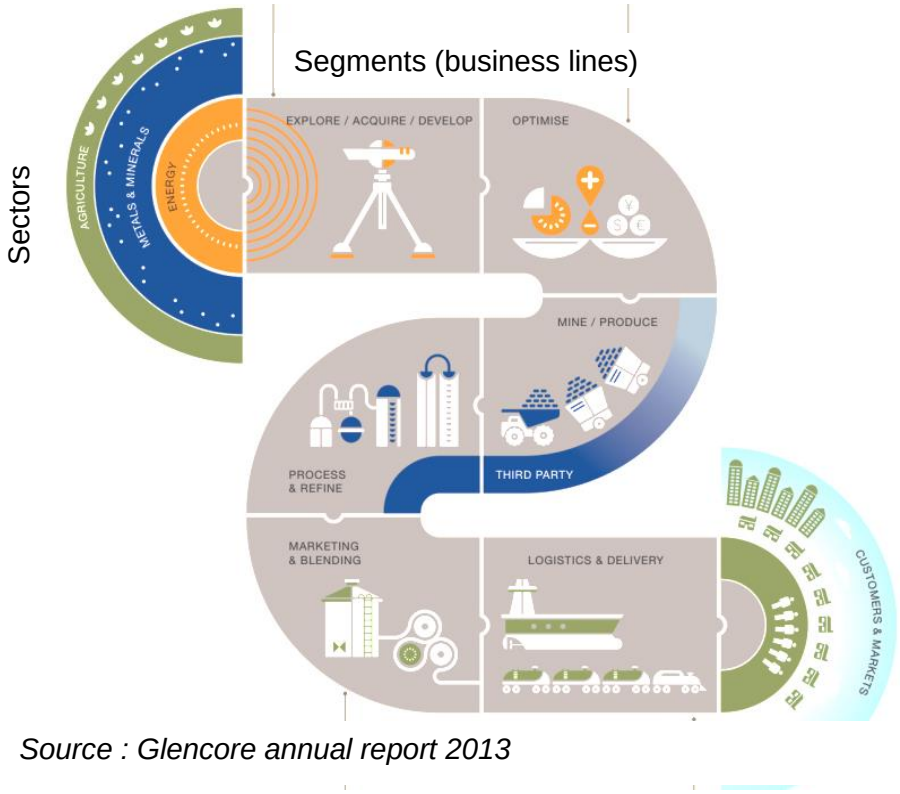
This shift is explained by massive equity requirements that is beyond the capacity of a small groups of managers. In addition, most of the activities that Glencore carries involves risks[3] that cannot be transferred by financial contracts, as such owning assets is a justifiable choice.

[3] Some risks that cannot be transferred via financial contracts are: climate change risks, geopolitical, permits and licenses to operate risks, laws and enforcement risks, supply, demand, and prices of commodities risk

2.4.1.3 Glencore's business model

Glencore is the most globally integrated and diversified player in the commodities industry. This can be observed on Figure 3 displaying its business model.

Figure 3: Glencore's Business Model



Source : Glencore annual report 2013

As we can observe, Glencore's business model can be divided into : (1) Sectors and (2) Segments or Business lines:

1. **Sectors:**
   - 1.1. Agriculture (e.g. crops, sugar)
   - 1.2. Energy (e.g. coal, oil and gas products)
   - 1.3. Non-Precious Metals and Minerals (e.g. copper, zinc)
   - 1.4. Precious Metals (e.g. gold, silver)

2. **Segments (Business lines)**
   - **2.1. Industrial activities**
     - 2.1.1. Exploration, acquisition and development
     - 2.1.2. Extraction and production
     - 2.1.3. Processing and refining

2.2. Marketing activities

2.2.1. Logistics and delivery

2.2.2. Blending and optimisation

Figure 4 illustrates how Glencore's Sectors and Business lines are interconnected creating synergies.

Figure 4: Glencore's business segment and sectors

	SECTOR		
SEGMENT	Agriculture	Energy	Metals & Minerals
Industrial activities (e.g. production, processing)	handling of originating, handling of grain, pulses, sugar, rice, cotton, vegetables oil, protein meals and biodiesel	Coal mining and oil production	Mining activities for copper, zinc, lead, nickel, ferroalloys, alumina & aluminium
Marketing activities (e.g. physical trading)	Processing and marketing grains, pulses, sugar, rice, cotton, vegetables oil, protein meals and biodiesel	Supplying and shipping thermal coal (utilities), cooking coal (steel producers), oil, refined products and natural gas	Marketing of copper, zinc, lead, nickel, ferroalloys, alumina & aluminium and iron ore

Source : (Matteocci 2017, p. 3)

2.4.2 Trafigura

2.4.2.1 Story of Trafigura

1977

The Trafigura story began with its founder Claude Dauphin, a Frenchman born in Houlgate, Normandy. His career in the commodities industry commenced in 1977 when he met Felix Posen, then head of non-ferrous metals trading at the commodities trading company *Marc Rich + Co* (formerly Glencore).

Posen hired Claude Dauphin as an employee of *Marc Rich+ Co*. Within that company, Claude Dauphin progressed to head of London's oil business. After several scandals involving Marc Rich, Dauphin quit the company and in 1993 founded a partnership - *Trafigura Beheer BV* - with five former Marc Rich employees. (Tham 2019)

1993 – (today) *Trafigura Beheer BV*

In March 1993, Dauphin acquired a shell company based in the Netherlands, thus founding Trafigura Beheer BV. The company's first measures included establishing a profitable oil trading business and securing a series of major contracts in countries such as Argentina and China, positioning itself as a key player in the oil trading sector.

Later in 2000, Trafigura took its first step into the midstream and downstream sector by acquiring Puma Energy, whose assets were primarily in Latin America. The subsidiary proliferated. By 2014, it was present in 45 countries and reported more than $13 billion in revenues.

As Trafigura's business expanded, the company was presented with numerous opportunities to be listed publicly, thereby increasing its visibility and enabling its founders to collect substantial funds. However, Dauphin refused. His philosophy was that a private company better aligned the interests of owners and management and fostered an environment in which risk management and long-term sustainability were paramount. (Tham 2019)

This legacy is still prevalent in Trafigura's philosophy. For example, about public ratings, Trafigura states in its 2020 annual report that the company does not hold a public rating and does not seek one. One reason for this is that Trafigura's strategy has always been to obtain financing from stakeholders who understand its business model rather than making investment decisions based on a credit rating.

Additionally, Trafigura's management believes that holding a credit rating could lead the company to take more short-term oriented decisions to maintain a particular credit rating level, which would conflict with the Group's focus on long-term value creation and maintaining a solid balance sheet. (*Trafigura Group annual report* 2020, pp. 10–11)

Trafigura also declined to follow the path of competitors such as Glencore, which had moved into commodity production, on the grounds that Trafigura was fundamentally a trader and that commodity production required different ownership models and financial structures. (Tham 2019)

To this day, the company is still owned by its management and about 850 of its senior executives. Moreover, Trafigura is one of the few remaining commodity trading companies, with its operations focused on physical trading and logistics.

2.4.2.2 Asset-light business model

An asset-light business model involves the transfer of capabilities to specialized third parties. In doing so, the company embracing this business model seeks to transform fixed costs into a variable cost structure. This transition promotes agility, facilitates the transfer of resources, and allows the company to focus on its core capabilities.

In the commodity trading sector, private trading houses like Trafigura are a good fit for the "asset light" model. For these companies engaged in pure trading activities, the transfer of risks outside the management's control to third parties through financial contracts is more efficient. In doing so, these trading houses can conduct low-risk operations. The residual risk is managed through close monitoring and adequate risk management mechanisms. (Pirrong 2014, p. 35)

In terms of the advantages of the asset-light business model, we can cite, among others, the followings:

(1) the business can be initiated with substantially less capital, thus generating higher revenues with lower investments, resulting in (2) higher return on assets (ROA) and return on investment (Equity) for Shareholders (ROE); (3) the company is more flexible and agile as it can add or remove physical infrastructure according to demand in a very short timeframe, which implies that (4) the company can cut costs in order to remain competitive, which ultimately results in (5) more steady profits, (6) stable cash flows renders the company more attractive to investors. (Advantages of Asset Light Business Model 2022)

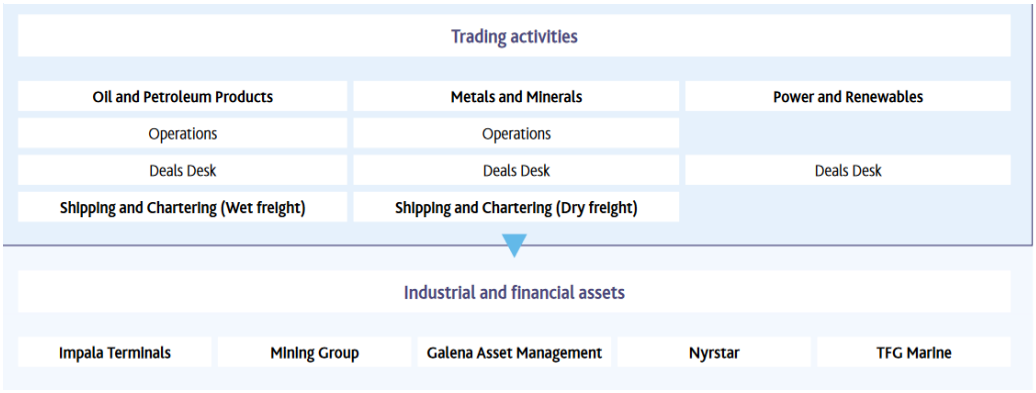
An key drawback of this Business model is the high degree of leverage that makes its capital structure more vulnerable to financial market conditions.

2.4.2.3 Trafigura's business model

Trafigura's core business is the physical trading of raw and processed commodities and the logistics involved in transporting these commodities from buyer to seller.

Figure 5 depicts the trading activities performed by Trafigura. As shown in the table, Trafigura's business activities encompass three areas: (1) Oil & Petroleum products that are supported by Shipping & Chartering services (wet freight); (2) Metals & Minerals, which have attached their Shipping & Chartering services (dry freight); (3) On the year 2020 Trafigura established a third trading division focused on Power & Renewables. (*Trafigura Group annual report* 2020, p. 5)

Figure 5: Trafigura's Business model



Source: Trafigura's annual report 2020, p. 32

Oil & Petroleum activities: this segment is engaged in the sourcing and storing of oil at all stages, from crude to finished products such as naphtha and gasoline. This includes the blending required to make gasoline in the various grades suitable for the different specifications relevant in different countries. The Oil & Petroleum Products segment also includes related freight activities. (*Trafigura Group annual report* 2020, p. 65)

Metals & Minerals: In addition to trading activities, this segment realizes the blending of metal concentrates, iron ore, coal, and alumina, and the smelting of zinc and lead concentrates. The Metals & Minerals segment includes related warehousing, transportation, and freight activities.

In relation to industrial and financial assets, Trafigura generally owns only the necessary transport infrastructure to facilitate the movement of large quantities of raw materials. For Trafigura, these assets' ownership is purely complementary to its core trading business.

Among Trafigura's industrial and financial assets, we can name:

Impala Terminals: this is a multimodal logistics provider focused on export-driven emerging markets. It owns and operates ports, port terminals, warehouses, and other transport assets. This infrastructure also provides external clients with logistics to move commodities.

Trafigura Mining Group: supports the Metals & Minerals activities by : managing the mining operations & project development ; and executing technical audit of existing and potential partner projects. Trafigura is also the controlling shareholder of **the Nyrstar subsidiary** that detain a market-leading position in zinc and lead trading. (Tham 2019)

Nevertheless, as outlined earlier in this paper, operating under an asset-light business model, Trafigura does not extract or produce raw materials but instead connects miners with smelters and refined metal manufacturers by buying and selling various metal products.

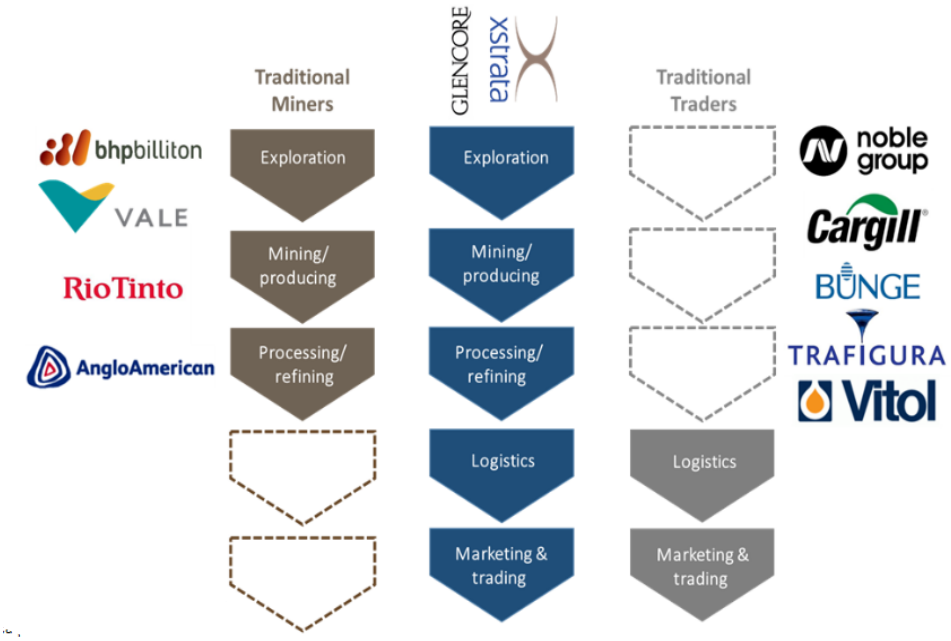
Finally, the subsidiary **Galena Asset Management,** Trafigura's private investment arm, enables Trafigura to provide financial assistance to producers and smelters through offtake agreements, structured finance, and tolling agreements. Under an offtake agreement, Trafigura commits to purchase a contractually defined quantity of raw materials over a specified period. Under a tolling agreement, Trafigura agrees to convert an input product in exchange for a fee, while ownership of the raw material or input product remains with the supplier. (Tham 2019)

2.5 How Glencore and Trafigura are positionned in the commodity industry value chain versus their competitors

As illustrated by Figure 6, thanks to its vertical integration strategy pursued over the years, Glencore differentiates from its competitors by being the only commodities player that is significantly present in each step of the commodity trading value chain: from exploration to marketing and trading; and owning long-lived assets to perform the required transformations.

As shown, Glencore's competitors have found success focusing on its core business either as miners (BhP, Vale, Rio Tinto, and AngloAmerican) or traders (Trafigura, Vitol, Bunge, Cargill, etc.).

Figure 6: Key players on the Commodity trading industry value



Source : (Matteocci 2017, p. 4)

2.6 How Glencore and Trafigura exploited arbitrage opportunities during Covid-pandemic to earn exceptional profits?

2.6.1 How Glencore's business model captured arbitrage opportunities during Covid-19 to earn exceptional profits?

In its Annual Financial Report, Glencore does not provide details on strategies employed to exploit arbitrage opportunities during 2020 to deliver extraordinary profits. Instead, the Group provides a broad outline on how its Business model operates and how fluctuations in the market environment impact its revenues.

According to Glencore, the physical commodity markets in which the Group operates are fragmented or periodically volatile. As a result, differences generally arise in the prices at which raw materials can be bought or sold in different forms, in different geographical locations or periods, taking into account the many relevant pricing factors, including freight and product quality. These price discrepancies may provide arbitrage opportunities for the Group to profit by sourcing, transporting, blending, storing, or processing relevant raw materials.

In consequence, the profitability of Glencore's marketing activities depends mainly on its ability to identify and exploit such arbitrage opportunities. The absence of such opportunities, for example, due to a prolonged period of price stability in a particular market, or the inability to take advantage of such opportunities when they arise, due to, for example, a lack of liquidity or an inability to access necessary logistical assets or other operational constraints, can adversely affect Glencore's business results. (Glencore annual Report 2013, p. 22), (Glencore annual report 2020, p. 53)

Fluctuations in the price of commodities produced or marketed impact Glencore's results of operations and earnings. However, the impacts that fluctuating commodity prices have on the Group's business differ between its marketing activities and industrial activities:

Marketing activities: during periods of falling commodity prices, as observed during Covid-pandemic in particular related to oil, the margins that the Group generates in its physical marketing operations tend to be lower. On the opposite, higher commodity prices translate into higher margins and also higher working capital financing requirements. (Glencore annual Report 2013, p. 19), (Glencore annual report 2020, pp. 72–75)

Industrial activities: higher commodity prices are particularly favorable to the profitability of the Group in respect of those commodities which the Group produces at its industrial assets or are produced by its associated companies and other investees.

Similarly, low prices negatively impact the Group's industrial activities: it generally results in a decline in the Group's profitability and can result in a devaluation of inventories and impairment losses.

Although lower commodity prices affect Glencore's marketing and industrial activities differently, the negative impact on its industrial activities is generally greater, as the profitability in the industrial activities is more directly exposed to price risk due to its higher level of fixed costs.

In contrast, the Group's marketing activities are ordinarily substantially hedged in respect of price risk and principally operate a service-like margin-based model. (Glencore annual Report 2013, p. 19) , (Glencore annual report 2020, pp. 72–75)

2.6.2 Glencore's earnings by business segment and by commodity type during Covid-19

In its consolidated financial statements, Glencore points out that 2020 was a dramatic year for oil: the collapse of the OPEC+ production cut agreement, combined with the destruction of global oil demand, led to a sharp fall in oil prices as governments extended their restraint measures. As global oil storage approached capacity, tanker freight rates soared, and the structure of the oil price curve shifted into deep contango as the market forced more oil into storage.

As per Glencore's CFO[4], in such market circumstances:

> *" Physical oil traders, like ourselves, saw the usage of storage and logistics soar and unprecedented price dislocations in markets for crude oil, refined products, and freight, generating material trading opportunities, (…) Our business model, containing many countercyclical elements, allowed the Group to adjust to the challenges of Covid-19 quickly".* (*Glencore annual report* 2020, pp. 3; 54)

That being said, in the following paragraph, we break-down Glencore's earnings during the Covid-19 period by Business line and commodity type.

[4] Chief Financial Officer

Figure 7, displays the total revenue and operational profit realised in year 2020 opposed to year 2019.

Figure 7: Glencore's key earnings 2020

Highlights

US$ million	2020	2019	Change %
Key statement of income and cash flows highlights[1]:			
Revenue	142,338	215,111	(34)
Adjusted EBITDA◊	11,560	11,601	–
Adjusted EBIT◊	4,416	4,151	6
Net loss attributable to equity holders	(1,903)	(404)	(371)
Loss per share (Basic) (US$)	(0.14)	(0.03)	(380)
Funds from operations (FFO)[2◊]	8,325	7,865	6
Cash generated by operating activities before working capital changes	8,568	10,346	(17)
Net purchase and sale of property, plant and equipment[2◊]	3,921	4,966	(21)

Source : Glencore annual report 2020, p.45

As the table shows, in 2020, Glencore's total revenue amounted to $142,338 million, a decline of 34% over the year 2019. Despite the 34% decrease in revenue, EBITDA remained flat, and EBIT actually increased by 6%.

Figure 8 displays the turnover realised per business segment:

Figure 8: Revenue by business segment

2. Segment information continued

Glencore accounts for intra-segment sales and transfers where applicable as if the sales or transfers were to third parties, i.e. at arm's length commercial terms.

2020 US$ million	Marketing activities	Industrial activities	Inter-segment eliminations	Total
Revenue				
Metals and minerals	54,847	30,303	(18,859)	66,291
Energy products	69,290	11,145	(1,944)	78,491
Corporate and other	–	5	–	5
Revenue – segmental	**124,137**	**41,453**	**(20,803)**	**144,787**
Proportionate adjustment – revenue[1]	–	(2,449)	–	(2,449)
Revenue – reported measure	**124,137**	**39,004**	**(20,803)**	**142,338**

Source : Glencore annual report 2020, p.45

As the table shows, in 2020, of the $142'338 million of total revenue earned, the marketing segment's revenue of $124'137 million accounted for 76% of Glencore's total revenue, while revenue from industrial activities only amounted to $39'004 million (24%).

Out of the $124’137 million of total Marketing revenue, energy products were the most oversized item traded, with $69’290 million, or 56% of Marketing revenue; and metals and minerals accounted for $54’847 million (44%).

In terms of Industrial activities, it can be seen that metals and minerals revenues accounted for 78% ($30’303 million) of turnover, while energy products accounted for only $11’145 million.

With regard to Operating profitability (EBITDA and EBIT), the breakdown by business segment is as follows:

Figure 9: Glencore- EBITDA and EBIT by business segment

Adjusted EBITDA by business segment is as follows:

	2020			2019			
US$ million	**Marketing activities**	**Industrial activities**	**Adjusted EBITDA**	Marketing activities	Industrial activities	Adjusted EBITDA	Change %
Metals and minerals	1,768	7,285	9,053	1,169	5,555	6,724	35
Energy products	2,053	1,039	3,092	1,515	3,854	5,369	(42)
Corporate and other[4]	(89)	(496)	(585)	(47)	(445)	(492)	19
Total	**3,732**	**7,828**	**11,560**	2,637	8,964	11,601	–
Segment change (%)	***42***	***(13)***					

Adjusted EBIT by business segment is as follows:

	2020			2019			
US$ million	**Marketing activities**	**Industrial activities**	**Adjusted EBIT**	Marketing activities	Industrial activities	Adjusted EBIT	Change %
Metals and minerals	1,667	3,054	4,721	1,089	1,016	2,105	124
Energy products	1,761	(1,365)	396	1,324	1,274	2,598	(85)
Corporate and other[4]	(89)	(612)	(701)	(47)	(505)	(552)	(27)
Total	**3,339**	**1,077**	**4,416**	2,366	1,785	4,151	6
Segment change (%)	***41***	***(40)***					

Source : Glencore annual report 2020, p.45

Glencore’s total adjusted EBITDA[5] in 2020 was $11’560 million compared to $11’601 million in 2019; the adjusted EBIT[6] rose by 6% ($4,416 million in 2020). According to Glencore’s CFO, this broadly consistent headline result masks differing performances and timing across the Marketing and Industrial segments, notably:

5 Adjusted EBITDA consists of Adjusted EBIT plus depreciation and amortisation, including the related Proportionate adjustments

6 Adjusted EBIT is the net result of revenue less cost of goods sold and selling and administrative expenses, plus share of income from associates and joint ventures, dividend income and the attributable share of Adjusted EBIT of relevant material associates and joint ventures, excluding Significant items.(impairment losses for example)

(1) Marketing activities segment's EBIT increased by 41% ($ 3'339 in 2020; $ 2'366 in 2019):

- Energy Products EBIT increased by $437 million ($1'761 in 2020; $1'324 in 2019). This record yearly performance was due to exceptional price movements and dislocations across crude oil and refined products, combined with soaring demand for and prices of storage and logistics.
- Metals and minerals increased by $578 million ($1'667 million in 2020; $1'089 million in 2019). This performance was derived from China's demand recovery. (Glencore annual report 2020, p. 3), (Glencore annual report 2020, p. 54)

(2) Industrial activities segment EBIT declined to $1'077 million, which is 40% lower than 2019 ($1'785 million)

- This deterioration in EBIT mainly reflects low coal and oil prices and, to a lesser extent, reduced production volumes compared to the previous year (2019). (Glencore annual report 2020, p. 3), (Glencore annual report 2020, p. 44)

It is also interesting to note that during Covid-pandemic, in the Marketing business segment, energy products generated a higher share of the total revenue, that is, 56% of marketing's revenue and metals and minerals 44%.

However, concerning profitability, Glencore obtains higher margins in the Industrial business segment, notably when mining and producing metals and minerals: in 2020, of the total adjusted EBITDA of $11'560 million, 68% ($7'828 million) was generated by industrial activities. Of the $7'828 million EBITDA, 93% ($7'285 million) was obtained in metals and minerals.

Nevertheless, we should notice that in the Industrial activities segment, the EBIT of energy products was negative (-$1'365 million). This negative result evidences the more significant impact of lower commodity prices on the Industrial segment and the impact of depreciation and amortization expenses on this business unit. (EBITDA was $1'309, and EBIT declined to -$1'365). (Glencore annual report 2020, p. 45), (Glencore annual report 2020, p. 3)

2.6.3 How Trafigura's business model captured arbitrage opportunities during Covid-19 to earn exceptional profits?

Differently from Glencore, in their financial reports, Trafigura provides more detail about strategies used by the company to exploit arbitrage opportunities during the Covid pandemic to earn extraordinary profit.

Accordingly, Trafigura reports that its success was derived from its trading platform that responded to price signals either by (1) moving large volumes of commodities from one geographic region to another where they were most required; or by (2) storing them when supply exceeded demand.

Therefore, when crude oil futures went into a steep contango, Trafigura's traders began to move oil rapidly around the world, particularly from the US and Europe to Asia, in response to those price signals. (Trafigura Group annual report 2020 2020, p. 4)

Additionally, Trafigura reported that they have increased the size of the fleet by almost 70% during 2020, controlling up to 220 owned or time-chartered vessels (not including LNG carriers). Another key infrastructure to Trafigura's performance was their access to the Cactus II pipeline from the Texas shale fields to the coast. (Trafigura Group annual report 2020 2020, p. 24)

Concerning the trade of gasoline, Trafigura explained that they undertook significant additional storage, notably in Asia, both on land and via floating tanker solutions, to manage the oversupply and provide customers with additional flexibility. (Trafigura Group annual report 2020 2020, p. 16)

In terms of inventories, we can observe on the financial statements that this item climbed from $13.4 billion to $20.2 billion, well beyond the $6 billion of stocks required for its regular trading activities.

With respect to Trafigura's exceptional performance in the year 2020, a spokesperson argued that the credit for Trafigura's large profits belongs not to the markets alone but to its fleet-footed traders. According to this trader: *"you will hear that contango makes it easy for trading houses to make money because all you have to do is buy storage, but the reality is more complicated. The logistics involved in storing and moving oil worldwide are incredibly complicated".* (Carpenter 2020)

Finally, amid such a volatile market environment, Trafigura is proud to report that the company has gained additional market share by providing producers with access to its global logistics network and working capital through pre-payment financing. As weaker players are squeezed out of the market, large trading companies like Trafigura, with strong financial backing, consolidate their positions. (Trafigura Group annual report 2020, p. 4)

2.6.4 Trafigura's earnings by activity and commodity type during Covid-19

Figure 10 displays the sales revenue by activity and commodity type. As observed, of the total realized revenue of $146'994 million, 57% was generated by the Oil & Petroleum division (including service revenue from chartering from oil and petroleum); and 43% by the Metals & Minerals division (including service revenue from chartering of metals and minerals).

Additionally, we can perceive that the proportion of realized revenue in the Oil & Petroleum division versus the Metals& Minerals division is the same as that of Glencore's trading arm. This similarity implies that both companies managed equally to deploy their logistics to make the most of existing arbitrage opportunities and that any difference in profitability is not due to their trading arm's under or overperformance.

Figure 10: Trafigura – sales revenue by activity

2020	Oil and Petroleum USD'M	Metals and Minerals USD'M	Corporate and Other USD'M	Total USD'M
Sales revenue from external customers	82,107.1	63,043.9	–	145,151.0
Service revenue from external customers	1,573.4	269.9	–	1,843.3
Revenue	**83,680.5**	**63,313.8**	**–**	**146,994.3**
Cost of sales	(78,421.5)	(61,778.4)	–	(140,199.8)
Gross profit	**5,259.0**	**1,535.4**	**–**	**6,794.5**

2019	Oil and Petroleum USD'M	Metals and Minerals USD'M	Corporate and Other USD'M	Total USD'M
Sales revenue from external customers	111,333.3	59,084.1	–	170,417.4
Service revenue from external customers	841.5	215.2	–	1,056.7
Revenue	**112,174.8**	**59,299.3**	**–**	**171,474.1**
Cost of sales	(110,493.4)	(58,110.9)	–	(168,604.3)
Gross profit	**1,681.4**	**1,188.4**	**–**	**2,869.8**

Source : Trafigura's annual report 2020, p. 65

Unlikely Glencore, Trafigura does not segregate its operational profit (EBIT and EBITDA) by trading activity: this is understandable as Glencore, as a mining company, is concerned about the performance and profitability of its assets; whereas Trafigura is a pure trader and owns significantly fewer assets, is more concerned about the Gross margins.

Hence, Trafigura offers an overview of the Gross margins realized by each trading activity and per commodity type. The outcome is as follows:

Gross profit in Oil & Petroleum Products amounted to $5'259 million (2019: $1'681million) or 75% of the Group total; Metals & Minerals Gross profit amounted to $1'535 million (2019: $1'188 million) or 25% of the total Gross margin.

Compared to 2019, sales revenue decreased by 14% ($146'994 million in 2020; $171'474 million in 2019). While the overall trading volumes remained relatively flat compared to 2019, generally lower commodity prices led to a net reduction in revenue. (Trafigura Group annual report 2020, p. 8)

Another not surprising exceptional performance is the sharp increase in chartering services, which rose from $ 841 million to $ 1'573 million - an increase of 87%.

Overall, during the Covid-19, Trafigura benefited from the contribution of these two divisions : Oil & Petroleum Products, and Metals & Mining serving markets with distinct and largely uncorrelated business cycles.

3. Conclusion Theoretical foundations

In the Theoretical foundations section, we have provided an overview of the asset-light and asset-intensive Business model. We further explained the mechanics of the forward curve that traders rely on to collect critical information about marketing sentiment in order to deploy their trading strategies.

A key element of our analysis was the concept of arbitrage opportunities and the different ways in which traders exploit them to earn profits. One cannot make such an observation without questioning the role of physical assets for commodity trading firms. In other words, why do trading companies invest in physical assets?

3.1.1 Why trading companies invest in tangible assets (PPE) ?

We can argue that there are two main strong economic reasons for trading firms to invest in physical assets: firstly, the transaction costs economics which refers to the costs involved in market exchange. It includes the costs of information, costs of negotiation, and costs of enforcing an agreement. (Nouail 2021, pp. 72–73)

An example of transaction costs occurs when the trade is "*time sensitive*". That is, when even a short delay in the transaction imposes a significant loss on the buyer or seller. Because of this time-specificity, storage costs or the value of storage is determined by the rapidity of access to the goods.

This condition gives the storage owner a strong incentive to seek to extract value (margin) if faster access to the commodity is granted to the trader. Therefore, having direct access to the commodity either by owning it or via a long-term contract or lease arrangement can avoid transaction costs (opportunistic behaviour of third parties involved), enabling traders to fully capture the value of the arbitrage. (Pirrong 2014, p. 43)

Secondly, information technology has (1) increased price transparency, which has (2) reduced the length of arbitrage opportunities, and (3) increased the ability of market participants to monitor the activities of other competing traders (e.g., by tracking vessel movements in real-time). The combined effect of these events has pushed traders' margins down.

Hence, as the profitability of pure physical arbitrage has gone under pressure, traders have responded by investing more heavily in physical assets. (Baines, Hager 2021, p. 22), (Pirrong 2014, p. 40)

According to Hume (2014): "*trading has become more competitive and markets more transparent, big commodity traders have responded by sinking billions of dollars into refineries, power plants, ports and other assets*, and some *energy and metals traders have indeed become more asset heavy through targeted acquisitions.*"

This may well be one reason why, despite choosing to own a few assets, Trafigura has increased its ratio of fixed assets to total assets over time. Additionally, throughout this research we have shown the critical role of physical assets for both Glencore and Trafigura in exploiting arbitrage opportunities.

This discussion brings to light the fact that while the asset-light business model confers industries, in general, more agility and flexibility to adapt its cost structure, the asset-intensive business model confers commodity traders greater flexibility and agility in terms of arbitrage opportunities.

Controlling physical assets provides traders with an edge both when: (1) market volatility is high (traders will use their physical assets to exploit arbitrage opportunities) or, (2) market volatility is low, traders will use their physical assets to deliver value-added transactions to their customers.

That being said, during the Covid-pandemic, a typical market circumstance marked by high volatility, uncertainty, and ambiguity, one would expect Glencore, which controls a greater proportion of physical assets, to realize higher margins than Trafigura, or at least an equivalent Net profit margin.

Regarding the realized turnover or sales revenue, we have seen that both companies performed similarly, by displaying the same share of Oil & Petroleum and Metals & Minerals products sold. However, the same cannot be stated in terms of Net profit margin: Trafigura's record Net profit during the Covid pandemic ($1,599 million), contrasted with Glencore's Net loss (-$3,946 million), raises the question of to which extent Glencore's high proportion of PPE and the resulting Impairment losses undermined its core function as a trader, that is, to exploit arbitrage opportunities and capitalize from market volatility.

Hence, this paper aims to examine how the asset intensity of these two competing firms has influenced their ability to earn record profits during the Covid pandemic (the year 2020).

4. Research Question:

How asset-intensity has impacted the ability of Commodity Trading Firms to earn exceptional profits during the Coronavirus crisis, on year 2020?

Through this research, we also intend to answer the following subset of questions:

- What predictors are statistically significant in explaining the variation in Glencore's Net income? And for Trafigura?
- Is Glencore's asset-intensive Business Model (high proportion of PPE) the cause of its negative Net income?
- Is Trafigura's asset-light Business Model the main driver of its ability to deliver continuous positive Net income?
- How does Glencore's regression model and statistically significant explanatory variables differ from those of Trafigura?
- What is the role of Impairment charges on the Net income of Glencore and Trafigura?

5. Thesis outline and Research Methods

5.1 General Methodology : Quantitative analyses

To conduct our research, and study how asset-intensity has impacted the ability of Trafigura and Glencore to earn exceptional profits during Covid-pandemic, we will define as a starting point the assumption that Net income is a variable that can be impacted by several financial indicators such as the asset-intensity, defined as the ratio of (PPE / Total assets), Profitability[7] and Efficiency[8] (performance) ratios.

For that reason, in the present research, **Net income[9]** will be defined as the dependent variable (Y) and asset-intensity, efficiency (performance) and profitability ratios as the independent variables (X_i to X_k).

The dependent variable **Net income** (*net profit / total revenue*) is a profitability ratio that expresses the Net profit obtained by the company per dollar of revenue earned. Despite the drawback that this metric includes a lot of *"noise*" such as one-time expenses and gains, we have decided to select it because after all, it provides the final picture of how profitable a company was, after incurring all expenses. (Corporate Finance Institute 2021)

As per the independent variables, the ratios will be computed based on data extracted from Glencore and Trafigura's annual consolidated financial statements. Besides the ratios, we shall also consider as independent variables: (i) balance sheet items such as level of debt, current assets, etc.; and (ii) Income statement items such as Operating and non-Operating expenses and sales revenue or turnover.

The period under observation will be

(1) For Glencore: **ex-merger period** (2007 - 2012), and **post-merger period** (2013 - 2020) ; (2) Comparison between Glencore and Trafigura (2013 – 2020).[10]

On this paper year 2020 is referred as being the year of the Covid-pandemic or Coronavirus Crisis.

[7] Profitability ratios: Gross profit margin; EBITDA (earnings before interest taxes and depreciation) margin, EBIT (earnings before interest and taxes) margin, Net income margin

[8] Efficiency or performance ratios: total asset turnover, PPE turnover, etc.

[9] Net income or Net profit shall be used interchangeably.

[10] See Appendix 14 to Appendix 17 to consult full data set

Below we present a summary of *some* key financial ratios (independent variables) we intend to analyse:

The definition of the ratios listed below has been taken from the financial analysis book. "*International Financial Statement Analysis*". (Robinson et al. 2009)

PROFITABILITY RATIOS :

Profitability ratios: measure the company's ability to generate profitable sales from its resources (assets).

Operating profit or operating income (EBIT): reflects a company's profits on its usual business activities before deducting taxes is calculated as sales revenue less selling, general, administrative, depreciation, and research and development expenses.

Gross Profit Margin = (Gross profit / Sales): Gross profit is calculated as sales revenue minus COGS. Gross profit margin measures the percentage of each sales dollar remaining after the firm has paid for its goods. The higher the GPM indicates higher profitability.

EBIT Margin (Earnings before interest taxes and depreciation) = Operating Profit Margin = (Operating profit / Sales), or (EBIT / sales): measures the percentage of each sales dollar remaining after all operating expenses other than interest and taxes are deducted. The higher the OPM, the better.

Net Profit Margin = Net income Margin = (Net Profit / Sales): measures the percentage of each sales dollar remaining after all costs and expenses including interest, taxes and one time-expense or revenue have been deducted. A higher level of net profit margin indicates higher profitability, and thus more desirable**.**

Return on Equity = (Net Profit / Equity): measures the return earned on the shareholders' investment in the firm. The higher the ROE, the better for the owners.

ASSET ACTIVITY MANAGEMENT RATIOS (Efficiency or Performance ratios)

Efficiency or Performance ratios: measure how efficiently the company manages its assets.

Fixed Asset Turnover = (Sales / Fixed Assets): indicates the efficiency with which the firm uses its fixed assets to generate sales. Generally, the higher a firm's fixed asset turnover, the more efficiently its fixed assets have been used.

Inventory Turnover = (COGS / Inventory): measures the activity, or liquidity, of a firm's inventory. The resulting turnover is meaningful only when it is compared with that of other firms.

Accounts Receivable Turnover = (Sales / Accounts Receivable): measures the activity of the accounts receivable collection. The more activity in collection is required within the boundaries of the industry that the firm works in.

Total Asset Turnover = (Sales / Total Assets): indicates the efficiency with which the firm uses its assets to generate sales. Generally, the higher a firm's total asset turnover, the more efficiently its assets have been used.

The analysis of the data collected will be organised in 3 parties:

5.2 Research Methodology part I

5.2.1 Outline and Objectives

Section one starts with a brief overview of both Glencore and Trafigura. Then, we are going to analyse how sales revenue, expense items, profitability, and efficiency ratios from Glencore and Trafigura have evolved as the level of PPE or tangible assets of each respective company changed over time.

The objective is to identify key financial metrics of the balance sheet and/or Income Statement that have been the most positively or adversely impacted as the levels of PPE owned fluctuated, on the one hand; by the outbreak of the Covid-19 pandemic, on the other hand.

The resulting analysis of this section will help to: (1) draw conclusions about the financial outcomes of the business model[11] of these companies; (2) formulate hypotheses as to the discrepancy in Net profit margin between Glencore and Trafigura during the Covid-pandemic.

5.2.2 Methodology:

To assess and compare the evolution of financial metrics of Glencore and Trafigura, we will use the common-sized analysis approach. This method involves dividing each item on the financial statement by a single item or base, and then express the result in percentage. For the Balance Sheet analysis, Total assets will be used as base, and for income statement analysis, revenue will be used as base.

We will start by comparing the financial metrics from Glencore before merging with Xstrata (2007 -2012) and after (2013- 2020)[12]. The analysis will close by assessing the impact of this takeover on the metrics under observation.

Then, we will compare Glencore and Trafigura between 2013 and 2020 and assess the relationship between the proportion of PPE held against the selected financial metrics. Particular attention will be placed on the impact of the Covid-19 pandemic (the year 2020) on the financial metrics of both companies compared to previous years (2018 and 2019).

We will endeavour to pinpoint the financial metrics that have been the most impacted and assess whether the pandemic initiated a new trend, or inversely, it was just an exacerbation of an already existing trend.

Finally, in order to obtain more insights about the discrepant profitability between Glencore and Trafigura, a detailed analysis of the ROE[13] will be performed through the three-step DuPont framework.

Section one will close with a summary highlighting key finds of our research and assumptions as per the difference between the profit margins realised by Glencore and Trafigura.

[11] Asset-intensive Business model (Glencore) versus Asset-light Business model (Trafigura)

[13] Return on Equity ratio

5.3 Research Methodology part II

5.3.1 Objective

In this section of the research, the objective is to test the statistical significance of the following assumptions:

Hypothesis 1: There is a statistically significant difference between the Net income of Glencore and the Net income of Trafigura.
Hypothesis 2: The operating profit (EBIT) of Glencore is higher than the operating profit (EBIT) of Trafigura.

5.3.2 Methodology

(*NEDARC - Hypothesis Testing* 2019)

For the hypothesis testing, we set the following conditions concerning our data sample:

1. Sample data are independent or unrelated
2. Data are normally distributed
3. Population variance (σ^2) is unknown

For this set of conditions, the **independent two-sample t-test** or **independent t-test** is the most appropriate; We will utilize the Microsoft Excel data analysis tool.

To decide whether an equal or unequal variance t-test should be carried out, an F-test is first performed to determine if the variances of the population differ significantly.

Steps in hypothesis testing:

Step 1: **Define the null hypothesis (H0) and the alternative hypothesis (H1)**

The null hypothesis states, by default, that there is **NO** difference between the samples being compared.

The alternative hypothesis is the assumption we are interested in proving, and it claims that **there is** a difference between the groups being compared.

Step 2: **Set the significance level or alpha (α)**

The significance level, or alpha (α), informs about the reliability of the hypotheses: it indicates whether the results obtained in the sample are expected to be true in the population.

For the purposes of this paper, we will set alpha at 0.05, implying that there is a 5% probability of rejecting the null hypothesis when it is true (Type I error), or that there is a 95% chance that we are right.

Step 3: Decision rule and Conclusion

- **Fail to reject the null hypothesis**

If test statistic < critical value: The smaller the t-value, the more similarity exists between the two sample sets;

Or,

If p-value > alpha (α): not statistically significant result

Fail to reject the null hypothesis implies that there is not sufficient statistical evidence to to reject the claim that there is no difference between the samples.

- **Reject the null hypothesis**

If test statistic >= critical value: Higher values of the t-score indicate that a large difference exists between the two sample sets;

Or,

If p-value <= alpha (α): statistically significant result

Rejecting the null hypothesis implies that there is sufficient statistical evidence to support the alternative hypothesis which claims that there is a difference between the samples.

5.4 Research Methodology part III

5.4.1 Objective

In the last section of this paper, the purpose is to test the reliability or statistical significance of the independent variables in explaining the variation in the dependent variable. With the insights obtained, we will endeavour to build a multiple linear regression model that can best predict and explain the variation of the Net income of Glencore and Trafigura.

5.4.2 Methodology

On a **first step**, we will be assessing the strength of the correlation between the dependent variable (Net income) and the independent variables (the financial metrics). This step will allow to eliminate variables that are redundant for the regression model.

The strength of the correlation between the dependent and independent variables will be tested by using the JASP software, where for each relation between Net income and the independent variable a Pearson Correlation Coefficient will be generated.

The Pearson's Coefficient expresses the intensity of the correlation between the dependent and independent variables. It takes values between [-1 and 1], where -1 indicates a perfect negative correlation and 1 a perfect positive correlation. (*Pearson's Correlation Coefficient* 2021)

The Correlation test requires a test of Significance. Significance or Reliability indicates that the findings in the Sample are likely to be accurate in the Population. (ZACH 2019)

In this study, a Significance level (alpha = 0.05) will be set. This implies that independent variables presenting a p-value < 0.05 are statistically significant or, a large influence on the variation of the dependent variable.

On a second step, we will attempt to build a multiple linear regression model, which can best predict and explain the variation on the Net income.

The relationship between the Net income and the independent variables can be expressed through an equation of the form:

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + \cdots B_KX_K + E$$

Where:

Y = dependent variable (Net income)

$B_0 \ldots B_k$ = partial regression coefficients

$X_1 \ldots X_k$= independent or explanatory variables with impact on the dependent variable (for example : PPE ratio, Impairment charges, Asset turnover ratio, Sales revenue, etc.).

For the variable selection, and to avoid the problem of multicollinearity that occurs when the independent variables introduced into the regression model are highly inter-correlated, leading to an over-fitting problem, we will use the **VIF - Variance Inflation Factor** method to help detect multicollinearity. As a general rule, a VIF > 10 is an indicator of multicollinearity. Thus, variables with a VIF > 10 should not be included in the model.(Wu 2021), (Goss-Sampson 2018, p. 61)

Then, to further build the regression model, we will use the **Stepwise Regression Methods** to help identifying the best combination of independent variables that explain the variation on the dependent variable. This approach consists of adding or deleting regressors in the model, one at a time.

There are three categories of Stepwise Regression Methods: (1) **Forward selection**: starts with an empty model, and the predictor with the highest correlation coefficient and lowest p-value is entered first. This is repeated until all predictors have been included in the model; (2.) **Backward Elimination**: is the opposite approach from the Forward selection. It starts with the full model, and the less significant predictors are removed. The process is repeated until all the predictors are statistically significant; (3) **Stepwise** entry: functions similarly to the Forward method, except that each time a predictor is added to the model, a deletion test is performed, and redundant predictors are removed.

The stepwise approach is useful because it: (i) reduces the number of predictors; (ii) minimises the problem of multicollinearity; (iii) and addresses the problem of overfitting. (StatPlus Help - Backward Stepwise 2019), (Choueiry 2022)

The best model achieved is the one with the highest adjusted R^2 and lowest Standard error.

The insights obtained through Person's Correlation and Regression analysis should help draw global conclusions about : (1) the impact of PPE on Glencore and Trafigura's Net income ; (2) the relevance of other statistically significant variables in explaining the variation in Net income of Glencore and Trafigura ; and (3) understand the impact of Impairment losses on Glencore and Trafigura's profitability.

In the conclusion section, we shall summarise the key findings of this research.

1. QUANTITATIVE ANALYSIS PART I

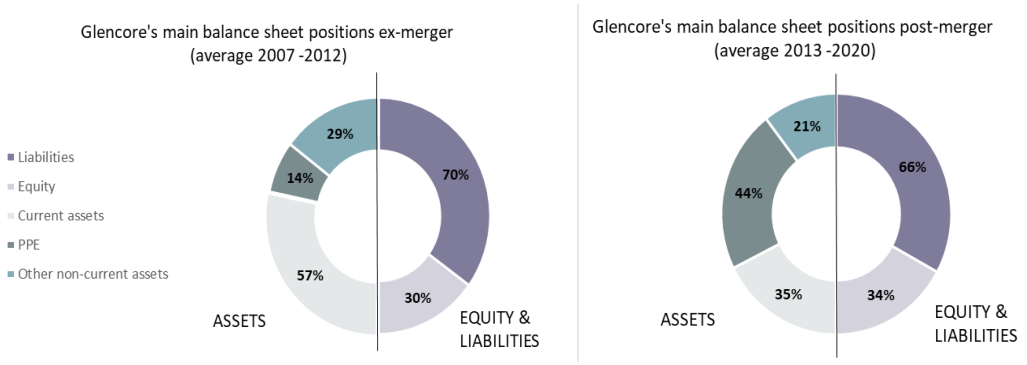
1.1 Evolution and Comparison of key Financial Metris of Glencore and Trafigura

1.1.1 Common-sized analysis of Balance Sheet

1.1.1.1 Glencore: Global overview of financial positions 2007 - 2020

As shown on Figure 11, prior to the merger with Xstrata, an average of 57% of Glencore's assets consisted of current assets (comprising cash and cash equivalents, inventories and trade receivables), and 43% represented non-current or fixed assets. Of the fixed assets, PPE- property, plant and equipment averaged 14%. In terms of the Equity and Liabilities position, Equity amounted to 30% and short and long-term debt equalled 70% of liabilities.

Figure 11: Glencore's key Balance Sheet positions 2007 - 2020

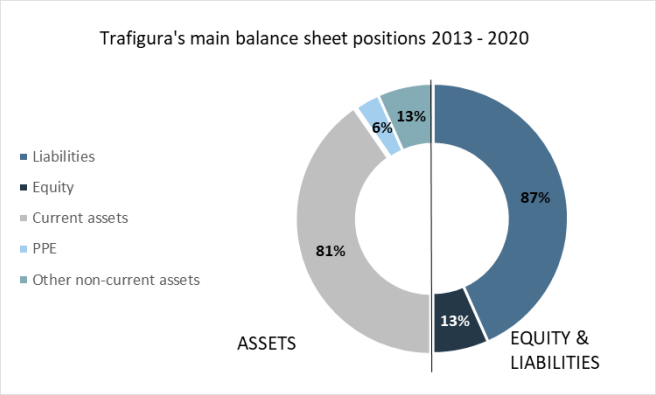


Following the merger, Glencore's asset mix was nearly reversed: 35% comprised current-assets and 65% fixed assets, of which PPE accounted for 44% of total assets. On the Equity and Liabilities side, on average, Glencore deleveraged by 4%, increasing its total Equity to 34%.

1.1.2 Trafigura: Global overview of financial positions 2013 - 2020

As illustrated on Figure 12 , approximately 80% of Trafigura's assets are current assets. The remaining 20% consists of fixed assets, of which only 6% is PPE owned. In terms of Equity and Liabilities, Trafigura is a much more leveraged company than Glencore: Equity is only a small fraction of 13%, with total debt of 87%.

Figure 12: Trafigura's Glencore's key Balance Sheet positions 2013 - 2020



At present we are moving on to consider the detailed composition of the Assets and Liabilities of the two companies, appreciating their evolution, including identifying any significant variations during the Covid pandemic.

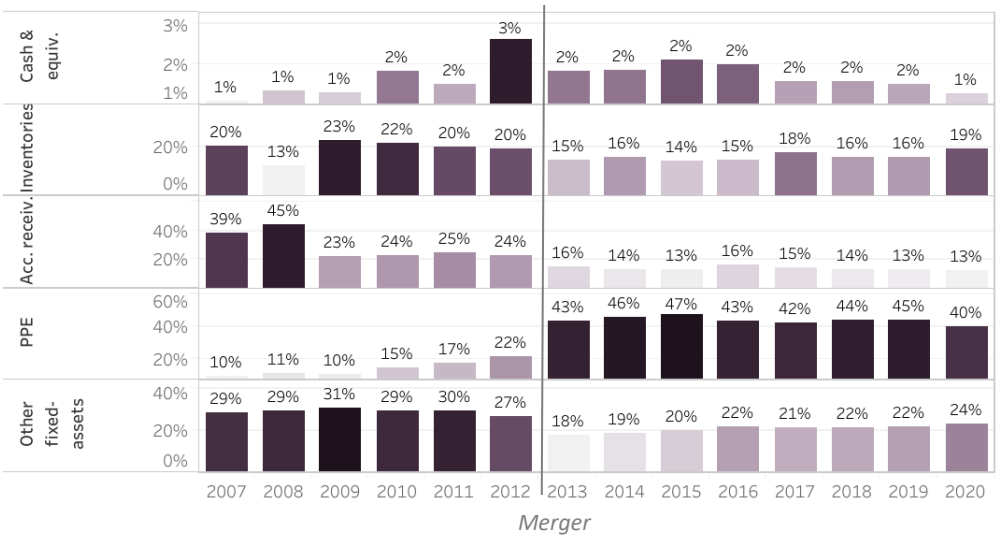
Glencore: evolution of Asset-intensity

From Figure 13 we can observe that before the merger with Xstrata, Glencore's current-assets (representing 57% of total assets) were mainly composed by accounts receivables and inventories. The Accounts Receivables and Inventories gradually declined averaging 13% and 15% of the Total Assets on year 2020. As per Cash and Equivalents item, it fluctuated between 1% to 2% of the Total Assets over the entire period.

A more marked evolution was the steady increased in the proportion of PPE owned by Glencore: from 2007 to 2012 they doubled: Glencore transitioned from being a company that initially owed only 10% of the PPE, to have this item representing more than 40% of their total assets.

It is worth also noting that Non-current Assets of Glencore during this period were composed by Investments in other Subsidiaries. On average, they represented 30% of Glencore's total assets.

Figure 13 : Glencore – evolution of Asset-intensity 2007 - 2020

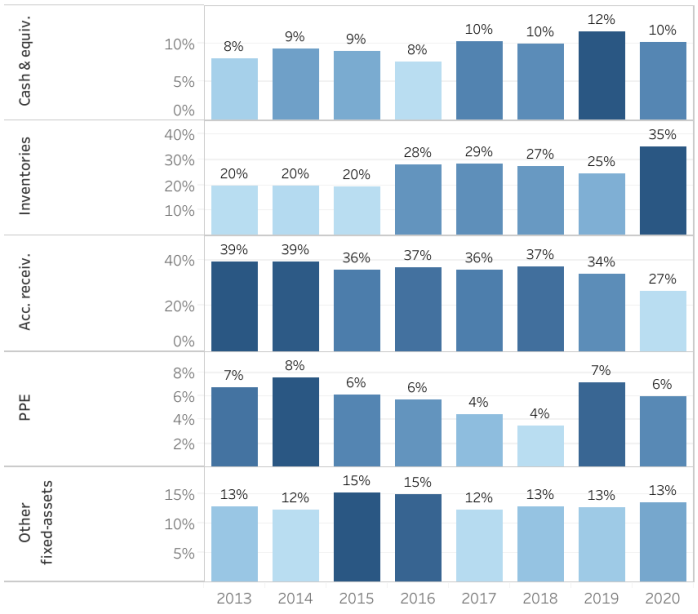


Trafigura: evolution of Asset -intensity

Figure 14 demonstrates that since 2013, Asset-composition have remained stable. As we it can be observed, Trafigura's Balance Sheet differentiate itself from Glencore's for its considerable proportion of Current-Assets (on average 80%), among which, approximately the half constitutes Trade Receivables, 30% being Inventories and 10% Cash and Equivalents.

With regards to the non-Current Assets, this item remained unchanged. PPE levels averaging 6% of Total Assets started decreasing between 2015 and 2018 reaching 4% but then on the wake of the Covid-19 they went back to their former levels of 6% of Total Assets.

Figure 14 : Trafigura - evolution of Asset-intensity 2007 - 2020

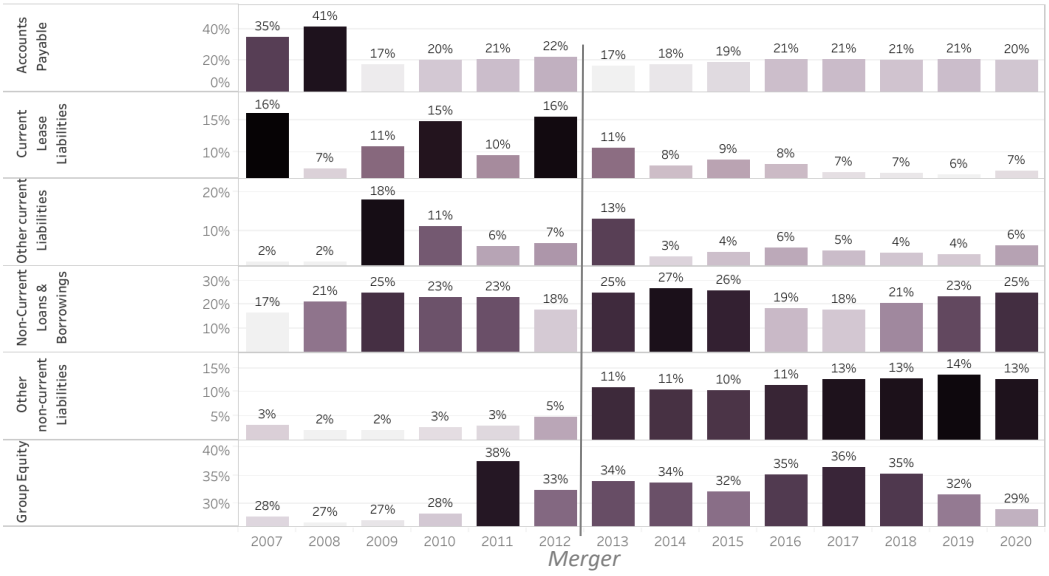


Glencore: Evolution of Liabilities & Equity positions

Turning to the Liabilities and Equity items, Figure 15 shows that globally after the merger with Xstrata Glencore's level of debt have declined, increasing therefore the Group's Equity. Before the takeover, Total Liabilities amounted to 70% and after, they declined to 66%.

A striking trend on the graph is the significant increase in Other non-Current Liabilities that rose from an average of 3% to 13%. This item is mainly composed by deferred Tax Liabilities and Provisions created by the Group. Long-term Loans and Borrowings remained fairly stable, averaging one quarter of the balance sheet.

Figure 15: Glencore: Evolution of Liabilities & Equity positions 2007 - 2020



Trafigura: evolution of Liabilities & Equity positions

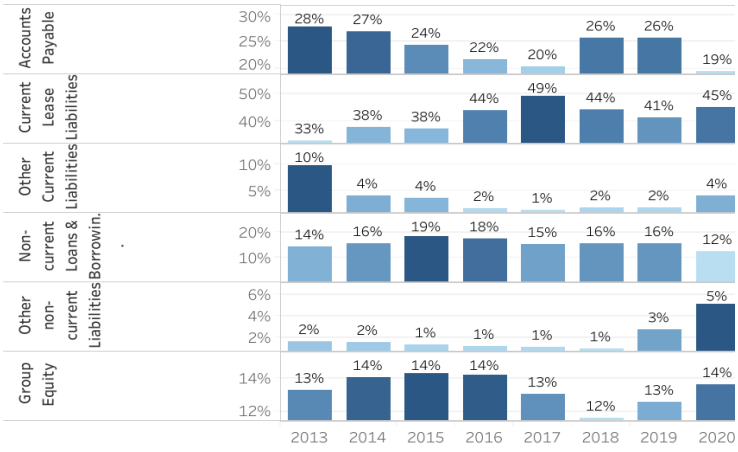
In respect of Trafigura's Liabilities and Equity positions, as shown on Figure 16 the Group's Equity averaged 14% of the Balance Sheet, which corresponds to half the equity of Glencore. This Equity ratio leads to an average total Debt of 86%. Of the 86% of Total Debt, approximately 70% is Current Liabilities and the remaining 16% is non-Current Liabilities.

From the Current Liabilities account, we can observe that Glencore and Trafigura exhibit the same average of 20% of Trade receivables, despite some occasional fluctuations. These companies also have a similar proportion of Other Current-Liabilities, which comprises non-Financial Debt such as Tax Liabilities.

Where Glencore and Trafigura differ is in their level of Current Lease Liabilities: while Glencore, on the one hand, has maintained an average of 7%-8%, Trafigura, on the other hand, has six times this proportion, i.e., an average of 42%.

Finally, regarding non-Current Liabilities, Trafigura's share of Loans is slightly lower than that of Glencore. On average, they were less than 20% of the Balance sheet. As per Other non-Current Liabilities Account, which includes Provisions and Deferred Tax Liabilities, it can be observed that unlike Glencore, Trafigura has not constituted significant Provisions. This item varied between 1% and 2%, with a marginal increase in 2020.

Figure 16: Trafigura: evolution of Liabilities & Equity positions 2013 - 2020



Discussion of the results:

The common-sized Balance Sheet analysis has demonstrated that Glencore and Trafigura despite of competing on the same commodities, are companies with quite different business models: Glencore is a more-capital intensive model detaining roughly 40% of PPE, and approximately 34% of Equity, resulting in a robust financial positions and Business model.

In contrast, Trafigura fits the profile of a typical trading company: it employs a light asset-model, composed of Inventory, Trade receivables, Cash and Cash Equivalents. Additionally, Trafigura is a highly leveraged company, enabling it to be extremely profitable in favourable market conditions, however presenting higher investment risk in a severe economic downturn.

With such distinct financial profiles, we turn now to consider what are the outcomes of each Business model.

To this end, in the coming section, we will perform the decomposition of the Income Statement of Glencore and Trafigura, by comparing their respective common-sized Financials.

1.2 Common-sized analysis of Income statement

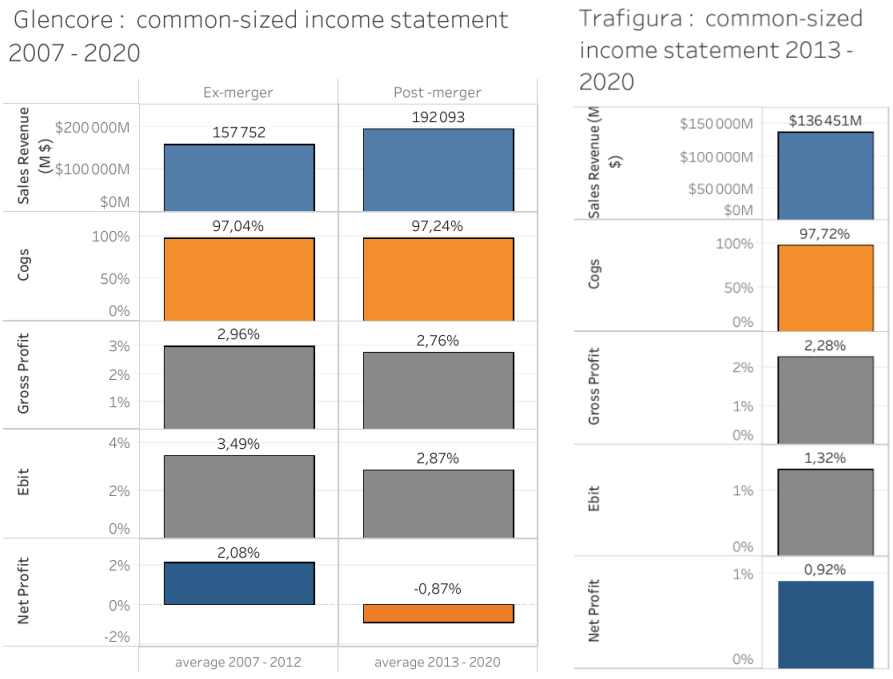
Figure 17, Illustrates the common-sized Income Statement of Glencore and Trafigura. The values figuring on the graph were obtained by averaging the ratio of each item over 2013 - 2020.

With respect to Glencore, it can be observed that globally, the increase in the proportion of PPE has resulted in higher turnover levels. On average, revenue from sales have risen by a factor of 1.21. As per Trafigura, it generates a significantly lower turnover levels even when compared to Glencore's levels before the Merger.

Concerning the COGS, it represents an average of 97% to 98% of the turnover, for both companies. Nonetheless, Glencore incurs slightly lower costs than Trafigura when selling the commodities. Additionally, is worth noting that this item has remained flat for Glencore since 2007.

As per the Operating margins (Gross profit and EBIT), Glencore's data shows that although larger turnover levels were achieved in the post-Merger period, Operating margins were greater prior to the Merger with Xstrata, i.e., when the proportion of PPE were lower.

Figure 17: Common-sized Income Statement



Despite the decline in these ratios, on average, Glencore on has realised higher Operating margins than Trafigura.

The one aspect where Trafigura seems to outperform Glencore is in terms of Net income margin: over the period 2013 - 2020, despite an operating profit (EBIT) of 2.87%, Glencore has returned an average **Net loss** of around -0.87% of its turnover. Trafigura, on the other hand, while achieving a lower EBIT of 1.32 %, yielded an average Net income of 0.92% to its Shareholders.

In the next paragraphs, we will explore the Income Statement of both companies in greater detail. Such analysis will be opposed to the evolution of PPE levels, so that we can spot any marked relationship between PPE levels and Income Statement items.

Such approach aims at understanding what elements have caused Glencore's Net income to deteriorate, on the one hand, and what elements have enabled Trafigura to protect the realised margins, returning consistently positive Net result since 2013.

Evolution of PPE owned versus Turnover and Profitability ratios

Glencore

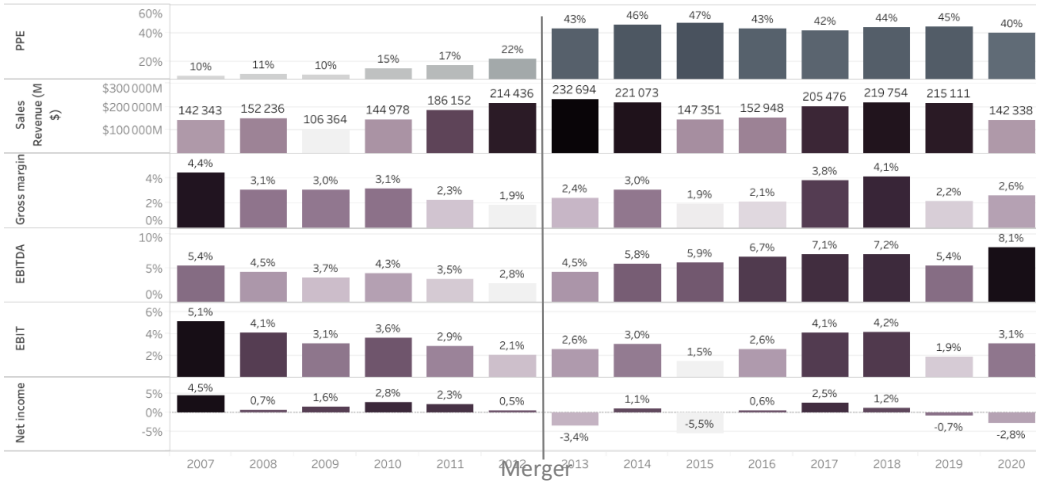
Figure 18 illustrates the evolution of Glencore's PPE levels against turnover and profitability ratios

Considering the overall impact of the merger between Glencore and Xstrata on the Financial metrics, it is safe to assert that one of the direct positive effects of the increased proportion of PPE was the higher volumes traded, resulting in greater turnover levels. Before the merger, average turnover was $157 million and after the merger it was $192 million, an increase of 22%.

Nevertheless, if higher proportion of PPE translated into higher turnover rates, it did not lead to higher Operating margins. As observed previously, Glencore's Operating margins have remained fairly stable, with some occasional fluctuations.

A less steadily fluctuation was the pattern of the Net profit margin. As the chart shows, it experienced ups and downs, but more frequent and more severe downs, especially after the Merger. It was from year 2013 onwards that Glencore recorded a negative Net profit margin for the first time since 2007. This negative loss was not an isolated case. In the post-Merger period, Glencore recorded a Net loss three additional occasions: in year 2015, 2019 and 2020.

Figure 18: Glencore – Evolution of PPE versus Turnover and Profitability ratios 2007 - 2020



With regards to the impact of the analysed metrics on the dependent variable, Net income, the data suggest that the turnover levels are nearly irrelevant concerning the variation of Net income: (1) in periods when Glencore realised one of the highest turnover (years 2013 and 2018), it closed the financial year at a Net loss; (2) conversely, in periods when Glencore's sales revenues were below average (years 2007, 2009 and 2016), Glencore generated one of its best Net profit margins.

Therefore, when performing the Pearson's Correlation analysis on part III, we expect sales revenue to be positively weakly correlated with Net profit margin, and PPE levels to have a moderate negative correlation with the Net profit margin.

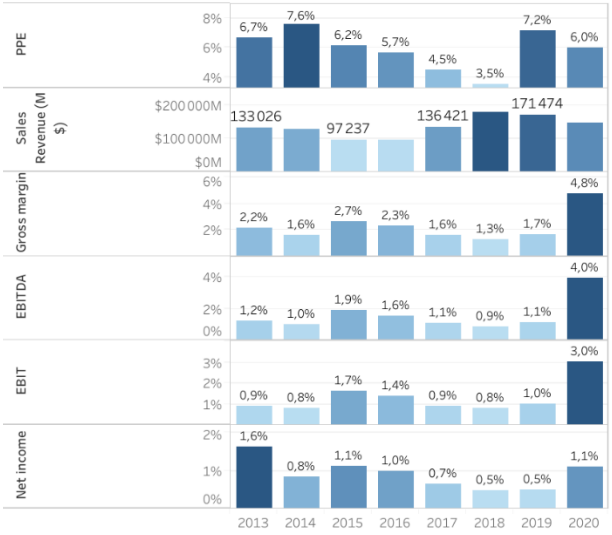
Trafigura

From the chart depicting Trafigura's evolution of PPE levels against turnover and profitability ratios (Figure 19), we can assert that : (i) unlike to Glencore, there might be a moderate positive correlation between Net income and PPE levels; (ii) The outstanding performance and profitability of Trafigura during Covid-pandemic, year 2020, was an isolated event.

Apart from year 2013 that registered the highest Net profit margin of 1.6%, on overall, Trafigura's margins fluctuated marginally. Where Trafigura's ratios differ from Glencore's is in their size, as they are smaller.

With regard to Trafigura's turnover levels and comparing to Glencore's turnover over the period 2013 to 2020, we can notice that both companies' turnover curve has followed the same trend: turnover has increased and decreased on the same years by approximately identical proportion.

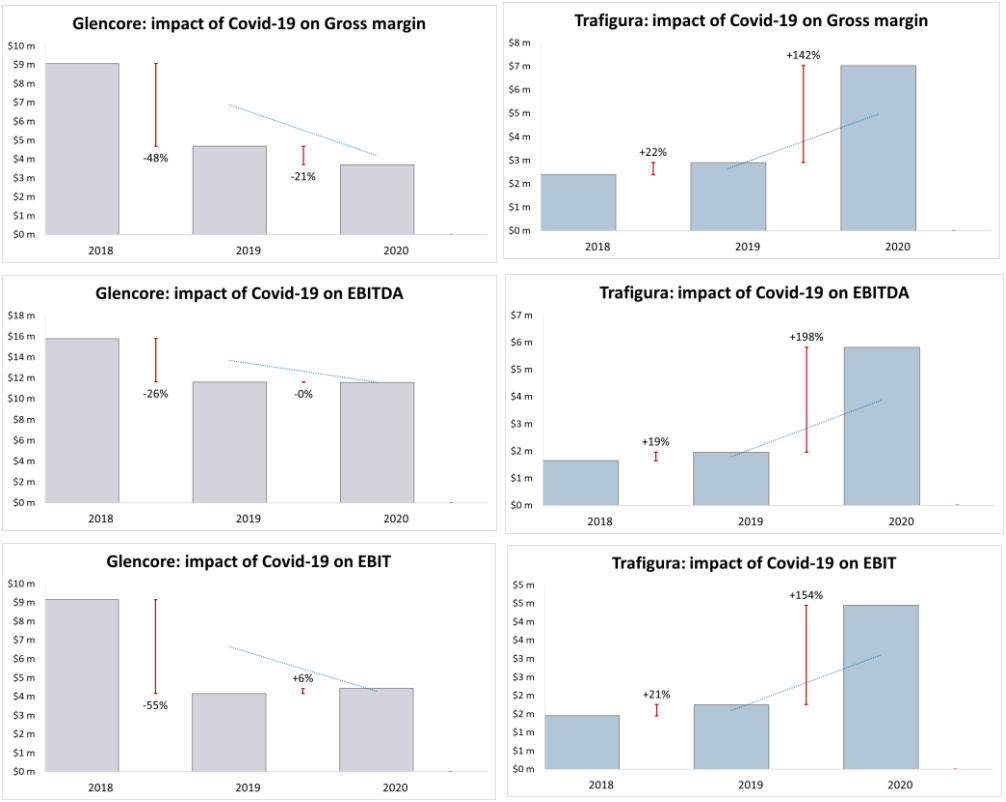
Figure 19: Trafigura – Evolution of PPE versus Turnover and Profitability ratios 2013 - 2020



Impact of Covid-pandemic on Operating margins

Concerning the impact of Covid-pandemic on the Operating ratios[14], the graphs (Figure 20), depicting the percentual change, present as follow:

Figure 20: Impact of Covid-pandemic on Operating margins



What stands out in these graphs is the marked opposite trajectory taken by the Operating margins of Glencore and Trafigura over the period 2018 to 2020.

In relation to Glencore, the Covid-pandemic, appears to have set a downward trend pushing down the outstanding margins generated in 2018. Between 2018 and 2019, Gross margin fell by 48% and EBIT[15] by over 50%. As for the decline in EBITDA, the deterioration was less significant, amounting to 26%.

[14] Gross margin, EBITDA and EBIT

[15] EBIT (adjusted EBIT for Glencore) is the net result of revenue less cost of goods sold and selling and administrative expenses, plus share of income from associates and joint ventures, dividend income and the attributable share of Adjusted EBIT of relevant material associates and joint ventures, excluding Significant items.

Contrary to expectations, the year 2020 was rather a stabilisation of a pattern that had already commenced in 2019. The Gross margin only dropped by a further 21%, EBITDA in line with 2019, and EBIT actually rose by 6%. According to Glencore, this increase was due to significantly higher prices of base metals: if the initial impact of the pandemic lead to multi-year lows, the trend reversed in the second half, with base metals prices increasing well above their pre-Covid levels. (Glencore annual report 2020, p. 22)

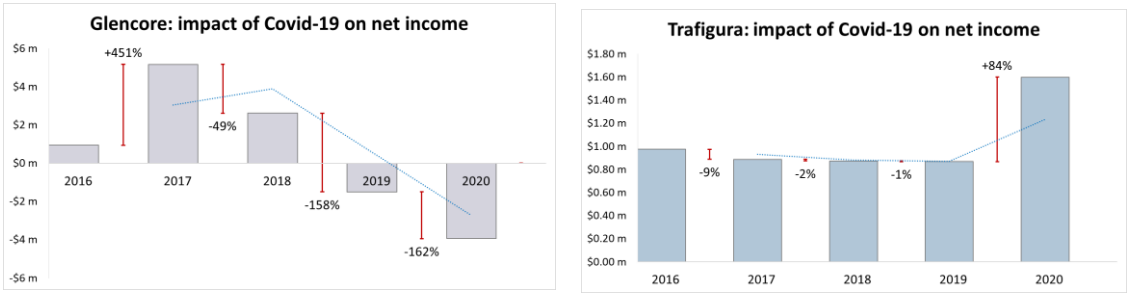
When it comes to Trafigura's Operating margins, they have evolved in the opposite direction : after a modest performance in 2018 and following a marginal improvement in 2019, these ratios skyrocket in 2020 to record levels. Gross margin was up by 142%, operating profit by almost 200% and EBIT by 154%.

It is noteworthy that this 154% exponential growth in Trafigura's EBIT, in absolute figures, corresponds to Glencore's EBIT after suffering a 50% decline between 2018 and 2020, that is, $4 million.

Impact of Covid-pandemic on Net income

The percentual change of Net income margin since year 2016 change can be observed on Figure 21.

Figure 21: Impact of Covid-pandemic on Net income



Glencore's chart shows that, contrary to the other precedent Operating ratios which have displayed a similar pattern, the Net income curve is completely distinct and has not followed any of the observed trends. Moreover, what stands out from the chart is the dramatic plunge in Net income, triggered over the course of 2017 and extending throughout the Covid-pandemic, totalling a decline of around 370%.

The deterioration of Net income occurred despite an initial exponential growth of 451% between 2016 and 2017. Finally, unlike the previous profitability ratios which peaked in 2018 and only began to decline in 2019, Net income reached a high in 2017, after which it commenced to fall.

Turning to the Net income of Trafigura, in contrast to Net income of Glencore, it has exhibited a smoother and similar pattern as previous Trafigura's Operating ratios. As the graph evidences, Trafigura's Net income, Gross margin, EBITDA and EBIT ratios, have remained flat since 2016 and have only experienced remarkable growth in 2020. Trafigura's average Net profit over this period was less than $1 million. With the Pandemic, Net income was multiplied by 1.7 attaining a new all-time high of $1’600 million.

Discussion of the Results:

The analysis so far, has evidenced that despite the recurrent negative Net profit registered since 2013, Glencore’s Operating margins not only have remained relatively constant since 2007, but also, they are greater than Trafigura’s margins. As per Trafigura, Operating ratios as well as Net income curve have displayed similar patterns.

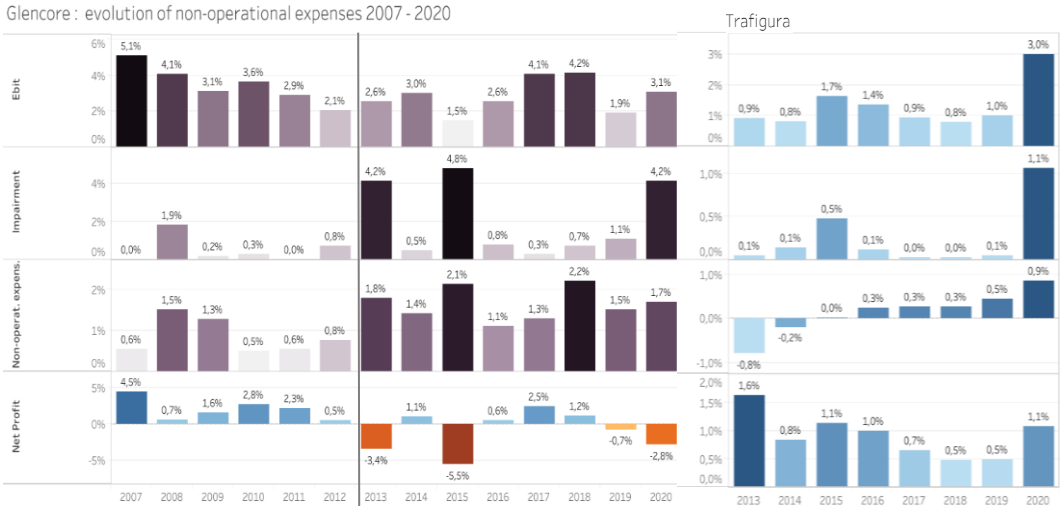
These findings allow to conclude that both companies have not incurred any major escalations concerning their Operational expenses such as G&A and depreciation. Such fact is confirmed by charts displaying the evolution of Operational expenses of these firms (See Appendix 1).

Hence, the stabilisation of Operational expenses implies that Glencore’s deterioration of Net income was caused by non-Operating items. That have been said, we are turning now to examine the evolution of non-Operational expenses.

Evolution of non-Operational Expenses

The chart illustrating the evolution of non-Operational expenses of Glencore and Trafigura are presented as follow:

Figure 22: Evolution of non-Operational expenses



With regards to Glencore, the chart shows that the company has experienced some one-off instances where non-Operating expenses have escalated beyond normal levels. These instances coincide with financial years in which Glencore has reported a Net loss. Despite the existence of "*other NET non-Operating expenses*[16]" such as tax payables and interest charges, we can observe that Impairment charges are by far the most significant item, and that it is inversely correlated to Net income: when Impairment expenses increase, Net income decreases, and vice-versa.

For the years 2013, 2015 and 2020, Impairment charges alone represented more than 4% of realised turnover.

Furthermore, if we only consider the impact of other non-Operating charges on Net profit, deducting this item from operating profit (EBIT), we would reach the conclusion that: (1)

[16] *Other NET non-Operating expenses* (Impairment losses excluded*)* - includes all expenses and revenues from activities outside the scope of normal business activities. This include items such as : loss/gain on disposal of non-current Assets; interest income/expense; Market-to-market valuations on investment; Foreign exchange loss/gain; legal related costs; acquisition related costs

exclusively in 2015, Glencore would have suffered a Net loss of 0.7% instead of 5.5%. (2) without the Impairment charges, over the period 2013 - 2020, Glencore's average Net profit margin would amount to the **same average** Net profit of Trafigura of 1.20%.

As per Trafigura, it can be seen that non-Operating expenses and Impairment expenses represent a negligible proportion of turnover, which might be indicative of the fact that if Trafigura has successfully delivered a constant Net profit as bottom line, it is because until now, the company has not suffered from, (or has strategically managed) abnormal escalation on this item.

It may be noted that an exception applies to the year 2020, which saw Impairment charges exceeding the usual ranges, reaching more than 1% of turnover. As the chart shows, at typical profit levels earned in ordinary market circumstances, this size of Impairment would have translated into a Net loss.

Alternatively, it might be that Impairments are *strategically or opportunistically recorded* by Trafigura. That is, their size varies according to the EBIT achieved or to the expected Net income. Consequently, Impairment expenses increase when EBIT/and or Net income increases and inversely, allowing always a margin as Net result.

For demonstration: if we compare the graph of EBIT, Net income and Impairments, we notice that there is a positive relationship. Even though the percent change in Impairment charges is lower, it follows the same path as EBIT and Net income. Additionally, it can be seen, that the item *"Other non-Operating expenses*[17]" unlike Impairments behave more like a traditional cost item, with an inverse relationship to profits.

[17] Includes interest expenses and taxes payables

Evolution of Asset management ratios (Efficiency ratios)

Lastly, before performing the DuPont analyis, we will look briefly into the Asset management ratios.

Glencore

In terms of the efficiency with which Glencore has managed its assets, the findings[18] showed that apart from PPE turnover and some occasional swings, Glencore's asset management ratios have remained broadly stable.

A more pronounced evolution was the quasi-perfect inverse relationship between the proportion of PPE held and PPE turnover: as the proportion of PPE gradually increasead, PPE turnover also progressively decreased. Before merging with Xstrata, on average, for every $1 invested on PPE, Glencore was generating $16 of revenue. After the merger, the average revenue generated dropped to $ 3.

Trafigura

With respect to Trafigura,[19]excluding PPE turnover, its Current-Asset[20] efficiency ratios were found to be only marginally superior to those of Glencore. What sets Trafigura apart from Glencore is its exceptional, but not unforeseen, PPE turnover. On average, for every dollar invested in PPE, Trafigura generated $ 46 in revenue. During 2018, the return was $ 95.

In relation to the effect of the Covid-pandemic on asset management ratios of Glencore and Trafigura, outside of Trafigura's exceptional PPE turnover in 2018, there was observed no major fluctuation.

On the last section the detailed assessment of Glencore’s and Trafigura's profitability using DuPont analysis tool is expected to: (i) help identify key changes in ROE over time, (ii) highlight the ratio(s) that drive or undermine each company's profitability.

[18] See Appendix 3: Evolution of PPE versus Efficiency ratios

[19] See Appendix 3: Evolution of PPE versus Efficiency ratios

[20] This includes: Inventories turnover and Accounts Receivables turnover

Dupont Analysis

The starting point of the DuPont framework is that a company's profitability can be derived from three sources: from its (1) Operational efficiency[21], (2) Asset usage[22] or (3) Financial leverage[23]. When these three ratios are multiplied with one another, the outcome is the ROE[24] of a company. This model is summarised on the diagram in Appendix 4.

Glencore - Dupont analysis

DuPont analysis of Glencore, Figure 23 highlights the fact that the **Profitability ratio**, is the element undermining Glencore's overall profitability and ROE for Shareholders. As we can see, although Profitability, Efficiency and Leverage ratios have all deteriorated since the golden age of 2007, the Profitability ratio is by far the most impacted. It has fallen by 161%. Contrary to expectations, the increase in PPE from around 10% to 45% of Total Assets only halved the Efficiency ratio, while the Leverage ratio fell by 29%.

Figure 23: DuPont analysis of Glencore

	ROE	=	Net Income / Equity						
	ROE	=	Profitability	X	Efficiency	X	Leverage		
	ROE	=	Net Income / Sales	X	Sales / Assets	X	Assets / Equity		
YEAR									
2007	22.6%	=	4.5%		2.37		2.10		
2008	3.5%	=	0.7%		2.48		2.00		
2009	4.8%	=	1.6%		1.60		1.86		
2010	9.6%	=	2.8%		1.82		1.86		
2011	7.8%	=	2.3%		2.16		1.58		
2012	2.0%	=	0.5%		2.03		1.81		MERGER
2013	-7.3%	=	-3.4%		1.50		1.43		
2014	2.3%	=	1.1%		1.45		1.41		
2015	-9.3%	=	-5.5%		1.15		1.47		
2016	1.2%	=	0.6%		1.23		1.53		
2017	5.7%	=	2.5%		1.52		1.49		
2018	3.0%	=	1.2%		1.71		1.46		
2019	-1.8%	=	-0.7%		1.73		1.46		
2020	-5.0%	=	-2.8%		1.21		1.50		
% change (2020 versus 2007)			-161%		-49%		-29%		

[21] Operational efficiency is measured by Net Profit Margin and indicates the amount of Net income generated per dollar of sales.

[22] Asset usage (efficiency) is measured by the Total Asset turnover and represents the sales amount generated per dollar of assets.

[23]) Financial leverage is determined by the company's level of leverage or debt.

[24] Traditionally, ROE ratio is computed as Net income divided by the Equity, expresses the amount of profit returned as a percentage of the Equity (is represented by the sum of the total Liabilities and the Total Group's Equity).

Trafigura – DuPont analysis

Focusing now on the period between 2013 and 2020 and comparing Glencore's ROE break down with Trafigura's ROE breakdown, the outcomes are presented on Figure 24 below:

Figure 24: Glencore and Trafigura – DuPont analysis

GLENCORE : DUPONT ANALYSIS

YEAR	ROE	=	Profitability	X	Efficiency	X	Leverage
2013	-7.3%	=	-3.4%		1.50		1.43
2014	2.3%	=	1.1%		1.45		1.41
2015	-9.3%	=	-5.5%		1.15		1.47
2016	1.2%	=	0.6%		1.23		1.53
2017	5.7%	=	2.5%		1.52		1.49
2018	3.0%	=	1.2%		1.71		1.46
2019	-1.8%	=	-0.7%		1.73		1.46
2020	-5.0%	=	-2.8%		1.21		1.50
AVERAGE	**-1.4%**		**-0.87%**		**1.44**		**1.47**
Impact of Covid (2020 versus AVERAGE)			**-218%**		**-16%**		**2%**

TRAFIGURA : DUPONT ANALYSIS

YEAR	ROE	=	Profitability	X	Efficiency	X	Leverage
2013	18.6%	=	1.6%		3.32		3.41
2014	8.7%	=	0.8%		3.22		3.21
2015	8.3%	=	1.1%		2.49		2.92
2016	7.2%	=	1.0%		2.38		3.04
2017	6.2%	=	0.7%		2.80		3.40
2018	5.7%	=	0.5%		3.36		3.53
2019	5.2%	=	0.5%		3.17		3.23
2020	9.0%	=	1.1%		2.58		3.21
AVERAGE	***8.6%***		***0.92%***		***2.92***		***3.24***
Impact of Covid (2020 versus AVERAGE)			**19%**		**-12%**		**-1%**

As the findings show, what drives Trafigura's overall profitability and performance it is not its Profitability ratio, that is, the Net income earned per sales generated, but rather its **Leverage ratio** and **Asset efficiency ratio**. Both ratios, are two times greater than Glencore's ratio. Such outcome is the result of low levels of PPE combined with high Debt ratio.

2. Conclusion part I

The main findings of our research on Glencore, were that after the takeover of the mining company Xstrata, sales revenue levels increased while Operating margins decreased, yet only marginally.

In terms of asset efficiency, it was observed that PPE turnover[25] was the most deteriorating ratio. It went from an average return of $25 in 2007 per $1 invested to just $3 of average return per $1 invested. Nevertheless, as DuPont's analysis highlighted, if we consider the efficiency of the whole asset base, (Total assets turnover), the total declined since 2007 drops to only 50%.

With respect to the impact of the Covid pandemic on profitability ratios, it was found that Glencore's Net income ratio was by far the most negatively affected. Hence, it supports the outcome of Dupont's analysis that the deterioration of Glencore's ROE is not linked to asset inefficiencies, but rather to the decline in Profitability, i.e., the *Net income generated as a percentage of the turnover realised.*

The findings of the Income Statement analysis were suggestive of the fact that Impairment charges are the main driver of the sharp degradation in Glencore's Net income.

In the case of Trafigura, and contrary to Glencore, it was found that, globally, turnover levels, profitability and performance ratios remained relatively constant, apart from the year 2020.

The Covid-pandemic was an isolated event, triggering a *momentum* of exceptional Net profit margin and financial performance for this company.

As for the drivers of success, the DuPont analysis, demonstrated that Trafigura's ability to deliver a steady positive return to its Shareholders is derived from its Financial Leverage and Asset Efficiency ratio.

On the question of the absolute values of the margins generated by Glencore and Trafigura, relative to Net income, it was noted that: (1) in the year 2020, Glencore registered a negative loss of $ -3'946 million, whereas Trafigura a profit of $1'599 million, resulting in a difference of $5'545 million; (2) Over the period 2013 to 2020, Glencore's

[25] See Appendix 3: Evolution of PPE versus Efficiency ratios

mean Net income amounted to a loss of $ -1’294 million; and Trafigura’s to a profit of $1’526 million.

Interestingly, on year 2020, Glencore’s EBIT amounted to $4’416 million while Trafigura’s to $4’443 million. If at this point in time Trafigura has outperformed Glencore in terms of EBIT by $27 million, when we consider the period 2013 - 2020 as a whole, Glencore have by far outperformed Trafigura: Glencore’s average EBIT equalled to $ 5’618 million and Trafigura’s to $1705 million.

Summing up on absolute values of the margins generated by these competing firms, one should note that: (1) Trafigura's realised Net profit is higher than that of Glencore; (2) Glencore's EBIT is higher than that of Trafigura.

Hence, the discussion in this paper has so far been confined to the assumption that **there is** a substantial difference between the Net income generated by Glencore and Trafigura. Such disparity equally extends to their realised EBIT.

Nevertheless, one question that arises is that of the statistical reliability of these assumptions. In other words, if there is enough statistical evidence to claim that there is a significant difference or discrepancy between the Net income and EBIT generated by Glencore and Trafigura?

The assessment of the statistical reliability of these assumptions will be the subject of Section II, by means of the Hypothesis testing analysis.

3. QUANTITATIVE ANALYSIS PART PART II

3.1 Hypothesis Testing

The following section tests the statistical significance of the following hypothesis:

Hypothesis 1: There is a statistically significant difference between the Net income of Glencore and the Net income of Trafigura

Hypothesis 2: The operational profit (EBIT) of Glencore is significantly greater than the operational profit of Trafigura

3.1.1 Testing of Hypothesis one

*"**There is** a statistically significant difference between the Net income of Glencore and the Net income of Trafigura"*

H0 (null hypothesis): There is **NO** statistically significant difference between the Net income of Glencore and Trafigura

HA (alternative hypothesis): There is a statistically significant difference between the Net income of Glencore and Trafigura

μ1: population mean Net income of Glencore

μ2: population mean Net income of Trafigura

***H0**: μ1 - μ2 = 0*

***HA:** μ1 - μ2 ≠ 0*

Because H0 intends to assess whether the two population's mean are different, the **two-tailed t-test** has been performed.

As per the decision to run equal or unequal variances t-test, the F-Test two-sample for variances outcome (Appendix 5), was: **p-value = 0.0001**, which implies the rejection of H0, and that there is a statistical significance difference between the variances. Consequently, an **unequal variances t-test** have been applied.

3.1.1.1 Result of t-test two sample assuming unequal variances (H1)

The outcome (Figure 25) of the t-test two sample assuming unequal variances, is presented as follow:

t-Stat = -1.580

t Critical value 2-tailed = 2.36

t-Stat < t critical value

p-value = 0.16

α alpha = 0.05

p-value > α alpha

Decision: <u>FAIL</u> TO REJECT the null hypothesis (H0)

Figure 25: Result of the t-test two-sample, assuming unequal variances

	Glencore NET INCOME	*TRAFIGURA NET INCOME*
Mean	**-1294**	**1526**
Variance	24814276	642507
Observations	8	8
Hypothesized Mean Difference	0	
df	7	
t Stat	**-1.58047**	
P(T<=t) one-tail	0.07901	
t Critical one-tail	1.89458	
P(T<=t) two-tail	**0.15801**	
t Critical two-tail	**2.36462**	

Both t-value and p-value denote that we fail to reject the null hypothesis: the low t-value (in this case, negative) indicates that there is a high degree of similarity between the sample sets; and a high p-value (higher than alpha) signifies that the difference between the sample sets is not statistically significant.

3.1.1.2 Interpretation of Results and discussion

When testing the assumption that "*there is a statistically significant difference between the Net Income of Glencore and Trafigura*" we failed to reject the null hypothesis that claims no difference between groups, at the 95% confidence level.

The hypothesis test returned a p-value of 0.15 which is above the significance level or alpha of 0.05. Such result signifies that the data do not provide sufficient evidence to justify rejection of the null hypothesis, said differently, to support the alternative hypothesis (HA).

As such, this finding demonstrates that despite: (1) the gradual deterioration observed in Glencore's Net income and subsequent average negative Net income; (2) Trafigura's consistent Net income and outstanding realised Net income during the Covid-pandemic; The difference in Net income (profitability) between these competing firms is not statistically significant.

3.1.2 Testing of Hypothesis two

*"The operational profit (EBIT) of Glencore **is greater** than the EBIT of Trafigura"*

H0 (null hypothesis): *The operational profit (EBIT) of Glencore is smaller or equal to the EBIT of Trafigura*

HA (alternative hypothesis): *The operational profit (EBIT) of Glencore is greater than the EBIT of Trafigura*

μ1: population mean Net income of Glencore

μ2: population mean Net income of Trafigura

H0: μ1 =< μ2

HA: μ1 > μ2

Since the alternative hypothesis is concerned with values "*greater than*", the relevant rejection region under the graph is situated above the acceptance region. Hence, a **one-sided right-tail** t-test have been conducted.

The outcome (Appendix 6) of F-test two-sample for variances obtained was: p-value = 0.029. A p-value is smaller than alpha (0.05) implies that there is a statistical significance difference between the variances. Hence, ***unequal* variances** t-test was carried.

3.1.2.1 Result of t-test two sample assuming unequal variances (H2)

Figure 26, displays the outcome of the t-test:

Figure 26: t-test two-sample, assuming unequal variances

	GLENCORE EBIT	*TRAFIGURA EBIT*
Mean	5618	1769
Variance	5732244	1216672
Observations	8	8
Hypothesized Mean	0	
df	10	
t Stat	**4.13047**	
P(T<=t) one-tail	**0.00102**	
t Critical one-tail	**1.81246**	
P(T<=t) two-tail	0.00204	
t Critical two-tail	2.22814	

t-Stat = **4.13047**

t Critical value one-tailed = **1.81246**

t-Stat > t critical value

p-value = **0.00102**

α alpha = 0.05

p-value < α alpha

Decision: <u>REJECT</u> the null hypothesis

A high t-value indicates that a significant difference exists between the two sets of samples, and a low p-value denotes that we are dealing with a statistically significant result. For that reason, we should reject the null hypothesis and argue that there is sufficient statistical evidence that Glencore's operating profit is greater than Trafigura's.

3.1.2.2 Interpretation of Results and discussion

When testing the assumption that "t*he operational profit (EBIT) of Glencore* ***is greater*** *than the EBIT of Trafigura",* the hypothesis test returned a p-value of **0.00102** which is well below alpha of 0.05. As expected, such outcome implies that there is sufficient statistical evidence to support the alternative hypothesis and claim that Glencore has greater operational profitability (EBIT) than Trafigura. Such decision implies having a 5% probability of incorrectly rejecting the null hypothesis.

4. Conclusion part II

Contrary to expectations, the hypothesis test showed that while in terms of absolute value ($) the Net income of Glencore and Trafigura appear to be materially different, statistically this difference is inexistent. Put simply, there is no statistically significant disparity between the Net income earned by Glencore and Trafigura.

With regard to EBIT, as anticipated in section one, we found sufficient statistical evidence that Glencore's EBIT not only is statistically different from Trafigura's but is also significantly greater.

These results reinforce the overall findings in section one, namely that Glencore does not suffer from any operational inefficiencies or performance issues, and that Trafigura's ability to deliver a continued positive Net Income is not derived from its outstanding operational performance (EBIT).

Another implication of this finding with relation to EBIT, is that asset-intensity, i.e., the level of PPE owned, is not the key determinant of profitability (Net income), but rather of performance (EBIT). Glencore, which holds higher levels of PPE, succeeded in generating a higher EBIT margin than Trafigura, which holds lower levels of PPE.

Finally, the observation that: (1) the Net income of Glencore and Trafigura is largely determined by Impairment charges; (2) that Impairment expenses is correlated negatively with the Net income of Glencore and positively with Trafigura's Net income; and, (3) the outcome of the Hypothesis one that there is NO significant statistical difference between the Net profit of Glencore and Trafigura, raises the **question of the role and extent to which the Impairment losses reported by these companies comply with an accounting principle (IAS 36) or rather serve as a strategic (*opportunistic*) tool to manage profits.**

We shall address this discussion at the end of section three after conducting the Pearson and the multiple regression analysis, aiming to assess (among others) whether Impairment charges are a statistically significant variable in explaining the variation in Glencore's and Trafigura's Net income.

5. QUANTITATIVE ANALYSIS PART III

5.1 Pearson Coefficient Correlation analysis and Multiple Linear Regression

5.1.1 Pearson Correlation analysis

5.1.1.1 Glencore: 2013 - 2020

Results[26]

Figure 27 illustrates the strength of the correlation between the Net income and 28 Financial metrics.

According to conventional guidelines (Goss-Sampson 2018, p. 49), variables deemed to have a strong effect on the dependent variable are those with a Pearson **r-value > 0.5**. Among this category, it was observed:

Strong positive correlation with: Accounts Payable, EBIT, Gross profit and, Other non-Current Assets[27] represented in dark green colour.

Strong negative correlation with: Impairment expenses, Other Financial Assets[28] and Other Current Liabilities[29], represented in red-orange colour.

Figure 27 : Glencore Pearson's Correlation Coefficient

Glencore Pearson's Correlations 2013 - 2020

NET INCOME versus INDEPENDENT VARIABLES

	Pearson's r	p-value	
ACCOUNTS PAYABLE	0.78	0.022	*
EBIT	0.684	0.061	
GROSS_PROFIT	0.646	0.083	
OTHER NON-CURRENT ASSETS	0.572	0.139	
TOTAL ASSETS TURNOVER	0.445	0.269	
PPE TURNOVER	0.443	0.272	
OTHER NON-CURRENT LIABILITIES	0.386	0.345	
INVENTORIES	0.318	0.443	
ACCOUNTS RECEIVABLE TURNOVER	0.305	0.462	
SALES	0.287	0.491	
COGS	0.26	0.534	
DEPRECIATION	0.228	0.588	
G & A	0.143	0.735	
INVENTORIES TURNOVER	0.1	0.813	
TOTAL CURRENT LIABILITIES	0.064	0.881	
ACCOUNS PAYABLE TURNOVER	0.063	0.883	
ACCOUNTS RECEIVABLE	0.029	0.945	
TOTAL NON-CURRENT ASSETS	-0.016	0.969	
TOTAL CURRENT ASSETS	-0.07	0.869	
PPE	-0.1	0.813	
NON-OPERATING EXPENSES	-0.13	0.758	
CASH AND CASH EQUIVALENTS	-0.229	0.585	
TOTAL NON-CURRENT LIABILITIES	-0.345	0.403	
LOANS AND BORROWINGS	-0.449	0.264	
SHORT-TERM LEASE LIABILITIES	-0.486	0.222	
OTHER CURRENT LIABILITIES	-0.544	0.163	
OTHER FINANCIAL ASSETS	-0.575	0.136	
IMPAIRMENT	-0.945	< .001	***

* p < 0.05, ** p < 0.01, *** p < 0.001

[26] See Appendix 7 : Glencore - Pearson's Correlation Coefficients Net income versus Predictors for full results

[27] Such as Investments in associates and joint ventures, Intangible assets (Port allocation rights, Licences, trademarks and software, Customer relationships)

[28] Derivatives

[29] Such as deferred income, provisions and deferred tax liabilities

On the category variables with moderate effect **r value 0.3 - 0.5**, it was identified **moderate positive correlation** with: PPE turnover, Inventories, Accounts Payable turnover. **Moderate negative correlation** was observed with: Short-term Lease Liabilities and Loans & Borrowings.

The remaining variables with a Pearson's **r value < 0.3** which are considered **insignificant** or having a **small effect** on the dependent variable include: the proportion of PPE held, Total non-Current Assets, Total Current Assets and non-Operating expenses.

5.1.1.2 Interpretation of Results and discussion

Over the period 2013 – 2020, which metrics were statistically significant in explaining the variation in Glencore's Net income?

As shown by the Pearson correlation coefficient table, out of the 28 predictors tested, only two statistically significant correlations were observed: (1) with **Impairment charges** having a Pearson r-value of -0.945, p-value < 0.001, indicating a highly significant predictor; and (2) with **Accounts Payables** with a Pearson r-value of 0.78, p- value = 0.022

As for the partial effect of each of the identified predictors on the dependent variable, squaring the coefficient r results in the R^2. This is a statistical measure of the proportion of the variance of the dependent variable that is explained by the independent variable (Goss-Sampson 2018, p. 50).

Hence, if we square the coefficient r of Impairment charges: $(0.945)^2 = 0.8930$, this means that 89.30% of the variation in Glencore's Net income *(in this case, the decline*) is explained by Impairment charges alone. For Accounts Payables: $(0.78)^2 = 0.6084$, implying that this variable can explain 60.84% of the positive variation in Net income.

Did Glencore's asset-intensive business model (high proportion of PPE) cause its Net profit to be negative or at least to deteriorate?

No, the Pearson Correlation coefficient test demonstrated that the proportion of PPE held by Glencore is (1) statistically insignificant and (2) has no relevant effect on the variation in Net income. The outcome of the test was as follows: Pearson's **r-value = -0.1** and **p-value = 0.813**, as can be noticed, this p-value is well above the significance threshold of 0.05.

Similarly, if we extend this analysis to the Total non-Current assets owned by Glencore, the r-value = -0.016 and the p-value 0.969, thus reinforcing previous findings on this paper that although the proportion of Fixed (tangible) assets held by Glencore is negatively correlated with profitability, this correlation is irrelevant on explaining the variation in profitability (Net income).

Even if we consider the impact of efficient PPE utilization (PPE turnover) on the Net income, the r-value = 0.443 and the p-value = 0.813 indicate that the strength of the correlation has improved, yet this predictor remains statistically insignificant.

This outcome would suggest that the critical factor in determining profitability is not the proportion of PPE owned, which by default can drag down profits due to high fixed and maintenance costs (negative correlation), but rather the efficiency with which the company is capable of using those assets. (PPE turnover is positively correlated with Net income).

Since the Impairment charges were found to be statistically significant and strongly negatively correlated with Net income, it could be argued that Glencore's high proportion of PPE indirectly led to the decline in Net profit, as a substantial portion of the Impairments are attributable to PPE (tangible assets).

In fact, as depicted in Appendix 8, the strength of the correlation between PPE and Impairment expenses was tested and the outcome was: r-value =0.160 and p- value = 0.706. These coefficients show that these variables are weakly correlated, thus allowing to conclude that PPE levels are statistically trivial in explaining the fluctuation in Impairment charges *incurred* or, *recorded* by Glencore.

Additionally, such weak correlation is an indication that Impairment charges registered by Glencore is *substantially,* derived from other source than the material loss of value in their assets. Which supports evidence to the fact, the to some extent there is arbitrary and opportunistic booking of Impairments expenses to manage earnings.

5.1.2 Trafigura : 2013 - 2020

5.1.2.1 Results[30]

The outcome of the Pearson's Correlation Coefficient between Trafigura's Net income and financial metrics, are displayed on Figure 28:

Among variables deemed to have strong effect on the dependent variable **r- value > 0.5**, it was identified:

Strong positive correlation

Statistically significant at alpha = 0.01, or 99% Confidence level with: (1) Depreciation, (2) Gross profit margin, (3) G&A and, (4) Impairment charges.

And,

Statistically significant at alpha = 0.05, or 95% Confidence level with: **(1)** EBIT, (2) Other Current Liabilities[31] and (3) Other non-Current Liabilities[32]. These correlations are statistically significant at 90 % Confidence Level.

Figure 28: Trafigura - Pearson's Correlation Coefficient

Trafigura: Pearson's Correlations 2013 - 2020

	Pearson's r	p-value	
Depreciation	0.905	0.002	**
Gross profit	0.864	0.006	**
G & A	0.841	0.009	**
Impairment	0.837	0.01	**
EBIT	0.78	0.022	*
Other Current Liabilities	0.74	0.036	*
Other non-Current Liabilities	0.728	0.041	*
Acc. Receiv. turnover	0.374	0.361	
PPE	0.367	0.372	
Total non-Current Assets	0.367	0.372	
Inventories	0.321	0.438	
Other Financial Assets	0.263	0.529	
Other non-Current Assets	0.239	0.568	
Total assets	0.147	0.729	
Total non-Current Liabilities	0.116	0.784	
Total Current Liabilities	0.113	0.79	
Total Current-Assets	0.1	0.814	
Other net non-Operating expenses	0.086	0.84	
Short-term Lease Liabilities	0.019	0.964	
Cash and Equivalents	0.014	0.974	
Acc. Payab. turnover	-0.023	0.957	
Sales	-0.082	0.847	
COGS	-0.13	0.759	
Accounts Payable	-0.148	0.727	
Inventory turnover	-0.173	0.682	
Total assets turnover	-0.202	0.632	
PPE turnover	-0.362	0.379	
Loans & Borrowings	-0.483	0.225	
Accounts Receivable	-0.495	0.213	

* p < 0.05, ** p < 0.01, *** p < 0.001

[30] See Appendix 9: Trafigura - Pearson's Correlation Coefficients Net income versus Predictors for full results

[31] Derivatives and tax liabilities

[32] Provisions and long term tax liabilities and Derivatives

In terms of predictors falling into the moderate effect category **r value 0.3 - 0.5**, three **strong/moderate negative** correlations were found with: Loans and Borrowing, Accounts Receivables and PPE turnover; and two **moderate positive** correlations with: PPE own and Inventories. However, none of these correlations proved to be statistically significant.

All remaining predictor coefficients are classified as having a small or trivial effect on the variation of the dependent variable.

5.1.2.2 Interpretation of Results and discussion

Between 2013 and 2020, which financial metrics were statistically significant in explaining the variation in Net income of Trafigura?

Was Trafigura's asset-light business model the main driver of its extraordinary profitability during the Covid-19 pandemic?

The Pearson correlation coefficient enabled the identification of several statistically significant predictors of Trafigura's Net income. The identified predictors were all highly positively correlated with Net income and can be classified into two categories: (1) Income statement items (statistically significant at the 99% CL): Depreciation, Gross profit, General and administrative expenses and Impairment charges; and (2) Balance Sheet items (statistically significant at the 95% CL): Short-term and Long-term Debt.

This result corroborates the outcome of DuPont analysis namely that the driver of Trafigura's profitability comes less from its asset-light Business model and more from its realised Operating margin and the company's ability to obtain and secure financing.

In the following chapter, we endeavour to build a multiple regression model that can best predict the Net income of Glencore and Trafigura.

5.2 Multiple Linear Regression model

5.2.1 Outline and Objectives

In the coming section, we will insert the identified statistically significant predictors in the Multiple Liner Regression model. After the multicollinearity test and the overfitting check, we expect to come up with a reduced model containing the optimal combination of independent variables that can best forecast the Net income of Glencore and Trafigura.

5.2.2 Glencore's Regression Model

The variables entered into the model after the multicollinearity check (VIF < 10 and tolerance > 0.1), six predictors were entered into the model: (1) Impairment, (2) Accounts Payables, (3) Other non-Current assets,[33] (4) EBIT, (5) Sales and (6) PPE.

The Full model,[34] (obtained by selecting **Enter** method) generated the following outcome (Figure 29):

5.2.2.1 Results

Figure 29 : Glencore – Regression model (full)

Model Summary - NET_PROFIT

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	4981.393
H_1	1.000	1.000	1.000	19.211

The full model, (represented by H1) yielded great results : the adjusted R2 of 1, implies that 100% of the variation in the dependent variable can be explained by the model. As per the standard error (RMES) the coefficient of 19.211 can be considered low.

[33] This account comprises items like intangible assets (Goodwill), etc., excluding PPE

[34] See Appendix 10: Glencore Regression model (Full Model)

Regarding the statistical significance of this Regression model, the outcome of the ANOVA table (Figure 30) is displayed below:

Figure 30: Glencore Anova table (full model)

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	1.737e+8	6	2.895e+7	78441.904	0.003
	Residual	369.062	1	369.062		
	Total	1.737e+8	7			

Note. The intercept model is omitted, as no meaningful information can be shown.

The F-statistics shows that the model is a reliable predictor of the dependent variable as the obtained p-value of 0.003 is smaller than alpha = 0.05.

As per the statistical significance of the independent variables inserted in the model, the Coefficients table below (Figure 31) shows that all variables fit the multicollinearity check standards, here represented by Collinearity Statistics (VIF < 10 and tolerance > 0.1).

All predictors, apart from PPE, are statistically significant as their p-value are < 0.05.

Figure 31: Glencore – Coefficient's table (full model)

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	−1293.750	1761.188		−0.735	0.486		
H_1	(Intercept)	−22880.604	291.273		−78.554	0.008		
	IMPAIRMENT	−1.048	0.003	−0.716	−321.413	0.002	0.428	2.335
	ACCOUNTS PAYABLE	365.588	10.182	0.113	35.906	0.018	0.216	4.637
	OTHER NON-CURRENT ASSETS	617.179	10.985	0.133	56.182	0.011	0.378	2.649
	EBIT	0.628	0.006	0.302	112.124	0.006	0.293	3.409
	SALES	−0.022	3.694e−4	−0.166	−59.482	0.011	0.271	3.687
	PPE	−7.522	1.386	−0.011	−5.425	0.116	0.502	1.994

For this reason, we attempted to improve the model by re-running the test. As we already obtained a relatively good full model, we opted for the **Stepwise Backward** variable entry method, in which the least statistically significant predictor (p-value > 0.05) is removed. (Goss-Sampson 2018, p. 59)

The outcome of the **Backward** method,[35] presents as follow (Figure 32):

Figure 32: Glencore – RM (Backward method)

Model Summary - NET_PROFIT

Model	R	R^2	Adjusted R^2	RMSE
1	1.000	1.000	1.000	19.211
2	1.000	1.000	1.000	74.940

Model 1 denotes the initial full model. Model 2 is the Regression model obtained after the removal of the non-statistical significant variable (PPE).

As the model summary table (Figure 32) shows, the adjusted R^2 remained unchanged, and the standard error increased from 19.211 to 74.940. While this development might suggest a worsening of the model, the ANOVA table beneath, (Figure 33) demonstrates that despite the higher standard error, the model is statistically more significant: p-value < 0.001 in contrast to the previous model with a p-value = 0.003; and all variables comprised in the model are statistically significant (Figure 34), p-value < 0.05.

Figure 33: Glencore – Anova table (Backward method)

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
1	Regression	1.737e+8	6	2.895e+7	78441.904	0.003
	Residual	369.062	1	369.062		
	Total	1.737e+8	7			
2	Regression	1.737e+8	5	3.474e+7	6185.450	< .001
	Residual	11232.081	2	5616.040		
	Total	1.737e+8	7			

[35] See Appendix 11: Glencore Regression model, Stepwise Backward method

Figure 34: Glencore – Coefficient's table (Backward method)

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
1	(Intercept)	−22880.604	291.273		−78.554	0.008		
	IMPAIRMENT	−1.048	0.003	−0.716	−321.413	0.002	0.428	2.335
	ACCOUNTS PAYABLE	365.588	10.182	0.113	35.906	0.018	0.216	4.637
	OTHER NON-CURRENT ASSETS	617.179	10.985	0.133	56.182	0.011	0.378	2.649
	EBIT	0.628	0.006	0.302	112.124	0.006	0.293	3.409
	SALES	−0.022	3.694e−4	−0.166	−59.482	0.011	0.271	3.687
	PPE	−7.522	1.386	−0.011	−5.425	0.116	0.502	1.994
2	(Intercept)	−22888.703	1136.212		−20.145	0.002		
	IMPAIRMENT	−1.052	0.012	−0.719	−85.000	< .001	0.452	2.211
	ACCOUNTS PAYABLE	357.022	39.238	0.110	9.099	0.012	0.221	4.525
	OTHER NON-CURRENT ASSETS	616.023	42.845	0.133	14.378	0.005	0.378	2.648
	EBIT	0.637	0.021	0.306	30.630	0.001	0.323	3.092
	SALES	−0.023	0.001	−0.175	−19.252	0.003	0.392	2.553

The Backward method resulted in a highly significant model **F = 6185.450**, **p < 0.001**, and a Regression equation of the form:

Glencore's estimated Net income = $\hat{y}_G$

$\hat{y}_G$ = *-22' 888.703 + (-1.052 * Impairment) + (357.022 * Accounts Payables) +*

*(616.023 * Other non-current Assets) + (0.637 * EBIT) + (-0.023 * Sales)*

Glencore's Multiple linear regression model forecasts that when Impairment losses increase by $1 million, while other variables remain constant, the Net income will decrease by -$1'052 million.

When EBIT increases by $1 million, while other variables remain constant, the Net income will increase by $0.637 million, and so forth.

5.2.3 Trafigura's Regression model

The variables entered into the model after the multicollinearity check (VIF < 10 and tolerance > 0.1), six predictors were entered into the model : (1) Impairment, (2) G & A, (3) Loans and Borrowings, (4) Inventories, (5) Sales and (6) PPE turnover.

5.2.3.1 Results

The results of the Full model[36] are as follows (Figure 35):

Figure 35: Trafigura Regression model (full)

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	801.565
H_1	1.000	1.000	0.999	24.895

The adjusted R^2 indicates that the independent variables in the model can predict 99.9% of the variation in Net income.

The ANOVA table (Figure 36) shows the F-statistic to be significant as p = 0.022 which is smaller than alpha 0.05. These metrics suggest that the model is a statistically significant predictor of Trafigura's Net income.

Figure 36: Trafigura – Anova table (full model)

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	4.497e+6	6	749488.446	1209.352	0.022
	Residual	619.744	1	619.744		
	Total	4.498e+6	7			

[36] See Appendix 12: Trafigura Regression model (Full Model)

Concerning the Coefficients :

Figure 37: Trafigura – Coefficient's table (full model)

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	1525.563	283.396		5.383	0.001		
H_1	(Intercept)	550.593	131.759		4.179	0.150		
	G & A	2.067	0.075	0.567	27.515	0.023	0.324	3.085
	Impairment	1.036	0.035	0.670	29.642	0.021	0.270	3.707
	LOANS AND BORROWINGS	−0.111	0.018	−0.133	−6.299	0.100	0.311	3.212
	INVENTORIES	−0.021	0.005	−0.116	−4.656	0.135	0.222	4.503
	Sales	−0.005	6.180e−4	−0.182	−7.818	0.081	0.254	3.943
	PPE turnover	9.453	0.800	0.220	11.820	0.054	0.397	2.520

If ANOVA table indicated the model to be significant, and collinearity Statistics indicators respect the convention (VIF < 10 and Tolerance > 0.1), as we can observe from the Coefficient's table (Figure 37), 4 out of 6 the predictors entered in the model are not statistically significant as their p-value is > 0.05.

Hence, we re-ran the analysis, but this time using the **Stepwise** variable entry method. With this method, the most significant predictors are entered first. A test of removal follows and the least relevant predictor is removed. (Goss-Sampson 2018, p. 59)

The output of the **Stepwise**[37] method are as follows:

Figure 38: Trafigura – RM (Stepwise method)

Model Summary - Net profit

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	F Change	df1	df2	p
1	0.000	0.000	0.000	801.565	0.000		0	7	
2	0.841	0.708	0.659	468.094	0.708	14.526	1	6	0.009
3	0.965	0.931	0.903	249.439	0.223	16.129	1	5	0.010
4	0.989	0.979	0.963	154.310	0.048	9.065	1	4	0.040

With the Stepwise method (Figure 38), JASP has returned 4 potential regression models: it can be seen that each consecutive model decreases the standard error (RMES) and increases the adjusted R^2, with model 4 explaining 96.3% of the variance on the dependent variable.

The ANOVA table below (Figure 39), demonstrates that each successive model is better, which is reflected in the increase in the F-value and improving of p-value (< 0.05).

Figure 39: Trafigura – Anova table (Stepwise method)

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
2	Regression	3.183e+6	1	3.183e+6	14.526	0.009
	Residual	1.315e+6	6	219111.912		
	Total	4.498e+6	7			
3	Regression	4.186e+6	2	2.093e+6	33.642	0.001
	Residual	311099.516	5	62219.903		
	Total	4.498e+6	7			
4	Regression	4.402e+6	3	1.467e+6	61.627	< .001
	Residual	95246.879	4	23811.720		
	Total	4.498e+6	7			

[37] See Appendix 13: Trafigura Regression model, Stepwise Forward method

Figure 40**,** shows that on model 4 as the predictors were entered and tested, the least significant contributors were gradually eliminated (Inventory, Sales and PPE turnover). This has resulted in a model with 3 statistically significant variables : G&A, Depreciation and Loans & Borrowings, for which the p-value, Tolerance and VIF are acceptable.

Figure 40: Trafigura – Coefficient's table (Stepwise method)

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
1	(Intercept)	1525.563	283.396		5.383	0.001		
2	(Intercept)	−1233.632	742.620		−1.661	0.148		
	G & A	3.065	0.804	0.841	3.811	0.009	1.000	1.000
3	(Intercept)	−589.957	426.953		−1.382	0.226		
	G & A	2.039	0.499	0.559	4.085	0.009	0.738	1.356
	Impairment	0.850	0.212	0.550	4.016	0.010	0.738	1.356
4	(Intercept)	1257.931	668.171		1.883	0.133		
	G & A	1.603	0.341	0.440	4.704	0.009	0.605	1.653
	Impairment	0.908	0.132	0.587	6.857	0.002	0.722	1.384
	LOANS AND BORROWINGS	−0.204	0.068	−0.243	−3.011	0.040	0.812	1.231

Note. The following covariates were considered but not included: INVENTORIES, Sales, PPE turnover.

The Stepwise Regression method resulted in a highly significant model:
F = 61.62, p < 0.01.

The regression model that can best predict the Net income of Trafigura is of the form:

Trafigura's estimated Net income = $\hat{y}_T$

$$\hat{y}_T = 1257.931 + (1.603 * G\ \&\ A) + (0.908 * Impairment) + (- 0.204 * Loans\ \&\ Borrowing)$$

Trafigura's Multiple linear regression model forecasts that when Impairment losses increase by $1 million, while other variables remain constant, the Net income will increase by $0.908 million.

When G&A expenses increases by $1 million, while other variables remain constant, the Net income will increase by $1.603 million, and so forth.

6. Conclusion part III

6.1 How do Glencore's statistically significant predictors differ from those of Trafigura?

This research showed that Glencore and Trafigura share the fact that Impairment expenses is a statistically significant, and highly correlated predictor of their Net income. However, while the expected negative correlation between Impairments and earnings was observed in the case of Glencore, surprisingly, a positive correlation was observed in the case of Trafigura.

Such observation raises now the question of role and the impact of Impairment charges on profits. More precisely:

What is the role, and to what extent are Impairment charges fulfilling their intended purpose of recognising the loss of value of a tangible asset, or being used as a tool for managing earnings?

6.2 Impairment losses

6.2.1 Role of Impairment losses

With regard to the role of Impairment losses, its fundamental purpose is set out in IFRS - IAS 36, which considers that an Impairment loss exists if the recoverable amount of the asset is less than its carrying value. In such cases, the company must recognise an Impairment loss, measured as the difference between the asset's carrying value and its fair value. The fair value should represent the quoted market price when available. However, as long-lived assets generally do not have active markets, managers are allowed to provide an estimate of fair value based on *"the best information available in the circumstances."* (Riedl 2003, p. 5) (Hong, Paik, Smith 2018)

As one can easily perceive, assessing the Impairment of long-lived assets often requires substantial judgement and estimates that give companies flexibility in determining the amount and timing of Impairment. (Hong, Paik, Smith 2018)

6.2.2 How and for which impairment losses has Glencore accounted for in year 2020?

According to the financial reports, the Impairment charges registered for 2020 were taken mainly in the first half. These asset-write down[38] were derived from two factors: firstly, the uncertain market conditions giving rise to lower confidence in the development of projects to which value had previously been allocated, and secondly, the sustained reduction in Atlantic steam coal prices significantly impairing the economics of coal mining in Colombia. (Glencore annual report 2020, p. 22)

Consequently, of the total Impairment losses of $ 5,947million, the most significant losses registered were: (1) Chad oil operations due to lower oil price assumptions and operational impacts from Covid-19 restrictions to international mobility; (2) Astron oil refinery primarily due to lower projected oil refining margins, following the global macroeconomic impact of Covid-19 on refined petroleum product demand and resulting global refinery overcapacity, (3) Prodeco coal operations owing to continued pressure on European coal market seeking to place the operations on extended care and maintenance; (4) Impairment was recognized in a Colombian coal operation. (Glencore annual report 2020, p. 121)

6.2.2.1 How Glencore's impairment losses are correlated with their Net income?

The high and statistically significant negative correlation between Net income and Impairment charges observed in Glencore's case implies that: Impairments increase when Net income decreases and Impairments decrease when Net income increases. This pattern is entirely consistent with what is referred to in the literature of *asset write-down*[39] as the "**big bath**" behaviour.

This behaviour describes a company that registers Impairment losses in a period when its profits are already lower than expected, thus giving it the opportunity to improve its future profits. Actually, writing-down[40] an asset reduces depreciation expenses and

[38] Impairment losses

[39] Similar meaning as asset-write off, Impairment loss, Impairment expenses or Impairment charges

[40] Similar meaning as Impairment

consequently, increases Net profit in subsequent periods. (Alciatore et al. 1998) (Hong, Paik, Smith 2018, pp. 10–12).

Even worse, some authors believe that the *timing* of asset Impairment is often manipulated by managers to attenuate the reaction of investors (e.g. recording huge Impairment losses during a crisis when investors are already expecting large losses).(SeekingAlpha 2020)

Moreover, as Riedl (2003) has argued, asset write-downs are less associated with economic factors and more associated with 'big bath' reporting behaviour. This could explain why, between 2013 and 2020, although Glencore and Trafigura faced the same economic environment, which is reflected in the similarity of their Sales revenue (turnover) curves, the shape of their Net income curves is so divergent.

Additionally, Riedl's findings demonstrated that "big bath" behaviour more likely reflects managers acting opportunistically rather than providing private information about the underlying performance of the firm. (Riedl 2003, p. 3)

This pattern is consistent with the findings of this paper that the deterioration in Glencore's Net income is solely due to Impairment charges and that the company does not suffer from any Operational or Performance inefficiencies. As we have shown, Glencore's Operating margins (EBIT) are statistically greater than those realised by Trafigura.

Further evidence supporting the conclusion that the Impairment losses recorded by Glencore do not objectively reflect the loss in value of their tangible assets is reflected in the Independent Auditor's review of Glencore's Impairment estimates and assumptions. The following can be read in the annual financial report:

> *"As a result, we have identified a potential risk of fraud through management bias due to the significant estimation uncertainty and subjectivity in certain judgements and key assumptions applied by management in its impairment assessment."* (Glencore annual report 2020, p. 121)

Despite this caveat, the recognition of significant Impairment losses was authorized, as explained in the Independent Auditors' report:

> ***"Management's methodology** for impairment testing and modelling, **complies** with the **accounting framework**, and that management's **assessment** of impairment indicators **was appropriate**.(…)"*

> ***"Key assumptions** to which impairment outcomes were sensitive were **reasonable overall** within the **acceptable ranges**.(…)"*
>
> *"In the course of auditing management's impairment models, we identified certain **modelling errors** which were subsequently corrected by management. These errors were not detected by management's review processes, and therefore **they constituted control deficiencies**."*
>
> *"We concluded that the recoverable amounts for the CGUs tested were **within an acceptable rang**e of outcomes, although **subject to high levels of estimation uncertainty**.(…)" .* (*Glencore annual report* 2020, p. 122)

The issue of the *"subjectivity with which Impairment losses were accounted for"* by the Management board highlighted by the Independent Auditors was brought to Glencore's Governance Body's attention.

On the " *Audit Committee Report*" (Internal report issued by Glencore's Governance Body), the Committee disclosed that they have assessed whether suitable accounting policies, including the implementation of new accounting standards, have been adopted and whether management has made appropriate estimates and judgements. (*Glencore annual report* 2020, p. 97)

The following can be read on the *"Audit Committee Report": "(…)The Committee also considered particular issues in response to Covid-19, including fraud risk factors, re-assessment of internal controls"* (Glencore annual report 2020, p. 98)

The report further continues:

> *"Considerable focus was applied to management's commodity price and exchange rate assumptions and their sensitivities within the models.(…); The Group's coal assets in Australia, Colombia and South Africa, copper assets in central Africa, the Volcan business in Peru, the Koniambo nickel asset in New Caledonia and the oil assets in Africa have been subject to particular scrutiny."*(Glencore annual report 2020, p. 98)

Considering the above findings, we believe that Glencore has the ability to deliver stellar profitability mainly when there is high market volatility. Moreover, Glencore's high proportion of tangible assets is a source of competitive advantage as they confer Glencore enhanced control over the supply chain and allow it to fast-track logistics and infrastructures to exploit arbitrage opportunities, whether they originated upstream (exploration and production), midstream (logistics and storage) and downstream (processing, blending and distribution).

These advantages remain valid even if we consider the drawback of a higher proportion of tangible assets: they potentially entail higher impairments, higher fixed and maintenance costs, and a higher impact on revenues if a certain volume threshold is not met. However, up to now, Glencore has been a robust business generating exceptional operational profitability (EBITDA and EBIT).

Glencore's significant Net loss in 2020 was directly attributable to massive Impairment losses. Consequently, the Net loss incurred during the Covid-pandemic was not driven by an alarming decline in profitability or adverse impact of an asset-intensive Business model but rather by the Management board's willingness to administer earnings: deciding when to allocate dividends, lowering the amount of taxes payable, increasing the amount of retained earnings, and possibly reducing the debt ratio.

6.2.3 How and for which impairment losses has Trafigura accounted for in year 2020?

In the Financial reports, Trafigura discloses that its industrial assets in all regions suffered from the contraction in demand and restrictions in the movement of goods and people caused by the pandemic. Consequently, Impairment losses jumped to multiple of their levels. (*Trafigura Group annual report* 2020, p. 8)

Three impairment lines of the Income statement contributed to the loss of $1'568 million: the largest adjustment occurred in relation to the Impala Terminals businesses in Colombia. The second adjustment is related to The Nyrstar zinc and lead smelting business, of which Trafigura took control in 2019 amid a turnaround but made a loss. The third most significant asset write-down was concerning Puma Energy, which is the fuel distribution, and retailing business. (*Trafigura Group annual report* 2020, p. 44)

6.2.3.1 How Trafigura's impairment losses are correlated with their Net income?

In the case of Trafigura, it was observed a positive relationship between Impairment losses and Net income. This direct correlation implies that Impairment charges increase when Net profit increases and decrease when Net profit decreases.

This pattern matches the term used in the context of asset write-downs, "***income smoothing***," behavior, which describes a company that, in its desire to maintain steady earnings growth, records Impairments in periods of exceptionally high earnings(Hong, Paik, Smith 2018), (Riedl 2003)

A pattern similar to income smoothing was observed during the Covid-pandemic: Trafigura realized record Net income but also registered record Impairment expenses.

Nevertheless, differently from Glencore, even though significant Impairment losses booked by Trafigura were considered as a *"key audit matter"*, after scrutiny, no major issues were identified. According to the Independent auditor's report*: "based on the work performed, we were able to conclude that the significant judgements and estimates used in the valuation model were reasonable and appropriate."* (Trafigura Group annual report 2020, p. 45)

The fact that no major issues were found in respect of the amount of Impairment losses registered is much in line with Trafigura's CEO statement that*: "the Group took a conservative approach to assessing the value of its fixed assets (…) The strong profit for the year came despite losses and substantial value impairments in relation to some of our industrial assets as a result of the economic downturn caused by the virus."* (Trafigura Group annual report 2020, pp. 5–6)

Moreover, if one considers the profile of companies that use this strategy, which derives from the flexibility found within Accounting standards, this revenue smoothing behavior is more prevalent for companies with higher debt ratios, suggesting that these companies manage earnings to avoid violating debt covenants. (Hong, Paik, Smith 2018). Or, as we have observed throughout this research paper, to ensure ongoing financing, which is a critical factor in ensuring the sustainability of Trafigura's Business Model.

By using revenue smoothing techniques, between 2013 and 2020, Trafigura was able to exhibit less volatility not only in Net income margins but also in overall profitability ratios, a situation that is more likely to attract investors, especially the risk-averse profile.

Lastly, earnings management, whether through bathing behavior or income smoothing, offers the company the benefit of reduced tax payments.

7. General conclusion

In this research paper, we have examined how asset intensity impacted the ability of Glencore and Trafigura to earn record profits during the Covid pandemic. In the Theoretical Foundation section, it was observed that the super contango was a key element allowing traders to exploit arbitrage opportunities as they bought oil on spot markets at lower prices, stored it, and then resold it at higher prices.

The common-sized analysis of the Balance sheet and Income statement for Glencore showed that despite the recurrent negative Net profit registered since 2013, its Operating margins have remained relatively constant since 2007 and are superior to those of Trafigura. DuPont's analysis demonstrated that the deterioration in Glencore's ROE is not driven by asset inefficiencies but rather by the decline in Profitability ratio, that is, the Net income earned in terms of the realized sales.

Concerning Trafigura, it was found that, globally, turnover levels, profitability, and performance ratios remained relatively constant, on the one hand, and that The Covid-pandemic was an isolated event, triggering a momentum of exceptional Net profit margin and financial performance. As for the drivers of success, the DuPont analysis demonstrated that Trafigura’s great ROE is derived from its Financial Leverage and Asset Efficiency ratio.

In the second part of the quantitative analysis, when testing the assumption "there is a statistically significant difference between the Net Income of Glencore and Trafigura," we failed to reject the null hypothesis, which assumes no difference between the variables. This outcome implies that despite Glencore's Net loss and Trafigura's record Net income during Covid pandemic, there is no statistically significant difference in the Net income realised by these competitors.

When testing the second assumption that "the operational profit (EBIT) of Glencore is greater than the EBIT of Trafigura," sufficient statistical evidence was obtained to support the alternative hypothesis, which claims a statistically significant difference between groups. This outcome reinforces the overall findings of the paper, namely that Glencore does not suffer from any operational inefficiencies and that Trafigura's ability to deliver a continued positive Net Income is not derived from its outstanding operational performance (EBIT).

In the third section of the quantitative analysis, Impairment expenses were found to be a predictor statistically significant in explaining the variation in the Net income of Glencore.

The correlation coefficient r-value = -0.945, p-value < 0.001, implies that this variable alone can explain 89.30% of the variation in Glencore's Net income.

Unexpectedly, the proportion of PPE owned by Glencore showed an r-value = -0.1 and p-value = 0.813, meaning that this variable is statistically insignificant and has a trivial effect on the variation in Net income. Another surprising finding was that the proportion of Glencore's PPE and Impairment expenses are weakly correlated, thus allowing us to conclude that Impairment charges registered by Glencore are substantially derived from other sources than the material loss of value in their assets.

Regarding Trafigura, Depreciation expenses, Gross profit margin, G&A expenses, and Impairment charges were found to be positively correlated with Net income at 99% CL; Short-term and Long-term Debt showed a high positive correlation with Net income at alpha = 0.05. This outcome corroborates the findings of the DuPont analysis, namely that the driver of Trafigura's ROE comes less from its asset-light Business model and more from its asset efficiency and the company's ability to obtain and secure financing (Leverage ratio).

Another point deserving our attention is that Trafigura's Operational expenses positively correlate with the Net income, meaning that Trafigura fulfilled its purpose in turning these items into variable costs when choosing to operate under an asset-light Business model.

Turning to the multiple linear regression model, Glencore's model forecasts that when Impairment charges increase by $1 million, while other independent variables remain constant, the Net income decreases by -$1'052 million. Trafigura's regression model forecasts that when Impairment charges increase by $1 million while other independent variables remain constant, the Net income increases by $0.908 million.

The expected negative correlation between Impairment losses and earnings observed in the case of Glencore and the unexpected positive correlation between Impairment losses and earnings observed in the case of Trafigura raised the question of the role and the extent to which Impairment charges were objectively recognizing the loss of value of a tangible asset or being used as a tool to manage earnings.

This paper's finding is that the inverse correlation between Glencore's Impairment losses and Net income matches the concept of "big bath" behavior which describes a company that registers Impairment losses in a period when its profits are already lower than expected, thus allowing it to improve its future profits.

As for Trafigura, the observed positive correlation between Impairment losses matches the notion of “income smoothing,” which describes a company that, in its desire to maintain steady earnings growth, records Impairment in periods of exceptionally high earnings.

Considering the overall finding of this research paper, we consider that Glencore is a company with robust financial positions able to deliver stellar profitability mainly when there is high market volatility. However, the company uses a conservative approach when it comes to dividend distribution: it tends to portray a picture much worse than it actually is and seeks to constitute significant levels of provision, which is also a reflection of the company's concern in decreasing its debt level in one side; and be prepared to cope with significant lawsuits taking place on the other side.

Trafigura, on the other side, despite being a dominant oil trader in the market, its Business model makes it more dependent on the Financial market and Financial institutions' willingness to provide funding. As such, this company tends to project a brighter overall picture than it actually is.

One of the limitations of this study is the small sample size because commodity trading companies are secretive and do not disclose their activities. It was only in 2011, when Glencore went public, that it started to publish its financial reports. On the other hand, Trafigura spontaneously started publishing its financials in 2013.

Finally, in terms of future research gaps, we have seen throughout this research paper that during the Covid pandemic, commodity traders thrived by using their global network of terminals, storage facilities, and transport fleets to take advantage of supply disruptions and rising demand. With the breakout of war in Ukraine in February 2022, the critical issue is whether the industry can replicate the same success and capitalize on the market chaos triggered by the war.

According to Hume (2022) this will not come simply. While severe sanctions on Russia have generated profitable arbitrage opportunities and a reorganization of global trade flows, a liquidity crunch makes it difficult to capitalize on them. As commodity prices, from crude oil and gas to copper and corn, have soared, traders have faced huge margin calls (demand for cash) to cover hedges taken out for future sales. That has forced some traders to scale back their operations and others to seek additional funds to protect themselves against further market turbulence.

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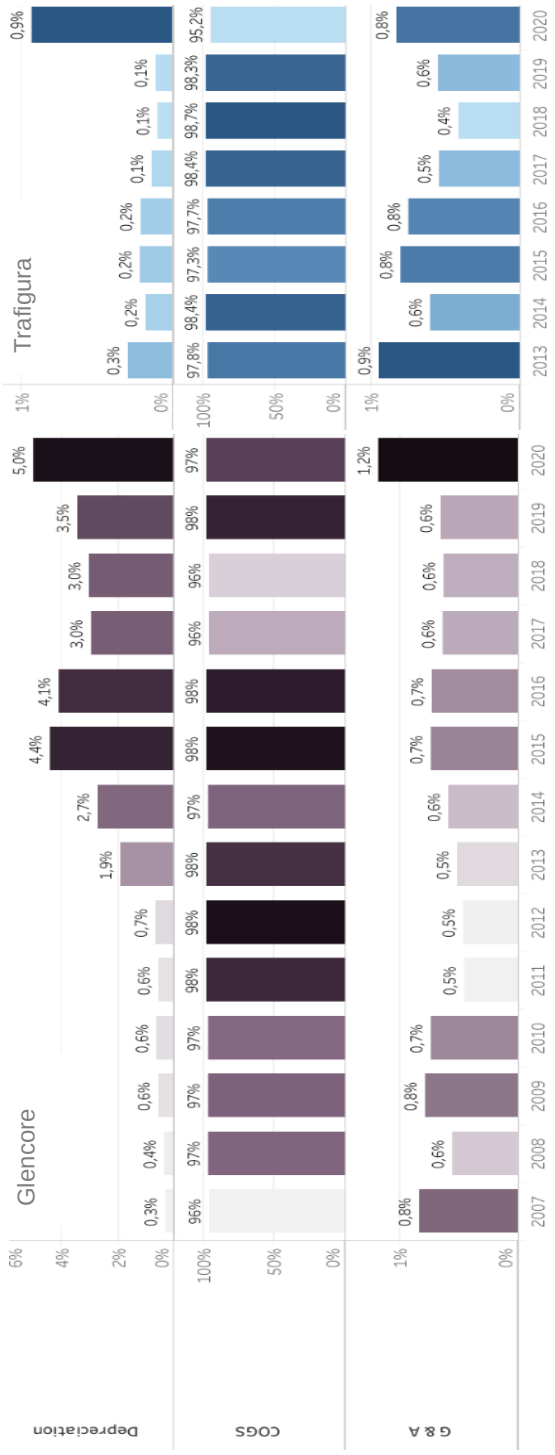
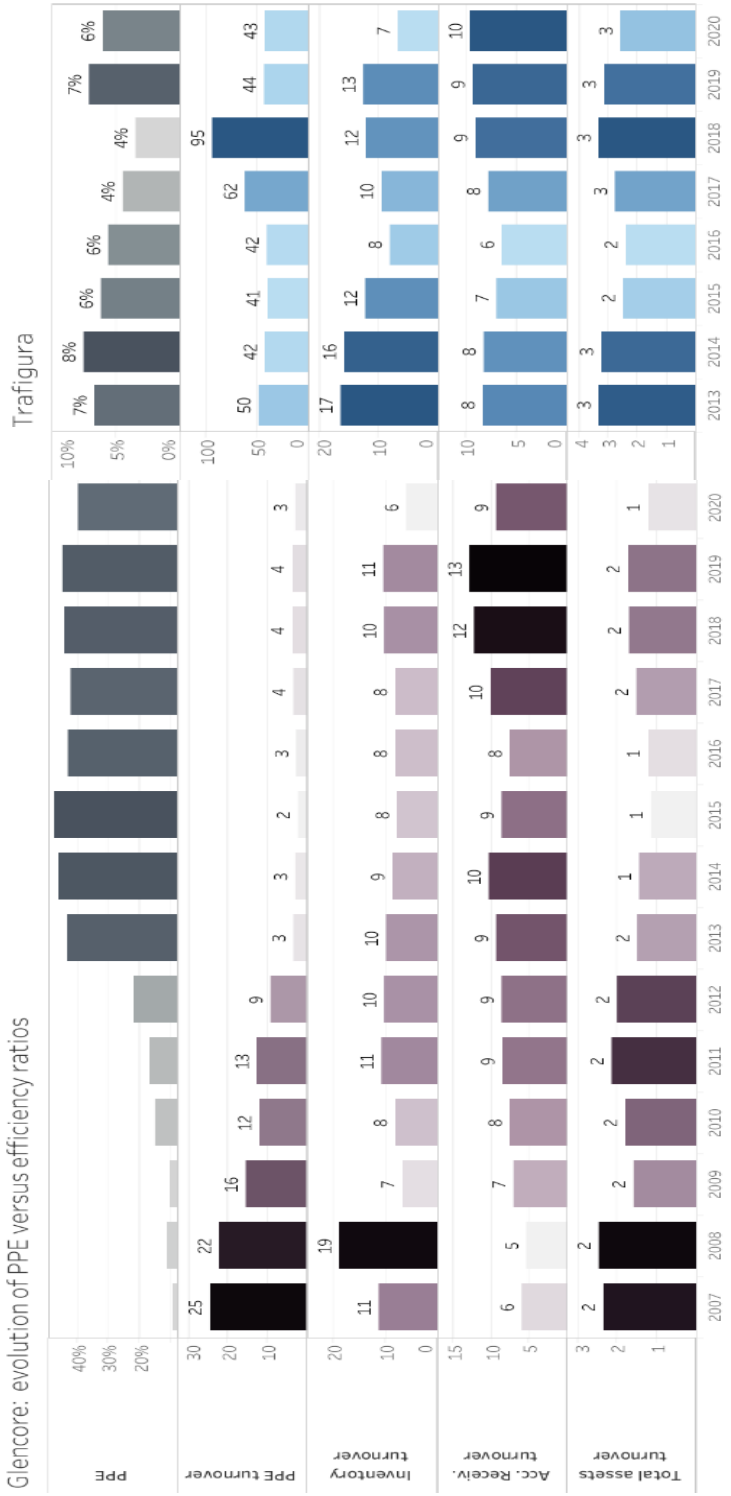
Appendix 1: Glencore and Trafigura - Evolution of non-Operational expenses



Appendix 2: Appendix 3: Evolution of PPE versus Efficiency ratios



Appendix 4: DuPont Analysis Framework

DUPONT ANALYSIS

$$\textbf{ROE} = \frac{\text{Net Income}}{\text{Equity}}$$

$$\textbf{ROE} = \text{Profitability} \times \text{Efficiency} \times \text{Leverage}$$

$$\textbf{ROE} = \frac{\text{Net Income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}}$$

Appendix 5: F-Test Two-Sample for Variances for hypothesis ONE

To decide whether to conduct *equal* or *unequal* variances t-test, a F-Test Two-Sample for Variances was conducted. The outcome are as follow:

HO: there is no difference between the variances
HA: there is a difference between the variances
Alpha α = 0.05
Decision: If p- value < 0.05 , reject the null hypothesis

Result of F-Test Two-Sample for Variances :

F-Test Two-Sample for Variances

	Glencore NET INCOME	*Trafigura NET INCOME*
Mean	-1294	1526
Variance	24814276	642507
Observations	8	8
df	7	7
F	39	
P(F<=f) one-tail	**0.00005**	
F Critical one-tail	4	

*** P-value 2-tailed test**	**0.0001**

** On a 2-tailed test, the P-value outcome (1-tailed test must be multiplied by 2).*

P-value (2-tailed) = 0.0001

0.0001 < 0.05 , reject the HO.

There is a statistical significance difference between the variances.

Perform **UNEQUAL** variance t-test.

Appendix 6: F-Test Two-Sample for Variances for hypothesis TWO

F-Test Two-Sample for Variances

H0: There is no difference between the variances
HA: There is a difference between the variances

Alpha α = 0.05
Decision: If p- value < 0.05, reject the null hypothesis

F-Test Two-Sample for Variances

	GLENCORE EBIT	*TRAFIGURA EBIT*
Mean	5618	1769
Variance	5732244	1216672
Observations	8	8
df	7	7
F	5	
P(F<=f) one-tail	**0.02908**	
F Critical one-tail	3.78704	

p-value = 0.029
0.029 < 0.05 (alpha)

Decision: P-value is smaller than alpha. We should reject the null hypothesis. There is a statistical significance difference between the variances.

Perform UNEQUAL variance t-test.

Appendix 7 : Glencore - Pearson's Correlation Coefficients Net income versus Predictors (2013 - 2020)

Pearson's Correlations

			Pearson's r	p
NET_PROFIT	-	EBIT	0.684	0.061
NET_PROFIT	-	INVENTORIES	0.318	0.443
NET_PROFIT	-	ACCOUNTS RECEIVABLE	0.029	0.945
NET_PROFIT	-	CASH AND CASH EQUIVALENTS	−0.229	0.585
NET_PROFIT	-	OTHER FINANCIAL ASSETS	−0.575	0.136
NET_PROFIT	-	TOTAL CURRENT ASSETS	−0.070	0.869
NET_PROFIT	-	PPE	−0.100	0.813
NET_PROFIT	-	OTHER NON-CURRENT ASSETS	0.572	0.139
NET_PROFIT	-	TOTAL NON-CURRENT ASSETS	−0.016	0.969
NET_PROFIT	-	TOTAL ASSETS	−0.043	0.920
NET_PROFIT	-	ACCOUNTS PAYABLE	0.780*	0.022
NET_PROFIT	-	SHORT-TERM LEASE LIABILITIES	−0.486	0.222
NET_PROFIT	-	OTHER CURRENT LIABILITIES	−0.544	0.163
NET_PROFIT	-	TOTAL CURRENT LIABILITIES	0.064	0.881
NET_PROFIT	-	LOANS AND BORROWINGS	−0.449	0.264
NET_PROFIT	-	OTHER NON-CURRENT LIABILITIES	0.386	0.345
NET_PROFIT	-	TOTAL NON-CURRENT LIABILITIES	−0.345	0.403
NET_PROFIT	-	SALES	0.287	0.491
NET_PROFIT	-	COGS	0.260	0.534
NET_PROFIT	-	GROSS_PROFIT	0.646	0.083
NET_PROFIT	-	G_&_A	0.143	0.735
NET_PROFIT	-	DEPRECIATION	0.228	0.588
NET_PROFIT	-	IMPAIRMENT	−0.945***	< .001
NET_PROFIT	-	OTHER NET NON-OPER EXPENSES /INCOME	−0.130	0.758
NET_PROFIT	-	PPE turnover	0.443	0.272
NET_PROFIT	-	inventory turnover	0.100	0.813
NET_PROFIT	-	Acc. Receiv. Turnover	0.305	0.462
NET_PROFIT	-	Acc. Payab. Turnover	0.063	0.883
NET_PROFIT	-	Total assets turnover	0.445	0.269
EBIT	-	INVENTORIES	0.601	0.115
EBIT	-	ACCOUNTS RECEIVABLE	0.339	0.412
EBIT	-	CASH AND CASH EQUIVALENTS	−0.101	0.811
EBIT	-	OTHER FINANCIAL ASSETS	0.096	0.820
EBIT	-	TOTAL CURRENT ASSETS	0.416	0.305
EBIT	-	PPE	0.192	0.648
EBIT	-	OTHER NON-CURRENT ASSETS	0.730*	0.040
EBIT	-	TOTAL NON-CURRENT ASSETS	0.284	0.495
EBIT	-	TOTAL ASSETS	0.362	0.379
EBIT	-	ACCOUNTS PAYABLE	0.741*	0.035
EBIT	-	SHORT-TERM LEASE LIABILITIES	−0.024	0.955
EBIT	-	OTHER CURRENT LIABILITIES	0.019	0.965
EBIT	-	TOTAL CURRENT LIABILITIES	0.311	0.454
EBIT	-	LOANS AND BORROWINGS	−0.091	0.830
EBIT	-	OTHER NON-CURRENT LIABILITIES	0.744*	0.034
EBIT	-	TOTAL NON-CURRENT LIABILITIES	0.072	0.865
EBIT	-	SALES	0.676	0.066
EBIT	-	COGS	0.646	0.083
EBIT	-	GROSS_PROFIT	0.973***	< .001
EBIT	-	G_&_A	0.231	0.582
EBIT	-	DEPRECIATION	−0.261	0.532
EBIT	-	IMPAIRMENT	−0.441	0.274
EBIT	-	OTHER NET NON-OPER EXPENSES /INCOME	0.494	0.213
EBIT	-	PPE turnover	0.708*	0.049
EBIT	-	inventory turnover	0.336	0.415
EBIT	-	Acc. Receiv. Turnover	0.465	0.245
EBIT	-	Acc. Payab. Turnover	0.530	0.177
EBIT	-	Total assets turnover	0.685	0.061
INVENTORIES	-	ACCOUNTS RECEIVABLE	0.389	0.342
INVENTORIES	-	CASH AND CASH EQUIVALENTS	−0.047	0.911

* p < .05, ** p < .01, *** p < .001

Appendix 8: Glencore - Pearson's Correlation PPE own versus Impairment

Pearson's Correlations

			Pearson's r	p
PPE	-	IMPAIRMENT	0.160	0.706

* p < .05, ** p < .01, *** p < .001

Appendix 9: Trafigura - Pearson's Correlation Coefficients Net income versus Predictors (2013 - 2020)

			Pearson's r	p
Net profit	-	EBIT	0.780*	0.022
Net profit	-	Sales	−0.082	0.847
Net profit	-	COGS	−0.130	0.759
Net profit	-	Gross profit	0.864**	0.006
Net profit	-	G & A	0.841**	0.009
Net profit	-	Depreciation	0.905**	0.002
Net profit	-	Impairment	0.837**	0.010
Net profit	-	Other net non-operating expenses	0.086	0.840
Net profit	-	PPE turnover	−0.362	0.379
Net profit	-	Inventory turnover	−0.173	0.682
Net profit	-	Acc. Receiv. turnover	0.374	0.361
Net profit	-	Acc. Payab. turnover	−0.023	0.957
Net profit	-	Total assets turnover	−0.202	0.632
Net profit	-	INVENTORIES	0.321	0.438
Net profit	-	ACCOUNTS RECEIVABLE	−0.495	0.213
Net profit	-	CASH AND CASH EQUIVALENTS	0.014	0.974
Net profit	-	OTHER FINANCIAL ASSETS	0.263	0.529
Net profit	-	TOTAL CURRENT ASSETS	0.100	0.814
Net profit	-	PPE	0.367	0.372
Net profit	-	OTHER NON-CURRENT ASSETS	0.239	0.568
Net profit	-	TOTAL NON-CURRENT ASSETS	0.367	0.372
Net profit	-	TOTAL ASSETS	0.147	0.729
Net profit	-	ACCOUNTS PAYABLE	−0.148	0.727
Net profit	-	SHORT-TERM LEASE LIABILITIES	0.019	0.964
Net profit	-	OTHER CURRENT LIABILITIES	0.740*	0.036
Net profit	-	TOTAL CURRENT LIABILITIES	0.113	0.790
Net profit	-	LOANS AND BORROWINGS	−0.483	0.225
Net profit	-	OTHER NON-CURRENT LIABILITIES	0.728*	0.041
Net profit	-	TOTAL NON-CURRENT LIABILITIES	0.116	0.784
EBIT	-	Sales	0.190	0.652
EBIT	-	COGS	0.138	0.745
EBIT	-	Gross profit	0.985***	< .001
EBIT	-	G & A	0.559	0.150
EBIT	-	Depreciation	0.952***	< .001
EBIT	-	Impairment	0.959***	< .001
EBIT	-	Other net non-operating expenses	0.690	0.058
EBIT	-	PPE turnover	−0.198	0.638
EBIT	-	Inventory turnover	−0.620	0.101
EBIT	-	Acc. Receiv. turnover	0.529	0.178
EBIT	-	Acc. Payab. turnover	0.203	0.629
EBIT	-	Total assets turnover	−0.370	0.367
EBIT	-	INVENTORIES	0.778*	0.023
EBIT	-	ACCOUNTS RECEIVABLE	−0.183	0.664
EBIT	-	CASH AND CASH EQUIVALENTS	0.508	0.199
EBIT	-	OTHER FINANCIAL ASSETS	0.078	0.854
EBIT	-	TOTAL CURRENT ASSETS	0.569	0.141
EBIT	-	PPE	0.469	0.241
EBIT	-	OTHER NON-CURRENT ASSETS	0.742*	0.035
EBIT	-	TOTAL NON-CURRENT ASSETS	0.789*	0.020
EBIT	-	TOTAL ASSETS	0.625	0.097
EBIT	-	ACCOUNTS PAYABLE	0.079	0.853
EBIT	-	SHORT-TERM LEASE LIABILITIES	0.563	0.146
EBIT	-	OTHER CURRENT LIABILITIES	0.206	0.624
EBIT	-	TOTAL CURRENT LIABILITIES	0.555	0.153
EBIT	-	LOANS AND BORROWINGS	0.085	0.842
EBIT	-	OTHER NON-CURRENT LIABILITIES	0.948***	< .001
EBIT	-	TOTAL NON-CURRENT LIABILITIES	0.665	0.072
Sales	-	COGS	0.999***	< .001
Sales	-	Gross profit	0.183	0.665
Sales	-	G & A	0.192	0.648
Sales	-	Depreciation	0.116	0.784
Sales	-	Impairment	−0.019	0.964
Sales	-	Other net non-operating expenses	0.398	0.329
Sales	-	PPE turnover	0.627	0.096
Sales	-	Inventory turnover	0.063	0.882
Sales	-	Acc. Receiv. turnover	0.868**	0.005
Sales	-	Acc. Payab. turnover	0.745*	0.034
Sales	-	Total assets turnover	0.686	0.060
Sales	-	INVENTORIES	0.539	0.168
Sales	-	ACCOUNTS RECEIVABLE	0.879**	0.004
Sales	-	CASH AND CASH EQUIVALENTS	0.818*	0.013
Sales	-	OTHER FINANCIAL ASSETS	0.322	0.437
Sales	-	TOTAL CURRENT ASSETS	0.826*	0.011
Sales	-	PPE	0.255	0.541
Sales	-	OTHER NON-CURRENT ASSETS	0.493	0.215
Sales	-	TOTAL NON-CURRENT ASSETS	0.495	0.212
Sales	-	TOTAL ASSETS	0.800*	0.017
Sales	-	ACCOUNTS PAYABLE	0.939***	< .001
Sales	-	SHORT-TERM LEASE LIABILITIES	0.637	0.090
Sales	-	OTHER CURRENT LIABILITIES	−0.029	0.945
Sales	-	TOTAL CURRENT LIABILITIES	0.855**	0.007
Sales	-	LOANS AND BORROWINGS	0.538	0.169
Sales	-	OTHER NON-CURRENT LIABILITIES	0.325	0.433
Sales	-	TOTAL NON-CURRENT LIABILITIES	0.593	0.121
COGS	-	Gross profit	0.130	0.759
COGS	-	G & A	0.156	0.711
COGS	-	Depreciation	0.064	0.881
COGS	-	Impairment	−0.071	0.866
COGS	-	Other net non-operating expenses	0.370	0.367
COGS	-	PPE turnover	0.644	0.085
COGS	-	Inventory turnover	0.092	0.828
COGS	-	Acc. Receiv. turnover	0.845**	0.008

* p < .05, ** p < .01, *** p < .001

Appendix 10: Glencore Regression model (Full Model)

Linear Regression

Model Summary - NET_PROFIT

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	4981.393
H_1	1.000	1.000	1.000	19.211

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	1.737e+8	6	2.895e+7	78441.904	0.003
	Residual	369.062	1	369.062		
	Total	1.737e+8	7			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H_0	(Intercept)	−1293.750	1761.188		−0.735	0.486		
H_1	(Intercept)	−22880.604	291.273		−78.554	0.008		
	IMPAIRMENT	−1.048	0.003	−0.716	−321.413	0.002	0.428	2.335
	ACCOUNTS PAYABLE	365.588	10.182	0.113	35.906	0.018	0.216	4.637
	OTHER NON-CURRENT ASSETS	617.179	10.985	0.133	56.182	0.011	0.378	2.649
	EBIT	0.628	0.006	0.302	112.124	0.006	0.293	3.409
	SALES	−0.022	3.694e−4	−0.166	−59.482	0.011	0.271	3.687
	PPE	−7.522	1.386	−0.011	−5.425	0.116	0.502	1.994

Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions						
				(Intercept)	IMPAIRMENT	ACCOUNTS PAYABLE	OTHER NON-CURRENT ASSETS	EBIT	SALES	PPE
H_1	1	6.455	1.000	0.000	0.003	0.000	0.000	0.001	0.000	0.000
	2	0.456	3.764	0.000	0.326	0.000	0.000	0.013	0.000	0.000
	3	0.069	9.698	0.001	0.200	0.001	0.000	0.367	0.001	0.005
	4	0.015	20.681	0.004	0.041	0.002	0.003	0.170	0.292	0.086
	5	0.005	37.111	0.002	0.006	0.002	0.002	0.222	0.607	0.899
	6	4.622e−4	118.181	0.148	0.407	0.990	0.180	0.022	0.066	0.010
	7	3.115e−4	143.944	0.846	0.017	0.005	0.815	0.205	0.032	0.000

Note. The intercept model is omitted, as no meaningful information can be shown.

Casewise Diagnostics

Case Number	Std. Residual	NET_PROFIT	Predicted Value	Residual	Cook's Distance
.	.	.	.	.	.

Appendix 11: Glencore Regression model, Stepwise Backward method

Linear Regression

Model Summary - NET_PROFIT

Model	R	R^2	Adjusted R^2	RMSE
1	1.000	1.000	1.000	19.211
2	1.000	1.000	1.000	74.940

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
1	Regression	1.737e+8	6	2.895e+7	78441.904	0.003
	Residual	369.062	1	369.062		
	Total	1.737e+8	7			
2	Regression	1.737e+8	5	3.474e+7	6185.450	< .001
	Residual	11232.081	2	5616.040		
	Total	1.737e+8	7			

Coefficients

							Collinearity Statistics	
Model		Unstandardized	Standard Error	Standardized	t	p	Tolerance	VIF
1	(Intercept)	−22880.604	291.273		−78.554	0.008		
	IMPAIRMENT	−1.048	0.003	−0.716	−321.413	0.002	0.428	2.335
	ACCOUNTS PAYABLE	365.588	10.182	0.113	35.906	0.018	0.216	4.637
	OTHER NON-CURRENT ASSETS	617.179	10.985	0.133	56.182	0.011	0.378	2.649
	EBIT	0.628	0.006	0.302	112.124	0.006	0.293	3.409
	SALES	−0.022	3.694e−4	−0.166	−59.482	0.011	0.271	3.687
	PPE	−7.522	1.386	−0.011	−5.425	0.116	0.502	1.994
2	(Intercept)	−22888.703	1136.212		−20.145	0.002		
	IMPAIRMENT	−1.052	0.012	−0.719	−85.000	< .001	0.452	2.211
	ACCOUNTS PAYABLE	357.022	39.238	0.110	9.099	0.012	0.221	4.525
	OTHER NON-CURRENT ASSETS	616.023	42.845	0.133	14.378	0.005	0.378	2.648
	EBIT	0.637	0.021	0.306	30.630	0.001	0.323	3.092
	SALES	−0.023	0.001	−0.175	−19.252	0.003	0.392	2.553

Collinearity Diagnostics

				Variance Proportions						
Model	Dimension	Eigenvalue	Condition Index	(Intercept)	IMPAIRMENT	ACCOUNTS PAYABLE	OTHER NON-CURRENT ASSETS	EBIT	SALES	PPE
1	1	6.455	1.000	0.000	0.003	0.000	0.000	0.001	0.000	0.000
	2	0.456	3.764	0.000	0.326	0.000	0.000	0.013	0.000	0.000
	3	0.069	9.698	0.001	0.200	0.001	0.000	0.367	0.001	0.005
	4	0.015	20.681	0.004	0.041	0.002	0.003	0.170	0.292	0.086
	5	0.005	37.111	0.002	0.006	0.002	0.002	0.222	0.607	0.899
	6	4.622e−4	118.181	0.148	0.407	0.990	0.180	0.022	0.066	0.010
	7	3.115e−4	143.944	0.846	0.017	0.005	0.815	0.205	0.032	0.000
2	1	5.466	1.000	0.000	0.004	0.000	0.000	0.001	0.000	
	2	0.455	3.466	0.000	0.342	0.000	0.000	0.015	0.000	
	3	0.065	9.157	0.001	0.195	0.001	0.001	0.399	0.001	
	4	0.013	20.809	0.002	0.038	0.001	0.001	0.347	0.803	
	5	4.664e−4	108.255	0.152	0.404	0.993	0.181	0.015	0.145	
	6	3.116e−4	132.451	0.845	0.017	0.005	0.817	0.222	0.050	

Casewise Diagnostics

Case Number	Std. Residual	NET_PROFIT	Predicted Value	Residual	Cook's Distance

Appendix 12: Trafigura Regression model (Full Model)

Results

Linear Regression

Model Summary - Net profit

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	801.565
H_1	1.000	1.000	0.999	24.895

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	4.497e+6	6	749488.446	1209.352	0.022
	Residual	619.744	1	619.744		
	Total	4.498e+6	7			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

							Collinearity Statistics	
Model		Unstandardized	Standard Error	Standardized	t	p	Tolerance	VIF
H_0	(Intercept)	1525.563	283.396		5.383	0.001		
H_1	(Intercept)	550.593	131.759		4.179	0.150		
	G & A	2.067	0.075	0.567	27.515	0.023	0.324	3.085
	Impairment	1.036	0.035	0.670	29.642	0.021	0.270	3.707
	LOANS AND BORROWINGS	−0.111	0.018	−0.133	−6.299	0.100	0.311	3.212
	INVENTORIES	−0.021	0.005	−0.116	−4.656	0.135	0.222	4.503
	Sales	−0.005	6.180e−4	−0.182	−7.818	0.081	0.254	3.943
	PPE turnover	9.453	0.800	0.220	11.820	0.054	0.397	2.520

Collinearity Diagnostics

				Variance Proportions				
Model	Dimension	Eigenvalue	Condition Index	(Intercept)	G & A	Impairment	LOANS AND BORROWINGS	INVENTORIES
H_1	1	6.173	1.000	0.000	0.000	0.002	0.000	0.001
	2	0.676	3.022	0.000	0.000	0.231	0.000	0.000
	3	0.083	8.629	0.006	0.081	0.018	0.000	0.047
	4	0.031	14.127	0.007	0.079	0.087	0.038	0.129
	5	0.025	15.812	0.036	0.072	0.328	0.023	0.253
	6	0.010	25.122	0.013	0.136	0.332	0.019	0.460
	7	0.002	54.530	0.938	0.632	0.001	0.920	0.111

Note. The intercept model is omitted, as no meaningful information can be shown.

Appendix 13: Trafigura Regression model, Stepwise Forward method

Results

Linear Regression

Model Summary - Net profit

Model	R	R^2	Adjusted R^2	RMSE
1	0.000	0.000	0.000	801.565
2	0.841	0.708	0.659	468.094
3	0.965	0.931	0.903	249.439
4	0.989	0.979	0.963	154.310

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
2	Regression	3.183e+6	1	3.183e+6	14.526	0.009
	Residual	1.315e+6	6	219111.912		
	Total	4.498e+6	7			
3	Regression	4.186e+6	2	2.093e+6	33.642	0.001
	Residual	311099.516	5	62219.903		
	Total	4.498e+6	7			
4	Regression	4.402e+6	3	1.467e+6	61.627	< .001
	Residual	95246.879	4	23811.720		
	Total	4.498e+6	7			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

							Collinearity Statistics	
Model		Unstandardized	Standard Error	Standardized	t	p	Tolerance	VIF
1	(Intercept)	1525.563	283.396		5.383	0.001		
2	(Intercept)	−1233.632	742.620		−1.661	0.148		
	G & A	3.065	0.804	0.841	3.811	0.009	1.000	1.000
3	(Intercept)	−589.957	426.953		−1.382	0.226		
	G & A	2.039	0.499	0.559	4.085	0.009	0.738	1.356
	Impairment	0.850	0.212	0.550	4.016	0.010	0.738	1.356
4	(Intercept)	1257.931	668.171		1.883	0.133		
	G & A	1.603	0.341	0.440	4.704	0.009	0.605	1.653
	Impairment	0.908	0.132	0.587	6.857	0.002	0.722	1.384
	LOANS AND BORROWINGS	−0.204	0.068	−0.243	−3.011	0.040	0.812	1.231

Note. The following covariates were considered but not included: INVENTORIES, Sales, PPE turnover.

Appendix 14: Glencore - Balance sheet 2007 - 2020

year	INVENTORIES	ACCOUNTS RECEIVABLE	CASH AND CASH EQUIVALENTS	OTHER FINANCIAL ASSETS	TOTAL CURRENT ASSETS	PPE	OTHER NON-CURRENT ASSETS	TOTAL NON-CURRENT ASSETS	TOTAL ASSETS
2007	12'212	23'673	658	339	36'882	5'742	17'331	23'073	59'955
2008	7'805	27'764	826	113	36'508	6'859	17'944	24'803	61'311
2009	15'073	15'189	860	7'603	38'725	6'845	20'706	27'551	66'276
2010	17'393	18'994	1'463	6'446	44'296	12'088	23'403	35'491	79'787
2011	17'129	21'895	1'305	5'402	45'731	14'639	25'795	40'434	86'165
2012	20'682	24'882	2'782	5'713	54'059	23'238	28'240	51'478	105'537
2013	22'753	24'536	2'849	9'154	59'292	67'233	28'337	95'570	154'862
2014	24'436	21'456	2'824	4'503	53'219	70'110	28'876	98'986	152'205
2015	18'303	17'001	2'707	4'187	42'198	60'774	25'513	86'287	128'485
2016	18'347	20'066	2'508	2'491	43'412	53'826	27'362	81'188	124'600
2017	24'084	20'359	2'124	3'159	49'726	57'046	28'821	85'867	135'593
2018	20'564	17'787	2'046	3'871	44'268	56'770	27'634	84'404	128'672
2019	19'936	16'671	1'899	2'904	41'410	55'357	27'309	82'666	124'076
2020	22'852	15'154	1'498	3'708	43'212	47'110	27'678	74'788	118'000

ACCOUNTS PAYABLE	SHORT-TERM LEASE LIABILITIES	OTHER CURRENT LIABILITIES	TOTAL CURRENT LIABILITIES	LOANS AND BORROWINGS	OTHER NON-CURRENT LIABILITIES	TOTAL NON-CURRENT LIABILITIES	TOTAL LIABILITIES	SHARE CAPITAL	RESERVES AND RETAINED EARNINGS	OTHERS	TOTAL GROUP EQUITY	TOTAL GROUP EQUITY AND LIABILITIES
20'760	9'624	1'083	31'467	10'023	1'894	11'917	43'384	46	2'901	13'624	16'571	59'955
25'205	4'483	1'018	30'706	13'071	1'223	14'294	45'000	46	2'755	13'510	16'311	61'311
11'482	7'186	11'913	30'581	16'403	1'348	17'751	48'332	46	4'395	13'503	17'944	66'276
16'145	11'881	8'812	36'838	18'251	2'191	20'442	57'280	46	5'378	17'083	22'507	79'787
18'160	8'185	5'131	31'476	19'844	2'510	22'354	53'830	69	29'196	3'070	32'335	86'165
23'501	16'498	7'150	47'149	19'028	5'060	24'088	71'237	71	31'195	3'034	34'300	105'537
26'041	16'461	20'285	46'326	38'712	17'143	55'855	102'181	133	49'180	3'368	52'681	154'862
26'881	12'005	5'061	43'947	40'688	16'090	56'778	100'725	133	48'409	2'938	51'480	152'205
24'088	11'117	5'667	40'872	32'932	13'338	46'270	87'142	146	41'108	89	41'343	128'485
26'176	10'030	7'161	43'367	23'188	14'264	37'452	80'819	146	44'097	-462	43'781	124'600
28'826	9'402	6'186	44'414	24'532	17'192	41'724	86'138	146	46'609	2'700	49'455	135'593
26'484	8'570	5'318	40'372	26'424	16'493	42'917	83'289	146	45'592	-355	45'383	128'672
26'193	7'976	4'839	39'008	29'067	16'765	45'832	84'840	146	40'128	-1'038	39'236	124'076
24'038	8'252	7'151	39'441	29'227	14'930	44'157	83'598	146	37'491	-3'235	34'402	118'000

Appendix 15: Glencore – Income Statement 2007v- 2020

Glencore: income statement 2007 - 2020

YEAR	SALES	COGS	GROSS_PROFIT	G_&_A	EBITDA	DEPRECIATION	EBIT	IMPAIRMENT	OTHER NET NON-OPER EXPENSES /INCOME	NET_PROFIT
2007	142'343	136'068	6'275	1'185	2'444	437	7'266	43	798	6'425
2008	152'236	147'565	4'671	850	2'583	575	6'212	2'843	2'301	1'068
2009	106'364	103'133	3'231	839	2'631	622	3'307	214	1'364	1'729
2010	144'978	140'467	4'511	1'063	2'921	911	5'290	434	750	4'106
2011	186'152	181'938	4'214	857	3'077	1'066	5'398	72	1'058	4'268
2012	214'436	210'435	4'001	997	3'485	1'473	4'470	1'650	1'668	1'152
2013	232'694	227'145	5'549	1'206	6'509	4'496	5'970	9'730	4'182	-7'942
2014	221'073	214'344	6'729	1'304	8'072	6'058	6'706	1'101	3'161	2'444
2015	147'351	144'533	2'818	1'096	8'537	6'522	2'172	7'120	3'166	-8'114
2016	152'948	149'763	3'185	1'102	8'354	6'338	3'930	1'268	1'726	936
2017	205'476	197'695	7'781	1'310	8'103	6'086	8'459	628	2'669	5'162
2018	219'754	210'698	9'056	1'381	8'642	6'624	9'143	1'643	4'884	2'616
2019	215'111	210'434	4'677	1'391	9'469	7'450	4'151	2'408	3'249	-1'506
2020	142'338	138'640	3'698	1'681	9'164	7'144	4'416	5'947	2'415	-3'946

Appendix 16: Trafigura – Balance sheet 2013 - 2020

TRAFIGURA: BALANCE SHEET 2013 -2020

YEAR	INVENTORIES	ACCOUNTS RECEIVABLE	CASH AND CASH EQUIVALENTS	OTHER FINANCIAL ASSETS	TOTAL CURRENT ASSETS	PPE	OTHER NON-CURRENT ASSETS	TOTAL NON-CURRENT ASSETS	TOTAL ASSETS
2013	7'856	15'794	3'213	5'346	32'209	2'686	5'132	7'818	40'027
2014	7'905	15'526	3'710	4'554	31'695	3'010	4'870	7'880	39'575
2015	7'614	13'902	3'534	5'590	30'641	2'400	5'957	8'357	38'998
2016	11'538	15'200	3'142	2'823	32'702	2'345	6'183	8'528	41'230
2017	13'927	17'367	4'989	4'203	40'485	2'191	6'026	8'217	48'770
2018	14'733	19'952	5'356	4'857	44'897	1'900	6'936	8'836	53'801
2019	13'435	18'517	6'267	5'153	43'372	3'874	6'903	10'777	54'151
2020	20'178	15'245	5'767	4'677	45'867	3'430	7'686	11'116	56'986

ACCOUNTS PAYABLE	SHORT-TERM LEASE LIABILITIES	OTHER CURRENT LIABILITIES	TOTAL CURRENT LIABILITIES	LOANS AND BORROWINGS	OTHER NON-CURRENT LIABILITIES	TOTAL NON-CURRENT LIABILITIES	TOTAL LIABILITIES	TOTAL GROUP EQUITY	TOTAL GROUP EQUITY AND LIABILITIES
11'095	13'241	3'947	28'283	5'774	666	6'440	34'723	5'304	40'027
10'589	14'967	1'673	27'229	6'176	613	6'788	34'018	5'557	39'575
9'486	14'668	1'475	25'629	7'290	510	7'800	33'429	5'568	38'997
8'953	18'033	667	27'652	7'234	497	7'731	35'383	5'847	41'230
9'941	23'854	643	34'437	7'401	547	7'948	42'385	6'385	48'770
13'809	23'742	1'025	38'576	8'462	513	8'975	47'551	6'250	53'801
13'935	22'456	988	37'379	8'492	1'476	9'968	47'347	6'805	54'151
11'081	25'784	2'360	39'224	7'070	2'901	9'972	49'196	7'790	56'986

Appendix 17: Trafigura – Income Statement 2013 -2020

TRAFIGURA: INCOME STATEMENT 2012 - 2020 ($ M)

YEAR	SALES	COGS	GROSS_PROFIT	G&A	EBITDA	DEPRECIATION	EBIT	IMPAIRMENT	OTHER NET NON-OPERATIONAL EXPENSES	NET PROFIT
2012	120'419	117'795	2'625	1'140	1'485	292	1'193	93	95	1'004
2013	133'026	130'134	2'892	1'263	1'629	406	1'223	81	-1'039	2'181
2014	127'613	125'568	2'045	769	1'277	236	1'040	189	-228	1'080
2015	97'237	94'636	2'600	775	1'825	220	1'606	469	33	1'103
2016	98'098	95'807	2'291	742	1'549	205	1'345	121	249	975
2017	136'421	134'182	2'239	746	1'493	199	1'294	45	361	887
2018	180'744	178'360	2'384	746	1'638	192	1'447	61	513	873
2019	171'474	168'576	2'899	945	1'954	201	1'753	104	781	868
2020	146'994	139'967	7'028	1'215	5'813	1'369	4'443	1'568	1'277	1'599