



Equity Valuation: United States Steel Corporation

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Abstract

Title: Equity Valuation: United States Steel Corporation

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This dissertation aims to determine the price target of United States Steel Corporation, a steel manufacturing company of historical significance which has recently experienced profitability issues. Despite previous issues the company finds itself in a transitional environment towards sustainability, presenting a unique opportunity for the company to rebound from several years of financial mediocracy compared to its peers.

In pursue of the fair value of U.S. Steel two model will be utilized, for the fundamental analysis a DCF model will be performed and for the relative valuation a Comparable Company Analysis (CCA) also known as a multiple's valuation. Within the DCF three scenarios will be computed to depict the different economic environments that the company may undergo, with those being an optimistic, a recession and a base scenario. For each respective scenario, assumptions have been made which conform with the company strategy and macro-economic landscape.

Following the research and assumptions considered the price target for U.S. Steel comes to **\$17.1 per share**, categorized as a **sell** recommendation, due to the target being 20% lower than the trading price of \$21.36 per share.

Keywords: Discounted Cash-Flow Model, Relative Valuation, Iron & Steel, Equity Valuation, United States Steel Corporation.

Abstrato

Título: Equity Valuation: United States Steel Corporation

Autor: Michail Kyriakidis

Esta dissertação tem por objetivo determinar o preço-alvo da United States Steel Corporation, uma empresa siderúrgica de importância histórica que recentemente tem tido problemas de rentabilidade. Apesar destes problemas, a empresa encontra-se num ambiente de transição para a sustentabilidade, apresentando uma oportunidade única para recuperar de vários anos de mediocracia financeira em comparação com os seus concorrentes.

Para determinar o valor justo da U.S. Steel, serão utilizados dois modelos: para a análise fundamental, será utilizado um modelo de *Discounted Cash Flow* e, para a avaliação relativa, uma análise de empresas comparáveis (CCA), também conhecida como avaliação por múltiplos. No âmbito do DCF, serão calculados três cenários para representar os diferentes ambientes económicos que a empresa pode atravessar, sendo estes um cenário optimista, um de recessão e um cenário base. Para cada um dos respetivos cenários, foram feitas suposições que estão em conformidade com a estratégia da empresa e o panorama macroeconómico.

Após a pesquisa e os pressupostos considerados, o preço-alvo para a U.S. Steel é de **\$17,1 por acção**, categorizado como uma recomendação de **venda**, devido ao facto de o preço-alvo ser 20% inferior ao preço de negociação de \$21,36 por acção.

Keywords: Discounted Cash-Flow Model, Relative Valuation, Iron & Steel, Equity Valuation, United States Steel Corporation.

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Table of Contents

ABSTRACT	I
ABSTRATO	II
ACKNOWLEDGEMENTS	III
TABLE OF CONTENTS	IV
1. EXECUTIVE SUMMARY	1
2. LITERATURE REVIEW	3
2.1 VALUE.....	3
2.2 METHODS OF VALUATION.....	3
2.3 INPUTS FOR DCF.....	5
2.4 MONTE CARLO SIMULATION.....	7
2.5 COMPARABLE COMPANY ANALYSIS.....	7
3. INDUSTRY ANALYSIS	9
3.1 CYCLICALITY.....	10
3.2 MAIN PRODUCERS.....	10
3.3 PORTER'S 5 FORCES.....	11
3.4 INDUSTRY OUTLOOK.....	13
4. COMPANY OVERVIEW	16
4.1 HISTORY.....	16
4.2 REVENUE STREAMS.....	16
4.3 STRATEGY.....	17
4.4 OWNERSHIP STRUCTURE.....	19
4.5 HISTORICAL PERFORMANCE.....	20
4.6 IMPACT OF RISK FACTORS ON REGIONAL PROFITABILITY.....	23
4.7 PERFORMANCE OF THE STOCK.....	24
5. SEGMENT ANALYSIS	24
5.1 ELECTRIC ARC FURNACE AND BLAST FURNACE.....	25
6. ASSUMPTIONS	26
6.1 REVENUE PROXY MODEL.....	26
6.2 CYCLICALITY.....	27
6.3 REVENUES.....	28
6.4 COST OF GOODS SOLD.....	28
6.5 SG&A.....	29
6.6 NET WORKING CAPITAL.....	29
6.7 CAPITAL EXPENDITURE.....	30
6.8 DEPRECIATION.....	31
6.9 TERMINAL GROWTH.....	31
6.10 DISCOUNT FACTOR.....	31
6.11 DILUTION OF SHARES.....	31
6.12 TAXATION.....	32
6.13 WEIGHTED AVERAGE COST OF CAPITAL.....	32
6.14 CAPITAL STRUCTURE.....	33
7. VALUATION	34
7.1 DISCOUNTED CASH FLOW.....	34
7.2 MONTE CARLO.....	45
7.3 COMPARABLE COMPANY ANALYSIS.....	46
7.4 VALUATION SUMMARY.....	47
7.5 LIMITATIONS.....	47
8. GLOSSARY	48
8.1 FINANCIAL.....	48
8.2 OTHER.....	48
9. APPENDIX	49
9.1 INCOME STATEMENT.....	49
9.2 BALANCE SHEET.....	50
9.3 CASH FLOW STATEMENT.....	51

9.4	HISTORICAL RATIOS.....	52
9.5	COGS	53
9.6	NET WORKING CAPITAL.....	54
9.7	STEELMAKING PROCESS.....	55
10.	REFERENCES.....	56
11.	FIGURES & TABLES.....	59

1. Executive Summary

The purpose of this dissertation is to determine the equity value of United States Steel Corporation, one of the most significant companies of the 20th century, which helped the US economy to the levels it did by supporting a plethora of industries such as the automotive, and construction industry. Additionally, this valuation is of particular interest as it is on the precipice of an energy and sustainability transformation, which can determine whether the company will be able to thrive in a changing market.

Extensive research was conducted on the industry to better understand the intricacies associated with steelmaking but also with the outlook of the sector. Even though there was no clear consensus and lack of data regarding the outlook, a proxy model was created for this purpose to serve as an explanatory variable for the revenue growth, which is the basis of the forecast.

Given the information collected, the two valuation methods were selected in order to value U.S. Steel, the primary being the Discounted Cash-Flow model with three different scenarios representing an optimistic state, a recession scenario, and a base scenario. The second valuation method used was the Comparable Company Analysis (CCA). Both methods required a reliable peer group, in order to gain insights for the DCF and to do the valuation for the CCA. The criteria used to select those peers have been listed in the literature review chapter.

As it relates to the stock performance, U.S. Steel has performed worse than its peers from 2018 onward, due to plethora of reasons from operational inefficiencies to the war in Ukraine, which disproportionately affected the company compared to its peers.

Overall, the company given in the analysis earned a **sell** recommendation and a price target of \$17.1 per share which is substantially lower than its trading price of \$21.36, as of 10/5/2023. This recommendation comes in part from the DCF and sensitivity analysis. U.S. Steel is well positioned to maintain its market share as it invests in the future of steelmaking, reducing its operational costs and bringing its margins and profitability closer to its peers. Nevertheless, this process will be risky as the degree of uncertainty has historically been high with U.S. Steel as it was characterized by Morningstar research.

Per the relative valuation, U.S. Steel outlook is very positive as it yields a price target of \$56.48 per share, bringing it well above its trading price, however such targets are hard to justify when considering the other factors discussed in this research.

2. Literature Review

Literature review is intended to provide an insight into the valuation techniques that will be utilized in this thesis to determine the value proposition of United States Steel Corporation. The valuation methods that will be mentioned below can be employed on a plethora of companies and serve as the foundation for the very broad field of financial valuation. These models have been extensively used throughout the industry to derive and determine the intrinsic value of an asset, joint venture, or a potential investment.

United States Steel Corporation was chosen for several reasons. The primary being that it is a company of historical significance. Additionally, the sector as a whole goes unnoticed from mainstream coverage as it is not a flashy industry, such as tech, however it is aligned to play a key role in the rise of infrastructure projects related to sustainability and growth. Lastly, as it is a company which relies on commodities, it poses unique challenges to the valuation, which I find interesting and serves as an opportunity to learn something new which goes beyond the scope of my studies.

2.1 Value

This analysis will look to derive the intrinsic value of United States Steel Corporation. This means that fundamental, DCF, and relative, CCA, analysis will be used in order to examine the operational aspects of the company and determine whether the company is undervalued or overvalued based on its current market value. Based on the results of such an analysis an investor can determine whether they want to invest in the company or not and how they want to do it, either by going long or short on the asset. As such it is important to recognize that the intrinsic value represents the real value of the target, whereas market value represents what the market is paying for the asset.

2.2 Methods of Valuation

2.2.1 Discounted Cash-flow Model

The Discounted Cash-flow (DCF) model is one of the most prominent models used to conduct a valuation. It looks at the future Free Cash-flows that the company is forecasted to earn and discounts them to get the Present Value. The model is very sensitive to minor changes in the

assumptions, which is one of its key strengths but also its Achilles heel. According to a report from UBS Global Research DCF is a powerful tool in the hands of a scrupulous analyst, but in the hands of an unscrupulous analyst it can be used to justify any value by tweaking the assumptions (Wilson, 1997).

To estimate how much a company is worth, the amount of cash the target is expected to generate in the future must be forecasted at which point these cashflows are discounted using a risk-adjusted rate, like the formula indicates:

$$\text{Discounted Free Cashflow} = \sum_{n=1}^n \frac{FCF_n}{(1+r)^n} = \frac{FCF_1}{(1+r)^1} + (\dots) + \frac{FCF_n}{(1+r)^n} \quad (1)$$

Where:

FCF_n = Expected Free Cashflow at period n

n = Number of periods

r = Risk adjusted rate. Known as weighted average cost of Capital

As the model relies on forecasts of the company's cashflows, it is important to have a strong grasp and understanding of what factors drive the company's profitability and cash generation ability. Some of these factors include U.S. Steel's earnings, capital expenditure (Capex), depreciation, net working capital, amongst others. Factors such as cost of debt and equity are very important as well, as they define the rate at which we discount those cashflows.

2.2.2 Comparable Company Analysis

Comparable Company Analysis, also known as multiples valuation, is based on the notion that comparable companies, i.e., peers, should command a similar relative valuation. Comparable companies can be competitors, whereas they face the same economic environment and sustain many of the same problems in supply and demand as our company. Peers can also be companies that have similar growth and profitability, regardless of their sector (Damodaran, 2002).

2.3 Inputs for DCF

2.3.1 Free Cash Flow Firm

Free Cash Flow to the firm (FCFF) is an integral part of a DCF as it represents the cash generated by the company's assets and which are available to all of its shareholders, such as equity holders and creditors (Damodaran, 2002). Investors use FCFF as a key metric to evaluate the company's ability to generate cash. The formula is as follows:

$$FCFF = EBIT(1 - t_c) - Capex + DA - \Delta NWC \quad (2)$$

Where:

EBIT = Earnings Before Interest and Tax

t_c = Tax rate

Capex = Capital Expenditure

DA = Depreciation & Amortization

ΔNWC = Change in Net Working Capital

The calculation of FCFF (2) starts from the Net Operating Profit after Tax (NOPAT), which is simply the resulting after EBIT after deducting the company's tax rate. After, we deduct Capex, which represents the costs of maintaining and growing the firm's asset base. Because of accrual accounting, on a firm's income statement the depreciation and amortization are registered, however, these are not cash expenses. As such, Depreciation and amortization are added-back, to get from earnings to actual cash flows. As a result, DA has to be added back as it is a tax-deductible expense in addition to being a non-cash expense. Lastly, the change in net working capital is subtracted as in essence, net working capital represents the amount of cash that a company has to invest as part of its operations and the cash conversion cycle. Any increase in the net working capital is interpreted as an actual outflow where the company had to use more of its cash to finance the operations.

2.3.2 Weighted Average Cost of Capital

Weighted Average Cost of Capital (WACC) represents the combined cost of debt and cost of equity proportionally weighted to represent the long-term capital structure of the firm.

Additionally, it utilized the tax rate to determine benefits of the Interest Tax Shield. As such it denotes the cost the company is expected to incur to raise capital. WACC is a key part of the DCF model where it is used as a discount rate on the future FCFF which is integral to determine the enterprise value of the firm.

$$WACC = R_d * \frac{D}{D+E} * (1-t_c) + R_e * \frac{E}{D+E} \quad (3)$$

Where:

R_d = Cost of Debt

R_e = Cost of Equity

t_c = Tax rate

E = Market Capitalization

D = Market Value of Debt

2.3.3 Cost of Equity

In order to calculate the cost of equity, two methods were used, in a comparative role. Those methods being the CAPM and 3FF model. CAPM explains the relationship between excess returns on stocks and market risk. The 3FF model builds upon CAPM by introducing 2 additional factors which have been proven to have a stronger explanatory power in stock returns, those two factors being Book to Market Equity and Size (Fama & French, 1992).

2.3.4 Terminal Value

The Terminal value is a key part of the DCF valuation as it represents a large proportion of the value derived from the DCF, based on a small list of variables. It represents the value of the firm beyond the forecasted years. For this valuation, as it is common market practice, the perpetuity growth model will be used. It assumes a constant growth rate that the company will experience in perpetuity. For this reason, it is vital that the final year in the projection represents a steady state between cyclical lows and highs (Rosenbaum & Pearl, 2013). The alternative method to estimate terminal value is utilizing an expected EV based multiple, typically with EBIT or EBITDA, at the end of the forecasting period (Rosenbaum & Pearl, 2013). By utilizing the exit multiple however,

the DCF becomes a relative valuation metric, which is another reason why the perpetuity model was used.

Considering U.S. Steel, a company with cyclical revenues, it is of extra importance to achieve a terminal year that represents both states of the cycle. This is why a pro-forma year was created in the statements averaging all the stages of the cycle in the forecast. Representing both the positive and negative years, as to derive the FCFF for the terminal year. The formula for the terminal value can be seen below:

$$TV = \frac{FCFF_T * (1 + g)}{WACC - g} \quad (4)$$

Where:

$FCFF_T$ = Final free cash flow to the firm in steady state or proforma year

g = terminal growth rate

2.4 Monte Carlo Simulation

As part of the analysis into U.S. Steel, a Monte Carlo simulation will be performed based on the base scenario forecasted. The Monte Carlo simulation is an extension of the DCF, whereby we replace static values that we expect to be the most likely to occur with a probabilistic value (Pascolo, 2019). This serves as a scenario analysis by which we can judge more accurately the target price by incorporating random sampling and probability distribution. Monte Carlo Simulations are quite popular for assessing potential risks as well as for option pricing, but they can also be used in DCFs.

2.5 Comparable Company Analysis

2.5.1 Peers

Determining the peer group is one of the most important steps in the valuation. The business profile arguably is equally important as the financial profile of the company when choosing a peer group (Rosenbaum & Pearl, 2013). This is particularly important for companies that operate in cyclical sectors as the volatility in earnings can vary drastically from companies in adjacent sectors and

geographies. For these reasons, the peer group that was selected is from the mining & metals sector in the United States.

Regarding the financial profiles of the peer group, two factors were looked at: profitability and size. Size is usually measured using Enterprise value or Market Capitalization. If two companies are similar in size and operate in the same sector there tends to be evidence that they will have similar leverage, economies of scale, growth prospects as well as other structural similarities (Rosenbaum & Pearl, 2013). On the contrary, companies with large size gaps face different operation-related problems and are more likely to have different capital structures.

In terms of profitability and growth profile, when profitability is higher this translates to higher valuations, *ceteris paribus* (Rosenbaum & Pearl, 2013). As a result, we can derive an accurate valuation if the peers experience similar profit margins such as EBITDA margin and, or gross profit margin. The same applies for growth rates, companies with higher expected growth rates have on average higher relative valuations on current earnings. As such finding similar companies in those two regards can play an instrumental role in estimating a more reasonable valuation.

2.5.2 Key Multiples

After determining a peer group, it is important to decide on what multiples best represent the sector and the companies in it. There are often sector specific multiples that are used as they incorporate specificities of the sector and as such allow for greater comparability between peers. All ratios were calculated using 12-month historical data. As it pertains to the mining and metals industry the following were included:

For a profitability multiple, **price to earnings** will be used, it is considered very popular for cyclical companies such as manufacturing firms (Damodaran, 2002). Companies that trade at a higher relative P/E ratio often have higher expected earnings growth rates. This is a way to incorporate the growth component into the relative valuation. It is common practice to use forward looking P/E multiples. Given the uncertainty of the sector, 1-year forward-looking P/E was also used.

$$\frac{Price}{EPS}$$

(5)

The **enterprise value multiples** are a good litmus test to understand if a company is overvalued or undervalued, it is particularly important as it allows direct comparison between companies without considering the capital structure. For reference according to Damodaran the US industry average EV/EBITDA for mining and metals is 6.58 while for EV/EBIT it is 8.85 (Damodaran, 2023). Lastly, EV to Adjusted EBIT will be used. The former adjusts for unusual and non-recurring items.

$$\frac{EV}{EBITDA}, \frac{EV}{EBIT}, \frac{EV}{Adjusted\ EBIT}$$

(6)

3. Industry Analysis

The steel industry can be described by its overcapacity, which makes it a commoditized product. As such it is essential to the world economy as it supplies key materials to other industries, for example construction, heavy industries, automotive, mechanical equipment, machinery and many more. This makes the steel industry cyclical as it relies on the demand needs of the aforementioned industries, as such the cyclical nature of the economy heavily impacts steel.

The Steel Market is very segmented with Asia-Pacific accounting for 71.9% of the global market value in 2021, followed by Europe with 14.4%, the United States with 8% and the rest of the world accounting for only 5.7% (MarketLine, 2023).

In 2021 the global steel market reached a value of USD 874.6 Billion (IMARC group, 2021). From 2016 until 2021 the sector's production volume experienced a CAGR of 3.7%. However, in 2022 due to fears of a recession and the conflict in Ukraine, global production declined by 4.2% (United States Steel Corporation, 2023). This was in part due to the supply chain shortages caused by the conflict, as Ukraine was a key supplier of raw materials needed for the steel production as well as a key producer itself (Eleuterio, 2022). Despite the current short falls of the sector in 2022, growth in the future will be very reliant on the market, the energy crisis, sustainability, and supply shortages amongst other factors.

3.1 Cyclicality

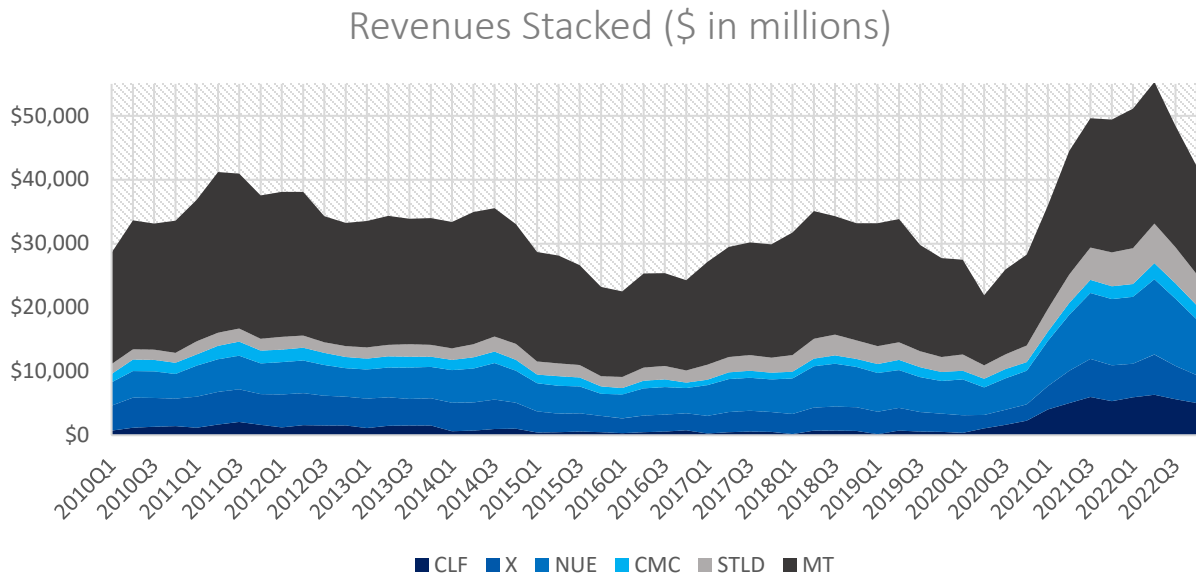


Figure 1: Revenues of Peers and United States Steel (ticker: X).

The sector is cyclical, nonetheless each cycle is unique in that its duration is not always predictable. As mentioned prior, cyclicality depends largely on macroeconomic factors, as such a cycle can be interrupted by a force majeure or simply an economic recession. The start of a cycle usually tends to be the trough before a rise and the end is also the trough after the peak. As can be observed the last completed cycle started in 2016 and ended during Q1 of 2020. Conversely the cycle we are currently in is expected to end around Q4 of 2023 or Q2 of 2024 as inflation is starting to cool off. Based on past performance, it can be said that a full cycle can last between three to five years. However, past cycle duration does not guarantee the same cyclicality for the future.

3.2 Main producers

The top producers of steel in the world were in China, accounting for 53.9%, India with 6.6%, Japan with 4.7%, USA with 4.3% and Russia with 3.8%. Additionally, of notable significance is the decline in production that Ukraine experienced due to the conflict within its borders, falling

from 14th globally to 25th with some of the global production losses being offset by India (World Steel Association, 2023).

Global Steel Production (in Mt)				% of
	2022	2021	Δ	Global
China	1,013.0	1,034.7	-2.1%	53.9%
India	124.7	118.2	5.5%	6.6%
Japan	89.2	96.3	-7.4%	4.7%
United States	80.7	85.8	-5.9%	4.3%
Russia (e)	71.5	77.0	-7.2%	3.8%
South Korea	65.9	70.4	-6.5%	3.5%
Germany	36.8	40.2	-8.4%	2.0%
Turkey	35.1	40.4	-12.9%	1.9%
Brazil	34.0	36.1	-5.8%	1.8%
Iran	30.6	28.3	8.0%	1.6%
Ukraine	6.3	21.4	-70.7%	0.3%
Other	290.6	311.5	-6.7%	15.5%
Total	1,878.4	1,960.3	-4.2%	

Table 1 : World Steel Production (in Mt), source: World Steel Association.

The main producers in the United States are Nucor, Steel Dynamics, Commercial Metals Company, Cleveland Cliffs and United States Steel Corporation. Amongst the top producers in 2021, United States Steel Corporation ranked 24th by production volume, being surpassed mainly by producers in China (World Steel Association , 2022), while it is ranked second in the United States.

3.3 Porter's 5 Forces

3.3.1 Power of Buyers

The Buyers in the industry have moderate power. Buyers of steel are primarily large companies in the construction, infrastructure, and heavy industries which together account for around 75-80% of the global steel production¹ (Zoryk, 2020). As such these large buyers place high-volume orders for discounted rates. Furthermore, the lack of differentiation² between manufactures leads to the buyers being price sensitive. This creates downward pressure on prices and makes it hard for producers to increase margins. However, the low risk of backwards integration, from buyers and

¹ Construction and infrastructure accounted for 52% in 2021 and heavy industries including automotive accounted between 25% and 30%

² Differentiation between manufacturers only vary in the steel grade, alloy, and finishing.

forward integration from producers due to the high initial investment and slim margins in the industry give back some power to the producers, who are essential to the global production needs.

3.3.2 Power of Suppliers

The power of suppliers can be assessed as strong. The primary suppliers are large mining corporations who supply iron and coal. Additionally, when utilizing Electric Arc Furnace (EAF), electricity providers and natural gas providers for Basic Oxygen Furnace (BOF) are also key suppliers as energy costs can account for 20-40% of the production costs (MarketLine, 2023). Iron miners hold substantial power over the steel producers as iron is a non-substitutable raw material in the steel making process. Moreover, iron miners in recent years have ditched annual contracts in favor of quarterly or index linked iron ore contracts as the volatile nature of the prices helps drive the profit margins of mining operations (MarketLine, 2023). Additionally steel producers tend to purchase all their ores (iron, coal, zinc, etc) from a single larger mining operation as it reduces the risk of supply chain delays. One factor that helps drive prices down is that larger steel producers tend to backward integrate opening or acquiring their own mines to have stable production costs and higher margins, due to economies of scale.

3.3.3 Threat of New Entrants

The threat of new entrants is quite low. The barriers to entry are high, as environmental regulations, large up-front investments, and protectionist measures such as tariffs and quotas are key parts of the industry. The sector in the developed countries has a strong regulatory regime as steel making is a key emitter of CO₂, this increases the cost for new participants to enter the market. Additionally tariffs and other protectionist measures are placed to prevent countries with less regulations and cheaper COGS from dumping cheap steel and destroying the local market. As such this makes it harder to operate cross-border if you are a new entrant. Lastly the cost of exit and divesting of tangible assets is high, making it harder for new entrants to leave the industry if they do not perform well.

3.3.4 Substitute products

The threat of substitutes is quite low. Steel's properties like its high tensile tolerance and strength, fatigue strength, good ductility and weldability make it valuable material which is also cost

effective. Additionally, steel is the most recycled material in the world, reducing the burden on the natural resources leading to a reduction in environmental impact (MarketLine, 2023).

Plastics are cheaper and tend to be weaker, composite materials which are stronger but more expensive can be considered substitute products for some applications. However, steel's price to performance and environmental impact ensures a strong market demand.

3.3.5 Rivalry between Steel producers

The rivalry in the sector between producers is strong. As previously mentioned, the sector faces a concentration of large businesses mainly competing in price as their key differentiating factor. Companies in the sector are incentivized to vertically integrate with miners in order to secure supplies at lower cost and benefit from economies of scale. Producers who rely on spot prices or even hedging, often have to pass those costs on to their customers, making them less attractive in an otherwise very competitive market. Additionally, the manufacturing techniques utilized from Basic Oxygen Furnace which requires coal to the more agile, yet less scalable Electric Arc Furnaces plays a key role in the profitability and competitiveness of the company. This competition is further exacerbated by the cyclical nature of the industry and the long lifespan of steel products which has producers competing to supply buyers in key industries.

3.4 Industry Outlook

3.4.1 Ukrainian/Russian Conflict

The Ukrainian conflict has had a profound effect on the mining and steel industry in Europe. Ukraine and Russia were both key suppliers of iron and other metallurgic products to clients in MENA. With majority of the factories and mines in Ukraine damaged, and trade restrictions placed on Russian goods, a lot of the European steel producers have had problems sourcing raw materials from other places. This is particularly important since seaborne infrastructure in Europe is not adequate to substitute the supplies previously sent by rail from Ukraine and Russia. Furthermore, as it relates to several key producers in Europe such as ArcelorMittal, United States Steel Kosice and others, they were exclusively relying on Ukrainian resources for their steel production in Central and Eastern Europe. Prices of steel futures in European and American merchantile exchanges rose after the start of the conflict (depicted by the red line in *Figure 2*). However as producers scrambled to find new suppliers the prices throughout Q2 of 2022 decreased.

Additionally, the volume spikes in sales seem to correspond with the new trend of quarterly contracts from iron producers affecting the steel market.

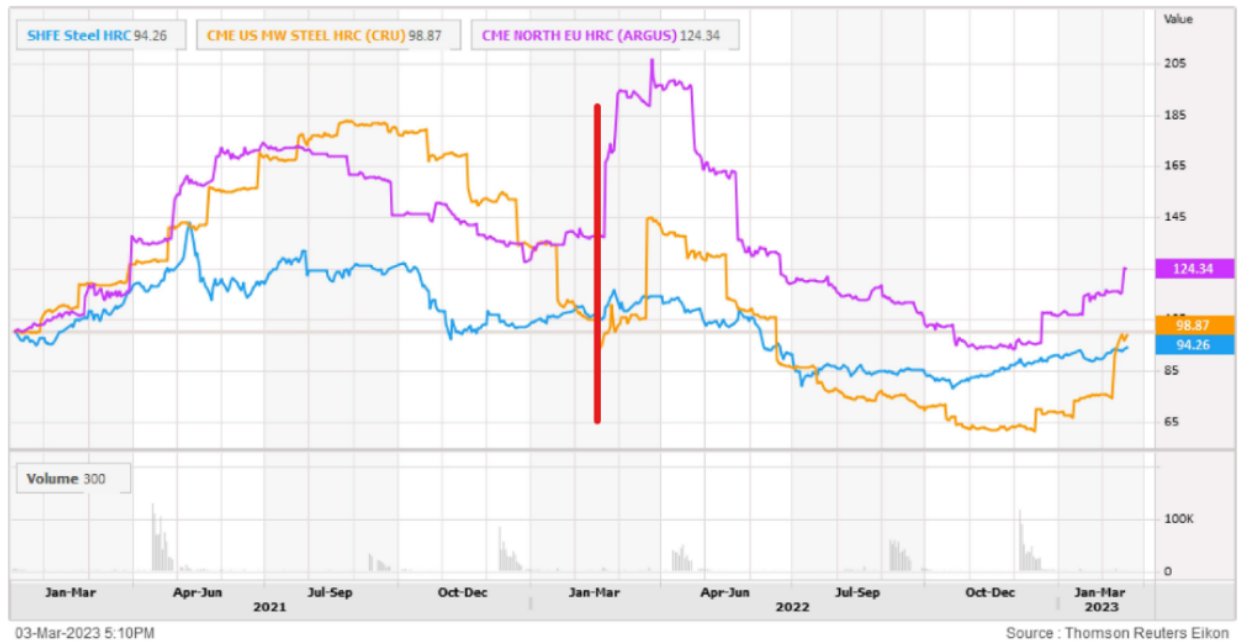


Figure 2: HRC Steel Futures price and volume in Singapore(blue), USA (yellow) and Europe(purple), Source: Thomson Reuters Eikon.

3.4.2 Sustainability

The steel industry is responsible for 7% of the global CO₂ emissions and approximately 5% of European emissions (International Energy Agency, 2020). While this industry is crucial in achieving a more sustainable environment by assisting other industries manufacture durable, recyclable tools and goods, the sector itself is a major polluter. This has led to EU and other Developed economies to implement regulations and goals to reduce the environmental impact of this energy costly process turning iron into steel. The regulations are intended to promote R&D and extensive investments into more energy and environmentally efficient processes, such as using renewable electricity for the EAF process and hydrogen-based steel production amongst other things (European Commission: Joint Research Centre, 2022). The plans to decarbonize the industry will be expensive in the short term but it should make the industry less susceptible to energy crises. The goals of 40% CO₂ reduction by 2030 and carbon neutrality by 2050 have caused the CO₂ emission allowance to reach 81 euros per metric ton, with it being forecasted to reach 100 euros in the following years (United States Steel Corporation, 2023).

Carbon emission credits is a system utilized within the EU. However, several other countries incentivize reducing CO2 emissions via carbon tax credits like in the US. As such the price of steel appears to be sensitive to the price of carbon emission spots, up until mid-2021. A possible explanation for this is that as companies in the sector focus more towards reducing their CO2 emissions and gaining the benefits from previous investments related to sustainability, they seem less depended on purchasing carbon credits to offset their emissions.

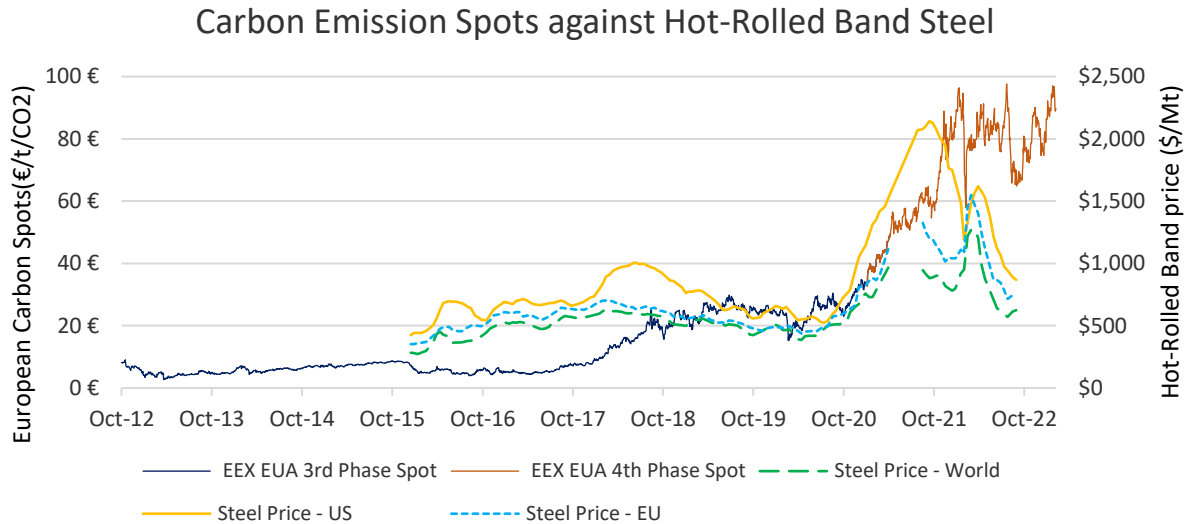


Figure 3: Carbon Emission Spots against Hot-Rolled Band Steel, source: International Trade Administration, Refinitiv.

The threat many producers in developed countries have expressed is that without adequate trade protections such as tariffs the local industries will not be able to compete with producers in developing economies who do not have to abide by such stringent regulations (United States Steel Corporation, 2023). Additionally, the same applies to substitute products such as plastics and composites which in some applications might become more cost effective than the more expensive environmental steel.

The US and EU have both signed in 2021 a Carbon-based agreement on aluminum and steel trade, which will aim to lower the tariffs between the two sides. This partnership comes at a point where cheaply made steel from countries like China who do not have to abide by strict carbon emitting regulations has flooded the market (The White House, 2021). The deal is meant to counter one of the industry’s main concerns, that the increased cost of implementing environmental regulations would harm the local industries.

4. Company Overview

United States Steel Corporation is a company operating in the mining and metals industry. Its main operations are centered in the United States, with a European subsidiary operating out of Slovakia in Kosice. The split between the two revenues has historically been 80:20. It primarily supplies customers in North America from the automotive, construction, electrical, OCTG³, consumer appliances and more. While the European sections serve mainly automotive and construction clients. U.S. Steel is the second largest US-based steel manufacturer and 24th overall in the world. Its market share by volume in 2021 was 15.2%. It also currently has a strong focus on sustainability with many investments meant to reduce its carbon footprint and make it more competitive in the sector.

4.1 History

United States Steel Corporation was founded in 1901 after the merger of Carnegie Steel Company and Federal Steel Company which was financed by J.P Morgan himself. At that point in time, it became the first US company to have a valuation of over \$1 billion.

4.2 Revenue Streams

The fiscal year of U.S. Steel starts January 1st and ends December 31st. It has four key production segments. The primary one Flat-rolled which utilized the BOF process. It is followed by Mini mills, also known in the industry as EAF, which can utilize steel scraps in production. Next is the European segment, followed by Tubular.

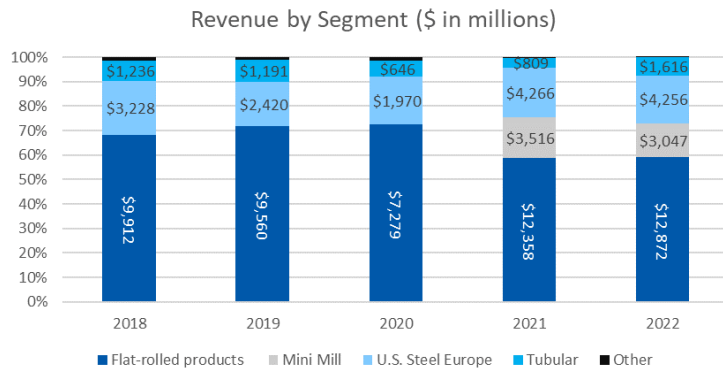


Figure 4: Revenues of U.S. Steel by segment.

Throughout the year the largest segment has been Flat-rolled, however its share has been decreasing as there is demand from clients for greener products which are favoring Mini mills.

³ Oil country tubular goods – products unitized in the oil industry, such as drill pipes.

Additionally, the EBIT margins of the segment show that Mini mill is more profitable than Flat-rolled, with a margin of 25% compared to 18.2%. The segment is expected to grow further as the largest share of capital expenditure is spent on Mini mills. Additionally, the U.S. Steel production in Slovakia had a 5-year average EBIT margin of 8.5%. However, it is expected that it will decrease as access to cheap raw materials from Russia and Ukraine has been reduced, which will have to be replaced by costlier materials. While the sector as previously mentioned has been commoditized, offering little differentiation between products, U.S. Steel sets itself apart by having a strong reputation.

EBIT Margin by Segment	2018	2019	2020	2021	2022	5 year Average
Flat-rolled products	8.9%	2.1%	-8.2%	21.3%	15.2%	7.8%
Mini Mill				34.3%	15.8%	25.0%
U. S. Steel Europe	11.1%	-2.4%	0.5%	22.9%	10.4%	8.5%
Tubular products	-4.7%	-5.6%	-27.7%	0.1%	33.7%	-0.8%
Other Businesses	29.6%	13.7%	-24.1%	-10.9%	244.4%	50.5%
Total by Year	8.5%	0.7%	-8.0%	22.8%	15.8%	8.0%

Table 2: Historic EBIT margin by segment.

4.3 Strategy

U.S. Steel’s strategy revolves around three main pillars, “Win in Strategic Markets”, “Move Up the Talent Curve” and lastly “Move Down the Cost Curve”. In order to implement these key ideas, they have been investing in a variety of projects to better meet their goals.

Regarding winning in strategic markets and reducing their cost curve, which is part of their Best for All® strategy, they have invested in pig iron casting facilities as well as DR-grade pellets facilities. Reducing their reliance on raw materials from external suppliers and integrating their production vertically will reduce supply chain bottlenecks and costs. Meeting their customer’s needs without delays.

Additionally, as clients demand greener products in order to reduce their own greenhouse emissions, U.S. Steel has been focusing on developing new techniques to produce steel more efficiently. While at the same time they have been investing heavily in state-of-the-art EAFs which will reduce their costs and greenhouse emissions, slowly phasing out their traditional BOF. Moreover, they continue to invest in finishing facilities, to provide products such as galvanized steel, endless casting, rolling products and advanced high-strength steel (AHSS), all of which are

meant to differentiate them from the competition and provide their customers with unique products, pushing up their margins.

As part of pushing down costs, U.S. Steel has been evaluating its capabilities and as such has been idling or permanently closing facilities that are redundant, such as the tin making line in East Chicago.

Lastly, attracting and retaining top talent is vital to the success of this strategy. In order to do this, they have been increasing benefits, such as increasing wages and pension plans, with hourly employees being included in the pension plans. They also offer professional development opportunities in order to retain but also improve their talent. Additionally, 80% of the workers are unionized and U.S. Steel works closely and maintains strong relationships with the union allowing employees to gain more benefits. Regarding attracting new talent, they partner with universities and technical schools in order to find the best talent. All aspects are monitored closely in order to maintain a voluntary turnover rate of 5% and below.

4.3.1 Key Projects

Some of the key notable projects in the pipeline include the following: A new steelmaking site in Arkansas, which is planned to have 3 million ton per year capacity, implementing some of the new finishing techniques mentioned before, like AHSS, endless casting and rolling. The next project which began construction in 2022 was the pig iron caster at the Gary Works facility, which will supply 50% of the metallic needs of the main EAF located at the Big River facility. Additionally, the company began construction the same year in the Keetac ore operation facility to produce DR grade pellets. In order to further cover its iron needs for EAF, with the potential of selling excess pellets to other steel producers once the plan comes online, creating a new product line for the firm.

U.S. Steel has also invested in additional lines at Big River Steel in non-grain oriented (NGO) electrical steel. These lines are expected to capture the increasing demand in electric vehicles and are positioned as key to capturing a strategically growing market. The \$450 million investment is a substantial one and will make the company a leader in the NGO. The new production lines are expected to become operational by September 2023.

4.4 Ownership structure

As of March 28th, 2023, U.S. Steel has 227.2 million outstanding shares (O/S), of which 98.66% are free float or 224.16 million shares. Ownership is mainly concentrated in American institutions with 74.5%, while European investors accounting only for 4.4% of O/S. Additionally, the primary institutional shareholders are investment advisors with 29.6% O/S and 28.16% being held by hedge funds. The largest single shareholder of U.S. Steel is Vanguard Group, Inc holding 9.22%. Moreover, the top 10 investors account for 40.0% of

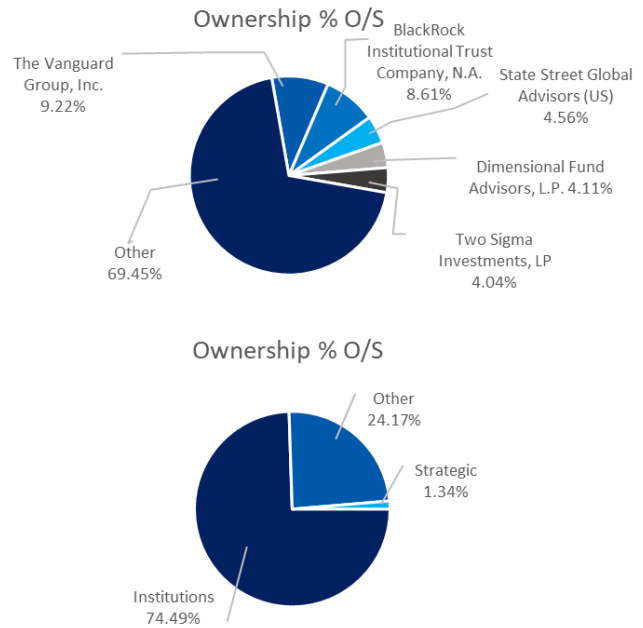


Figure 5: Ownership Structure % of outstanding shares.

O/S, with smaller institutional investors which include pension funds, sovereign wealth funds, trusts, insurance companies, foundations and brokerages making up the remaining amount.

4.5 Historical Performance

United States Steel Corporation in recent history has performed worse than its industry peers. This trend can be observed by looking at their margins which are significantly lower than the industry averages until 2021, at which point they converge towards the industry values.

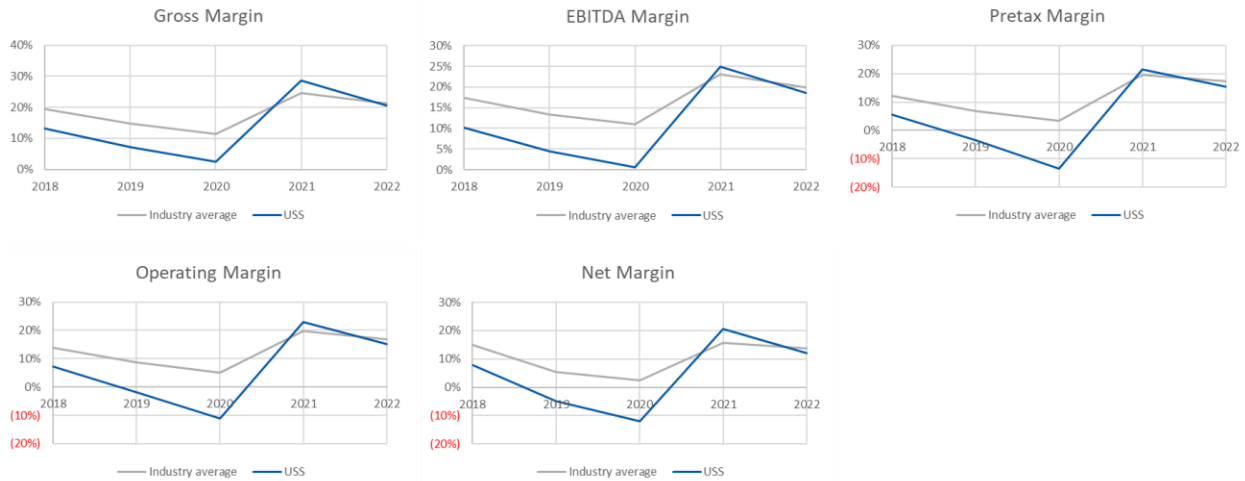


Figure 6: Margins of U.S. Steel and industry averages, values listed in the appendix.

This can also be observed when looking at the returns on assets and equity, which indicates that U.S. Steel has been inefficient in generating profits from its deployed capital. Moreover, historically U.S. Steel's return on invested capital was quite poor, due to low NOPAT margins, as from 2018 till 2022 it averaged 5.1%. However, the recent increases in efficiency seen from the rise in invested capital over assets provide some confidence in USS's ability to maintain and protect long-term profits as those investments start to come online.

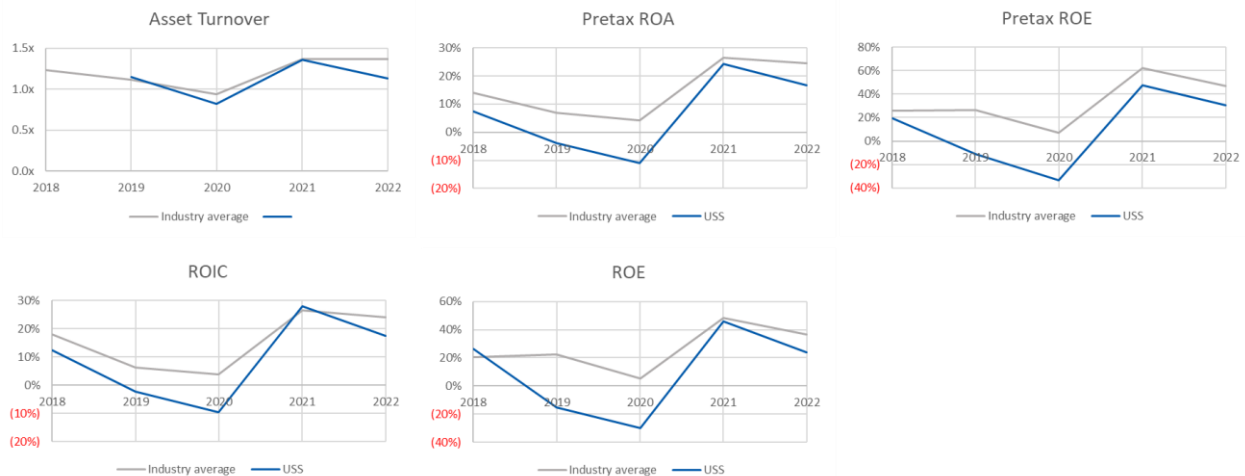


Figure 7: Return on (Assets, Equity, Invested Capital) of U.S. Steel and industry averages, values listed in the appendix.

These inefficiencies and operational issues come in part as a result of a now cancelled project which was meant to modernize and improve the production facilities. The project was valued at \$1.5 billion, however because of delays in securing building permits and other bureaucratic issues, USS was forced to cancel the project, which ended up hurting U.S. Steel’s competitiveness (Levy, 2021). In lieu of the failed project, U.S. Steel acquired Big River Steel in 2021 in an attempt to restore some of its competitiveness. Additionally, following the operational troubles and inefficiencies that it has experienced in recent years they appointed a new COO in 2021. This marked a turning point for the company and helped align its performance with that of its peers, yielding a more positive outlook on the company’s performance.

The years of poor performance culminated in firms like Morningstar publishing negative equity research on U.S. Steel, with the fair value of the company being valued at \$6 per share, when it was trading at \$18.2 in January of 2021. Analysts from Morningstar also evaluated the uncertainty of U.S. Steel as extreme (Morningstar Equity Research, 2021).

While the acquisition and the change in management has done a lot to reverse the problems of the past there is still room for improvement. Furthermore, the strategies and ongoing investments into new projects should help bring U.S. Steel into the forefront of steelmaking in USA.

The company has historically maintained a much lower debt to equity ratio than the industry, with the equity multiplier (Assets/Equity) being lower than the industry. This indicates that U.S. Steel has less assets as a multiple of equity compared to its peers. Additionally, it has been maintaining an interest coverage ratio of 13x since the last two years compared to the negative 2.4x average experienced in 2019 and 2020.

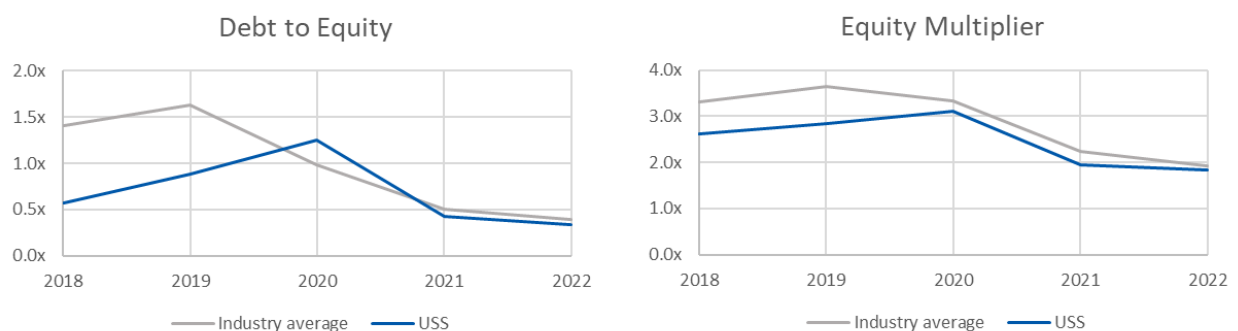


Figure 8: Debt to Equity and Equity Multiplier of U.S. Steel and industry averages, values listed in the appendix.

The quick ratio of U.S. Steel prior to 2020 portrayed an alarming image, where U.S. Steel would not be able to meet current liabilities, with its quick assets such as cash equivalents, marketable securities, and net account receivables. U.S. Steel’s ratio was considerably lower than the industry, further illustrating operational problems, which contributed to the price target assessment by Morningstar to be very low. The current ratio shows a similar image, nevertheless U.S. Steel managed to maintain a ratio of above 1, indicating that they theoretically have enough short-term assets to meet their short-term liabilities. Despite the early problems, the values seem to be converging towards the industry ratios indicating that there have been improvements.

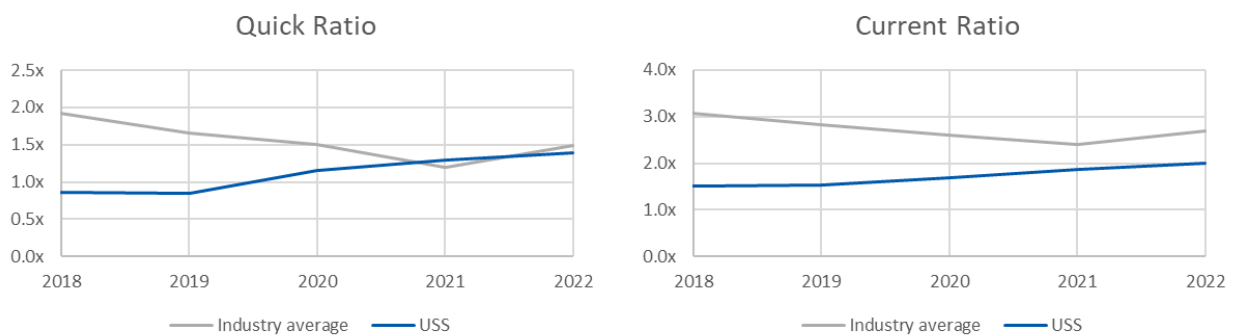


Figure 9: Quick and Current ratio of U.S. Steel and industry averages, values listed in the appendix.

U.S Steel has historically taken longer to collect revenues from its customers, as highlighted by higher Days of Sales outstanding, than the industry average. However, it has had a more efficient inventory management process, as well as been able to negotiate longer payment terms with its suppliers. The latter is an indication of stronger bargaining power with the suppliers. This more efficient management of its working capital and cash conversion cycle has only improved in 2022.

	2018	2019	2020	2021	2022
A/R Turnover	8.3x	9.3x	9.2x	9.4x	12.4x
<i>Industry average</i>	10.6x	9.4x	8.6x	11.4x	10.6x
Inventory Turnover	5.9x	6.7x	6.8x	6.5x	7.1x
<i>Industry average</i>	5.9x	5.3x	4.4x	4.9x	4.8x
Fixed Asset Turnover	2.9x	2.4x	1.8x	2.8x	2.5x
<i>Industry average</i>	3.5x	3.0x	2.3x	3.5x	3.8x
Avg. A/R Days	44	39	40	39	29
<i>Industry average</i>	36	41	45	34	36
Avg. Inventory Days	62	54	54	56	52
<i>Industry average</i>	68	73	94	80	81
Avg. A/P Days	75	62	72	73	66
<i>Industry average</i>	35	37	46	40	37

Table 3: Working Capital Ratios for U.S. Steel and the industry averages.

Overall, we can see that U.S. Steel has the means to sell its inventory, however it appears to be falling behind its peers in the other metrics as a result of high operational costs. This is in line with the view that U.S. Steel had fallen behind in competitiveness, in part due to bad planning with the failed investment but also, by not taking proactive action to prevent such problems from occurring. Based on the current strategy of U.S. Steel and the projects they have lined up, it appears that they have learned their lesson the hard way and are on the path towards better operational efficiency.

4.6 Impact of Risk factors on regional profitability

Following the war in Ukraine, U.S. Steel had to diversify its suppliers for its European operations as majority of its suppliers previously were from Ukraine. This sudden disruption in the supply of raw materials did not only affect U.S. Steel but many manufacturers in Europe, all of whom had to look for new suppliers. This resulted in increased COGS as the demand exceeded the supply available, often having to source raw materials from distant suppliers. As 20% of the revenue of U.S. Steel comes from its European operations a disruption of this magnitude can be the cause of alarm.

Regarding the energy crisis, U.S. Steel along with other Steel producers were able to pass down the costs to their customers however, this is a good solution in the short term but can lead to the crippling of demand for steel products, widely affecting numerous industries.

4.7 Performance of the stock

United States Steel's ticker is **X** and its price as of 10/5/2023 was 21.36 with the stock being down 14.7% YTD, from 2018 till 2023 the stock saw a 12.9% decrease. As can be seen below, U.S. Steel performed worse than the S&P500, however it appears that it is tracking it very closely. Moreover, it has performed worse than its peers during the same period of time. Its 52Wk low was \$16.41 with the 52Wk high being \$31.55.

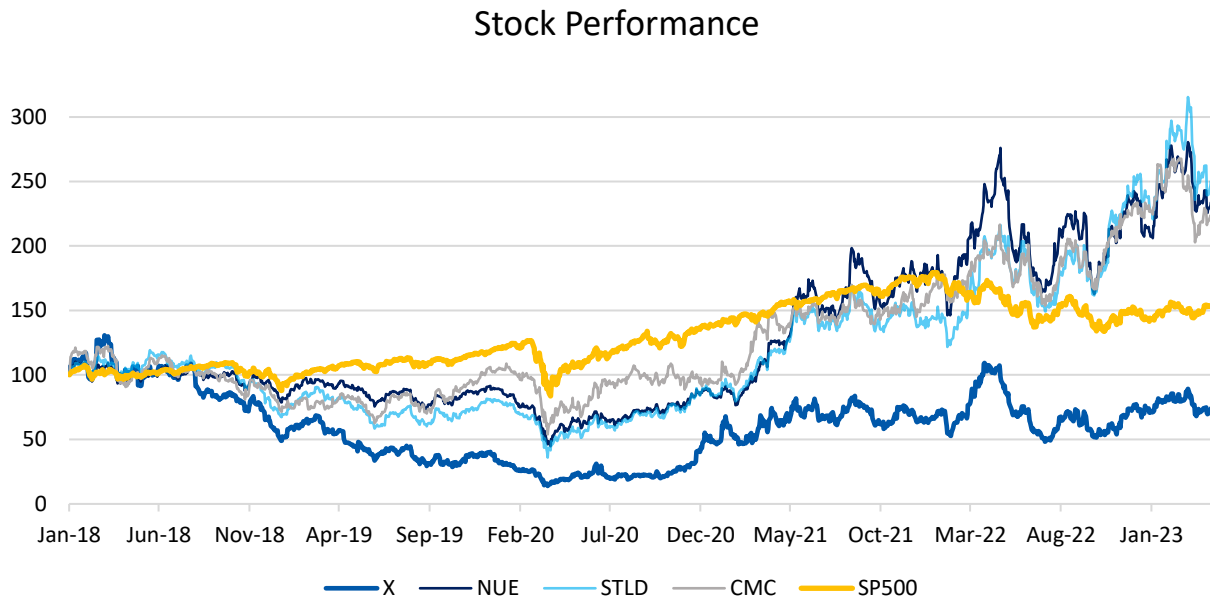


Figure 10: Stock performance of U.S. Steel (X) and peer, base year 2018.

The poor performance of the stock can be in part attributed to the operational problems discussed above but also the war in Ukraine as U.S. Steel has a large exposure in the region, compared to its peers who operate almost solely in the US.

5. Segment Analysis

There are many steel products that can be produced via various types of production methods such as EAF and BOF, and analyzing each product would yield a much more accurate overview of the sector and where it is headed. However, for the purpose of this research the focus will be placed on the two main production methods and how this will affect the steel production capacity in the US.

5.1 Electric Arc Furnace and Blast Furnace

Since the past decade Electric Arc Furnaces have proven to be a cheaper alternative to Basic Oxygen Furnaces. Their popularity has been driven by lower upfront cost and versatility in utilizing steel scraps instead of pig iron. Lastly their efficiency and possibility to be net zero emitters by utilizing renewable energy has propelled their popularity in recent years. As opposed BOF is less efficient in its output and requires natural gas as a source of energy to produce steel.

As more steel companies are focusing on sustainability and their existing BOF production lines are reaching the end of their useful lives, many companies are investing in new EAF lines. In 2012 the market share of EAF according to S&P Global was around 60%, with being close to 71% in 2020 (Coyne & Fitzgerald, 2022). 2022 and 2023 have been expected to be the years when steel production reverts from the pandemic era deficit to a production surplus as more EAF production lines come online around the world.

The change is expected to decrease costs for producers while at the same time pushing prices to lower levels as new capacity comes online. Industry experts expect this to be a difficult time for BOF producers as they will either have to invest in EAF or yield market share to producers who have already invested in EAF (Coyne & Fitzgerald, 2022).

One factor which could slow down the transition to EAF is the supply of steel scraps, as up until now the vast amount of scrap steel originated from vehicles. However, in recent years as automotive supply chains and increased prices for new cars have plagued the industry, the withdrawal of old vehicles to be scrapped has slowed down too. Only recently have improvements in EAF mills allowed obsolete scraps to be converted to steel, supplementing some of that lost supply of usable scraps.

While U.S. Steel is still maintaining its BOF facilities, as previously mentioned it has invested a lot in increasing its EAF production following the acquisition of Big River Steel. These strategic investments into the future of steel production have positioned U.S. Steel for success and potential growth. While it is not explicitly mentioned by the management, there is a strong expectation that the BOF lines will start to be phased out as EAF capacity comes online.

6. Assumptions

As part of the valuation of U.S. Steel a lot of assumptions had to be made for the DCF as well as the scenarios presented in the model. These assumptions are a key part of the forecast and are based on historical data or industry reports.

6.1 Revenue Proxy Model

As previously mentioned, the steel sector is cyclical, which means its performance closely tracks the economic cycle. Based on this information a model was created incorporating the forecasted economic data from the US Congressional Budget Office (CBO) to estimate the revenue growth of steel companies. The data downloaded goes back to 2010 and is on a quarterly basis. The factors used in the model were: civilian labor force 16 years and older, consumer price index, natural gas price (Henry hub) and real GDP. The model was trained using three different regression models: a simple linear regression, another using a 4-quarter moving average, and lastly, one with expanding window since 2010. The forecasted revenues were based on the regression results obtained using these models as well as the forecasted factors provided by CBO.

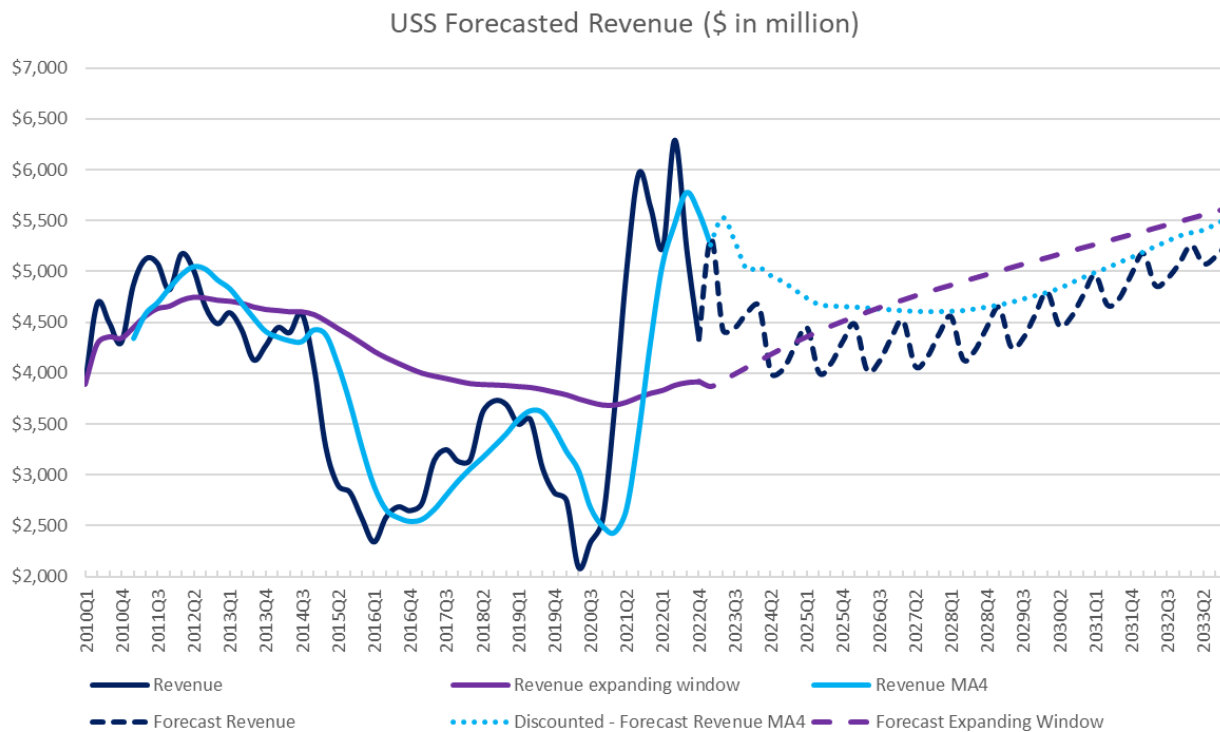


Figure 11: Proxy Model Forecast of U.S. Steel Revenues.

The creation of the model came out of the need to forecast how the industry will perform in the future, as data regarding the industry outlook are sparse.

Comparing the 3 models based on the adjusted R^2 , expanding window performed the best. However, it reduced the cyclicity of the revenues. On the contrary the simple regression and moving average retained cyclicity forecasted returns, as a result the Moving average model was used to calculate the industry growth per period in order to forecast the revenues.

Adjusted R^2	No Moving Avg	Moving Avg 4-Q	Expanding Window
United States Steel Corp	0.553	0.696	0.890
Nucor Corp	0.840	0.904	0.902
Steel Dynamics Inc	0.900	0.942	0.942
Cleveland-Cliffs Inc	0.826	0.881	0.534
Commercial Metals Co	0.601	0.720	0.822
ArcelorMittal SA	0.344	0.557	0.808

Table 4: The Adj R^2 of the proxy model on the revenues of U.S. Steel and its peers. Utilizing normal regression, moving average of 4 quarters, and expanding window.

An additional discount rate of 15% was applied to the forecast of revenues to reduce the optimistic nature of government published forecasts. This value is based on a report from the Congressional Budget Office which indicates that for forecasts with 11-year horizons they tend to overestimate the prediction by around that amount (Congressional Budget Office, 2023).

6.2 Cyclicity

Based on the above-mentioned model we observe the trend of cyclicity, which for the forecast can vary in duration depending on the scenario. As a recessionary environment is expected to increase the interval of the cycle.

In the ***Optimistic and Base Scenario***, based on the model, the sector is expected to reach the peak in early 2023 and bottom out by 2025. Afterwards, a slow and steady recovery is expected, seeing it match the previous high by 2031.

The ***Recession Scenario*** builds on the two previous ones, however, it assumes a much stronger decline from the peak in 2023 and to trough the following year in 2024. The recovery phase is

expected to occur until 2031, as the recovery phase will need a bit longer to overcome the rapid declines caused by the recession.

6.3 Revenues

As is expected, each division of U.S Steel faces different margins, and as such it is important that each of their COGS are forecasted separately, but still using the proxy model as a base for the revenues. There is no expectation that the production capacity of U.S. Steel will increase in the long term based on historical evidence, as they will wind down older operations in favor of newer and more efficient ones.

In the *Optimistic Scenario* revenues are expected to follow the growth rates of the proxy model. In 2024 U.S. Steel will start winding down its Flat-rolled operations in favor of the higher margin Mini-Mill. While the management does not mention a specific timeline for the winding down, the choice of 2024 is based on when the new production lines from ongoing investments are expected to come online. To compensate for this window, a constant discount rate will be applied to the Flat-rolled segment from 2024 onward and a multiplier will be applied to the Mini-Mill segment, the process should take 4 years. The remaining segments will remain the same.

The *Base Scenario* will represent the same assumptions as optimistic scenario, however the winding down of the Flat-rolled operations is expected to commence from 2025 onward.

For the *Recession Scenario* in addition to the growth rate from the proxy model, an additional discount rate of 15% will be placed during the years of 2023, 2024 to represent the strong recessionary environment. This is based on the 20% yoy change in revenues from 2019 to 2020 as the company faced a similar environment due to the Covid-19 crisis. Regarding the winding down it will start also in 2025 and should take 7 years to complete, as the company is likely to face delays in building up mini-mills due to the recession.

6.4 Cost of Goods Sold

The cost of goods sold, also known as COGS, represents a traditional variable cost, and as such it is represented as a percentage of revenues. It is based on the historical trends, and it is also calibrated to match the points in the cycle to the forecast. All scenarios assume the same percentage

varying only by segment as different segments present different historical relative COGS. The values are shown in the appendix (9.5).

6.5 SG&A

Similar to COGS, Selling, General & Administrative costs have historically had a fairly constant ratio to sales of around 3%. For this reason, it will assume the same rate for the forecasting period. While SG&A is considered a fixed cost, one of the methods used for forecasting it for a longer time horizon is as a percentage of sales, as in the long run it becomes a more variable cost.

	2018	2019	2020	2021	2022
SG&A (\$ in million) \$	(336)	(370)	(341)	(495)	(487)
% of Sales	2%	3%	4%	2%	2%
Δ yoy %		10.1%	(7.8%)	45.2%	(1.6%)

Table 5: Historic SG&A of U.S. Steel.

6.6 Net Working Capital

In order to determine the assumptions, the historical values were computed as seen on the table below. Based on historical data the NWC as % of Sales has been typically around 4% as such in the forecasted period it is expected to stay at the same levels.

Net Working Capital	2018	2019	2020	2021	2022	Industry Average
DOH (days of COGS) - Inventories	62	54	54	56	52	94
DSO (days of Sales) - Accounts Receivables	44	39	40	39	29	33
DPO (days of COGS) - Accounts Payables	75	62	72	73	66	56
Other financial Assets (% Sales)	0.4%	0.6%	0.2%	1.4%	1.6%	
Accrued Expense (% Sales)	3.4%	3.4%	4.4%	2.7%	2.9%	
Tax Payables (% Sales)	0.8%	0.9%	1.6%	1.8%	1.3%	
Other Current Liabilities (% Sales)	0.1%	0.2%	0.2%	0.1%	0.1%	

Table 6: Historic net working capital ratios.

Inventories

To forecast inventories Day on Hand of COGS was used. The historical DOH was pretty stable as such the DOH going forward is assumed to be 56, for all scenarios.

Accounts Receivables

For the accounts receivables forecast Day Sales Outstanding was utilized. Based on the historical variance the fixed value of 38 was chosen for forecasted periods and scenarios.

Accounts Payables

Days payable outstanding were used to forecast the accounts payable, where each forecasted year is matched with the appropriate historical value representing the stage of the cycle. The related values for each scenario can be found in the appendix.

Other Financial Assets

Other financial Assets are also important to include in the net working capital as they constitute hedges against their commodity contract prices. To forecast the values the ratio of other financial assets to sales was computed where a fixed rate of 1.6% was determined for all scenarios and periods during the forecast based on the historical values calculated.

Accrued Expenses

Accrued expenses as a percentage of sales were computed, they are based on the historical values, and a fixed rate of 3.4% was chosen for all scenarios to compute the forecast of accrued expenses.

Tax Payables

Taxes payables were also computed using the same method as accrued expenses and a fixed rate of 1.6% was chosen for the forecasted periods for all scenarios.

Other Current Liabilities

For other current liabilities the rate is as a percentage of sales was computed where based on that a fixed cost of 0.1% was chosen for the forecasted periods for all scenarios.

6.7 Capital Expenditure

Regarding capital expenditure the historical new capex was computed as percentage of sales and in all forecast scenarios the historical percentages were used in their equivalent stages of the forecast cycle. As such capex varies between 9.3% of sales, to 14.6% depending on the cycle of the firm. Additionally, the new capex issued in the optimistic scenario during the forecasted year

of 2023 was increased by 1.7 percentage points to represent the strong performance as an economic downturn is delayed for 2024. The values are available in the appendix.

While the capex can appear to be relatively high, the company is undergoing a transformation toward sustainable steel and net zero emissions, justifying such high numbers of Capex annually.

6.8 Depreciation

According to the annual report, two depreciation rates were found. The primary being 15 years for existing tangible assets as well as 15 years for any new capex to be depreciated, on the other hand intangible assets took around 21 years.

6.9 Terminal Growth

The terminal growth of 2% will be used. With the US long-term nominal GDP growth being 4.2% and the long-term inflation being around 2%, the real GDP growth will be 2%. For these reasons a 2% growth rate was chosen for U.S. Steel to grow in perpetuity as it is able to pass any inflation related costs to the customer.

6.10 Discount Factor

In order to get the present value of the projected FCFF the mid-year conversion will be used as it is assumed that FCF will be generated evenly throughout the year. This is important as it implies that cashflows are not received only at the end of the year but instead all year round.

6.11 Dilution of Shares

In order to determine the correct number of shares outstanding the dilution of shares was considered. “This expected dilution in future years will reduce the value of equity per share today” (Damodaran, 2002), this is why it is important to include the dilutions in the calculations. With that in mind the three main factors which affect the number of O/S in this analysis are convertible bonds, performance shares and restricted shares.

The convertible bonds worth \$350 million with a par value of \$1000, conversion rate of 74.83 and a strike of \$13.36 are the single largest factor affecting the capital structure if converted. It is assumed that these bonds will be converted using the “if converted” method as they are well in the money. As a result, they increased the number of outstanding shares by 26.2 million.

The remaining dilutions only amount to 2.5 million additional shares from restricted shares as well as performance shares, which are paid regularly. Overall, the performance and restricted shares bring in the total dilution to 28.7 million shares. The total number of total shares after dilution amounted to 255.9 million as opposed to the common shares outstanding of 227.2 million.

6.12 Taxation

Due to the pandemic related losses U.S. Steel received a tax benefit for 2020 and deferred tax benefit for 2021 and 2022 through a Valuation allowance on deferred tax assets, which is no longer required. As such it appears that these tax benefits will not be occurring on a regular basis, making the effective tax rate more closely reflect the federal statutory tax rate of 21%.

If more states implement a recycling and environmental tax credit incentive like in Arkansas, then the tax credits of the firm will increase, as focus has been placed on sustainability and environmental impact. This will potentially bring a substantial advantage for the company, as they have already been growing in the last few years due to Big River steel. However, for now the statutory rate of 21% is expected to take effect immediately.

6.13 Weighted Average Cost of Capital

Market Risk Premium

For the market risk premium in the US the rate of 5.94% was used from Damodaran, with further consensus showing a MRP of 5.6% based on a survey from IESE Business School (Fernandez, et al., 2022).

Cost of Equity

In order to calculate the WACC, both CAPM and 3FF were computed and after careful consideration, the 3FF model was used. Both models performed similarly regarding the cost of equity despite the fact that CAPM's explanatory power viewed using R^2 0.19 and 3FF was 0.29. The similarity in the results of cost of equity (R_e) is probably due to the sensitivity that the steel industry has to the general market rendering both models to yield very close results. Those results being a β of 1.48 and a R_e of 11.89% for CAPM, while 3FF yielded β s of 1.15 (HML), 1.15 (SMB), 1.42 (Mkt-rf) for each respective factor and a R_e of 10.34%.

Cost of Debt

The Cost of debt was computed using the weighted average yields that the outstanding bonds of U.S. Steel. For this calculation, a convertible bond was excluded from the calculation as its option is well in the money and as such should be treated as equity instead of debt.

Market Value of Debt

The market value of debt was computed calculating the bonds outstanding times their traded price, plus the loans.

Risk Free Rate

The risk-free rate represents the 10-Year Treasury yield of 3.62% as of February 6th, 2023.

6.14 Capital Structure

The market value of debt for US Steel as of 10th of May 2023 was \$2875 million, with the market capitalization as of the same date being \$4837.08 million. Based on the management strategy for U.S. Steel, the long-term capital structure should remain the same. Additionally, the company has covenants it must adhere to, preventing it from altering its capital structure. With one such covenant being to maintain a net debt to EBITDA below 3.5:1. The current rate is 0.03:1 with the historic values being in *Table 7*).

	2018	2019	2020	2021	2022
Net Debt / EBITDA	1.0x	5.0x	52.5x	0.3x	0.0x

Table 7: Historic Net Debt/EBITDA needed to for the covenants.

7. Valuation

7.1 Discounted Cash Flow

In the DCF model, three scenarios were run as mentioned before. The valuation of U.S. Steel has been performed using data until the end of March 2023. The model is based on the assumptions mentioned prior. The forecast period for the DCF ranged from 2023 until 2030, while this is generally speaking a long period to forecast and yield accurate result it is necessary as it represents a full cycle in the company. In these three scenarios the base, the optimistic and the recession scenario we observe has different the valuation is based in large part to the Capex the company expects to see going forward into the future.

7.1.1 Revenues

Based on the segments of U.S. Steel, revenues for the company are expected to fluctuate as the recovery phase after a bull market is quite long. In addition, the sales from Flat rolled will decrease over time in favor of larger expansion in the Mini mill segment, which is crucial for a carbon neutral future. Lastly, it also offers a larger profit margin over Flat-rolled.

The CAGR for the optimistic scenario revenues throughout the forecast period is -4.8%, while the base scenario is -6.5%, with the recession scenario having a CAGR of -6.2%. While the CAGR is lower for the base scenario this has to do with the number of years it takes Flat-rolled to be wound down as the assumptions indicate that it would take longer in the recession scenario to get rid of this segment in a timely manner, as such it would continue earning revenue. However, such a winding down is essential if the company wants to reach its climate goals.

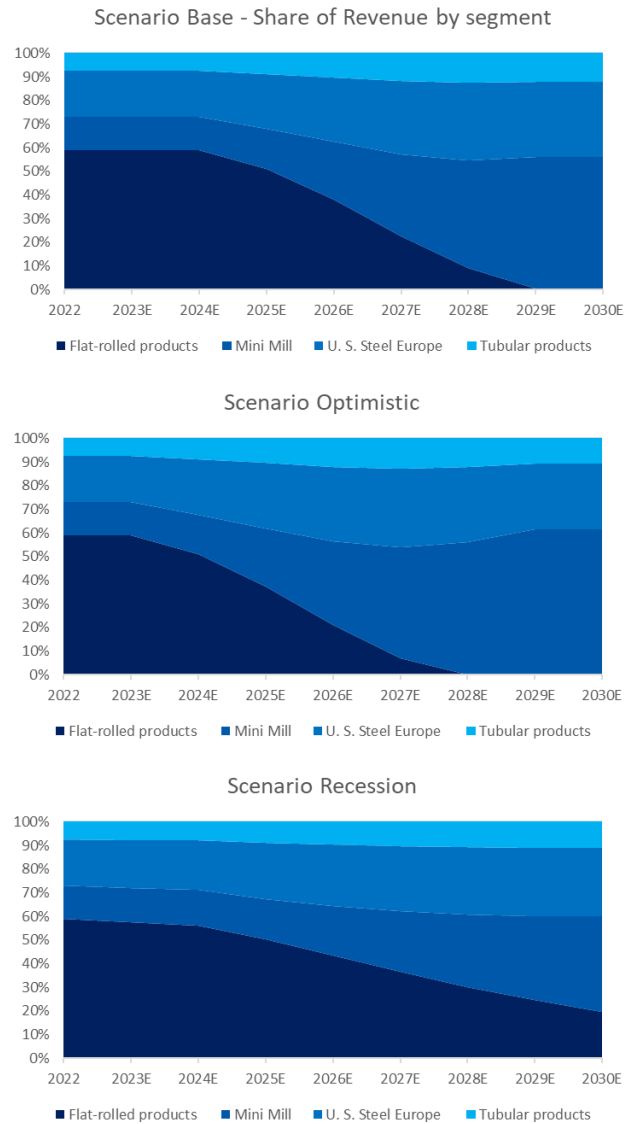


Figure 12: Share of U.S. Steel forecasted revenues by segment and scenario.

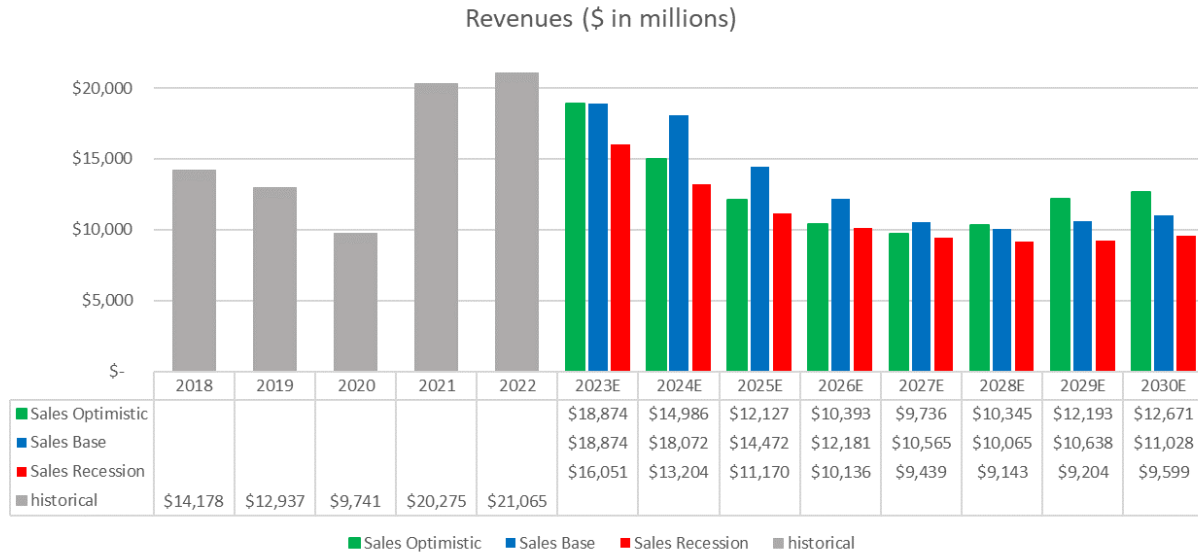


Figure 13: Historical and Forecasted revenues by scenario. (\$ in millions).

7.1.2 COGS

The main COGS of U.S. Steel as previously mentioned are iron products and other metals used in the production of steel as well as energy related costs. Since U.S. Steel has invested in new more efficient facilities COGS as % of sales is expected to decrease as the years pass, ceteris paribus. As such we generally see this trend is also present in our forecast period, as is shown in the graph below.

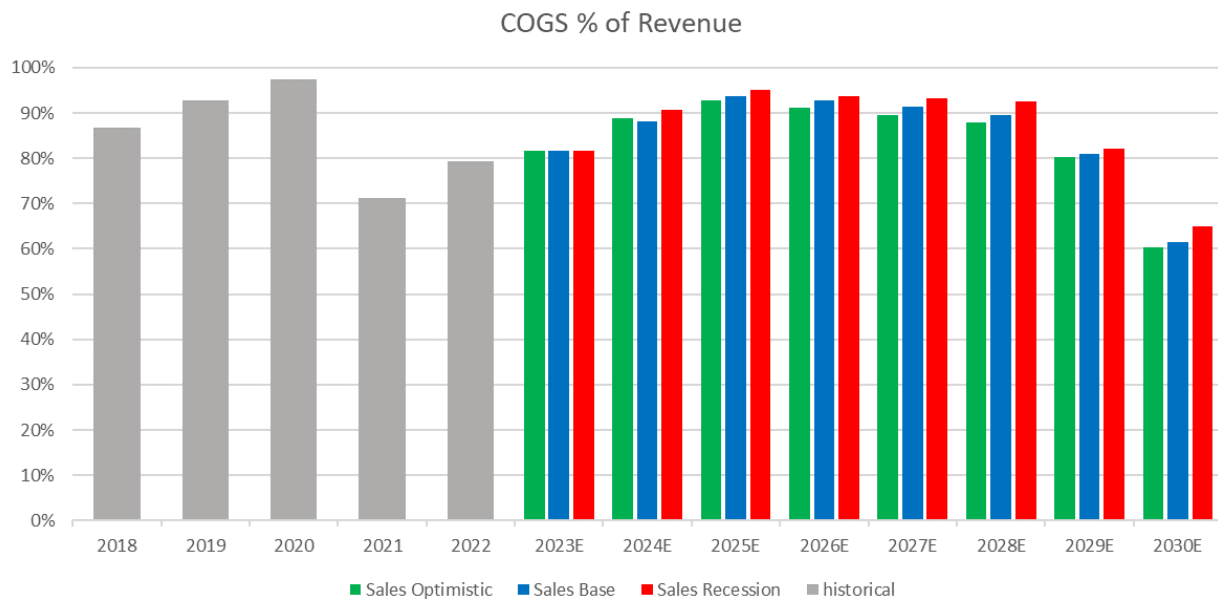


Figure 14: Historic and Forecasted Costs of Good Sold of U.S. Steel as a % of Revenues by scenario.

Additionally, during times of uncertainty, COGS become more expensive as the price of the underlying materials needed in the production has a high volatility, leading to high prices when negotiating contracts with suppliers. In all three scenarios this trend can be observed, but it is particularly pronounced in the recession scenario as it assumes that markets stay volatile for longer after an economic crash.

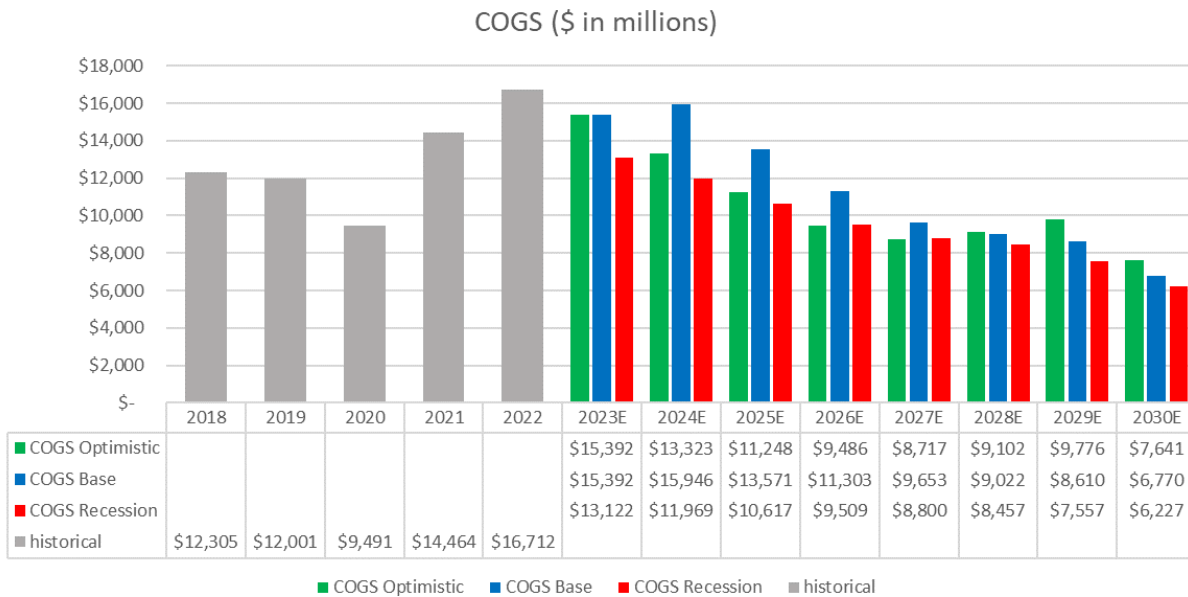


Figure 15: Historic and Forecasted Costs of Goods Sold by scenario (\$ in millions).

While COGS were computed with separate assumption for each segment that U.S. Steel operates in, COGS tends to account between 80-99% of sales during worse years, while during an economic boom they can even reach around 60%. This is, as mentioned, due to the volatility of prices and the uncertainty related to sourcing the raw materials which are essential to the steelmaking process.

7.1.3 SG&A

The SG&A of the firm is considered to be in line with its peers who report a rate between 3-5% of revenue.

7.1.4 Unusual Expense/Income

In 2021, U.S. Steel had a onetime gain of around \$378 million relating to the sale of one of its assets. On the contrary, in 2022 it received a loss of \$48 million, relating to severance packages and downsizing of the workforce. It is believed that these unusual expenses are not recurring and the ones that have been considered recurring have been accounted and adjusted moving forward.

7.1.5 Depreciation and Amortization

The depreciation of assets has been historically around 4% to 6%. However, this rate is expected to increase as the company has been experiencing a high capex for the last decade, investing in new manufacturing techniques as well as new production lines and mining operations. This is further exacerbated as the time it takes to depreciate the majority of assets is around 15 years.

While in % there seems to be a high fluctuation in D&A, in absolute terms it appears to be quite stable throughout the years, only experiencing increases due to the new Capex. As can be seen, the optimistic scenario has the highest depreciation % in the early years of the forecast, this is partly due to the increased rate of Capex in 2023, which increases the amount of new D&A.

In all scenarios D&A appears to be converging linearly towards the rate of 10% to 12%. This is expected to be the case as the new capex begins to depreciate.

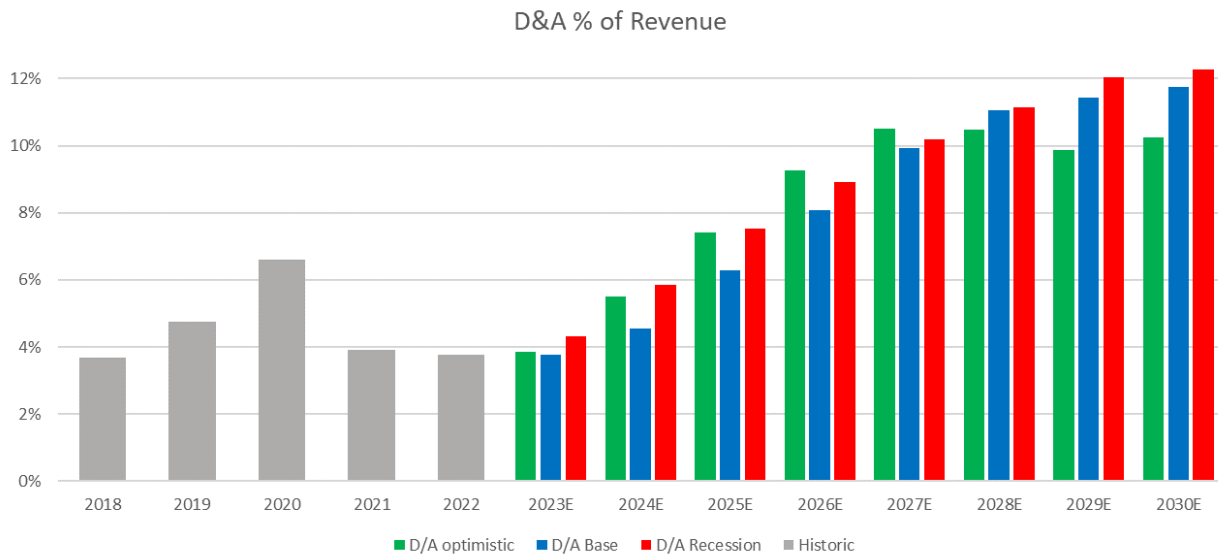


Figure 16: Historic and Forecasted Depreciation and Amortization as a % of Revenues by scenario.

7.1.6 Capital Expenditure

Capex is a key part of the valuation, as mentioned in the assumptions, U.S. Steel is undergoing a transformation towards sustainability as such it has been heavily investing in more efficient processes to be ahead of the competition and establish itself as a leader in sustainable steel.

All the scenarios present almost the same amount of Capex as % of sale, since regardless of the macro-economic situation affecting the industry, it is important to invest in new processes even during a downturn as new production lines take long time to come online.

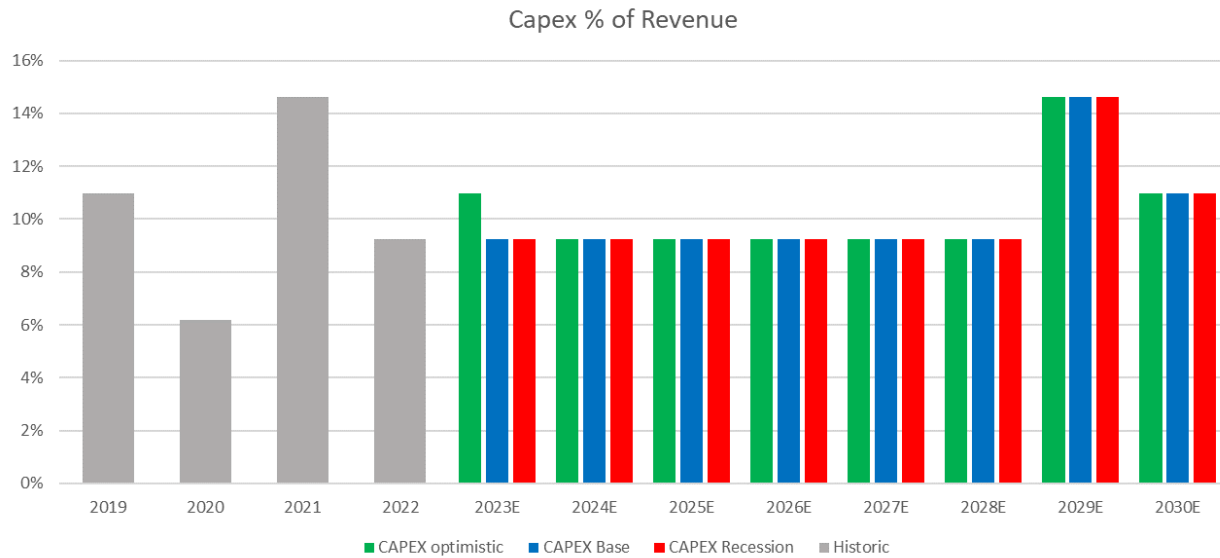


Figure 17: Historic and Forecasted Capital Expenditure as a % of Revenue by scenario.

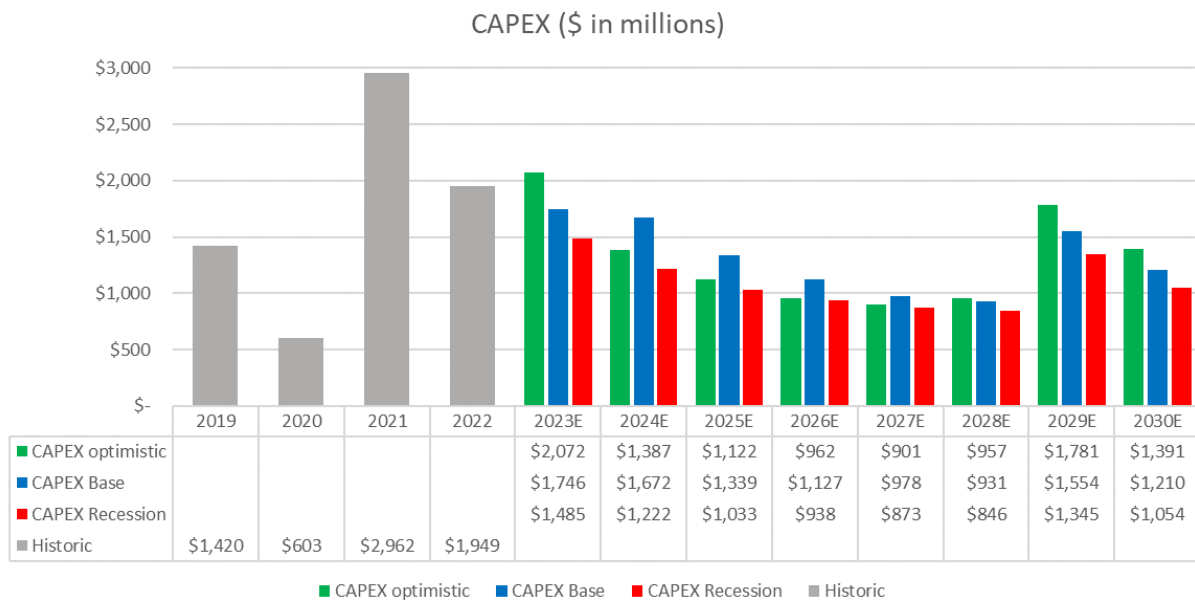


Figure 18: Historic and Forecasted Capital Expenditure by scenario (\$ in millions).

7.1.7 Net Working Capital

U.S. Steel may be a cyclical company however it is still in its maturity phase, as a result NWC is high and stable, meaning it does not fluctuate a lot. This indicates that the company is able to meet its short-term obligations. Historically there have been circumstances where that was not the case, but overall stability is believed to be the key feature of the company. Based on the assumptions listed under the net working capital, the company is expected to maintain its historic rate of NWC to Sales of 4%.

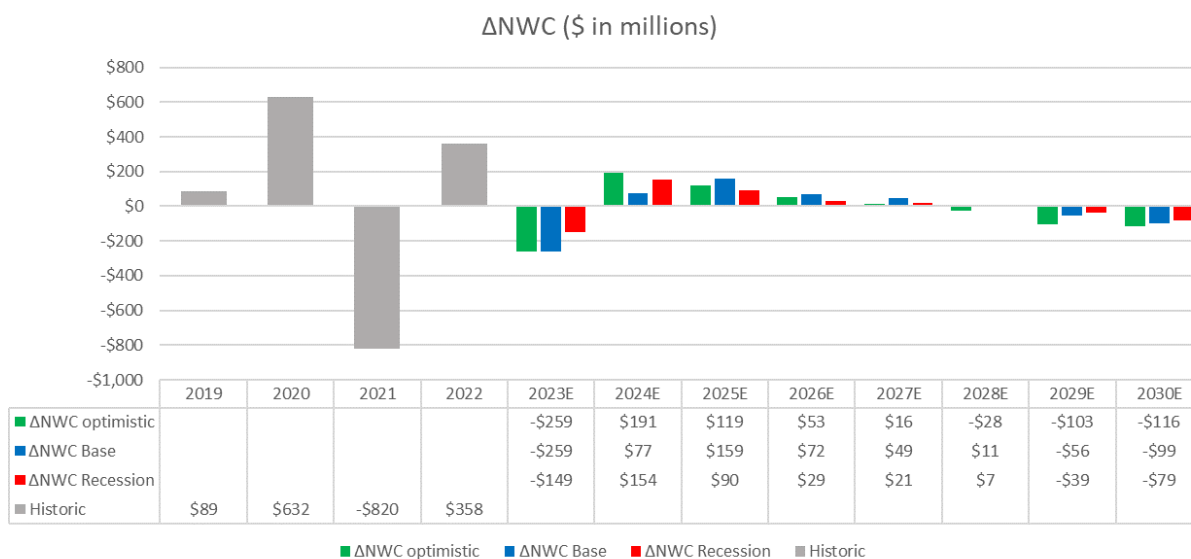


Figure 19: Historic and Forecasted Changes in Net Working Capital by scenario (\$ in millions).

In the net working capital, the firm appeared to perform better than the industry average in the DOH for the Inventory, where U.S. Steel boasts a value of 56 compared to 94 days. However, it performed worse in Day Sales Outstanding, where the value was 38 days compared to 33 days, indicating that the industry peers receive payments sooner for their services.

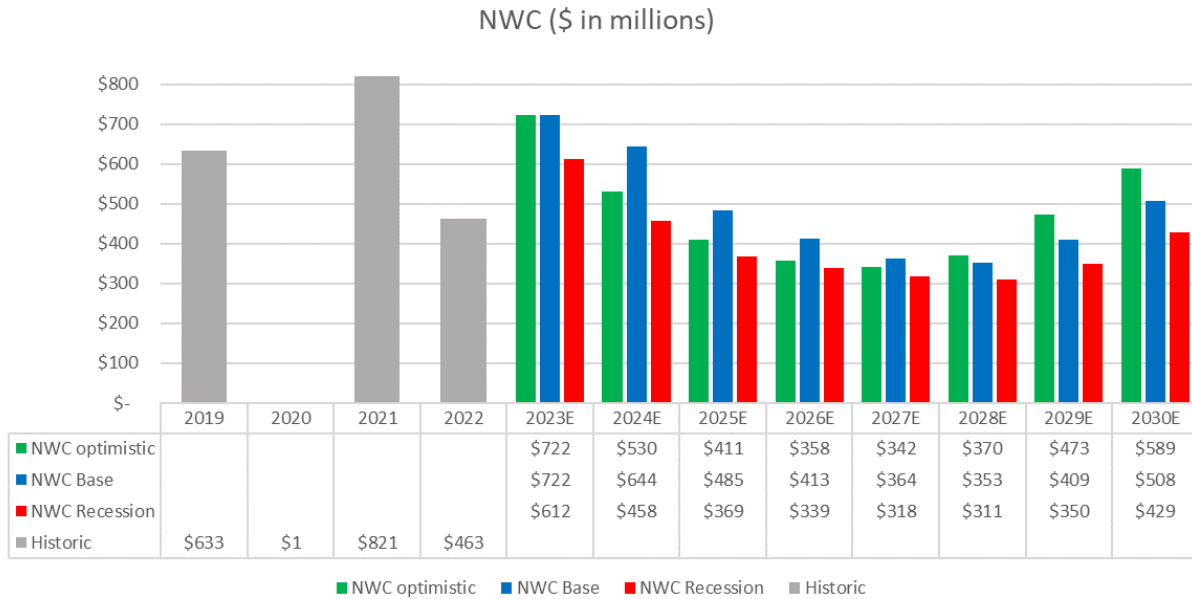


Figure 20: Historic and Forecasted Net Working Capital by Scenario (\$ in millions).

Lastly, Days Payable Outstanding was also higher for U.S. Steel as it has 70 days compared to the industry value of 56 days. This could be interpreted either as a good thing or alarming. The two scenarios are that the company has cultivated a strong reputation as a reliable counterparty, affording them the ability to increase their DSO without operational problems or they are having financial problems meeting their obligations. Given that their NWC has always been positive it is more likely that it is the first scenario.

7.1.8 Weighted Average Cost of Capital

The WACC of U.S. Steel was computed as referred by the assumptions, resulting in a WACC of 8.6%. After the computation U.S. Steel had a cost of debt of 7.1%, a cost of equity of 10.3%, with the MV of debt being \$2875 million and the Market Capitalization of \$4837 million as of May 10th, 2023.

	CAPM	3FF	Mix
Risk Free Rate		3.6%	
Cost of Debt		7.1%	
Tax rate		21%	
D/E Ratio		0.59	
Cost of Equity	11.9%	10.3%	11.1%
WACC	9.5%	8.6%	9.1%
Price Base Scenario	\$ 15.24	\$ 17.09	\$ 16.12

Table 8: Price Target comparison between CAPM, 3FF and Equally weighted Mix.

Having performed statistical test to determine which model is better suited for the DCF as it can be seen in the assumptions, 3FF was used. Despite that, the price target using CAPM and an equally weighted mix of the two models was computed as a reference point for the valuation.

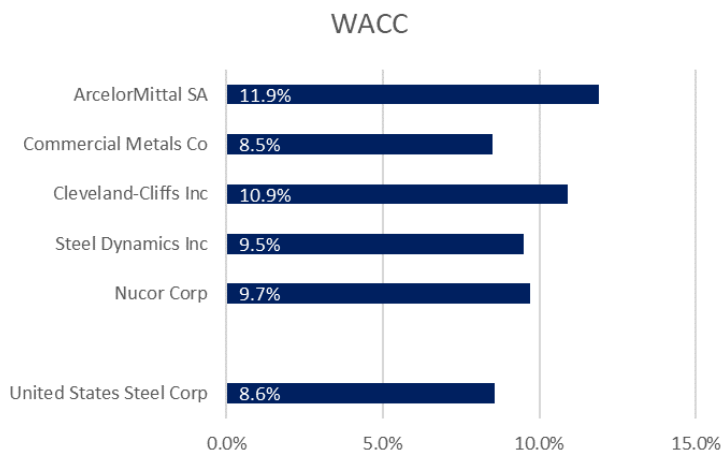


Table 8 presents the price targets for all three models. As CAPM has a

lower explanatory power than 3FF, it is subject to a considerably lower price target. The Mix was computed as it is often present in industry equity reports, however for the purpose of this valuation it serves only in a comparative role.

The WACC of the U.S. Steel follows closely the rate of 10.1% that other industry peers present. The rates of all the peers except ArcelorMittal were collected from Refinitiv, with ArcelorMittal's rate of 11.9% originating from a UBS equity report on the company, from March 2023 (UBS Global Research and Evidence Lab, 2023).

7.1.9 Discounted FCFF

In accordance with all the aforementioned assumptions the tables below show the discounted FCFF for each scenario as well as the Terminal year, which represents both the troughs and the peaks in the given life cycle of a U.S. Steel. Lastly, the terminal value can be found at the bottom right of each scenario table and when added with the previous discounted FCFFs it represents the Enterprise Value of the company.

Optimistic Scenario	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TV Pro Forma
Sales	14,178	12,937	9,741	20,275	21,065	18,874	14,986	12,127	10,393	9,736	10,345	12,193	12,671	
(-) COGS (Excluding D&A)	(12,305)	(12,001)	(9,491)	(14,464)	(16,712)	(15,392)	(13,323)	(11,248)	(9,486)	(8,717)	(9,102)	(9,776)	(7,641)	
Gross Margin	1,873	936	250	5,811	4,353	3,482	1,663	879	907	1,018	1,243	2,418	5,031	
(-) SG&A	(336)	(370)	(341)	(495)	(487)	(519)	(375)	(306)	(269)	(247)	(264)	(312)	(323)	
(-) Research & Development	-	-	-	-	-	-	-	-	-	-	-	-	-	
(+) Other Operating Gains & Losses	(89)	16	146	(257)	47	47	47	47	47	47	47	47	47	
Adj. EBITDA	1,448	582	55	5,059	3,913	3,010	1,335	620	684	818	1,026	2,153	4,755	
(+) Earnings from associates & joint ventures	99	79	(86)	281	249	100	85	83	82	82	82	84	88	
(-) Non-recurring expenses (Gains)	-	(275)	(138)	378	(48)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	
(-) Impairments	-	-	(263)	(273)	(163)	-	-	-	-	-	-	-	-	
EBITDA Reported	1,547	386	(432)	5,445	3,951	3,089	1,400	682	746	879	1,088	2,216	4,821	
(-) Depreciation & Amortization	(521)	(616)	(643)	(791)	(791)	(730)	(823)	(898)	(962)	(1,022)	(1,086)	(1,204)	(1,297)	
EBIT	1,026	(230)	(1,075)	4,654	3,160	2,358	577	(215)	(216)	(143)	2	1,012	3,524	
(+) Depreciation & Amortization	-	616	643	791	791	730	823	898	962	1,022	1,086	1,204	1,297	
(+) Taxes	-	(178)	142	(170)	(735)	(461)	(94)	67	65	45	18	(190)	(727)	
(+) P&L from discontinued operations	-	-	-	-	-	-	-	-	-	-	-	-	-	
(-) Δ NWC	-	89	632	(820)	358	(259)	191	119	53	16	(28)	(103)	(116)	
(-) Capex	-	(1,420)	(603)	(2,962)	(1,949)	(2,072)	(1,387)	(1,122)	(962)	(901)	(957)	(1,781)	(1,391)	
FCF to the Firm	-	(1,123)	(261)	1,493	1,625	297	111	(253)	(98)	40	121	142	2,587	368
Discount Factor	-	-	-	-	-	0.96	0.88	0.81	0.75	0.69	0.64	0.59	0.54	0.50
Present Value FCFF	-	-	-	-	-	285	98	(206)	(73)	28	77	83	1,396	2,839

Table 9: Optimistic Scenario: Revenue to present value FCFF plus the terminal Value.

Recession Scenario	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TV Pro Forma
Sales	14,178	12,937	9,741	20,275	21,065	16,051	13,204	11,170	10,136	9,439	9,143	9,204	9,599	
(-) COGS (Excluding D&A)	(12,305)	(12,001)	(9,491)	(14,464)	(16,712)	(13,122)	(11,969)	(10,617)	(9,509)	(8,800)	(8,457)	(7,557)	(6,227)	
Gross Margin	1,873	936	250	5,811	4,353	2,929	1,235	553	627	640	686	1,646	3,372	
(-) SG&A	(336)	(370)	(341)	(495)	(487)	(442)	(330)	(282)	(263)	(240)	(233)	(236)	(245)	
(-) Research & Development	-	-	-	-	-	-	-	-	-	-	-	-	-	
(+) Other Operating Gains & Losses	(89)	16	146	(257)	47	47	47	47	47	47	47	47	47	
Adj. EBITDA	1,448	582	55	5,059	3,913	2,534	952	318	412	447	500	1,457	3,174	
(+) Earnings from associates & joint ventures	99	79	(86)	281	249	100	85	83	82	82	82	84	88	
(-) Non-recurring expenses (Gains)	-	(275)	(138)	378	(48)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	
(-) Impairments	-	-	(263)	(273)	(163)	-	-	-	-	-	-	-	-	
EBITDA Reported	1,547	386	(432)	5,445	3,951	2,613	1,016	380	473	508	562	1,521	3,241	
(-) Depreciation & Amortization	(521)	(616)	(643)	(791)	(791)	(691)	(773)	(842)	(904)	(962)	(1,019)	(1,108)	(1,179)	
EBIT	1,026	(230)	(1,075)	4,654	3,160	1,922	244	(462)	(431)	(454)	(457)	413	2,062	
(+) Depreciation & Amortization	-	616	643	791	791	691	773	842	904	962	1,019	1,108	1,179	
(+) Taxes	-	(178)	142	(170)	(735)	(370)	(24)	119	112	115	121	(54)	(407)	
(+) P&L from discontinued operations	-	-	-	-	-	-	-	-	-	-	-	-	-	
(-) Δ NWC	-	89	632	(820)	358	(149)	154	90	29	21	7	(39)	(79)	
(-) Capex	-	(1,420)	(603)	(2,962)	(1,949)	(1,485)	(1,222)	(1,033)	(938)	(873)	(846)	(1,345)	(1,054)	
FCF to the Firm	-	(1,123)	(261)	1,493	1,625	609	(75)	(445)	(324)	(229)	(156)	84	1,702	146
Discount Factor	-	-	-	-	-	0.96	0.88	0.81	0.75	0.69	0.64	0.59	0.54	0.50
Present Value FCFF	-	-	-	-	-	584	(66)	(362)	(243)	(158)	(99)	49	918	1,123

Table 10: Recession Scenario: Revenue to present value FCFF plus the terminal Value.

Base Scenario	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	TV Pro Forma
Sales	14,178	12,937	9,741	20,275	21,065	18,874	18,072	14,472	12,181	10,565	10,065	10,638	11,028	
(-) COGS (Excluding D&A)	(12,305)	(12,001)	(9,491)	(14,464)	(16,712)	(15,392)	(15,946)	(13,571)	(11,303)	(9,653)	(9,022)	(8,610)	(6,770)	
Gross Margin	1,873	936	250	5,811	4,353	3,482	2,126	901	878	913	1,043	2,027	4,258	
(-) SG&A	(336)	(370)	(341)	(495)	(487)	(519)	(452)	(365)	(316)	(268)	(257)	(272)	(281)	
(-) Research & Development	-	-	-	-	-	-	-	-	-	-	-	-	-	
(+) Other Operating Gains & Losses	(89)	16	146	(257)	47	47	47	47	47	47	47	47	47	
Adj. EBITDA	1,448	582	55	5,059	3,913	3,010	1,721	583	609	692	833	1,802	4,024	
(+) Earnings from associates & joint ventures	99	79	(86)	281	249	100	85	83	82	82	82	84	88	
(-) Non-recurring expenses (Gains)	-	(275)	(138)	378	(48)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	(21)	
(-) Impairments	-	-	(263)	(273)	(163)	-	-	-	-	-	-	-	-	
EBITDA Reported	1,547	386	(432)	5,445	3,951	3,089	1,785	645	671	753	895	1,866	4,091	
(-) Depreciation & Amortization	(521)	(616)	(643)	(791)	(791)	(709)	(820)	(909)	(985)	(1,050)	(1,112)	(1,215)	(1,296)	
EBIT	1,026	(230)	(1,075)	4,654	3,160	2,380	965	(264)	(314)	(297)	(217)	650	2,795	
(+) Depreciation & Amortization	-	616	643	791	791	709	820	909	985	1,050	1,112	1,215	1,296	
(+) Taxes	-	(178)	142	(170)	(735)	(466)	(175)	77	86	80	67	(109)	(568)	
(+) P&L from discontinued operations	-	-	-	-	-	-	-	-	-	-	-	-	-	
(-) Δ NWC	-	89	632	(820)	358	(259)	77	159	72	49	11	(56)	(99)	
(-) Capex	-	(1,420)	(603)	(2,962)	(1,949)	(1,746)	(1,672)	(1,339)	(1,127)	(978)	(931)	(1,554)	(1,210)	
FCF to the Firm	-	(1,123)	(261)	1,493	1,625	618	16	(457)	(298)	(96)	42	147	2,214	273
Discount Factor	-	-	-	-	-	0.96	0.88	0.81	0.75	0.69	0.64	0.59	0.54	0.50
Present Value FCFF	-	-	-	-	-	593	14	(372)	(224)	(66)	27	86	1,194	2,104

Table 11: Base Scenario: Revenue to present value FCFF plus the terminal Value.

7.1.10 Enterprise Value to Equity Value

In order to get the target price from every scenario, after computing the enterprise value we have to create a bridge to equity value. This involves computing the net debt and then subtracting it together with minority interest from the enterprise value to get the equity value.

After computing the equity value, we must consider any possible dilutions related to performance stocks or convertible bonds. After the dilution U.S. Steel has 255.9 million outstanding shares, which once they are subtracted by the respective equity value the target price is presented.

Enterprise Value to Equity Value (\$ in millions)	Optimistic	Recession	Base
Enterprise Value	\$ 4,525	\$ 1,746	\$ 3,355
Less: Cash & Cash-Equivalents:	\$ 3,504	\$ 3,504	\$ 3,504
Less: Equity Investments:	\$ 818	\$ 818	\$ 818
Plus: Total Debt:	\$ (2,875)	\$ (2,875)	\$ (2,875)
Plus: Other financial liabilities:	\$ (25)	\$ (25)	\$ (25)
Plus: Noncontrolling Interests:	\$ (93)	\$ (93)	\$ (93)
Plus: Unfunded Pension Obligations:	\$ (209)	\$ (209)	\$ (209)
Plus: Other liabilities:	\$ (105)	\$ (105)	\$ (105)
Plus: Restructuring & Legal Liabilities:	\$ -	\$ -	\$ -
Market Capitalization	\$ 5,540	\$ 2,761	\$ 4,371
Number of common shares (m)	227.2	227.2	227.2
Number of shares issued from dilution (m)	28.7		
Total number of diluted shares outstanding (m)	255.9		
Market Capitalization diluted (m)	\$ 5,540	\$ 2,761	\$ 4,371
Target stock price	\$ 21.7	\$ 10.8	\$ 17.1

Table 12: Enterprise Value to Equity Value by scenario.

7.1.11 Industry Consensus

The analysts' consensus from Refinitiv Eikon as of May 5, 2023, is **Hold** recommendation, with the median price target being \$30. Of the 13 analysts 7 gave a hold recommendation, followed by 3 Buy, 2 Sell and 1 Strong Buy recommendation. The recommendations on Refinitiv Eikon are not only based on the target price but also on how the peers and the sector is performing, as such a hold recommendation represents that U.S. Steel is in line with its peers, whereas a sell indicates underperformance, conversely a buy signifies it can outperform its peers. The latest revisions to

the recommendation were in the beginning of May where the recommendations from several analysts got upgraded to either hold or buy.

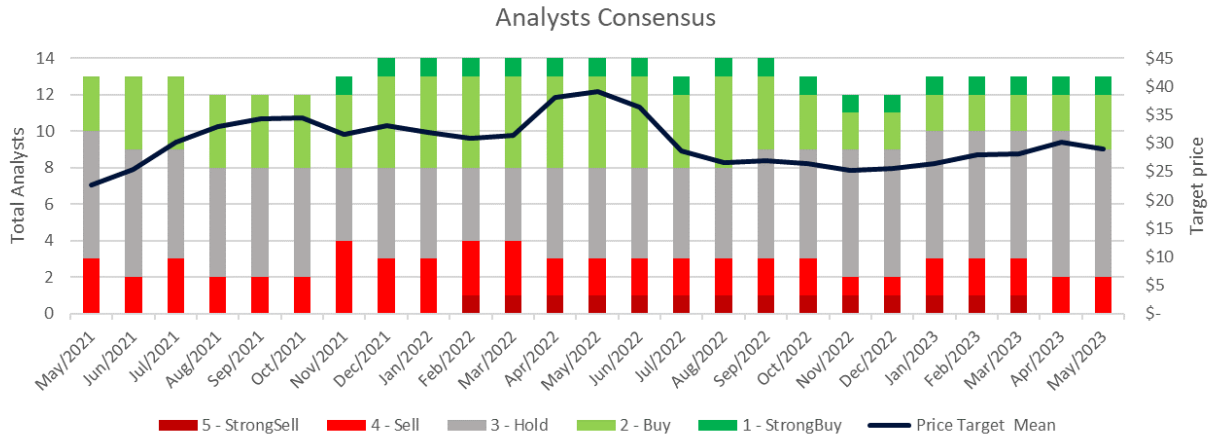


Figure 22: Analyst Recommendation and Price Target from refinitiv eikon.

The industry consensus goes largely counter to the finding of this research paper, since in the base scenario we receive a price target of \$17.1, which would indicate a sell recommendation.

		Optimistic Scenario						
		WACC						
Price \$ 21.36		7.00%	7.50%	8.00%	8.50%	9.00%	9.50%	10.00%
Terminal g	Target Price \$ 21.66							
	1.5%	\$ 26.19	\$ 24.19	\$ 22.49	\$ 21.03	\$ 19.77	\$ 18.66	\$ 17.68
	1.8%	\$ 26.94	\$ 24.79	\$ 22.99	\$ 21.45	\$ 20.11	\$ 18.95	\$ 17.93
	2.0%	\$ 27.76	\$ 25.46	\$ 23.53	\$ 21.89	\$ 20.49	\$ 19.26	\$ 18.19
	2.3%	\$ 28.68	\$ 26.18	\$ 24.11	\$ 22.37	\$ 20.88	\$ 19.60	\$ 18.48
	2.5%	\$ 29.69	\$ 26.98	\$ 24.75	\$ 22.89	\$ 21.31	\$ 19.96	\$ 18.78
	2.8%	\$ 30.82	\$ 27.86	\$ 25.45	\$ 23.46	\$ 21.78	\$ 20.34	\$ 19.11
	3.0%	\$ 32.10	\$ 28.84	\$ 26.22	\$ 24.08	\$ 22.28	\$ 20.76	\$ 19.45

7.1.12 Sensitivity analysis

The sensitivity analysis was computed using the different weighted average cost of capital but also terminal growth rate. While changes in the terminal growth rate are hard to justify, improvements or deterioration of WACC can more easily implemented as the company takes steps to address those issues.

		Recession Scenario						
		WACC						
Price \$ 21.36		7.00%	7.50%	8.00%	8.50%	9.00%	9.50%	10.00%
Terminal g	Target Price \$ 10.80							
	1.5%	\$ 12.59	\$ 11.80	\$ 11.12	\$ 10.55	\$ 10.05	\$ 9.61	\$ 9.22
	1.8%	\$ 12.89	\$ 12.04	\$ 11.32	\$ 10.71	\$ 10.18	\$ 9.72	\$ 9.32
	2.0%	\$ 13.21	\$ 12.30	\$ 11.53	\$ 10.89	\$ 10.33	\$ 9.85	\$ 9.43
	2.3%	\$ 13.57	\$ 12.58	\$ 11.77	\$ 11.08	\$ 10.49	\$ 9.98	\$ 9.54
	2.5%	\$ 13.98	\$ 12.90	\$ 12.02	\$ 11.28	\$ 10.66	\$ 10.12	\$ 9.66
	2.8%	\$ 14.42	\$ 13.25	\$ 12.30	\$ 11.51	\$ 10.84	\$ 10.28	\$ 9.79
	3.0%	\$ 14.93	\$ 13.64	\$ 12.60	\$ 11.75	\$ 11.04	\$ 10.44	\$ 9.92

The sensitivity analysis indicates that in most scenarios the recommendation should be Sell, with only the optimistic indicating a Hold.

		Base Scenario						
		WACC						
Price \$ 21.36		7.00%	7.50%	8.00%	8.50%	9.00%	9.50%	10.00%
Terminal g	Target Price \$ 17.09							
	1.5%	\$ 20.48	\$ 18.95	\$ 17.70	\$ 16.62	\$ 15.69	\$ 14.87	\$ 14.15
	1.8%	\$ 20.99	\$ 19.40	\$ 18.07	\$ 16.93	\$ 15.94	\$ 15.09	\$ 14.33
	2.0%	\$ 21.60	\$ 19.89	\$ 18.47	\$ 17.26	\$ 16.22	\$ 15.32	\$ 14.53
	2.3%	\$ 22.28	\$ 20.43	\$ 18.90	\$ 17.61	\$ 16.52	\$ 15.57	\$ 14.74
	2.5%	\$ 23.03	\$ 21.02	\$ 19.37	\$ 18.00	\$ 16.83	\$ 15.83	\$ 14.97

Table 13: Sensitivity Analysis

7.2 Monte Carlo

Lastly as part of the sensitivity analysis, utilizing the base scenario assumptions, a Monte Carlo was run with 10 million simulations of the revenue growth and standard deviation of that growth as well as other variable costs. The results yield a mean price of \$29.6 and median of \$34.9. The skewness of the simulation was 0.06 with an excess kurtosis of 0.25.

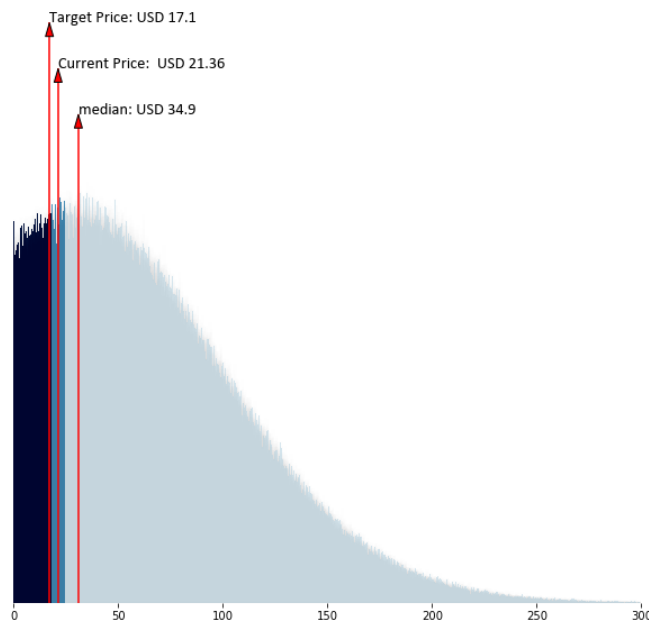


Figure 23: Monte Carlo Simulation distribution of target prices. The different colors on the distribution represent the, Sell, Hold and Buy based on the trading price of \$21.36.

While these results exceed substantially the results of the DCF, this is in part due to the fact that the Monte Carlo is probabilistic, indicating based on the parameters the most likely price target. While the Monte Carlo can be a good tool to see where the DCF falls on the probability curve it is not a good model in determining the price target itself.

7.3 Comparable Company Analysis

The companies that operate in the steel industry around the world are vast and as such there is a large pool of companies to choose from to form a peer group. The main factors which were looked at when looking to find the peer group were business profile, geographic location, profitability, and size. Based on these factors the following companies were included: Nucor Corp, Steel Dynamics, Cleveland-Cliffs, Commercial Metals and ArcelorMittal.

The main multiples used to conduct the comparable company analysis were EV to EBITDA, EV to EBIT, EV to Adjusted EBIT, Price to Earnings and lastly the P/E Forecast provided by Refinitiv as frame of reference.

Company Name	EV/EBITDA	EV/EBIT	EV/ Adj EBIT	P/E	P/E FY+1
Nucor Corp	3.6x	3.5x	3.9x	5.4x	10.1x
Steel Dynamics Inc	3.7x	3.5x	3.7x	5.0x	8.5x
Cleveland-Cliffs Inc	4.7x	6.6x	7.1x	7.3x	8.9x
Commercial Metals Co	4.1x	4.2x	5.0x	5.6x	6.7x
ArcelorMittal SA	2.4x	2.5x	3.0x	2.7x	6.9x
United States Steel Corp	3.7x	4.1x	4.5x	5.2x	8.2x
Industry average	3.7x	4.1x	4.5x	5.2x	8.2x
Industry median	3.7x	3.8x	4.2x	5.3x	8.4x

Table 14: Multiples for U.S. Steel and Peers.

Based on the following multiples the target price derived is between \$62.64 utilizing the EV/EBITDA and \$51.38 when using the forecasted P/E, with a median of \$56.48 which based on price as of May 10th, 2023, of \$21.36 it is a **Buy** recommendation. However, due to the massive discrepancy in the target price between the DCF and the Multiples valuation, we are inclined to more closely associate it with the DCF value.

	Target Price	Potential Upside/(Downside)	
EV/EBITDA	\$ 62.64	193.3%	Buy
EV/EBIT	\$ 55.49	159.8%	Buy
EV/ Adj EBIT	\$ 56.73	165.6%	Buy
P/E	\$ 51.38	140.5%	Buy
P/E FY+1	\$ 56.48	164.4%	Buy
median	\$ 56.48		

Table 15: Valuation of USS based on the multiples.

7.4 Valuation Summary

After the thorough investigation into the operations of U.S. Steel, the recommendation is a **Sell**. This recommendation is in part justified by the price target yielded from the base scenario of \$17.1 as it is 20% lower than the trading price of U.S. Steel.

While the company is well positioned for the transition to net zero carbon emissions and sustainable steel products, there are still traces of the historical problems that U.S. Steel underwent, nevertheless, they have improved substantially since the new COO Daniel R. Brown took over, and with the new investments already starting to yield results.

Despite this colossal growth, the historical uncertainty of USS as well as the current market being disrupted make U.S. Steel a risky opportunity for investors.

7.5 Limitations

The main limitations are presented in the form of the proxy model used in this analysis, which take a logical approach to estimating the revenues of the steel producers in the United States. However, due to informational barriers, access to more market data could have enhanced the model, by introducing Futures data to determine the demand and prices.

Overall, while U.S. Steel offers good granularity regarding the data, unfortunately there were limited information reported regarding Research & Development.

8. Glossary

8.1 Financial

CAPEX = Capital Expenditure

CAPM = Capital Asset Pricing Model

COGS = Cost of Goods Sold

DOH = Days on Hand

DSO = Days Sales Outstanding

DPO = Days Payable Outstanding

EBIT = Earning before Interest and tax

EBITDA = Earning before Interest Tax Depreciation and Amortization

EPS = Earning per Share

EV = Enterprise Value

FCF = Free Cash Flow

FCFF = Free Cash Flow to the Firm

NWC = Net Working Capital

O/S = Outstanding Shares

P/E = Price to Earning

WACC = Weighted Average Cost of Capital

8.2 Other

AHSS = Advanced High-Strength Steel

EAF = Electric Arc Furnace

BOF= Basic Oxygen Furnace

MENA = Middle East and North Africa

OCTG = Oil Country Tubular Goods

9. Appendix

9.1 Income Statement

1. Income Statement	2018	2019	2020	2021	2022
Net Sales	14,179	12,937	9,741	20,275	21,065
Flat-rolled products	9,912	9,560	7,279	12,358	12,872
Mini Mill	-	-	-	3,516	3,047
U. S. Steel Europe	3,228	2,420	1,970	4,266	4,256
Tubular products	1,236	1,191	646	809	1,616
Other Businesses	186	168	162	101	9
Segment Net Sales	14,562	13,339	10,057	21,050	21,800
Intersegment sales	(384)	(402)	(316)	(775)	(735)
Non-Core Operations	(1)	-	-	-	-
Sales	14,178	12,937	9,741	20,275	21,065
COGS (Excluding D&A)	(12,305)	(12,001)	(9,491)	(14,464)	(16,712)
Gross Margin	1,873	936	250	5,811	4,353
SG&A	(336)	(370)	(341)	(495)	(487)
Research & Development	-	-	-	-	-
Other Operating Gains & Losses	(89)	16	146	(257)	47
Adj. EBITDA	1,448	582	55	5,059	3,913
Earnings from associates & joint ventures	99	79	(86)	281	249
Non-recurring expenses (Gains)	-	(275)	(138)	378	(48)
Impairments	-	-	(263)	(273)	(163)
EBITDA Reported	1,547	386	(432)	5,445	3,951
Depreciation & Amortization	(521)	(616)	(643)	(791)	(791)
EBIT	1,026	(230)	(1,075)	4,654	3,160
Interest Expenses	(175)	(169)	(321)	(356)	(227)
Interest Gains	30	37	33	33	103
Other Financial Gains & Losses	(69)	(107)	56	13	223
Fair Value adjustments	-	17	-	-	-
EBT	812	(452)	(1,307)	4,344	3,259
Tax Expenses	303	(178)	142	(170)	(735)
Profit (Loss) from Discontinued Operations	-	-	-	-	-
Net Profit	1,115	(630)	(1,165)	4,174	2,524

9.2 Balance Sheet

2. Balance Sheet	2018	2019	2020	2021	2022
Property, Plant & Equipment	4,865	5,447	5,444	7,254	8,492
Right-of-Use assets	-	230	214	185	146
Intangible Assets	83	75	54	444	403
Goodwill	-	-	-	920	920
Operating Investments	-	-	-	-	-
Long Term Investments	489	1,275	1,143	663	818
Other Non-current Assets	691	577	738	1,167	791
Non-Current Assets	6,128	7,604	7,593	10,633	11,570
Cash & Cash Equivalents	1,000	749	1,985	2,522	3,504
Accounts Receivables	1,698	1,391	1,062	2,164	1,695
Inventories	2,092	1,785	1,402	2,210	2,359
Tax Receivables	-	-	-	-	-
Financial Instruments	14	5	-	-	-
Assets held for sale	-	-	-	-	-
Other Current Assets	50	74	17	287	330
Current Assets	4,854	4,004	4,466	7,183	7,888
Total Assets	10,982	11,608	12,059	17,816	19,458
Long-term Debt	2,316	3,627	4,695	3,863	3,914
Convertible Bonds (in the money)					(350)
Long-term Debt Adjustment	2,316	3,627	4,695	3,863	3,564
Deferred Tax Liabilities	286	547	344	627	960
Provisions for Employee Benefits	980	532	322	235	209
Other Provisions	-	7	-	-	-
Other Non-current Liabilities	-	177	163	136	105
Non-Current Liabilities	3,582	4,890	5,524	4,861	5,188
Non-Current Liabilities Adj	3,582	4,890	5,524	4,861	4,838
Short-term Debt	65	3	176	12	38
Accrued Expenses	479	441	426	551	609
Accounts Payable	2,517	2,036	1,884	2,908	3,016
Other Provisions (Current)	-	-	-	-	-
Tax Payables	118	116	154	365	271
Other Current Liabilities	18	29	16	16	25
Current Liabilities	3,197	2,625	2,656	3,852	3,959
Total Liabilities	6,779	7,515	8,180	8,713	9,147
Total Liabilities Adj	6,779	7,515	8,180	8,713	8,797
Common Stock	177	179	229	280	283
+ Convertible Bonds (in the money)					350
Treasury Shares	(78)	(173)	(175)	(334)	(1,204)
Additional Paid-in Capital	3,917	4,020	4,402	5,199	5,194
Retained Earnings	1,212	544	(623)	3,534	6,030
Hybrid Debt	-	-	-	-	-
Other Reserves	(1,026)	(478)	(47)	331	(85)
Non-controlling Interests	1	1	93	93	93
Total Shareholder's Equity	4,203	4,093	3,879	9,103	10,311
Total Shareholder's Equity Adj	4,203	4,093	3,879	9,103	10,661
Total Liabilities & Shareholder's Equity	10,982	11,608	12,059	17,816	19,458
Total Liabilities & Shareholder's Equity Adj	10,982	11,608	12,059	17,816	19,458

9.3 Cash Flow Statement

3. Cash Flow Statement	2018	2019	2020	2021	2022
EBIT		(230)	(1,075)	4,654	3,160
(+) Depreciation & Amortization		616	643	791	791
(+) Taxes		(178)	142	(170)	(735)
(+) P&L from discontinued operations					
(-) Δ NWC		89	632	(820)	358
(-) Capex		(1,420)	(603)	(2,962)	(1,949)
FCF to the Firm		(1,123)	(261)	1,493	1,625
(+/-) Debt Issuance / Repayment		1,249	1,241	(996)	(273)
(+/-) Issuance / Repayment Revolving Debt					
(+) Net Financial Income		(222)	(232)	(310)	99
(+) Δ Equity		558	953	1,067	(938)
(-) Dividends		(38)	(2)	(17)	(28)
Cash Flow from Financing		1,547	1,960	(256)	(1,140)
(+/-) Δ Other Assets		(672)	(29)	(869)	221
(+/-) Δ Other Liabilities		(3)	(434)	169	276
Other Balance Sheet Movements		(675)	(463)	(700)	497
Cash BoP		1,000	749	1,985	2,522
(+) Cash Generated Adjustments		(251)	1,236	537	982
Cash EoP	1,000	749	1,985	2,522	3,504

9.4 Historical Ratios

Gross Margin					
	2018	2019	2020	2021	2022
Industry average	19.4%	14.9%	11.4%	24.6%	21.3%
USS	13.2%	7.2%	2.6%	28.7%	20.7%

EBITDA Margin					
	2018	2019	2020	2021	2022
Industry average	17.4%	13.3%	11.0%	23.1%	20.0%
USS	10.2%	4.5%	0.6%	25.0%	18.6%

Effective Tax Rate					
	2018	2019	2020	2021	2022
Industry average	-	18.7%	49.3%	20.4%	20.5%
USS	-	-	-	3.9%	22.6%

Asset Turnover					
	2018	2019	2020	2021	2022
Industry average	1.2x	1.1x	0.9x	1.4x	1.4x
USS		1.1x	0.8x	1.4x	1.1x

Pretax ROA					
	2018	2019	2020	2021	2022
Industry average	13.9%	7.0%	4.2%	26.6%	24.5%
USS	7.4%	(3.9%)	(10.8%)	24.4%	16.7%

ROE					
	2018	2019	2020	2021	2022
Industry average	20.7%	22.4%	5.2%	48.3%	36.5%
USS	26.5%	(15.4%)	(30.0%)	45.9%	23.7%

Quick Ratio					
	2018	2019	2020	2021	2022
Industry average	1.9x	1.7x	1.5x	1.2x	1.5x
USS	0.9x	0.8x	1.2x	1.3x	1.4x

Cash Cycle (Days)					
	2018	2019	2020	2021	2022
Industry average	69.6	77.2	93.8	74.5	79.5
USS	31.1	31.6	21.3	21.3	15.0

Assets/Equity					
	2018	2019	2020	2021	2022
Industry average	3.3x	3.6x	3.3x	2.2x	1.9x
USS	2.6x	2.8x	3.1x	2.0x	1.8x

(Total Debt - Cash) / EBITDA					
	2018	2019	2020	2021	2022
Industry average	1.1x	1.7x	2.4x	0.5x	0.6x
USS	1.0x	5.0x	52.5x	0.3x	0.0x

Interest Coverage Ratio					
	2018	2019	2020	2021	2022
USS	5.9x	-1.4x	-3.3x	13.1x	13.9x

Operating Margin					
	2018	2019	2020	2021	2022
Industry average	13.9%	8.7%	5.1%	19.8%	16.7%
USS	7.2%	(1.8%)	(11.0%)	23.0%	15.0%

Pretax Margin					
	2018	2019	2020	2021	2022
Industry average	12.2%	6.8%	3.3%	19.6%	17.2%
USS	5.7%	(3.5%)	(13.4%)	21.4%	15.5%

Net Margin					
	2018	2019	2020	2021	2022
Industry average	15.0%	5.5%	2.5%	15.7%	13.7%
USS	7.9%	(4.9%)	(12.0%)	20.6%	12.0%

Leverage (Assets/Equity)					
	2018	2019	2020	2021	2022
Industry average	0.3x	0.3x	0.3x	0.4x	0.5x
USS	0.4x	0.4x	0.3x	0.5x	0.5x

Pretax ROE					
	2018	2019	2020	2021	2022
Industry average	25.8%	26.4%	7.2%	62.4%	47.2%
USS	19.3%	(11.0%)	(33.7%)	47.7%	30.6%

Current Ratio					
	2018	2019	2020	2021	2022
Industry average	3.1x	2.8x	2.6x	2.4x	2.7x
USS	1.5x	1.5x	1.7x	1.9x	2.0x

Times Interest Earned					
	2018	2019	2020	2021	2022
Industry average	11.2x	6.4x	6.0x	40.7x	33.0x
USS	5.9x	-1.4x	-3.3x	13.1x	13.9x

Debt/Equity					
	2018	2019	2020	2021	2022
Industry average	1.4x	1.6x	1.0x	0.5x	0.4x
USS	0.6x	0.9x	1.3x	0.4x	0.3x

% LT Debt to Total Capital					
	2018	2019	2020	2021	2022
Industry average	41.9%	43.3%	38.2%	29.1%	24.8%
USS	35.2%	47.0%	53.7%	29.8%	24.4%

ROIC					
	2018	2019	2020	2021	2022
Industry average	17.9%	6.3%	3.9%	26.5%	24.2%
USS	12.4%	-2.3%	-9.7%	28.0%	17.4%

9.5 COGS

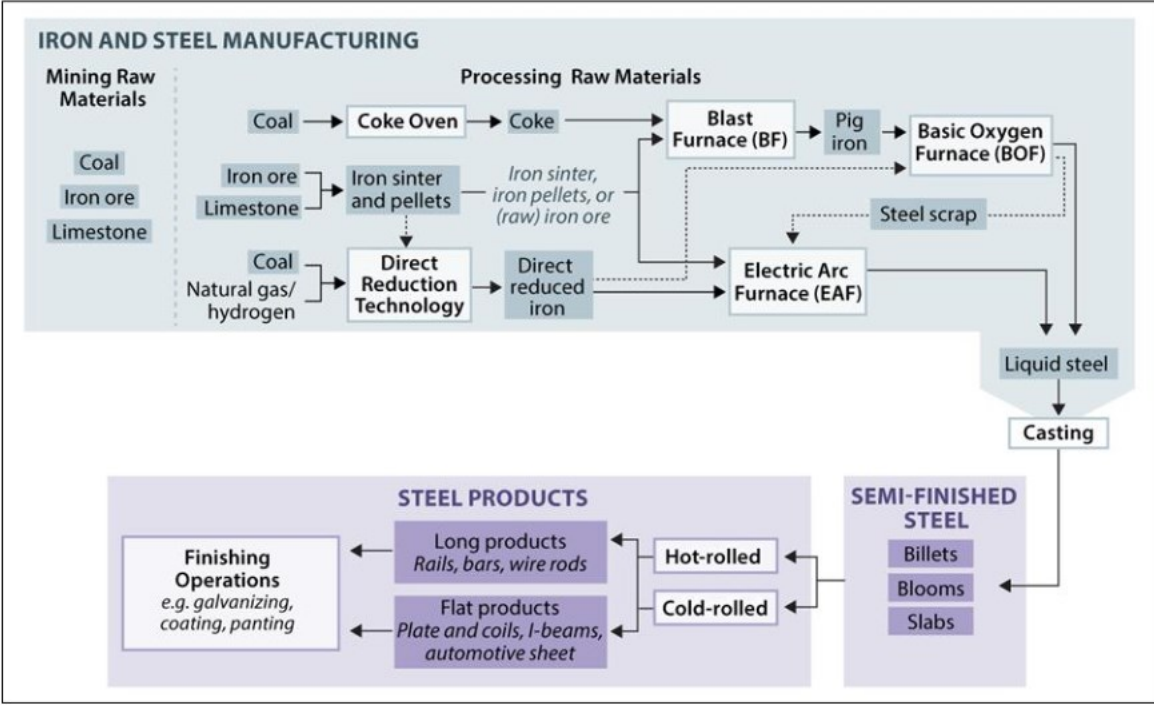
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1. Flat-rolled															
COGS	8,425	8,795	7,206	9,021	10,298										
COGS (% of Sales)	85%	92%	99%	73%	80%	80%	85%	95%	95%	95%	95%	80%	73%	80%	80%
1 - Macroeconomic (optimistic)						80%	85%	95%	95%	95%	95%	80%	73%	80%	80%
2 - Recession						80%	85%	95%	95%	95%	95%	80%	73%	80%	80%
3 - Base						80%	85%	95%	95%	95%	95%	80%	73%	80%	80%
2. Mini-mill															
COGS				1,863	2,285.25										
COGS (% of Sales)				53%	75%	75%	80%	80%	80%	80%	80%	75%	53%	75%	75%
1 - Macroeconomic (optimistic)						75%	80%	80%	80%	80%	80%	75%	53%	75%	75%
2 - Recession						75%	80%	80%	80%	80%	80%	75%	53%	75%	75%
3 - Base						75%	80%	80%	80%	80%	80%	75%	53%	75%	75%
3. U. S. Steel Europe															
COGS	2,744	2,347	1,832	3,157	3,703										
COGS (% of Sales)	85%	97%	93%	74%	87%	87%	93%	93%	93%	93%	93%	87%	74%	87%	85%
1 - Macroeconomic (optimistic)						87%	93%	93%	93%	93%	93%	87%	74%	87%	85%
2 - Recession						87%	93%	93%	93%	93%	93%	87%	74%	87%	85%
3 - Base						87%	93%	93%	93%	93%	93%	87%	74%	87%	85%
4. Tubular															
COGS	1,224	1,203	775	752	1,018										
COGS (% of Sales)	99%	101%	120%	93%	63%	78%	99%	93%	93%	93%	93%	78%	63%	78%	78%
1 - Macroeconomic (optimistic)						78%	99%	93%	93%	93%	93%	78%	63%	78%	78%
2 - Recession						78%	120%	101%	93%	93%	93%	78%	63%	78%	78%
3 - Base						78%	99%	93%	93%	93%	93%	78%	63%	78%	78%

9.6 Net Working Capital

Net Working Capital	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
DOH (days of COGS) - Inventories	62	54	54	56	52										
1 - Macroeconomic (optimistic)						56	56	56	56	56	56	56	56	56	56
2 - Recession						56	56	56	56	56	56	56	56	56	56
3 - Base						56	56	56	56	56	56	56	56	56	56
DSO (days of Sales) - Accounts Receivables	44	39	40	39	29										
1 - Macroeconomic (optimistic)						38	38	38	38	38	38	38	38	38	38
2 - Recession						38	38	38	38	38	38	38	38	38	38
3 - Base						38	38	38	38	38	38	38	38	38	38
DPO (days of COGS) - Accounts Payables	75	62	72	73	66										
1 - Macroeconomic (optimistic)						70	70	70	70	70	70	70	70	70	70
2 - Recession						70	70	70	70	70	70	70	70	70	70
3 - Base						70	70	70	70	70	70	70	70	70	70
Financial Instruments (% Sales)	0.1%	0.0%	0.0%	0.0%	0.0%										
1 - Macroeconomic (optimistic)						0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
2 - Recession						0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
3 - Base						0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Other Financial Assets (% Sales)	0.4%	0.6%	0.2%	1.4%	1.6%										
1 - Macroeconomic (optimistic)						1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
2 - Recession						1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
3 - Base						1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Accrued Expense (% Sales)	3.4%	3.4%	4.4%	2.7%	2.9%										
1 - Macroeconomic (optimistic)						3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
2 - Recession						3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
3 - Base						3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%	3.4%
Tax Payables (% Sales)	0.8%	0.9%	1.6%	1.8%	1.3%										
1 - Macroeconomic (optimistic)						1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
2 - Recession						1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
3 - Base						1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%	1.6%
Other Current Liabilities (% Sales)	0.1%	0.2%	0.2%	0.1%	0.1%										
1 - Macroeconomic (optimistic)						0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
2 - Recession						0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
3 - Base						0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%

9.7 Steelmaking Process

Figure 1. The Iron and Steel Manufacturing Process



Source: Figure created by CRS, adapted from Hasan Muslemani et al., "Opportunities and challenges for decarbonizing steel production by creating markets for 'green steel' products," *Journal of Cleaner Production*, vol. 315 (September 15, 2021), p. 10.

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11.Figures & Tables

Figure 1: Revenues of Peers and United States Steel (ticker: X).	10
Figure 2: HRC Steel Futures price and volume in Singapore(blue), USA (yellow) and Europe(purple), Source: Thomson Reuters Eikon.	14
Figure 4: Carbon Emission Spots against Hot-Rolled Band Steel, source: International Trade Administration, Refinitiv.	15
Figure 5: Revenues of U.S. Steel by segment.	16
Figure 6: Ownership Structure % of outstanding shares.	19
Figure 7: Margins of U.S. Steel and industry averages, values listed in the appendix.	20
Figure 8: Return on (Assets, Equity, Invested Capital) of U.S. Steel and industry averages, values listed in the appendix.	20
Figure 9: Debt to Equity and Equity Multiplier of U.S. Steel and industry averages, values listed in the appendix.	21
Figure 10: Quick and Current ratio of U.S. Steel and industry averages, values listed in the appendix.	22
Figure 11: Stock performance of U.S. Steel (X) and peer, base year 2018.	24
Figure 12: Proxy Model Forecast of U.S. Steel Revenues.	26
Figure 14: Share of U.S. Steel forecasted revenues by segment and scenario.	34
Figure 15: Historical and Forecasted revenues by scenario. (\$ in millions).	35
Figure 16: Historic and Forecasted Costs of Good Sold of U.S. Steel as a % of Revenues by scenario.	35
Figure 17: Historic and Forecasted Costs of Goods Sold by scenario (\$ in millions).	36
Figure 18: Historic and Forecasted Depreciation and Amortization as a % of Revenues by scenario.	37
Figure 19: Historic and Forecasted Capital Expenditure as a % of Revenue by scenario.	38
Figure 20: Historic and Forecasted Capital Expenditure by scenario (\$ in millions).	38
Figure 21: Historic and Forecasted Changes in Net Working Capital by scenario (\$ in millions).	39
Figure 22: Historic and Forecasted Net Working Capital by Scenario (\$ in millions).	40
Figure 23: WACC of U.S. Steel and Peers.	41
Figure 24: Analyst Recommendation and Price Target from refinitiv eikon.	44
Figure 25: Monte Carlo Simulation distribution of target prices. The different colors on the distribution represent the, Sell, Hold and Buy based on the trading price of \$21.23.	45