A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics.

Driving Change: Equity Research on Caterpillar Inc.'s Sustainable Transformation within the Machinery, Energy & Transportation Industry
–
A Valuation Approach

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A Project carried out on the Master in Finance Program, under the supervision of:

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Abstract

This analysis values Caterpillar Inc. utilizing a discounted cash flow (DCF) model based on 7-year financial projections. The valuation yields a fair value estimate of $291.74 per share as of December 31th 2024, implying a 0.3% downside from the current market price of $292.60 as of December 19th 2023 and yields a total shareholder return of +1%. In addition, an optimistic and pessimistic scenario was established to assess Caterpillar's valuation range under different operating environments. The optimistic case with higher growth and margins produces a valuation of $421 per share, while the pessimistic case generates a value of $114. The analysis considers market uncertainties that could impact Caterpillar's business, including challenges in regards to sustainable transformation, global economic slowdown, and fluctuations in commodity prices. These factors introduce risks of lower demand and pressured sales. Caterpillar's market-leading position, its strong balance sheet and flexible operations provide some resilience against cyclical downturns.

Keywords
Equity Research, Valuation, DCF, Forecast, Caterpillar Inc.

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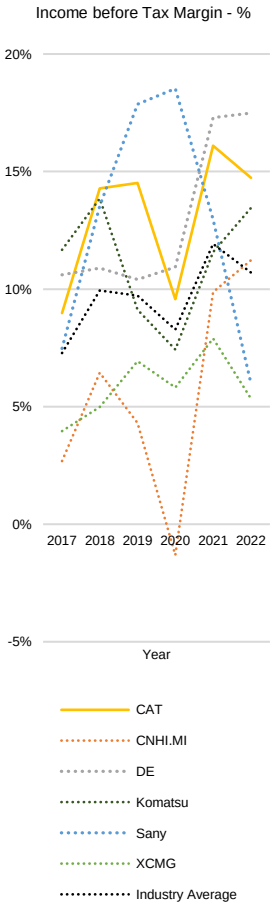
Introduction / Further Assumptions

To provide a general overview of Caterpillar's market position, an analysis of key DuPont metrics was used in relation to Caterpillar's primary competitors as well as to the industry average. In addition, Caterpillar's value drivers were analyzed in a consistent, comprehensive and strictly quantifiable manner to translate them into expected future developments.

Given that Caterpillar Inc. (NYSE: CAT) has two fundamentally different segments, a Machinery, Energy & Transportation (ME&T) operating segment and a Financial Products (FP) segment, they need to be treated differently in terms of valuation (McKinsey et al. 2015, 385).The financial statements of financial businesses are structured differently from those of a traditional industrial business. Assets of a financial business are typically highly leveraged and financial rather than physical (McKinsey et al. 2015). Hence, high levels of receivables are a reflection of it (EM&T receivables 2022 $3.7 B vs. FP 2022 $14.2B). To capture these different balance sheet structures, the Financial Products segment is measured using DCF Free Cash Flow to Equity approach (FCFE). The EM&T segment is measured using free cash flow to firm method (FCFF). Finally, the differently valued segments are combined as a sum of the parts analysis, resulting in an implied total company share price.

In addition to the analyst case (base case), an optimistic and a pessimistic scenario was applied to better reflect risks in ongoing uncertain markets, whereby the corresponding target prices were weighted according to their respective probability, resulting in a more market risk-stable target price.

Past Performance Overview



Source: own calculation & Refinitiv

DuPont's key performance indicators are analyzed and compared to key competitors and industry averages to determine Caterpillar's market position.

Over the past 6 years, CAT has maintained a higher **net profit** margins than their industry peer ranging between 9-16%. While the industry average was about 10%. Indicating it has better cost control and pricing power.

However, John Deere (DE) achieved even higher net profit margins than CAT over the past 6 years, ranging from 11-17%. This suggests DE has the strongest profitability profile among the major machinery manufacturers.

CAT has delivered industry average **asset turnover** ratios in recent years. This indicates CAT has been as efficient at generating revenues from its asset base as their competitors. Asset turnover ratios seem to decline over the recent years, as revenue growth has slowed amidst economic uncertainties.

Fueled by its strong margins and asset turns, CAT has generated **ROA** in the range of 5-11%, averaging 9% over the past 6 years, while its peers averaged 7%.

Driven by its high margins, CAT has achieved superior **ROE** relative to its peers. Ranging from 30-56%. Only DE has managed to match CAT in terms of ROE, ranging between 32-47%.

According to DuPont's analysis, CAT is one of the most profitable and efficient operations in the machinery industry and stands out for its high asset efficiency.

Estimations

In order to be able to provide appropriate forecasts for each of the value drivers, the financial statements have been analyzed on a consistent basis by segment. However, in order to obtain meaningful results, the financial statements have been reviewed on a line-by-line basis to eliminate/reclassify intercompany transactions, including the elimination of intercompany receivables or the proper reclassification of intercompany purchased receivables, to draw a more clear picture of the underlying operations of fundamentally different segments.

To be consistent and provide the most accurate reflection possible (applies to the ME&T segment), EBITA is used for valuation purposes instead of EBIT because EBITA prevents amortization expense from being counted twice, once through amortization and a second time through reinvestment, thus preventing the company from being penalized twice for an investment (McKinsey et al. 2015, 187).

Machinery Energy & Transportation

Revenue

The revenue forecast is central in equity research analysis. Revenue is the primary value driver in the model, shaping not only the segment's financial outlook but also influencing other critical metrics. Revenue is crucial as errors or assumptions in the forecast can affect key financial indicators and ultimately impact the target share price. Recognizing revenue as the linchpin in the forecasting framework underscores the need for meticulous analysis to ensure accuracy and reliability, reinforcing the integrity of the output.

The forecasting model for Caterpillar adopts a top-down methodology with four key elements:

1. **External Market Research:**

Utilizes market reports for a macro view of the industry.

2. **Precise Industry Figures:**

Examines historical and future data (e.g., coal mining volumes) for detailed sector analysis.

3. **Internal Company Analysis:**

Scrutinizes company publications, focusing on indicators like order backlog changes.

4. **Historical Revenue Development:**

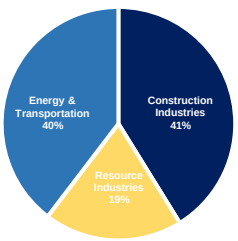
Analyzes Caterpillar's past revenue performance to identify patterns and trends.

Resources

The Resources segment, accounting for approximately 20% of the total operating revenue, a meaningful breakdown based on global production figures of Coal, Iron Ore, and Bauxite is conducted, implicitly drawing conclusions about segmental growth.

Coal: Countries such as China and Russia, as well as other developing countries in SEA (e.g. Indonesia), are increasing coal production (International Energy Agency 2022), even though most of the first world is phasing out coal in the medium to long term or using coal as an interim strategy (e.g. Germany) in favour of renewables. Therefore, a continuation of the 0.56% CAGR from 2017 to 2025 is appropriate in that case.

Average Operating Revenue Share - % 2020-2022



Source: own calculation

Growth Rate					
Year	Coal	Iron Ore	Bauxite	Average	Weighted
2018	4%	-12%	7%	0%	
2019	1%	4%	-2%	1%	
2020	-7%	-1%	6%	-1%	
2021	4%	3%	-2%	3%	
2022	1%	5%	6%	2%	
2023	1%	-2%	0%	1%	
2024	1%	1%	-1%	1%	
2025	0%	0%	0%	1%	
2026	1%	-1%	2%	1%	
2027	1%	-1%	2%	1%	
2028	1%	-1%	2%	1%	
2029	1%	-1%	2%	1%	
2030	1%	-1%	2%	1%	

Source: own calculation

Iron Ore: While iron ore is one of the world's most important precursors, the industry is getting more efficient at recycling iron and other metals, thus reducing the need for new ore exploration and production. While this is a valid trend, taking into account the growing demand for metals in developing countries such as India (Reuters 2023e), a negative compounded annual growth rate (CAGR) of -0.5% seems prudent, as positive signals are unlikely to mitigate the overall market trend (British Geological Survey 2023).

Bauxite: A critical industrial mineral essential for aluminium production, is expected to reach a market valuation of $15.1 billion in 2022 and $19.6 billion by 2032 (CAGR: 2.7%) (market.us 2023). Market growth is driven by increasing demand for aluminium in construction, transportation, and packaging, fuelled by economic expansion in China and India (Fact.MR 2023). Environmental concerns with bauxite mining, including vegetation loss and air pollution, and the associated adoption of higher regulations are potential hurdles for unhindered growth. With this in mind, a compound annual growth rate (CAGR) of 1.6% seems like a reasonable compromise. This choice reflects a balance between optimistic forecasts, such as ChemAnalyst's expectation of a CAGR of 3.99% from 2022 to 2035 (Chemanalyst 2023), market.us's of 2.7%, and the subdued or negative production figures observed since 2019.

Conclusion: Growth rates are weighted based on relative market share in metric tons to arrive at a compound annual growth rate for the Resources segment as a whole. A marginal real growth rate (CAGR of 0.8%) is assumed.

Construction

The global construction industry is expected to grow at a CAGR of 5.7% from 2023 to 2030, based on proprietary research and integration, as well as a weighting a broad range of industry reports. Demand for Caterpillar's construction segment is expected to grow in lockstep with this development. The projected growth can also be inferred from Caterpillar's reporting. Caterpillar sees strong demand in the heavy equipment sector from the construction and mining industries. Which is expected to drive its full-year operating margin near the top end of its prior forecast (Reuters 2023f).

Regionally, construction industry growth is expected to be strongest in Africa, China, India, the U.S. and Indonesia, where Caterpillar has significant market share and is considered the market leader, and it is therefore qualified to translate this market growth into sales growth. Demand growth in the U.S. is particularly driven by the Biden administration's $1 trillion infrastructure spending package (primarily investments in roads, rail and public transportation infrastructure) (Reuters 2023f). However, Caterpillar is exposed to long-term challenges, such as the ongoing shift to a greater emphasis on sustainability. While Caterpillar's machines are still largely and almost exclusively powered by non-renewable energy, CAT is on the right track to meet regulatory standards and drive growth in its construction segment (CAT 2023j).

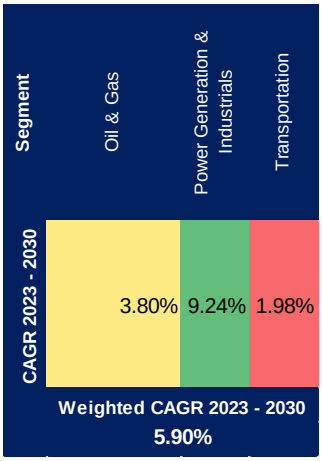
In summary, Caterpillar faces challenges but should emerge with renewed strength. Demand can be considered stable, driven primarily by growth in developing countries and the U.S. as a result of the infrastructure package. The 5.7% weighted GAGR calculated from market metrics is therefore well supported.

Energy & Transportation

On average, the Energy and Transportation (E&T) segment accounts for approximately 40% of the operational Group's sales, which is roughly the same weighting as the Construction segment.

The revenue forecast and analysis for E&T is segmented into the following sub-segments: Oil and Gas, Power Generation, Industrial, and Transportation.

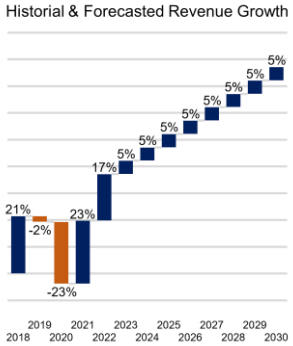
According to Kings Research, the **Oil and Gas** market is projected to experience a compound annual growth rate (CAGR) of 3.8% between 2023 and 2030 (Kings Research 2023). CAT's Oil & Gas segment is expected to lock-step growth due to the company's provision of machinery and services for all aspects of the Oil & Gas Market, including on- and offshore drilling, gas compressors, and generators. It is anticipated that CAT will continue to expand its service offerings to remain at the forefront of industry trends.



Source: own calculation

In CATs **Power Generation and Industrial** segment, the diesel generator market is anticipated as a proxy. The market is projected to grow at a compound annual growth rate (CAGR) of 9.24% during the forecast period (Grand View Research 2022). Growth is driven by increasing electricity demand due to population growth, urbanization, and the electrification of transport and heat. Caterpillar's products and services in power generation and industrials are likely to see increased demand in line with this market growth.

Due to the lack of substitution and differentiation within the maritime freight industry, the scaled industry average is expected to remain stable at a CAGR of 1.98% through 2030. To sustain this growth, it is necessary to increase the size and fleet of dry bulk and container vessels (Global Data 2023, Transport Geography n.d.). The growth of the maritime freight market and the growth of CAT's **transportation** segment are clearly in lockstep, as larger vessels mean more expensive engines and potentially more maintenance services provided by CAT over the long term.

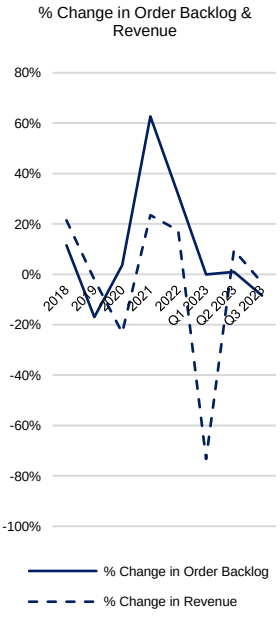


Source: own calculation

Caterpillar may face challenges in the E&T segment due to geopolitical risks, environmental regulations, and competition. These factors could potentially impact segment performance. However, Caterpillar's base case growth rates are not affected by these risks. This is due to Caterpillar's long-standing ability to manage these risks in an appropriate manner.

The growth rates of each segment were weighted according to their average share of sales, resulting in a CAGR of 5.9% for the Energy & Transportation segment.

Conclusion: The calculated CAGRs per segment (Resources 0.8%, Construction 5.7%, and Energy & Transportation 5.9%) are weighted by revenue per segment relative to total operating revenue, resulting in a total CAGR of 5% between 2023 and 2030.



Source: own calculation

Order Backlog

The order backlog decreased by $2.6 billion from Q2 2023 to Q3 2023 for the first time since 2019. This could indicate slowing demand for Caterpillar's operating activities. A correlation coefficient of 0.64 was determined in order to project the order backlog to a development in revenue. This coefficient indicates a medium to strong positive correlation, meaning that an adjustment of revenue growth may be necessary. However, Caterpillar noted supply chain issues have improved, reducing the need for customers to order far in advance (CAT 2023m). Management stated dealer inventories remain in the typical 3-4 month range and indicated inventory levels are not excessively high despite rising dealer inventories (CAT 2023m). The backlog is at 44% of sales, still above historical averages of 37% in 2017 and 32% in 2018. Suggesting there is still room for the backlog to fall while remaining healthy and implying backlog decline doesn't necessarily imply weakening demand. Nonetheless, if backlogs continue declining at a rapid pace in future quarters, it would signal issues with end market demand that could negatively impact Caterpillar's revenue growth going forward. Close monitoring of order

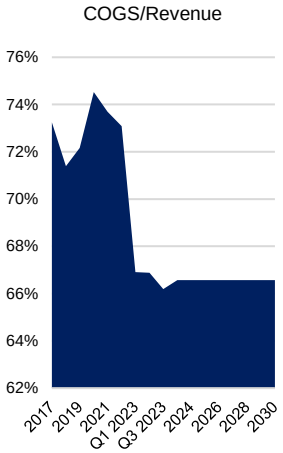
backlogs, dealer inventories and other leading indicators of equipment demand is recommended. In summary, we remain cautiously optimistic on Caterpillars, but note slowing sales and earnings growth is likely in Q4 2023 and 2024 relative to the exceptionally strong post-pandemic recovery period.

Iteration over historical Revenue

In order to confirm the calculated CAGRs and to check the assumptions, a cross-check is made with the historical sales trend. From 2017 to 2022, this results in an historical revenue CAGR of 6%. In the context of the anticipated GAGR of 5% and the slightly negative outlook for the backlog, the 5% CAGR hypothesis stays in line and is transferred to the model.

Gross Profit (COGS)

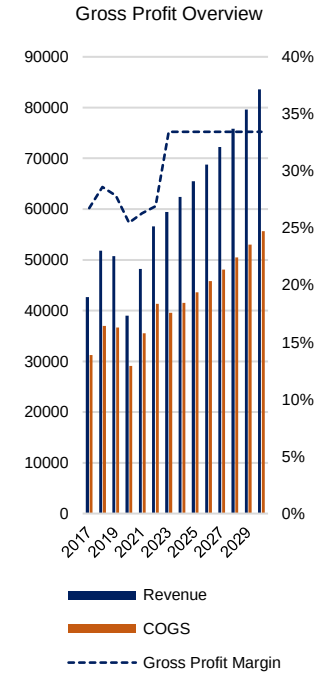
Caterpillar's COGS in absolute numbers has been rising steadily over the past few years, with increases of 16% in 2022, 22% in 2021, and a decline of 20% in 2020. The absolute decline is logically justifiable due to the COVID-19 pandemic and is therefore not given any additional significance. However, if the relative values to revenue are used, it can be seen that they generally align with changes in the company's sales revenue over the same time period (range only from +- 4%-ppt from 2017 until 2022). From 2023 onwards, cost of goods sold as a percentage of sales started to decline to a lower level of 66% to 67%. This is mainly attributable to lower restructuring charges price realization.



Source: own calculation

It is assumed that these lower COGS ratios will be maintained as the restructuring processes that have been ongoing since 2015 come to an end. The aim of the restructuring was to lower operating costs by $1.5 billion annually. The restructurings have involved significant job cuts exceeding 10,000, consolidation of over 20 facilities, and alignment of product portfolios and manufacturing footprint with market conditions across segments (CAT 2015). Cost reduction has been a focus of these efforts. In total, Caterpillar has incurred over $685 million in restructuring charges from 2015-2022, including $180 million in 2022 and over $500 million from 2015-2018.

However, increasing inflationary pressure could indicate a relative increase in COGS/revenue. Key inputs like steel and other commodities that Caterpillar uses extensively in manufacturing are expected to see ongoing price rises. Nevertheless, Caterpillar has recently shown an ability to pass on rising input costs through price realization while still expanding margins. The pricing power, along with any easing of cost pressures, is assumed to mitigate the impact on profitability. This year's most recent COGS/revenue ratio of 67% is therefore retained for the base case model. Other scenarios and their effects on the share price, such as a return to the long-term trend of around 73%, are assessed in the scenario analysis.

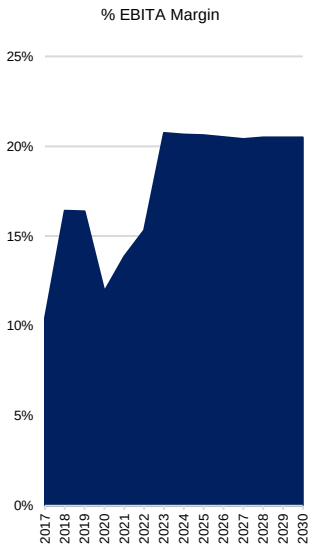


Source: own calculation

Operating Expenditures

SG&A expenses vary between 9 to 10% of revenue over the entire period under review (2017 - Q3 2023). There are no clear statements specifically addressing expectations for future SG&A expense trends in Caterpillar's official reporting. The forecast of SG&A expenses is extrapolated at the most recent 9% share of revenue.

R&D expenses have been steadily rising over the past decade, from $1.4 billion in 2009 to $1.8 billion in 2022. As a percentage of sales, R&D spend has remained very consistent at around 3% of revenue. With no evidence of intent to reduce innovation investments, R&D expenses will likely continue their historical growth trajectory in line with sales, remaining at ~3% of revenue.

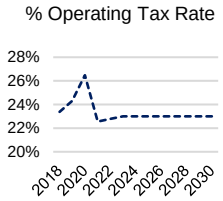


Source: own calculation

To capitalize on future market developments, Caterpillar has established a dedicated electrification team focused on advancing energy technologies such as battery electric solutions and fuel cell technology to meet regulatory emissions standards. The sustainable transformation is considered a top priority. Already several electric machine prototypes, including mini excavators, mid-size excavators and wheel loaders were presented. The mini-excavator and compact wheel loader are expected to be the first electric-powered machines on the market. Key features include interchangeable batteries designed to be compatible with other Caterpillar equipment.

Other operating (income) expenses include primarily of gains/losses on disposal of long-lived assets, gains/losses on divestitures and legal settlements and accruals. They fluctuate around 1% from sales. Other operating expenses are likely to continue their historical growth path in line with sales and remain at a rather pessimistic ~1% of sales. With these assumptions, a OPEX/Revenue Ratio, EBIT Margin and EBITA-Margin of 13%, 20%, 14% is expected.

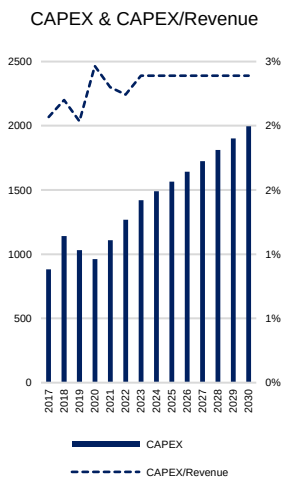
Operating Taxes



Source: own calculation

Operating taxes are calculated rather than just accruals taxes, as they take into account the actual tax outflow and allow for a more accurate picture of Caterpillar. Taxes are calculated at the marginal tax rate, which at Caterpillar is based on the US statutory tax rate of 21%. State and local taxes are added at an average rate of 1%. This tax rate is adjusted by tax credits/incentives and by the higher tax rate on foreign income of around 3%. The operating tax rate derived in this process amounts to 23% of EBITA. Resulting in NOPLAT after deduction of operating taxes.

Capital Expenditures



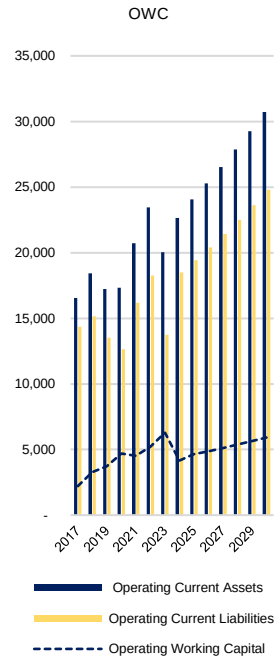
Source: own calculation

Caterpillar expects capital expenditures to remain reasonable to support future needs (CAT 2023f). CAPEX goals appear focused on supporting services growth, cost competitiveness, technology/sustainability goals, and geographic expansion. Specifically, they have targeted $28 billion in ME&T services revenue by 2026 (CAT 2022a), while maintaining a competitive and flexible cost structure over business cycles and investing in new technologies and sustainability initiatives. Geographic expansion and growing sales in areas like Asia Pacific and Latin America is also called out as important opportunity.

Capital expenditures are considered as a percentage of sales rather than, using industry best practice, the sum of the increase in net PP&E plus depreciation (McKinsey et al. 2015, 246), as this would result in inconsistent CAPEX figures. Capex as a percentage of sales is constant at 2%, hence the assumption is considered to be valid.

Operating Working Capital

Caterpillar's working capital increased steadily to support business growth but remains at healthy levels. The company is prioritizing working capital efficiency while funding needs from operating cash flows.

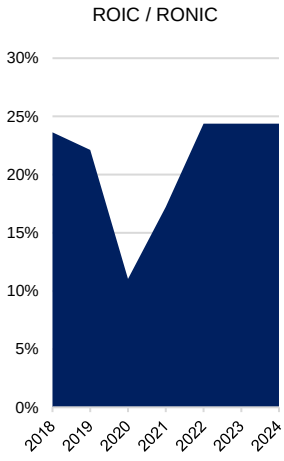


Source: own calculation

Since the aim is to include only core or operating items . An adapted definition of the NWC has been used - operating working capital. Operating working capital is divided into operating current assets and operating current liabilities, the delta in operating working capital is transferred to the model. Current operating assets include all assets needed to maintain business operations. All current operating assets, with the exception of inventories, were considered as a constant share of sales due to their historically constant trend. Inventories were projected as a constant percentage of COGS. Within the scope of cash and cash equivalents, a new item, operating cash, was established, which reflects 2% of revenues. 2% of sales is considered a valid, empirically verifiable assumption (McKinsey et al. 2015, 181) as Caterpillar does not adequately disclose the amount of excess cash held. In addition, segment eliminations would make reconciliation virtually impossible. The delta between operating cash and cash equivalents was classified as excess cash and transferred to nonoperating assets. The distinction in the cash and cash equivalents is necessary because excess cash generates very low returns and would therefore inaccurately reflect operating ROIC. In the forecast, the excess cash position was used as a plug between assets and liabilities, allowing the balance sheet to balance. However, this results in an important consideration that must be classified. Since ROIC is greater than revenue growth, operating cash flow is created, and if the dividend payments and share repurchases are not increased, excess cash will accumulate excessively. This is not a potential conflict triangle for the subsequent share price, since this accumulated excess cash is not directly included in the DCF assumptions. On the liability side of the balance sheet, the historical track record suggests that an unchanged share of sales is a valid assumption for operating current liabilities items.

ROIC / RONIC

Caterpillar's ME&T pre & post COVID-19 ROIC (Return on Invested Capital) ranged from 22% to 24%, with lows of up to 11% during the pandemic, but it is constantly generating returns well above its WACC (Weighted Average Cost of Capital). Demonstrating its efficient use of capital.



Source: own calculation

Caterpillar is expected to maintain a sustainable competitive advantage (see Threat of competitive rivalry), with ROIC exceeding WACC at all times. Consequently, it is assumed that ROIC will remain at 24%, since Caterpillar aims to continue improving capital efficiency through higher asset turnover and operating margins but faces challenges (see Revenue) that mitigate higher capital efficiency.

WACC

To value Caterpillar using the enterprise discounted cash flow method, the weighted average cost of capital (WACC) is needed. The WACC calculation is broken down into beta, cost of equity, cost of debt and the target capital structure.

The cost of equity is based on the expected return of a market portfolio, adjusted for Caterpillar's specific risk as part of the beta determination.

A beta of 1.2 was calculated using the MSCI World All Country Index in USD as the market portfolio. As CAT provides its products and services to a global network, using the MSCI World All Country Index, is considered the most prudent benchmark. Moreover, the 5-year beta was

chosen for proprietary calculation because of CAT's maturity as a company, as well as the fact that the forecasts place CAT on a stable path.

The equity risk premium was calculated using the MSCI World 5Y Returns and a risk free rate of 4.68% (30Y US Government Bonds). The cost of equity therefore corresponds to 10.7%.

WACC ME&T	
Cost of Equity	
Risk-free Rate	4.68%
Risk Premium	5.47%
Beta	1.2
Cost of Equity	10.70%
Cost of Debt	5.11%
Capital Strcture	
Debt	40%
Equity	60%
WACC	**8.50%**

Source: own calculation

The cost of debt has been calculated using the total amount of debt outstanding as of December 9, 2023. Finally, the sum was drawn from the amount of outstanding weighted yields. Arriving in a cost of debt of 5.11%.

With the above mentioned assumptions, Caterpillar's weighted average cost of capital (WACC) as of December 09, 2023 is estimated at 8.5%. The estimate is based on a capital structure of 40% debt and 60% equity, as debt has become CAT's preferred method of financing over the last three years (from 49.7% to 60.4% to 59.0% in 2020, 2021, and 2022, respectively). With rising interest rates making debt less attractive, CAT's capital structure is expected to be in line with the average of its peers. Thus, a WACC of 8.5% is considered appropriate. As a point of reference, the average industrial manufacturing WACC is approximately 8.1% (Tschöpel, Schöniger, and Snellen 2023) - therefore, a 0.5%-ppt cost of capital premium is considered appropriate for a player with global revenue exposure and linkage to a diverse array of industries, as well as facing significant supply chain risks.

Financial Products

As the Financial Products segment only supports the operating segment and an independent forecast is not feasible due to a lack of data and value driver, it is expected that Financial Products revenue will grow at the same 5% CAGR until 2030 and is discounted with the determined cost of equity of 10.7%. With regard to Return on Equity (ROE) and Return on new Equity (RONE), which basically has the same mechanism as ROIC and RONIC. A RONE of 3% was assumed, which reflects the most suitable level, taking into account the historical ROE and future development of RONE. All other forecasts are based on the same assumptions as for the main operating segment.

Given the fact that the free cash flow to equity method is used to value the Financial Products segment, forecasting the equity positions is crucial. Common stock, treasury stock, accumulated other comprehensive income (loss) remain constant as there is no meaningful forecast driver. However, a clear forecast of retained earnings is important. The principle of "clean surplus accounting" is applied in order to ensure that:

$$Retained\ Earnings_t = Retained\ Earnings_{\ t-1} + Net\ Income_t - Dividends_t$$

Intrinsic Valuation

Sum of the Parts

For the Energy, Machinery and Transportation segment and based on the previously defined forecast drivers, we assume revenue growth of 5%, a COGS margin of 67% and an OPEX margin of 13%, resulting in an EBIT margin of 20%. Amortizations are forecasted by Caterpillar itself, resulting in an EBITA margin between 20-21%. After deducting the previously determined operating tax rate of 23%, NOPLAT is determined. Finally, the NOPLAT is adjusted for cash flows from depreciation, change in operating working capital and capex investments, yielding the free cash flow. Under the DCFF (discounted cash flow to firm) method, the free cash flow is discounted to the respective period using the assumed WACC of 8.5%. The continuing value is derived as outlined below:

$$CV_6 = \frac{NOPLAT_{CV}(1 - \frac{g}{RONIC})}{WACC - g}$$

$$CV_0 = \frac{CV_6}{(1 + WACC)^5}$$

The terminal growth rate is set at 2%, which is based on historical data and forecasts of long-term GDP growth (Vipond 2023, PwC 2017, OECD 2023). Finally, the sum of the discounted free cash flows is added to the continuing value, resulting in a value of $171 billion for the ME&T operations. Using a six-year forecast horizon, the percentage of discounted cash flows to total operating value is 30%. After adding the excess cash (assumed to be 2% of revenues), which is a non-operating asset, the enterprise value is $170 billion. Subsequently, EM&T's projected debt, post-employment benefit liabilities, and non-controlling interests are deducted to arrive at the final equity value. It is important to note that not all of Caterpillar's debt is used here, as the equity value in the later analysis of the Financial Products segments is already net of its own debt. The equity value is divided by the number of common shares outstanding of 509 million, resulting in an implied share price for the EM&T segment of $301.

Base Scenario	
Inputs	**Base**
Revenue	5%
COGS Margin	67%
OPEX Margin	13%
CAPEX Margin	-2%
D&A Margin	91%
RONIC	24%
Operating Tax Rate	23%
RONE	3%
Terminal Value Growth Rate (g)	2%

Sum of the Parts Share Price	302 USD

Source: own calculation

The DCFE (discounted free cash flow to equity) method is performed for the Financial Products segment, which means the basis for valuation is no longer NOPLAT but net income. After deducting increases / adding decreases in equity, the free cash flow to equity is established. Cash flow to equity is discounted using the determined cost of equity of 10.7%. Continuing value is derived in the same way as in the EM&T segment, albeit now using RONE of 3% instead of RONIC. After aggregation, an equity value of 354 million is ascertained. Divided by the number of basic shares outstanding, an implied target share price for Financial Products of around $1 is obtained.

The implied target share prices of $301 for EM&T and Financial Products of $1 are combined, resulting in a target share price for Caterpillar and the Base Case of around $302.

Scenario-Analysis

The detailed description of the base case has already identified a number of issues that could fundamentally alter the value of Caterpillar, such as the strong influence of inflation and the inability to sustain price realization associated with the loss of market power and competitive advantage. To better quantify positive and negative effects, assumptions were made and two additional scenarios were developed: Pessimistic and Optimistic

Pessimistic Scenario:

Cyclical downturns in key end markets such as construction, mining, oil and gas, or a persistent recession could further reduce sales to 3%, ultimately leading to higher inventory levels as dealers are unable to sell inventory.

Since Caterpillar operates in industries with volatile commodity prices, rising input costs, such as materials and labor, could increase COGS and subsequently reduce margins and profitability. The erosion of market power and competitive advantage due to the entry of new competitors related to electrification reduces price realization opportunities, eventually resulting in an even higher COGS/revenue ratio and a lower ROIC, since competitive advantage is now lower/missing. Bringing ROIC toward the industry average of 8% and COGS/Revenue reverting to the historical 2017 - 2022 COGS margin of about 73%, which was disproportionately high due to restructuring needs (see COGS). Due to the shift to carbon neutral electrically operated machines, high Capex investments are needed to adequately upgrade the production line to new standards, but without corresponding sales growth, CAPEX margin increases to 4%. These theoretical changes in market conditions, result in an implied share price of $114. Bringing Caterpillar to a 3-year low.

Pessimistic Scenario	
Inputs	**Pessimistic**
Revenue	3%
COGS Margin	73%
OPEX Margin	15%
CAPEX Margin	-4%
D&A Margin	91%
RONIC	8%
Operating Tax Rate	23%
RONE	3%
Terminal Value Growth Rate (g)	2%
Sum of the Parts Share Price	**114 USD**

Source: own calculation

Optimistic Scenario:

The decline in the order backlog was only temporary and demand remains unbroken, allowing Caterpillar to increase its revenue at a CAGR of 7% between 2024 and 2030.

Increased input costs can be passed on in the long-term by maintaining market power through price realization. Due to its current market dominance, Caterpillar also remains a leader in the transformation to electrically powered machines. By introducing these new product lines, increased input prices can be passed on over-proprietarily. Supply disruptions, which also affect the COGS, can be performed more reliable and cost-effective through backward integration. As a result, the GOGS/revenue ratio falls slightly to 65%. By maintaining and expanding market power, ROIC can be further increased. It is estimated that RONIC will increase to a total of 30%. The operating expenditure ratio will fall slightly by 2%-ppt, as the market development in regards to electrification and sustainable energies is sufficiently good to reduce R&D to a lower level. These theoretical changes in market conditions, result in an implied share price of $421 and an upside of 44% (as of December, 19th 2023).

Optimistic Scenario	
Inputs	**Optimistic**
Revenue	7%
COGS Margin	65%
OPEX Margin	11%
CAPEX Margin	-2%
D&A Margin	91%
RONIC	30%
Operating Tax Rate	23%
RONE	3%
Terminal Value Growth Rate (g)	2%
Sum of the Parts Share Price	**421 USD**

Source: own calculation

Since both the optimistic and pessimistic scenarios reflect more abstract and extreme scenarios, the relative weighting is set to 15% each. Taking all three scenarios (base, pessimistic, optimistic) and assigning them their relative weights, the stock price is expected to be $292, resulting in a delta to the base scenario of only around $10 (cf. $302 base scenario).

Sensitivity Analysis

The sensitivity analysis is applied only to the base case scenario and inputs of the Machinery, Energy & Transportation segment, as factors in the Financial segment do not have a significant impact on the overall valuation, as the share price contribution of Financial Products is negligible at $1.

The 4x4 sensitivity matrix of terminal growth 1% to 3% and WACC 6.5% to 10.5% shows medium sensitivity to fluctuations in WACC and long-term growth rate. The stock price ranges from $212 to $539 (max Δ to target $237). It is therefore extremely important to set the "accurate" expectations for WACC and terminal growth.

In addition, the sensitivity of revenue growth to WACC was compared. Revenue growth ranges from 3% to 7% and WACC ranges from 6.5% to 10.5%. This results in an average sensitivity to fluctuations in WACC or revenue growth (max Δ to target $220).

Revenue growth is further analyzed for sensitivity with the tax rate. Revenue growth range remains constant at 3% to 7% and tax rate ranges from 13% to 33%. In comparison to the previously considered figures, the sensitivity is determined to be lower (max Δ to target $80).

Finally, the sensitivity between RONIC and WACC is analyzed. RONIC ranges between 4% and 44%. The WACC range remains constant with the previous assumptions. A medium sensitivity can be identified (max Δ to target $167).

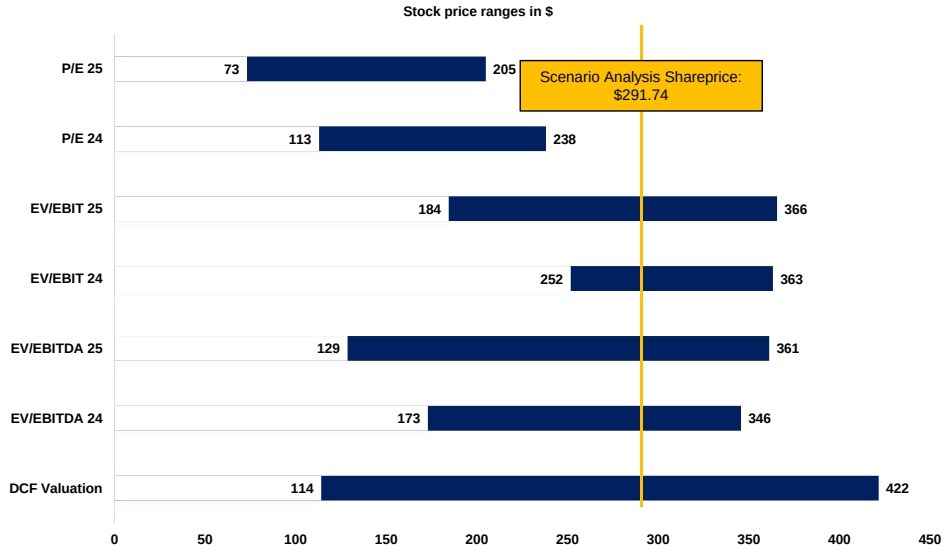
Overall, the variances identified are consistent with those expected to occur.

Final Recommendation

As the market is subject to significant uncertainties, both positive and negative, the target share price of $292/share from the scenario analysis (cf. base case: $302) is considered to be the most appropriate, as it best reflects market uncertainties. We especially feel that the intrinsic valuation yields the most accurate results when compared to the relative valuation. In order to be able to make a recommendation (HOLD, BUY or SELL), the total shareholder return is determined and dividends are factored in. The total shareholder return is derived as follows:

$$Total\ Shareholder\ Return = \frac{Target\ Share\ Price_{12.2024} + \frac{Dividends}{Share}_{2024}}{Share\ Price_{12.2023}}$$

Based on the current share price $293/share (as of December 19, 2023) the target share price of $292/share (as of December 31, 2024) and the expected dividend of USD 4.4 for 2024, the total shareholder return amounts to an upside of 1%. A **HOLD** recommendation is issued.



Source: own calculation