PACCAR Inc PCAR (XNAS)

Morningstar Rating	Last Price	Fair Value Estimate	Price/Fair Value	Trailing Dividend Yield %	Forward Dividend Yield %	Market Cap (Bil)	Industry	Stewardship
★★★★ 03 Jul 2018 15:04, UTC	60.79 USD 03 Jul 2018	71.00 USD 05 Mar 2018 13:28, UTC	0.86	1.69 03 Jul 2018	1.84 03 Jul 2018	21.41 03 Jul 2018	Truck Manufacturing	Exemplary

Morningstar Pillars	Analyst	Quantitative
Economic Moat	Narrow	Narrow
Valuation	★★★★	Undervalued
Uncertainty	Medium	Medium
Financial Health	—	Moderate

Source: Morningstar Equity Research

Quantitative Valuation

PCAR

Undervalued | Fairly Valued | Overvalued

	Current	5-Yr Avg	Sector	Country
Price/Quant Fair Value	0.89	1.04	0.91	0.94
Price/Earnings	11.4	20.6	18.3	21.6
Forward P/E	10.9	—	15.8	15.2
Price/Cash Flow	8.2	9.6	11.8	14.0
Price/Free Cash Flow	25.6	48.0	19.5	21.3
Trailing Dividend Yield%	1.69	1.49	2.15	2.23

Source: Morningstar

Bulls Say

- Paccar has built a premium brand and network that have consistently led to superior ROICs in the ever-volatile heavy equipment sector.
- Paccar has vigorously reduced its reliance on Cummins as an engine supplier, supplying 41% of its North American trucks with its own engines.
- Freight activity has been robust, and day-rate conditions for truck drivers are conducive for the current replacement cycle.

Bears Say

- The increasing mix of sales to fleet operators could pressure Paccar's pricing premium.
- The company is heavily leveraged toward economic growth for freight activity and the profitability of carriers, both of which are highly volatile.
- Owner-operators and fleet carriers may defer purchasing new equipment and opt for either used equipment or retrofitting existing equipment.

Trucking equipment recovery puts Paccar back on the road to stronger profitability.

Investment Thesis

Keith Schoonmaker, CFA, Sector Director, 05 March 2018

Since entering the heavy-duty truck market in 1945, Paccar has carefully fashioned unique and premium global brands in the manufacturing sector. Operating under the Kenworth, Peterbilt, and DAF (for the Europe and Brazilian markets) brands, the company has consistently ranked as one of the largest manufacturers of 18-wheelers. It has been able to achieve its strong market position against several deep-pocketed players, such as Volvo, Daimler, and Volkswagen, through a combination of market segmentation and customer and dealer financing capabilities. Unlike its competitors that historically sought business from large carriers, which possessed strong bargaining power, savvy Paccar focused on the overlooked owner-operator segment. Additionally, with more than 2,100 dealers in 98 countries and a strong captive arm, Paccar has met the challenges of its diverse customer base. Paccar's vigorous devotion to the needs of independent truck drivers, which we estimate make up about 60% of the overall North American fleet, has allowed the company to garner customer loyalty, and even more impressively, premium pricing. Indeed, Paccar's strategy has succeeded--over the past decade, it has consistently maintained its premium market position, controlling around 30% in the North America heavy-duty truck segment, 15% in Europe, and 35% in Mexico.

As the industry has evolved with increased regulations on engine emission standards and thus equipment cost structure, Paccar has also advanced its operational strategy to better withstand margin compression. Over the past decade, Paccar has shifted from its historical role as an assembler of truck components to in-sourcing. In fact, today, 41% of Paccar's Kenworth and Peterbilt trucks include its manufactured engines and nearly all its DAF vehicles, reducing supplier power concerns. Additionally, Paccar is improving operating efficiencies for its manufacturing and distributing facilities. We believe that Paccar's strategy and product differentiation will allow it to stay competitive in its well-defined niche market.

Analyst Note

Keith Schoonmaker, CFA, Sector Director, 24 April 2018

Following narrow-moat Paccar's first-quarter performance, we expect to maintain our fair value estimate of $71 per share. Paccar grew first-quarter 2018 adjusted EPS 65% from the prior-year period to $1.45, beating consensus by $0.14, or 11%. Paccar drove the earnings beat largely on both the top and bottom lines as the company continues to benefit from both new and replacement sales activity. (See our March 5, 2018, note "Tax Reform and a Solid Economy Support the Heavy Equipment Sector Despite U.S. Steel Tariffs.")

Manufacturing sales rose 35% to $5.3 billion from the prior year's quarter, led by improved truck and parts sales. Truck sales rose 39% to $4.4 billion, driven by solid Class 8 sales. Parts sales increased around 19% to $940 million thanks in part to the strong adoption of the MX engine line (around 40%-45% of truck sales contain Paccar's proprietary engine). Combined, Paccar improved gross margins by nearly 100 basis points to 14.8%. Management expressed optimism that 2018 would continue to improve, as noted by raising its parts sales forecast from around 8% to 11%.

From an industry perspective, the trucking industry continues to showcase solid fundamentals. Robust truck freight demand and trucking rates have persisted at elevated levels, and we don't see any meaningful catalyst at this time that would alter this outlook. Although we believe that this activity will continue for the foreseeable future, we believe that Paccar's current valuation is in line with our fair value estimate.

Economic Moat

Keith Schoonmaker, Sector Director, 03 July 2018

We believe that Paccar has a narrow moat based on intangible assets, primarily its brand. Paccar sells its products under three brands: Kenworth, Peterbilt, and DAF. Relative to its peer group (Volvo, Daimler, and Volkswagen), Paccar has generated an impressive 24% return on invested capital, or ROIC, over the past 10 years, far greater than its estimated 9.0% weighted average cost of capital, or WACC. We attribute these returns to the company's premium brand, which has benefited from several positive industry trends over the past decade, as

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Close Competitors	Currency (Mil)	Market Cap	TTM Sales	Operating Margin	TTM/PE
Volkswagen AG VOW3	EUR	70,379	232,713	5.71	6.29
Daimler AG DAI	EUR	59,459	165,533	7.72	5.81

well as a highly effective management team that has leveraged the brand for growth opportunities.

In the heavy-equipment industry, we generally believe that an economic moat is built on a company's intangible assets in the form of brand recognition, which is verified by two factors: perceived product quality, and the quality of the dealer network. These factors are usually demonstrated by a manufacturer's ability to maintain/build market share, sell products at a price premium to peers, and maintain higher-than-peer residual values. Under this framework, we review Paccar's segments and company positioning.

The truck business comprises around 75% of the company's sale base, with 60% of its revenue stemming from North America. The Kenworth and Peterbilt brands are sold in North America and command an impressive 30% market share, while DAF is sold internationally in Europe (15% market share) and elsewhere. As previously discussed, over the past few decades, Paccar has leveraged its premium products to owner-operators. This has been particularly useful as U.S. freight growth has rapidly expanded with increased global trade, gross domestic product growth, improvements in freight productivity, and the availability of an extensive multimodal transportation network--resulting in greater demand for heavy trucks. According to the American Trucker Association, 70% of freight (measured in tonnage per mile) is hauled by trucks within the U.S., with owner-operators/small carriers accounting for 60% of the overall trucking fleet. To meet the rigor demanded by constant freight activity, Paccar's trucks are engineered for around a life cycle that is approximately two years longer than peers' (nine years for Paccar versus seven years for peers), a leading source of justification for carriers to pay Paccar's 10% price premium, according to management. Separately, Paccar's truck sales have also been bolstered by another industry theme: an aging truck driver population, with a median age of 55. Anecdotally, this trend has motivated large carriers to boost recruiting and employ retention efforts with more-premium trucks, such as Paccar's. Overall, the company has been able to leverage its premium brand in its truck segment to take advantage of these favorable industry themes, bolstering its impressive ROICs.

Paccar's parts business accounts for around 20% of its sales and is largely distributed through its dealer network. While truck manufacturing is inherently volatile, given its dependence on the freight industry (capacity, economic output, and so on), we believe that Paccar's biggest risk is that there are many large industry players, including Daimler, Volvo, Navistar, and Volkswagen. However, we remain impressed by Paccar's ability to navigate this competitive landscape; apart from its premium brand, we attribute this success to Paccar's strong dealer network. Indeed, the company possesses a robust network of independent dealers across 2,100 worldwide locations, which compares much more favorably with Navistar's 822 locations. This broad dealer network can get much closer to customers than a global company, instilling a layer of stability within various unpredictable regional markets through consistent, lucrative aftermarket part sales (midteen margins). Moreover, we believe that Paccar's dealer network breadth and premium product reputation allow it to maintain not only its entrenched market share through strong customer service/customer interaction, but also better resale values for used trucks relative to its peers, both of which remain hurdles for competitors to match.

We don't award a wide moat rating because we believe Paccar is more likely than not to achieve normalized excess returns for at least the next 10 years (narrow moat) as opposed to 20 years (wide moat). We award Paccar a narrow moat based on our two key areas of concern: competition and distribution networks.

Aside from Paccar's highly cyclical and competitive industry is the tangible apprehension that autonomous driving technology could disrupt the trucking business. Ostensibly, autonomous technology would result in ever-larger carrier operations and diminish Paccar's core market: owner-operators/small operators. While the discussed U.S. regulations do stop short of allowing for automated fleets in the heavy-truck space, we believe that there is a strong possibility for eventual disruption, given the sizable research and development investments by U.S. and foreign automotive manufacturers (and thus Paccar's competitors). With the autonomous concern noted, this risk is partially diminished by Paccar's investments in

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setting up a Silicon Valley innovation center to explore next-generation technologies, as well as the fundamental long-term need for dealers and service stations to repair equipment, the latter of which is essential for long-haul fleets that depend on limited downtime. However, with the rising number of regional distribution networks (the "Amazon effect"), carriers' hauling distances have substantially declined, potentially offsetting demand over the long run for the premium products that Paccar manufactures. In fact, the American Trucking Association recently noted that the average dry van length-of-haul was down 33% from 2001 (796 miles in 2002 compared with 533 miles in 2016). We will be closely monitoring both developments and Paccar's response for a possible upgrade.

Valuation

Keith Schoonmaker, Sector Director, 03 July 2018

Following Paccar's first-quarter 2018 results, we are maintaining our fair value estimate for Paccar at $71 per share. We forecast five-year average annual revenue growth of 3.6% for Paccar's manufacturing division, primarily driven by parts sales growth of 5.2%, offsetting the modest 3.3% growth rate in truck sales. Broadly speaking, our analysis of Paccar's sales show that the company tends to grow in line with U.S. GDP over an economic cycle, albeit with considerable volatility. Thus, our five-year revenue growth rate is premised on modest U.S. and world GDP expansion. Paccar has expanded its engine manufacturing capabilities. Initially, we projected that in-sourcing engine capabilities would augment the company's operating margins. However, compensating for what we view as a more competitive environment, especially with stricter engine regulations that have driven up truck prices, we conservatively forecast operating margins staying relatively flat at around 10% on average. Combining our revenue and margin assumptions results in returns on invested capital, including goodwill, staying flat at around 29% through 2022. We estimate Paccar's weighted average cost of capital at 9.0%.

Separately, we analyzed the value of Paccar's captive arm by assigning it a multiple of book value. Our review of the finance division shows healthy returns on equity of 12.8% since 2005, in line with financial institutions' historical share price/book value of 1.0 times-1.5 times. As such, we assign a multiple of 1.25 to the division.

Risk

Keith Schoonmaker, Sector Director, 03 July 2018

We are changing our uncertainty rating to medium from high due to our confidence in management's capital-allocation strategy, specifically a debt-free industrial business, enabling the company to withstand headwinds that arise from the cyclical and capital intensive nature of truck manufacturing. The company has uniquely positioned itself as a supplier of premium brands without the use of leverage or overextension into nonaccretive business opportunities. Paccar is leveraged to general economic conditions, and is accordingly exposed to the overall health of the global economy. Aside from cyclical forces, the firm also competes with deep-pocketed players, which may challenge the company's premium-priced products, especially in the event of a protracted downturn. To counter such potential issues, management is investing in its engine capabilities to help reduce its cost structure, developing advanced driver-assistance technologies, and expanding/diversifying into certain growth markets, such as Brazil and engine manufacturing.

Management

Keith Schoonmaker, Sector Director, 05 March 2018

We assign Paccar an Exemplary stewardship rating. Management has an excellent track record of navigating multiple economic cycles. Indeed, management's superior stewardship is reflected by the company's 10-year industry-leading average ROIC. Unlike several of its peers, Paccar's management has largely avoided debt-fueled acquisitions and other costly adventures, choosing instead to focus on its core knitting. We believe that this focused strategy is due in large part to the company's background as a family-run company (the Pigott family), giving the company a more long-term perspective that is particularly useful in its highly cyclical industry. The company has paid a regular or special dividend every year since 1941 (apart from 2009, a special dividend has been declared every year over the past 10 years), which exemplifies its Exemplary stewardship.

Ronald Armstrong currently leads Paccar, having become the firm's CEO in 2014. Armstrong has been with the company for more than 20 years and previously served as the company's president from 2011 to 2014. Under his leadership, the company's long-term plan to produce its own engine in the U.S. remains on track, with around 41% of North American heavy-duty truck sales possessing

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Paccar's engines. He has also maintained the company's fierce focus on operational efficiencies. He is supported by Paccar's CFO, Harrie Schippers. Before taking the role of CFO, Schippers was the president of DAF Trucks N.V. from 2010 to 2016 and the director of finance from 2003 to 2010 at DAF. We believe that Schippers' experience in both financial and operational roles within Paccar makes him exceptionally qualified to assist Armstrong. We expect management to maintain Paccar's strong track record of capital allocation relative to peers.

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Analyst Notes Archive

Paccar Fires on All Cylinders in the 4Q

Nick Mokha, Eq. Analyst, 30 January 2018

Following narrow-moat Paccar's solid fourth-quarter results, we are maintaining our $67 fair value estimate. Paccar expanded fourth-quarter 2017 EPS 44% from the prior-year period to $1.18, beating consensus by 5 cents or 5.4%. Paccar continued to surpass our near-term expectations on the top line, increasing nonfinancial revenue an impressive 36% to $5.1 billion at 10.2% operating margins. Management attributed these strong financial results to its record quarterly worldwide deliveries of 44,300 trucks, which in turn allowed the company to gain another personal best record: 30.7% Class 8 North America market share (up from 28.5% in 2016).

In response, Paccar outlined a rosy 2018 outlook. Management projects Class 8 retail sales to increase around 15% against 2017 thanks to good economic growth, increased consumer spending, as well as strong commercial and residential construction activity. We share Paccar's optimistic outlook. As mentioned in our note last quarter, we have noticed improved fundamentals in the heavy-duty truck market over the past six months. Truck freight demand and trucking rates strengthened as 2017 progressed, and both remain elevated; indeed, North American truck sales in December 2017 were at their highest level in three years. In addition to fleet growth, we believe replacement activity will likely rise in 2018 as tax law changes incentivize greater capital spending.

Tax Reform and a Solid Economy Support the Heavy Equipment Sector Despite U.S. Steel Tariffs

Keith Schoonmaker, Sector Director, 05 March 2018

It appears that heavy equipment investors are in for a first-quarter 2018 earnings season even more stellar than we previously expected. In our view, first-quarter performance for companies within the heavy-equipment industry was already likely to be strong, particularly given recent U.S. tax reform, which we believe incentivized both customers and manufacturers to move orders from the fourth quarter of 2017 to the first quarter of 2018 to take advantage of immediate depreciation allowance and lower tax rates. But with the latest news on tariffs, we believe heavy-equipment companies will witness even stronger demand in the first quarter as customers who were contemplating orders become even more likely to pull the trigger.

While we are still assessing potential tariff-related effects, we note that both wide-moat Caterpillar and Deere have adequate inventory on hand to last for a few months before tariffs have an impact. Thereafter, we estimate that these companies will be exposed to rising steel prices, which account for around 10% of their total operating expenses (raw materials account for 50%-75% of cost of goods sold). We view it as unlikely that many companies will meaningfully pass along their increased raw material costs to customers, as foreign competitors stand ready to take advantage. Moreover, companies in our coverage list operate without hedges and are thus exposed to steel price fluctuations.

Steel tariffs enacted by the George W. Bush administration lasted for 18 months. If we assume 24 months of tariff-related impacts and an inability for manufacturers to pass the increased steel prices along to customers, then we would expect to see operating margins decline over 200 basis points, resulting in fair value estimates declining less than 5%. Thus, assuming no other retaliatory measures taken by other countries in response to products manufactured by our coverage list, we currently don't expect material impacts to our fair value estimates.

Paccar Delivers a Strong 1Q Performance

Keith Schoonmaker, Sector Director, 24 April 2018

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Quantitative Equity Report | Release: 03 Jul 2018, 10:10 UTC | Reporting Currency: USD | Trading Currency: USD | Exchange:XNAS

PACCAR Inc PCAR ★★★★Q

03 Jul 2018 02:00 UTC

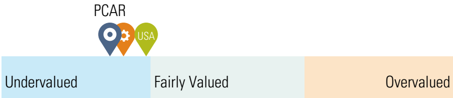
Last Close	Fair Value Q	Market Cap	Sector	Industry	Country of Domicile
02 Jul 2018 60.86	03 Jul 2018 02:00 UTC 68.13	02 Jul 2018 21,411.3 Mil	Industrials	Truck Manufacturing	United States

There is no one analyst in which a Quantitative Fair Value Estimate and Quantitative Star Rating are attributed to; however, Mr. Lee Davidson, Head of Quantitative Research for Morningstar, Inc., is responsible for overseeing the methodology that supports the quantitative fair value. As an employee of Morningstar, Inc., Mr. Davidson is guided by Morningstar, Inc.'s Code of Ethics and Personal Securities Trading Policy in carrying out his responsibilities. For information regarding Conflicts of Interests, visit http://global.morningstar.com/equitydisclosures

Company Profile

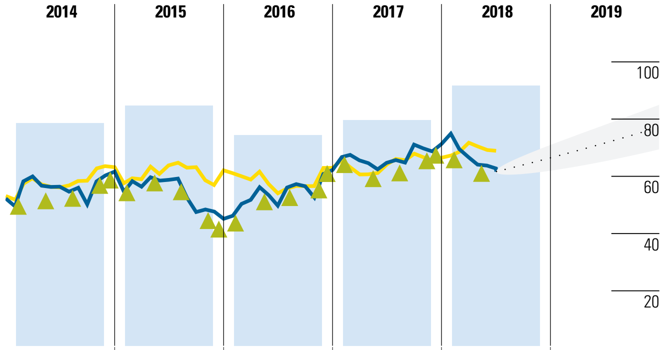
Quantitative Scores

		Scores All	Rel Sector	Rel Country
Quantitative Moat	Narrow	94	93	90
Valuation	Undervalued	57	56	59
Quantitative Uncertainty	Medium	100	100	99
Financial Health	Moderate	67	56	67



Source: Morningstar Equity Research

Price vs. Quantitative Fair Value

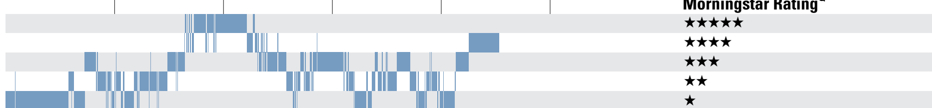


Momentum: Negative
Standard Deviation: 20.30
Liquidity: High

52-Wk: 59.82 – 79.69
5-Yr: 43.46 – 79.69

2014	2015	2016	2017	2018	2019	
18.1	-26.9	38.1	14.7	-13.6		Total Return %
5.2	-27.6	25.7	-6.8	-17.0		+/– Market (Morningstar US Index)
1.26	1.94	1.50	1.39	1.69		Trailing Dividend Yield %
1.29	2.03	1.50	1.41	1.84		Forward Dividend Yield %
18.6	10.2	38.9	18.2	11.4		Price/Earnings
1.3	0.9	1.3	1.4	1.0		Price/Revenue

Morningstar Rating Q



Valuation

	Current	5-Yr Avg	Sector Median	Country Median
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Price/Earnings	11.4	20.6	18.3	21.6
Forward P/E	10.9	—	15.8	15.2
Price/Cash Flow	8.2	9.6	11.8	14.0
Price/Free Cash Flow	25.6	48.0	19.5	21.3
Trailing Dividend Yield %	1.69	1.49	2.15	2.23
Price/Book	2.5	3.1	1.7	2.5
Price/Sales	1.0	4.4	1.0	2.4

Profitability

	Current	5-Yr Avg	Sector Median	Country Median
Return on Equity %	24.0	18.5	11.3	12.7
Return on Assets %	8.4	6.1	4.7	5.0
Revenue/Employee (K)	834.9	785.9	513.7	323.5

Financial Health

	Current	5-Yr Avg	Sector Median	Country Median
Distance to Default	0.6	0.7	0.6	0.5
Solvency Score	358.1	—	491.1	553.5
Assets/Equity	2.9	3.0	1.8	1.7
Long-Term Debt/Equity	0.7	0.8	0.2	0.4

Financials (Fiscal Year in Mil)

2013	2014	2015	2016	2017	TTM	
16,661	18,534	18,671	17,033	19,456	20,872	Revenue
0.4	11.2	0.7	-8.8	14.2	7.3	% Change
1,365	1,672	2,002	2,075	2,293	2,515	Operating Income
5.0	22.5	19.7	3.6	10.5	9.7	% Change
1,171	1,359	1,604	522	1,675	1,877	Net Income
2,376	2,124	2,556	2,301	2,716	2,631	Operating Cash Flow
-1,873	-1,537	-1,725	-1,965	-1,847	-1,792	Capital Spending
503	586	831	336	869	838	Free Cash Flow
3.0	3.2	4.4	2.0	4.5	4.0	% Sales
3.30	3.82	4.51	1.48	4.75	5.32	EPS
5.8	15.8	18.1	-67.2	220.9	12.0	% Change
1.17	1.90	1.86	0.87	2.18	2.37	Free Cash Flow/Share
0.80	0.86	0.92	0.96	0.99	1.00	Dividends/Share
18.29	20.21	20.90	19.90	22.56	24.35	Book Value/Share
354,300	354,500	351,300	350,700	351,800	351,812	Shares Outstanding (K)

Profitability

2013	2014	2015	2016	2017	TTM	
18.8	20.3	23.4	7.6	22.6	24.0	Return on Equity %
6.0	6.6	7.7	2.5	7.6	8.4	Return on Assets %
7.0	7.3	8.6	3.1	8.6	9.0	Net Margin %
0.85	0.90	0.89	0.82	0.88	0.93	Asset Turnover
3.1	3.1	3.0	3.0	2.9	2.8	Financial Leverage
16.6	16.5	18.1	20.6	19.9	19.8	Gross Margin %
8.2	9.0	10.7	12.2	11.8	12.1	Operating Margin %
6,007	5,589	5,795	6,028	5,946	5,896	Long-Term Debt
6,634	6,753	6,940	6,778	8,050	8,567	Total Equity
3.0	3.3	3.4	3.0	3.1	3.5	Fixed Asset Turns

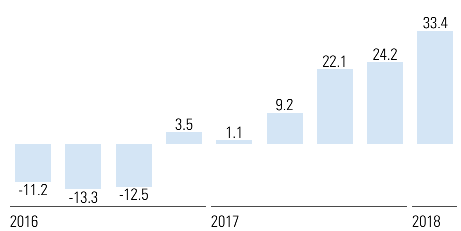
Growth Per Share

	1-Year	3-Year	5-Year	10-Year
Revenue %	14.2	0.8	3.2	2.5
Operating Income %	10.5	2.4	12.0	-0.7
Earnings %	221.0	7.5	8.8	3.7
Dividends %	3.1	4.8	4.9	4.4
Book Value %	18.4	6.3	6.7	5.3
Stock Total Return %	-4.5	1.2	5.5	6.6

Quarterly Revenue & EPS

Revenue (Mil)	Mar	Jun	Sep	Dec	Total
2018	5,654.0	—	—	—	—
2017	4,237.9	4,704.2	5,059.7	5,454.6	19,456.4
2016	4,192.6	4,306.1	4,143.5	4,391.1	17,033.3
2015	4,721.8	4,968.8	4,736.3	4,244.4	18,671.3
Earnings Per Share ()					
2018	1.45	—	—	—	—
2017	0.88	1.06	1.14	1.67	4.75
2016	-1.69	1.37	0.98	0.82	1.48
2015	1.06	1.26	1.21	0.98	4.51

Revenue Growth Year On Year %



Research Methodology for Valuing Companies

Qualitative Equity Research Overview

At the heart of our valuation system is a detailed projection of a company's future cash flows, resulting from our analysts' research. Analysts create custom industry and company assumptions to feed income statement, balance sheet, and capital investment assumptions into our globally standardized, proprietary discounted cash flow, or DCF, modeling templates. We use scenario analysis, in-depth competitive advantage analysis, and a variety of other analytical tools to augment this process. Moreover, we think analyzing valuation through discounted cash flows presents a better lens for viewing cyclical companies, high-growth firms, businesses with finite lives (e.g., mines), or companies expected to generate negative earnings over the next few years. That said, we don't dismiss multiples altogether but rather use them as supporting cross-checks for our DCF-based fair value estimates. We also acknowledge that DCF models offer their own challenges (including a potential proliferation of estimated inputs and the possibility that the method may miss short-term market-price movements), but we believe these negatives are mitigated by deep analysis and our long-term approach.

Morningstar's equity research group ("we", "our") believes that a company's intrinsic worth results from the future cash flows it can generate. The Morningstar Rating for stocks identifies stocks trading at a discount or premium to their intrinsic worth—or fair value estimate, in Morningstar terminology. Five-star stocks sell for the biggest risk-adjusted discount to their fair values, whereas 1-star stocks trade at premiums to their intrinsic worth.

Four key components drive the Morningstar rating: (1) our assessment of the firm's economic moat, (2) our estimate of the stock's fair value, (3) our uncertainty around that fair value estimate and (4) the current market price. This process ultimately culminates in our single-point star rating.

1. Economic Moat

The concept of an economic moat plays a vital role not only in our qualitative assessment of a firm's long-term investment potential, but also in the actual calculation of our fair value estimates. An economic moat is a structural feature that allows a firm to sustain excess profits over a long period of time. We define economic profits as returns on invested capital (or ROIC) over and above our estimate of a firm's cost of capital, or weighted average cost of capital (or WACC). Without a moat, profits are more susceptible to competition. We have identified five sources of economic moats: intangible assets, switching costs, network effect, cost advantage, and efficient scale.

Companies with a narrow moat are those we believe are more likely than not to achieve normalized excess returns for at least the next 10 years. Wide-moat companies are those in which we have very high confidence that excess returns will remain for 10 years, with excess returns more likely than not to remain for at least 20 years. The longer a firm generates economic profits, the higher its intrinsic value. We believe low-quality, no-moat companies will see their normalized returns gravitate toward the firm's cost of capital more quickly than companies with moats.

To assess the sustainability of excess profits, analysts perform ongoing assessments of the moat trend. A firm's moat trend is positive in cases where we think its sources of competitive advantage are growing stronger; stable where we don't anticipate changes to competitive advantages over the next several years; or negative when we see signs of deterioration.

2. Estimated Fair Value

Combining our analysts' financial forecasts with the firm's economic moat helps us assess how long returns on invested capital are likely to exceed the firm's cost of capital. Returns of firms with a wide economic moat rating are assumed to fade to the perpetuity period over a longer period of time than the returns of narrow-moat firms, and both will fade slower than no-moat firms, increasing our estimate of their intrinsic value.

Our model is divided into three distinct stages:

Stage I: Explicit Forecast

In this stage, which can last five to 10 years, analysts make full financial statement forecasts, including items such as revenue, profit margins, tax rates, changes in working-capital accounts, and capital spending. Based on these projections, we calculate earnings before interest, after taxes (EBI) and the net new investment (NNI) to derive our annual free cash flow forecast.

Stage II: Fade

The second stage of our model is the period it will take the company's return on new invested capital—the return on capital of the next dollar invested ("RONIC")—to decline (or rise) to its cost of capital. During the Stage II period, we use a formula to approximate cash flows in lieu of explicitly modeling the income statement, balance sheet, and cash flow statement as we do in Stage I. The length of the second stage depends on the strength of the company's economic moat. We forecast this period to last anywhere from one year (for companies with no economic moat) to 10–15 years or more (for wide-moat companies). During this period, cash flows are forecast using four assumptions: an average growth rate for EBI over the period, a normalized investment rate, average return on new invested capital (RONIC), and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until a perpetuity value is calculated. In the case of firms that do not earn their cost of capital, we assume marginal ROICs rise to the firm's cost of capital (usually attributable to less reinvestment), and we may truncate the second stage.

Stage III: Perpetuity

Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with estimated WACC.

Because a dollar earned today is worth more than a dollar earned tomorrow, we discount our projections of cash flows in stages I, II, and III to arrive at a total pres-

Morningstar Research Methodology for Valuing Companies

Economic Moat
Financial Health
Stewardship
Uncertainty
Moat Trend

Morningstar Fair Value

Margin of Safety
Market Pricing

Morningstar Rating™ For Stocks
★★★★★

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ent value of expected future cash flows. Because we are modeling free cash flow to the firm—representing cash available to provide a return to all capital providers—we discount future cash flows using the WACC, which is a weighted average of the costs of equity, debt, and preferred stock (and any other funding sources), using expected future proportionate long-term, market-value weights.

3. Uncertainty around that fair value estimate
Morningstar's Uncertainty Rating captures a range of likely potential intrinsic values for a company and uses it to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating represents the analysts' ability to bound the estimated value of the shares in a company around the Fair Value Estimate, based on the characteristics of the business underlying the stock, including operating and financial leverage, sales sensitivity to the overall economy, product concentration, pricing power, and other company-specific factors.

Analysts consider at least two scenarios in addition to their base case: a bull case and a bear case. Assumptions are chosen such that the analyst believes there is a 25% probability that the company will perform better than the bull case, and a 25% probability that the company will perform worse than the bear case. The distance between the bull and bear cases is an important indicator of the uncertainty underlying the fair value estimate.

Our recommended margin of safety widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the estimated value of the equity, the greater the discount we require relative to our estimate of the value of the firm before we would recommend the purchase of the shares. In addition, the uncertainty rating provides guidance in portfolio construction based on risk tolerance.

Our uncertainty ratings for our qualitative analysis are low, medium, high, very high, and extreme.

- ►**Low:** margin of safety for 5-star rating is a 20% discount and for 1-star rating is 25% premium.
- ►**Medium:** margin of safety for 5-star rating is a 30% discount and for 1-star rating is 35% premium.
- ►**High:** margin of safety for 5-star rating is a 40% discount and for 1-star rating is 55% premium.
- ►**Very High:** margin of safety for 5-star rating is a 50% discount and for 1-star rating is 75% premium.
- ►**Extreme:** Stock's uncertainty exceeds the parameters we have set for assigning the appropriate margin of safety.

4. Market Price
The market prices used in this analysis and noted in the report come from exchange on which the stock is listed which we believe is a reliable source.

For more detail information about our methodology, please go to http://global.morningstar.com/equitydisclosures

Morningstar Star Rating for Stocks
Once we determine the fair value estimate of a stock, we compare it with the stock's current market price on a daily basis, and the star rating is automatically re-calculated at the market close on every day the market on which the stock is listed is open. Our analysts keep close tabs on the companies they follow, and, based on thorough and ongoing analysis, raise or lower their fair value estimates as warranted.

Please note, there is no predefined distribution of stars. That is, the percentage of stocks that earn 5 stars can fluctuate daily, so the star ratings, in the aggregate, can serve as a gauge of the broader market's valuation. When there are many 5-star stocks, the stock market as a whole is more undervalued, in our opinion, than when very few companies garner our highest rating.

We expect that if our base-case assumptions are true the market price will converge on our fair value estimate over time, generally within three years (although it is impossible to predict the exact time frame in which market prices may adjust).

Our star ratings are guideposts to a broad audience and individuals must consider their own specific investment goals, risk tolerance, tax situation, time horizon, income needs, and complete investment portfolio, among other factors.

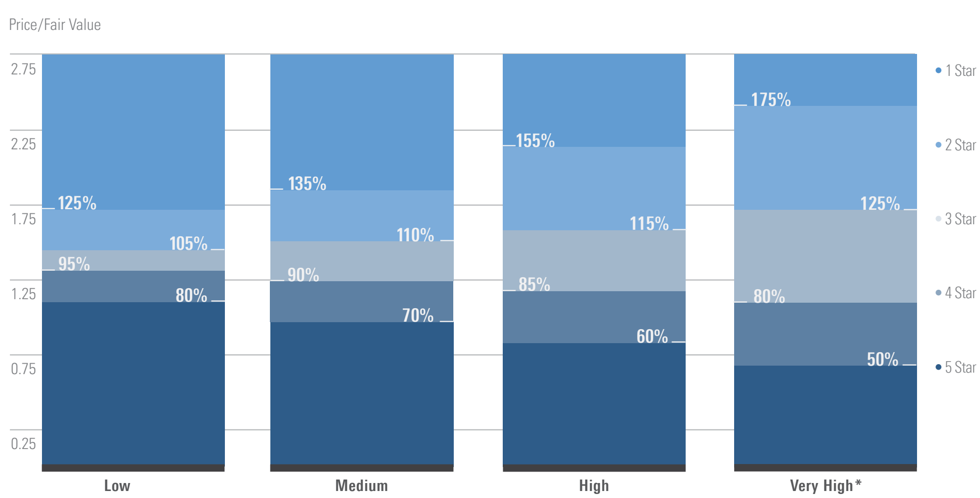
The Morningstar Star Ratings for stocks are defined below:

Five Stars ★★★★★
We believe appreciation beyond a fair risk-adjusted return is highly likely over a multiyear time frame. Scenario analysis developed by our analysts indicates that the current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.

Four Stars ★★★★
We believe appreciation beyond a fair risk-adjusted return is likely.

Three Stars ★★★
Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).

Morningstar Research Methodology for Valuing Companies



* Occasionally a stock's uncertainty will be too high for us to estimate, in which case we label it Extreme.

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Two Stars ★★
We believe investors are likely to receive a less than fair risk-adjusted return.

One Star ★
Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. Scenario analysis by our analysts indicates that the market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.

Other Definitions:

Last Price: Price of the stock as of the close of the market of the last trading day before date of the report.

Stewardship Rating: Represents our assessment of management's stewardship of shareholder capital, with particular emphasis on capital allocation decisions. Analysts consider companies' investment strategy and valuation, financial leverage, dividend and share buyback policies, execution, compensation, related party transactions, and accounting practices. Corporate governance practices are only considered if they've had a demonstrated impact on shareholder value. Analysts assign one of three ratings: "Exemplary," "Standard," and "Poor." Analysts judge stewardship from an equity holder's perspective. Ratings are determined on an absolute basis. Most companies will receive a Standard rating, and this is the default rating in the absence of evidence that managers have made exceptionally strong or poor capital allocation decisions.

Quantitative Valuation: Using the below terms, intended to denote the relationship between the security's Last Price and Morningstar's quantitative fair value estimate for that security.

- **Undervalued:** Last Price is below Morningstar's quantitative fair value estimate.
- **Farily Valued:** Last Price is in line with Morningstar's quantitative fair value estimate.
- **Overvalued:** Last Price is above Morningstar's quantitative fair value estimate.

Risk Warning
Please note that investments in securities are subject to market and other risks and there is no assurance or guarantee that the intended investment objectives will be achieved. Past performance of a security may or may not be sustained in future and is no indication of future performance. A security investment return and an investor's principal value will fluctuate so that, when redeemed, an investor's shares may be worth more or less than their original cost. A security's current investment performance may be lower or higher than the investment performance noted within the report. Morningstar's Uncertainty Rating serves as a useful data point with respect to sensitivity analysis of the assumptions used in our determining a fair value price.

Quantitative Equity Reports Overview
The quantitative report on equities consists of data, statistics and quantitative equity ratings on equity securities. Morningstar, Inc.'s quantitative equity ratings are forward looking and are generated by a statistical model that is based on Morningstar Inc.'s analyst-driven equity ratings and quantitative statistics. Given the nature of the quantitative report and the quantitative ratings, there is no one analyst in which a given report is attributed to; however, Mr. Lee Davidson, Head of Quantitative Research for Morningstar, Inc., is responsible for overseeing the methodology that supports the quantitative equity ratings used in this report. As an employee of Morningstar, Inc., Mr. Davidson is guided by Morningstar, Inc.'s Code of Ethics and Personal Securities Trading Policy in carrying out his responsibilities.

Quantitative Equity Ratings
Morningstar's quantitative equity ratings consist of: (i) Quantitative Fair Value Estimate, (ii) Quantitative Star Rating, (iii) Quantitative Uncertainty, (iv) Quantitative Economic Moat, and (v) Quantitative Financial Health (collectively the "Quantitative Ratings).

The Quantitative Ratings are calculated daily and derived from the analyst-driven ratings of a company's peers as determined by statistical algorithms. Morningstar, Inc. ("Morningstar", "we", "our") calculates Quantitative Ratings for companies whether or not it already provides analyst ratings and qualitative coverage. In some cases, the Quantitative Ratings may differ from the analyst ratings because a company's analyst-driven ratings can significantly differ from other companies in its peer group.

Quantitative Fair Value Estimate: Intended to represent Morningstar's estimate of the per share dollar amount that a company's equity is worth today. Morningstar calculates the Quantitative Fair Value Estimate using a statistical model derived from the Fair Value Estimate Morningstar's equity analysts assign to companies. Please go to http://global.morningstar.com/equitydisclosures for information about Fair Value Estimate Morningstar's equity analysts assign to companies.

Quantitative Economic Moat: Intended to describe the strength of a firm's competitive position. It is calculated using an algorithm designed to predict the Economic Moat rating a Morningstar analyst would assign to the stock. The rating is expressed as Narrow, Wide, or None.

- **Narrow:** assigned when the probability of a stock receiving a "Wide Moat" rating by an analyst is greater than 70% but less than 99%.
- **Wide:** assigned when the probability of a stock receiving a "Wide Moat" rating by an analyst is greater than 99%.
- **None:** assigned when the probability of an analyst receiving a "Wide Moat" rating by an analyst is less than 70%.

Quantitative Star Rating: Intended to be the summary rating based on the combination of our Quantitative Fair Value Estimate, current market price, and the Quantitative Uncertainty Rating. The rating is expressed as One-Star, Two-Star, Three-Star, Four-Star, and Five-Star.

- **One-Star:** the stock is overvalued with a reasonable margin of safety.
  *Log (Quant FVE/Price) < -1*Quantitative Uncertainty*
- **Two-Star:** the stock is somewhat overvalued.
  *Log (Quant FVE/Price) between (-1*Quantitative Uncertainty, -0.5*Quantitative Uncertainty)*
- **Three-Star:** the stock is approximately fairly valued.
  *Log (Quant FVE/Price) between (-0.5*Quantitative Uncertainty, 0.5*Quantitative Uncertainty)*
- **Four-Star:** the stock is somewhat undervalued.
  *Log (Quant FVE/Price) between (0.5*Quantitative Uncertainty, 1*Quantitative Uncertainty)*
- **Five-Star:** the stock is undervalued with a reasonable margin of safety.
  *Log (Quant FVE/Price) > 1*Quantitative Uncertainty*

Quantitative Uncertainty: Intended to represent Morningstar's level of uncertainty about the accuracy of the Quantitative Fair Value Estimate. Generally, the lower the Quantitative Uncertainty, the narrower the potential range of outcomes for that particular company. The rat-

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ing is expressed as Low, Medium, High, Very High, and Extreme.

- ►**Low:** the interquartile range for possible fair values is less than 10%.
- ►**Medium:** the interquartile range for possible fair values is less than 15% but greater than 10%.
- ►**High:** the interquartile range for possible fair values is less than 35% but greater than 15%.
- ►**Very High:** the interquartile range for possible fair values is less than 80% but greater than 35%.
- ►**Extreme:** the interquartile range for possible fair values is greater than 80%.

Quantitative Financial Health: Intended to reflect the probability that a firm will face financial distress in the near future. The calculation uses a predictive model designed to anticipate when a company may default on its financial obligations. The rating is expressed as Weak, Moderate, and Strong.

- ►**Weak:** assigned when Quantitative Financial Health < 0.2
- ►**Moderate:** assigned when Quantitative Financial Health is between 0.2 and 0.7
- ►**Strong:** assigned when Quantitative Financial Health > 0.7

Other Definitions:

Last Close: Price of the stock as of the close of the market of the last trading day before date of the report.

Quantitative Valuation: Using the below terms, intended to denote the relationship between the security's Last Price and Morningstar's quantitative fair value estimate for that security.

- ►**Undervalued:** Last Price is below Morningstar's quantitative fair value estimate.
- ►**Farily Valued:** Last Price is in line with Morningstar's quantitative fair value estimate.
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This Report has not been made available to the issuer of the security prior to publication.

Risk Warning

Please note that investments in securities are subject to market and other risks and there is no assurance or guarantee that the intended investment objectives will be achieved. Past performance of a security may or may not be sustained in future and is no indication of future performance. A security investment return and an investor's principal value will fluctuate so that, when redeemed, an investor's shares may be worth more or less than their original cost. A security's current investment performance may be lower or higher than the investment performance noted within the report.

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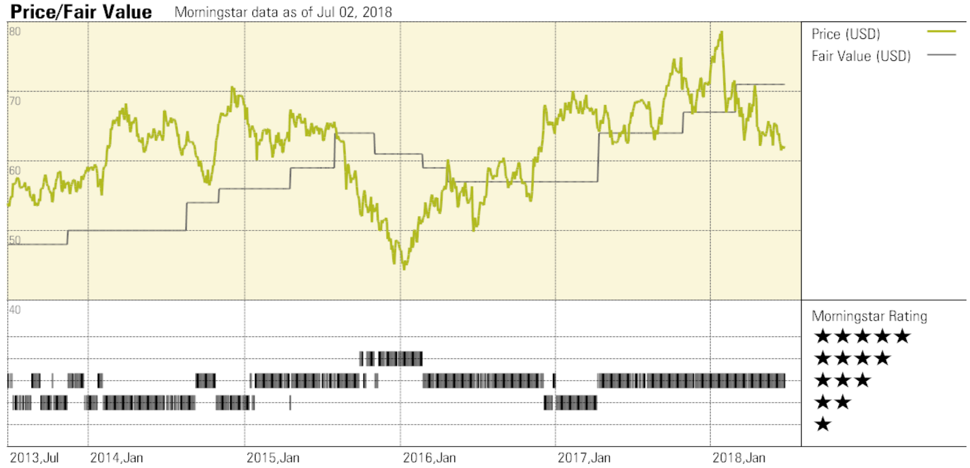
For more information about Morningstar's quantitative methodology, please visit www.corporate.morningstar.com.

PACCAR Inc PCAR (XNAS)

Morningstar Rating	Last Price	Fair Value Estimate	Price/Fair Value	Trailing Dividend Yield %	Forward Dividend Yield %	Market Cap (Bil)	Industry	Stewardship
★★★★	60.79 USD	71.00 USD	0.86	1.69	1.84	21.41	Truck Manufacturing	Exemplary
03 Jul 2018 15:04, UTC	03 Jul 2018	05 Mar 2018 13:28, UTC		03 Jul 2018	03 Jul 2018	03 Jul 2018		

Price/Fair Value Morningstar data as of Jul 02, 2018



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PACCAR Inc PCAR (XNAS)

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