**Bulls Say**
- LKQ has a symbiotic relationship with auto insurers—it is the largest buyer of insurance company auctioned salvage cars in the U.S. and it is the largest provider of collision-repair body shop recycled and aftermarket parts.
- State Farm left the aftermarket after losing a 1999 lawsuit related to not using OEM parts for collision repairs. Preliminary settlement was reached in 2018. Management is convinced State Farm will re-enter the aftermarket business soon.
- LKQ has established itself as a successful acquirer and integrator of recycled, alternative, and aftermarket parts distributors.

**Bears Say**
- If the Justice Department ever forces LKQ to comply with the Anti-Car Theft Act, it will burden the company with a distraction and higher expense to keep more detailed records on most of its recycled parts inventory.
- The market has paid a premium for LKQ’s earnings in the past, which means bad news may cause the share price to tumble, as is typical with growth companies.
- Over the long term, the firm could be threatened by local recycling companies forming alliances that could help them to match LKQ in price or product offering.

**Quantitative Valuation**

<table>
<thead>
<tr>
<th>LKQ</th>
<th>Undervalued</th>
<th>Fairly Valued</th>
<th>Overvalued</th>
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<tr>
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<td>0.80</td>
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<td>Country</td>
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<td>Price/Cash Flow</td>
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<td>17.7</td>
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<tr>
<td>Price/Free Cash Flow</td>
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<td>2.48</td>
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**Price/Fair Value**

<table>
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<tr>
<th>LKQ</th>
<th>Price/Fair Value</th>
<th>Trailing Dividend Yield %</th>
<th>Forward Dividend Yield %</th>
<th>Market Cap (Bil)</th>
<th>Industry</th>
<th>Stewardship</th>
</tr>
</thead>
<tbody>
<tr>
<td>26.38 USD</td>
<td>0.56</td>
<td>—</td>
<td>0.00</td>
<td>8.39</td>
<td>Auto Parts</td>
<td>Standard</td>
</tr>
</tbody>
</table>

**Morningstar Rating**

- 2018 4.5 Star Rating
- Classification: Large-Cap
- Sector: Auto Parts
- Stewardship: Standard

**Morningstar Pillars**

- Economic Moat: Narrow
- Valuation: Undervalued
- Uncertainty: Medium
- Financial Health: Moderate

**Morningstar Equity Research**

**Price/Cash Flow**

- 10.3
- 16.9
- 29.1
- 0.56

**Price/Fair Value**

- 0.68
- 14.9
- 10.3
- —

**Trailing Dividend Yield %**

- —
- —
- —
- —

**Forward Dividend Yield %**

- 0.00
- —
- —
- —

**Market Cap (Bil)**

- 8.39
- 0.00
- 0.00
- 0.00

**Industry**

- Auto Parts

**Analyst Note**

Richard Hilgert, Sr. Eq. Analyst, 28 October 2018

Narrow-moat-rated LKQ, which provides alternative and specialty parts to repair and accessorize vehicles, reported third-quarter earnings per share before special items of $0.56, in line with the consensus but $0.11 higher than the $0.45 reported in the same period a year ago. Organic parts and service revenue growth was a healthy 4.3% while acquisitions added 23.2% and favorable currency translation added 0.6%. Total consolidated revenue, including LKQ’s scrap metal business, was up 26.6% to $3.1 billion versus $2.5 billion reported in the third quarter of 2017. The 5-star-rated LKQ shares currently trade at an attractive 43% discount to our $47 fair value estimate.

Europe organic growth was a modest 2.0% as price competition affected revenue. Growth in Europe was also hurt by exceptionally warm weather in the third quarter. North America third-quarter organic growth was in line with management’s long-term target of 4%-6%, at 5.2%. However, performance in North America was partially hit by lower scrap prices. Specialty was a bright spot with organic growth of 8.0% due to increased RV demand and especially a strong economy in the United States.

As a result of lower scrap prices anticipated in the fourth quarter, management tweaked guidance. The new guidance decreased adjusted income from continuing operations guidance by $30 million, to $690 million-$710 million. This resulted in a $0.07 decrease in the midpoint of EPS guidance to $2.19-$2.25. However, we are increasing our fair value estimate to $47 per share from $43 in part because of the Stahlgruber acquisition, which closed June 30.

**Economic Moat**

Richard Hilgert, Sr. Eq. Analyst, 28 October 2018

We have assigned LKQ a narrow moat rating because of its cost advantage and efficient scale derived from the company’s unique and difficult-to-replicate nationwide distribution network, as the firm now has about 500 refurbished parts distributors are highly fragmented, and LKQ has no real competition.
LKQ Corp
LKQ (XNAS)

Morningstar Rating: ⭐⭐⭐⭐⭐
Last Price: 26.38 USD
Fair Value Estimate: 47.00 USD
Price/Fair Value: 0.56
Trailing Dividend Yield %: —
Forward Dividend Yield %: 0.00
Market Cap (Bill): 8.39

Industry: Auto Parts
Stewardship: Standard

Close Competitors
- O'Reilly Automotive Inc ORLY USD 26,199 9,269 19.06 22.27
- AutoZone Inc AZO USD 19,005 11,221 16.14 15.24
- Genuine Parts CoGPC USD 14,465 18,338 5.95 19.84
- Advance Auto Parts Inc AAP USD 12,190 9,420 8.47 22.78

LKQ obtains most of these vehicles from insurance company salvage vehicle auctions. The company has developed software technology that compiles information on recycled parts—for example, current inventory, historical demand, current demand, and estimated value.

Armed with handheld computing devices, LKQ’s buyers can go to salvage auctions and find vehicles containing high-demand, recyclable parts. Once located, the buyers can input the vehicle and its salvageable parts and get an estimated maximum bid, reducing the likelihood that LKQ will wind up with obsolete inventory and ensuring that the company does not overpay for procurement, bolstering profitability.

It makes good business sense for LKQ to maintain good relations with insurance companies and vice versa. While the firm is indirectly paid by automotive insurance companies through the collision repair shops with which they do business, it is the automotive insurance industry’s largest buyer of salvage vehicles, creating a modest network effect, adding to LKQ’s economic moat.

Typically, when auto insurers reimburse a policyholder for a “totaled” vehicle, the insurers try to offset the claim payout by selling the wrecks at salvage auctions. LKQ in turn buys the wrecks and salvages the good parts, selling them to the repair shops that are reimbursed by the automotive insurance companies.

The company is quickly becoming a major player in the European market for alternative and mechanical repair parts and systems. In October 2011, LKQ acquired Euro Car Parts, the U.K.’s largest distributor of aftermarket car parts. Sator, acquired in May 2013 and based in the Netherlands, provides alternative repair parts to the Netherlands, Belgium, Luxembourg, and northern France. LKQ signed a definitive agreement in December 2015 to acquire Italy-based Rhiag, which has pan-continental Europe operations that distribute mechanical repair parts.

However, with the exception of Sator, we see the aftermarket parts distribution business as less moaty than LKQ’s domestic operations. Aftermarket parts distribution is much more competitive with relatively large players when compared with LKQ’s domestic alternative collision repair parts business. Even so, the scale of the organization being built in Europe may strengthen a cost advantage economic moat pillar for LKQ.

domestic facilities. The difficulty and time required to obtain zoning and dismantling permits and other environmental authorizations necessary to operate newly sited recycled parts facilities represents a significant barrier to entry for any would-be competitor.

This network allows the company to fill more of its orders than the industry average, since it can move parts around the network to meet demand. This mobility is something single-point recyclers cannot do unless they form an alliance, which would be challenging to organize. LKQ is seeking to replicate its light-vehicle recycling operation on the heavy-duty truck side, but may have more formidable competition in refurbished parts markets from established firms such as Meritor.

Another of LKQ’s advantages relates to the insurance industry. Indirectly, automotive insurers are also LKQ customers because they pay for approximately 85% of all collision repair bills in the United States. The company’s primary customers (body shops and mechanical repair shops) look for parts on a daily basis to fill the specific needs for the repairs that are currently in their vehicle bays. These customers will order from a single source if that source can consistently deliver all the repair products required to complete all the shop’s repair jobs within a reasonable amount of time and at a reasonable price.

Since LKQ maintains a substantial amount of inventory across several facilities, all the repair products needed can usually be delivered within 24 hours and at prices that can be up to 50% less than new OEM replacement parts. Insurance companies, seeking to reduce the amount of money paid out in claims and in fees for rental vehicles used during repairs, look for the least expensive and quickest alternative to supply repair shops. As a result, LKQ, being the only nationwide provider, is usually designated as a preferred supplier by automotive insurance companies.

Due to its size and nationwide presence, LKQ also has an advantage in the procurement of salvage vehicles, its primary source of recycled and refurbished replacement parts. LKQ maintains an extensive nationwide network of salvage yards to source parts.
LKQ Corp LKQ (XNAS)

**Morningstar Rating**

<table>
<thead>
<tr>
<th>Morningstar Rating</th>
<th>Last Price</th>
<th>Fair Value Estimate</th>
<th>Price/Fair Value</th>
<th>Trailng Dividend Yield %</th>
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<tbody>
<tr>
<td>★★★★★</td>
<td>26.38 USD</td>
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</table>

**Price/Fair Value**

- 29 Oct 2018
- 01:25, UTC
- 29 Oct 2018
- 01:22, UTC

**Fair Value & Profit Drivers**

**Richard Hilgert, Sr. Eq. Analyst, 28 October 2018**

We are raising our fair value estimate to $47 per share from $43 after after evaluating the effects of the Stahlgruber acquisition as well as the time value of money ($1) since our last model update. We discount LKQ’s future cash flows assuming a weighted average cost of capital at 8.2%.

Our assumed cost of equity is 9%, in line with the 9% rate of return we expect investors will demand of a diversified equity portfolio, reflecting our average systematic risk rating for LKQ. Our pretax cost of debt assumption is 6.5%, taking into account the spread creditors are likely to demand given LKQ’s credit profile. Over the past 10 years, LKQ has averaged 18.7% total debt/total capital. Consequently, with an assumed tax rate of 25.5%, our tax-affected weighted average cost of capital for LKQ is 8.2%.

Our model assumptions reflect annualized revenue growth from market penetration and acquisitions of roughly 7%. We forecast EBITDA margin to peak at 12.6% with a normalized sustainable midcycle assumption of 12.2% in the final year of our five-year forecast. Our midcycle assumption is in line with the 10-year historical median EBITDA margin. We also assume capital expenditures averaging 2.1% of revenue per year over our five-year forecast.

LKQ benefitted significantly from U.S. tax reform. The 10-year high, low, and median tax rates for the company were 38.0% (2010), 30.7% (2017), and 35.5%, respectively. For 2018, management guided to 27%. Because management guidance was roughly in line with our expectations, we maintained similar tax rates in our new model.

**Risk & Uncertainty**

**Richard Hilgert, Sr. Eq. Analyst, 28 October 2018**

Like all acquisitive companies, LKQ faces the risk of overpaying for an acquisition and then taking a loss in the disposition or a fair value impairment charge in a subsequent period. LKQ also could have operational problems integrating acquisitions that could negate any synergies.

Another risk comes from the Anti-Car Theft Act passed in 1992, which requires all parts recyclers to catalog vehicle identification numbers for most parts they recycle. In January 2009, the Justice Department authorized implementation of an electronic system but has yet to issue final rules. If LKQ were ever forced to comply with this regulation, it could represent a significant expense, causing operational inefficiency as each individual, recycled part is painstakingly identified and cataloged.

**Stewardship**

**Richard Hilgert, Sr. Eq. Analyst, 28 October 2018**

We like that the chairman and CEO roles are separate. Additionally, directors and officers own more than 7% of the company, which properly aligns their interests with outside shareholders’ interests. We do not like that management’s bonus is based on earnings per share because this metric focuses management behavior too much on the immediate quarter and is more susceptible to accounting interpretation. This risk is magnified in a company that does extensive acquisition accounting.

In 2017, Dominick P. Zarcone became CEO, replacing Robert Wagman who was CEO for six years. Zarcone joined LKQ as CFO in March 2015 after a lengthy career in investment banking. Wagman’s departure was apparently due to health reasons. Wagman’s predecessor, Joseph Holsten, remains Chairman of the Board. Wagman had been with LKQ since 1998 and had more than 20 years of experience in the auto-parts sector.
LKQ Corp LKQ (XNAS)

<table>
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<th>Price/Fair Value</th>
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<td>Standard</td>
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**Price Fair Value**

26 Oct 2018 29 Oct 2018 01:22, UTC

**Last Price**

26.38 USD 28 Oct 2018 01:25, UTC

**Fair Value Estimate**

47.00 USD 29 Oct 2018 01:22, UTC

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**Analyst Notes Archive**

**LKQ Completes Stahlgruber Acquisition, Shares Attractively Valued; Maintaining $43 FVE**

Richard Hilgert, Sr. Eq. Analyst, 03 June 2018

Narrow-moat LKQ, which provides aftermarket alternative and specialty parts to repair and accessorize vehicles, closed the acquisition of Stahlgruber at the end of May. Stahlgruber, headquartered in Germany, solidifies LKO’s position as Europe’s largest wholesale distributor of automotive aftermarket parts. The closing was one month ahead of our assumed June 30 transaction completion. The additional month of Stahlgruber ownership in our 2018 full-year forecast did not have a meaningful impact on our $43 fair value estimate.

However, LKQ shares are trading at a 26% discount to our fair value estimate owing to disappointing first-quarter results. We think the market has focused on transient revenue and cost issues, creating an opportunity for investors to own LKQ stock at an attractive valuation. With the first-quarter results, management reduced guidance on weaker organic growth and margin pressure resulting from a slow ramp-up of an automated distribution facility in the U.K. The new guidance included a $35 million reduction in adjusted net income to a range of $685 million to $715 million. This resulted in a $0.10 decrease in EPS guidance to a range of $2.20-$2.30, not including Stahlgruber.

We had already been assuming average organic growth of 4% during our five-year forecast, in-line with management’s new organic growth guidance of 3%-5% (prior 4%-6% guidance). With 7 months of Stahlgruber ownership, we estimate 2018 incremental revenue to LKQ of nearly $1.0 billion. Stahlgruber’s EBITDA margins, in the 8% range, are lower than LKO’s, which had been better than 11%. Consequently, we estimate 2018 LKO EBITDA margin of 10.8%, down from 11.2% reported last year. Including Stahlgruber margin dilution, we estimate 2018 EPS of $2.30. We assume the same level of profitability in 2019, but with organic revenue growth of 4% and roughly $800 million in incremental revenue from Stahlgruber, we estimate 2019 EPS of $2.60.

**LKQ Reports Solid 2Q Results, Tweaks 2018 Guidance Higher; Maintaining $43 FVE**

Richard Hilgert, Sr. Eq. Analyst, 26 July 2018

Narrow-moat-rated LKQ, which provides alternative and specialty parts to repair and accessorize vehicles, reported second-quarter earnings per share before special items of $0.61, $0.03 better than the consensus EPS of $0.58 but $0.08 higher than the $0.53 reported in the same period a year ago. Organic parts and service revenue growth was strong at 7.2%, while acquisitions added 12.7% and favorable currency translation added 2.9%. Total consolidated revenue, including LKQ’s scrap metal business, was up 23.3% to $3.0 billion versus $2.5 billion reported in the second quarter of 2017. The 4-star-rated LKQ shares currently trade at an attractive 22% discount to our $43 fair value estimate.

Europe organic growth was exceptionally strong at 8.3% on new branches opened in Eastern Europe. North America second-quarter organic growth was impressive and above management’s long-term target of 4%-6%, increasing 7.4%. Growth was attributable to healthier volume after mild winter weather affected first-quarter 2018 results, but also favorable wholesale pricing during the second quarter. However, the outperformance in North America was partially offset by softer specialty segment organic growth of 4.1%. Higher steel prices drove scrap organic growth to 30.2%.

Consequently, management tweaked guidance slightly higher on combined organic growth and better margin guidance on the ramp-up of a large automated distribution facility in the U.K. The new guidance increased management’s adjusted income from continuing operations guidance by $25 million, to a range of $710 million to $735 million. This resulted in a $0.04 increase in the midpoint of EPS guidance to $2.25 to $2.33. We maintained our 2018 EPS estimate of $2.30, including the Stahlgruber acquisition that closed on June 30.

**LKQ Reports Solid 3Q Results as Stahlgruber Acquisition Shows Promise; Raising FVE to $47**

Richard Hilgert, Sr. Eq. Analyst, 28 October 2018

Narrow-moat-rated LKQ, which provides alternative and specialty parts to repair and accessorize vehicles, reported third-quarter earnings per share before special items of $0.56, in line with the consensus but $0.11 higher than the $0.45 reported in the same period a year ago. Organic parts and service revenue growth was a healthy 4.3% while acquisitions added 23.2% and favorable currency translation added 0.6%. Total consolidated revenue, including LKQ’s scrap metal business, was up 26.6% to
$3.1 billion versus $2.5 billion reported in the third quarter of 2017. The 5-star-rated LKQ shares currently trade at an attractive 43% discount to our $47 fair value estimate.

Europe organic growth was a modest 2.0% as price competition affected revenue. Growth in Europe was also hurt by exceptionally warm weather in the third quarter. North America third-quarter organic growth was in line with management’s long-term target of 4%-6%, at 5.2%. However, performance in North America was partially hit by lower scrap prices. Specialty was a bright spot with organic growth of 8.0% due to increased RV demand and especially a strong economy in the United States.

As a result of lower scrap prices anticipated in the fourth quarter, management tweaked guidance. The new guidance decreased adjusted income from continuing operations guidance by $30 million, to $690 million-$710 million. This resulted in a $0.07 decrease in the midpoint of EPS guidance to $2.19-$2.25. However, we are increasing our fair value estimate to $47 per share from $43 in part because of the Stahlgruber acquisition, which closed June 30.
LKQ Corp LKQ ★★★★★ 28 Oct 2018 02:00 UTC

Market Cap 28 Oct 2018 02:00 UTC 8,390.9 Mil

Price vs. Quantitative Fair Value

Company Profile

LKQ is a global distributor of vehicle replacement parts, components, and systems used in repair and maintenance, as well as specialty products and accessories. LKQ is the largest domestic alternative and mechanical replacement products provider. Collision repair shops and insurance companies (which fund 85% of U.S. collision repairs) want alternative parts that are up to 50% below the cost of OEM aftermarket parts. LKQ is also a leader in Europe through recent acquisitions including Euro Car Parts (U.K.) and Sater Beheer.

Quantitative Scores

Source: Morningstar Equity Research

Valuation

<table>
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<th>Score</th>
<th>Sector Median</th>
<th>Country Median</th>
<th>Relative Sector</th>
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Profitability

Return on Equity % 14.2
Return on Assets % 6.7
Return on Sales % 5.9

Financial Health

Distance to Default 0.6
Solvency Score 480.6
Assets/Equity 2.1

Growth Per Share

1-Year 3-Year 5-Year 10-Year
Revenue % 13.4 13.1 18.8 24.1
Operating Income % 8.2 9.3 14.5 21.6
Earnings % 17.7 11.4 14.7 20.2
Dividends % — — — —
Book Value % 21.3 14.9 15.5 15.7
Stock Total Return % -28.9 -2.6 -4.5 15.9

Quarterly Revenue & EPS

Revenue (Mil) Mar Jun Sep Dec Total
2018 2,720.8 3,030.8 — — —
2017 2,342.8 2,458.4 2,465.8 2,469.9 9,736.9
2016 1,921.5 2,450.7 2,386.8 1,825.0 8,584.0
2015 1,773.9 1,838.1 1,831.7 1,748.9 7,192.6

Earnings Per Share (Q)

2018 0.49 0.50 — — —
2017 0.44 0.49 0.39 0.39 1.71
2016 0.35 0.46 0.40 0.28 1.50
2015 0.35 0.39 0.33 0.31 1.38

Revenue Growth Year On Year %

2016 33.3 2017 21.9 2018 35.3 2019 23.3

Profitability

Return on Equity % 14.0
Return on Assets % 5.6
Return on Sales % 5.2

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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. We believe this bottom-up, long-term, fundamentally based approach allows our analysts to focus on long-term business drivers, which have the greatest valuation impact, rather than short-term market noise.

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 an uncertainty-adjusted 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 excess 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:

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, or EBIT, and the net new investment, or NNI, to derive our annual free cash flow forecast.

Stage II: Faded
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 EBIT over the period, a normalized investment rate, average return on new invested capital, or RONIC, and the number of years until perpetuity, when excess returns cease. The investment rate and return on new invested capital decline until the perpetuity stage is reached. 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 in 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 present 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 analyst's 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—margin of safety for 5-star rating is a 75% discount and for 1-star rating is 300% premium.

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 details about our methodology, please go to https://shareholders.morningstar.com.

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 on which the market is open. 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:

- ★★★★★ We believe appreciation beyond a fair risk-adjusted return is highly likely over a multiyear time frame. The current market price represents an excessively pessimistic outlook, limiting downside risk and maximizing upside potential.
- ★★★★ We believe appreciation beyond a fair risk-adjusted return is likely.
- ★★★ Indicates our belief that investors are likely to receive a fair risk-adjusted return (approximately cost of equity).
- ★★ We believe investors are likely to receive a less than fair risk-adjusted return.
- ★ Indicates a high probability of undesirable risk-adjusted returns from the current market price over a multiyear time frame, based on our analysis. The market is pricing in an excessively optimistic outlook, limiting upside potential and leaving the investor exposed to Capital loss.
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
(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 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 https://shareholders.morningstar.com for information about fair value estimates 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 1-Star, 2-Star, 3-Star, 4-Star, and 5-Star.

- ★: the stock is overvalued with a reasonable margin of safety.
  Log (Quant FVE/Price) > 1 * Quantitative Uncertainty

- ★★: the stock is somewhat overvalued.
  Log (Quant FVE/Price) between [1 * Quantitative Uncertainty, 0.5 * Quantitative Uncertainty]

- ★★★: the stock is approximately fairly valued.
  Log (Quant FVE/Price) between [0.5 * Quantitative Uncertainty, 1 * Quantitative Uncertainty]

- ★★★★: the stock is somewhat undervalued.
  Log (Quant FVE/Price) between [0.5 * Quantitative Uncertainty, 1 * Quantitative Uncertainty]

- ★★★★★: 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 rating 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
Research Methodology for Valuing Companies

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.
- Fairly Valued: Last Price is in line with Morningstar's quantitative fair value estimate.
- Overvalued: Last Price is above Morningstar's quantitative fair value estimate.

This Report has not been made available to the issuer of the security prior to publication.

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<th>Forward Dividend Yield %</th>
<th>Market Cap (Bil)</th>
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