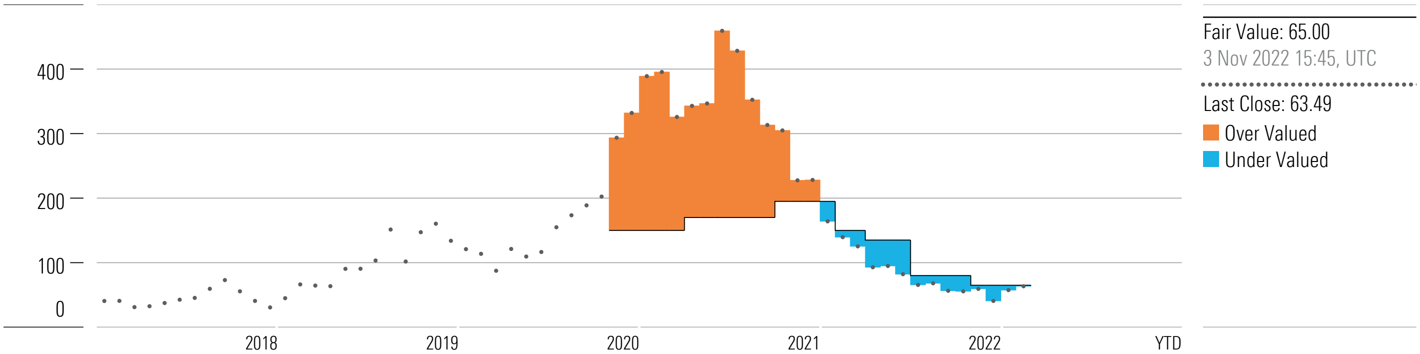
Morningstar Equity Analyst Report | Report as of 16 Feb 2023 14:38, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS Page 1 of 21

Roku Inc Class A ROKU ★★★ 15 Feb 2023 22:24, UTC

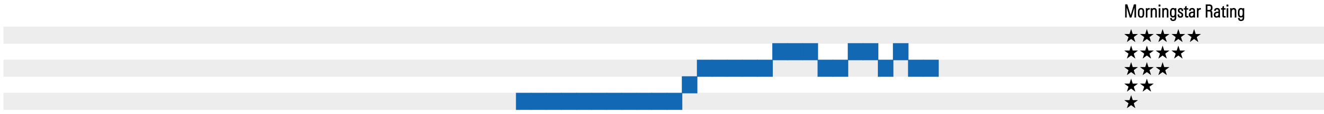
Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Moat Trend™	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
63.49 USD 15 Feb 2023	65.00 USD 3 Nov 2022 15:45, UTC	0.98	8.84 USD Bil 15 Feb 2023	None	Negative	Very High	Standard	1 Feb 2023 06:00, UTC

Price vs. Fair Value



	2018	2019	2020	2021	2022	YTD	
	—	—	2.21	1.17	0.63	0.98	Price/Fair Value
	-40.83	337.01	147.96	-31.27	-82.16	56.00	Total Return %

Morningstar Rating



Total Return % as of 15 Feb 2023. Last Close as of 15 Feb 2023. Fair Value as of 3 Nov 2022 15:45, UTC.

Contents

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The primary analyst covering this company does not own its stock.

[1]The ESG Risk Rating Assessment is a representation of Sustainalytics' ESG Risk Rating.

Roku Posts Strong End to 2022, but Weak Ad Revenue Market Will Hurt 2023 Top-Line Growth

Analyst Note Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

Roku reported a positive end to a challenging 2022 as fourth-quarter revenue came in well ahead of guidance and net new active accounts tied for the second strongest behind the pandemic-influenced fourth quarter of 2020. While revenue of $867 million was well ahead of the $800 million guidance, growth was the weakest on record at barely above 0% year over year. Management expects first-quarter revenue of $700 million, implying a 5% decline versus the same quarter in 2022. The company still expects to generate positive adjusted EBITDA in 2024, suggesting a second straight year with adjusted EBTIDA losses in 2023. We are maintaining our $65 fair value estimate, which we lowered last quarter to reflect slower revenue growth expectations and sluggish margin expansion as content and research and development costs move higher.

Net new account activation of 4.6 million showed that the firm's platform and product continue to attract users despite increased competition. The firm recently introduced its own line of Roku TVs, which should help speed up its international expansion. Streaming hours improved 23% year over year to hit 23.9 billion, with streaming hours per account per month up 5% to 117.7.

However, average platform revenue per account fell 11% year over year at $3.60, an expected drop given the generally weak ad market in the U.S. Management disclosed that the ad scatter market weakened even further in the fourth quarter than the third. Roku remains heavily dependent on the

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Sector	Industry
Communication Services	Entertainment

Business Description

Roku is the leading streaming platform in the U.S. by hours watched with under 59 billion hours of content streamed in 2020. The firm's eponymous operating system is used not only in Roku's own hardware but in co-branded TVs and soundbars from manufacturers like TCL, Onn, and Hisense. Roku generates revenue from advertising, distribution fees, hardware sales, OS licensing, and subscription sales.

near-term scatter market, which advertisers can pull out of quickly. Up-front ad sales remain a relatively low percentage of revenue on the Roku platform, unlike traditional linear networks and their streaming services. We expect platform revenue growth to drop into the midsingle digits in 2023 versus 19% in 2022 due to the weakness of the ad market, particularly in the first half of the year.

Business Strategy & Outlook Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

Roku is the leading streaming platform in the U.S. by hours watched with 87.4 billion hours of content streamed in 2022. The Roku platform provides its users with access to streaming services such as Netflix, YouTube, and Disney+. The company also offers its own ad-supported content channels that feature licensed third-party content. Its eponymous operating system is used on not only Roku-branded hardware but also in cobranded TVs and soundbars. Roku generates revenue from advertising, distribution fees, hardware sales, and subscription sales.

Despite operating in a highly competitive market, Roku has grown rapidly over the last five-plus years as it has benefited from the secular trend toward more over-the-top viewing and smart TV adoption.The firm had 70 million monthly active users as of December 2022, up sharply from 6 million at the end of 2014. Streaming hours on the platform have similarly exploded from 2.5 billion hours in the first half of 2015 to 45.8 billion in the second half of 2022. Like the streaming services that it offers, Roku benefited from the coronavirus-driven stay-at-home trend, but the secular shift toward streaming should provide a tailwind to both user and hour growth over the next few years.

The majority of Roku's users and revenue is generated in the U.S., where the firm's penetration is over 50% of broadband households. While we expect the service to continue to gain users in the U.S., most revenue growth will come from higher ad rates and subscription sales. The larger growth opportunity for Roku will be overseas, where the firm still faces fierce competition from Google, Amazon, and Apple along with consoles from Sony and Microsoft. Another impetus behind the growth of Roku has been its neutral approach to services. Unlike Amazon or Google, Roku had historically been open to placing any service on its platform. However, some media firms have been pushing back on the firm's terms, leading to newer services like HBO Max and Peacock not being available at launch. This more confrontational stance could cause users to look for other platforms for their streaming needs, as we believe switching costs for consumers are modest.

Bulls Say Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

- Roku is well positioned to take advantage of the secular trend toward increased content streaming in the U.S. and aboard.
- Roku's streaming service-neutral stance should continue to attract both new streaming services and customers.
- Roku should be able to leverage its growing active account base to get better advertising rates.

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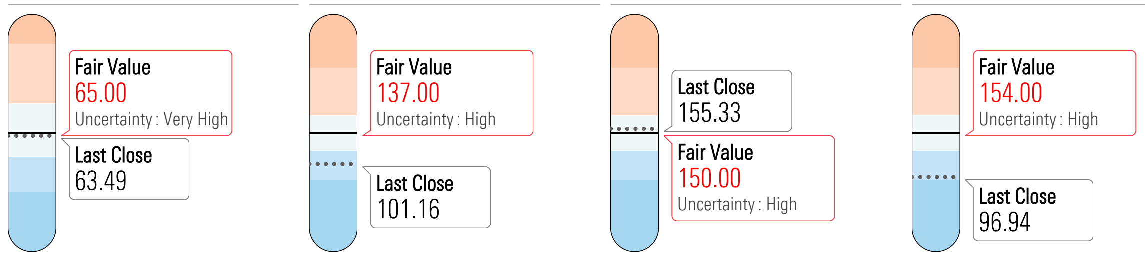
Competitors



	Roku Inc Class A ROKU	Amazon.com Inc AMZN	Apple Inc AAPL	Alphabet Inc Class A GOOGL
Economic Moat	None	Wide	Wide	Wide
Moat Trend	Negative	Stable	Stable	Stable
Currency	USD	USD	USD	USD
Fair Value	65.00 3 Nov 2022 15:45, UTC	137.00 3 Feb 2023 05:12, UTC	150.00 20 Jan 2023 17:37, UTC	154.00 3 Feb 2023 10:57, UTC
1-Star Price	113.75	212.35	232.50	238.70
5-Star Price	32.50	82.20	90.00	92.40
Assessment	Fairly Valued 15 Feb 2023	Under Valued 15 Feb 2023	Fairly Valued 15 Feb 2023	Under Valued 15 Feb 2023
Morningstar Rating	★★★15 Feb 2023 22:24, UTC	★★★★15 Feb 2023 22:24, UTC	★★★15 Feb 2023 22:24, UTC	★★★★15 Feb 2023 22:24, UTC
Analyst	Neil Macker, Senior Equity Analyst	Dan Romanoff, Senior Equity Analyst	Abhinav Davuluri, Strategist	Ali Mogharabi, Senior Equity Analyst
Capital Allocation	Standard	Exemplary	Exemplary	Exemplary
Price/Fair Value	0.98	0.74	1.04	0.63
Price/Sales	2.81	2.01	6.49	4.51
Price/Book	3.18	7.10	43.32	4.85
Price/Earning	—	—	26.37	21.26
Dividend Yield	—	—	0.59%	—
Market Cap	8.84 Bil	1,036.61 Bil	2,457.62 Bil	1,242.47 Bil
52-Week Range	38.26—165.84	81.43—170.83	124.17—179.61	83.34—143.79
Investment Style	Mid Growth	Large Growth	Large Growth	Large Growth

Bears Say Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

- Despite its tremendous subscriber growth, Roku has yet to generate operating income, and there may not be substantial leverage in the current business model.
- Roku is highly dependent on smart TV manufacturers that can easily swap out the Roku OS for another competing platform.
- Roku's competitors are much larger with considerably more resources. If they focus heavily on the streaming platform marketplace, they could blow Roku away by competing on price and features.

Economic Moat Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

We assign Roku a no-moat rating. While the firm is the leading streaming platform in the U.S., the streaming device marketplace is highly competitive with numerous competitors and relatively low barriers to entry. Despite its lead in the U.S., Roku is one of the smaller players in terms of total revenue and financial resources as the firm competes with not only other streaming devices but also smart TVs and video game consoles. Larger firms in the device space include Amazon (Fire TV), Apple (Apple TV), and Google (Android TV, Chromecast). Amazon and Google both also license their operating systems to TV, smart device, and soundbar manufacturers such as Toshiba, TCL, Insignia, and Xiaomi. Two of the largest smart TV manufacturers, LG and Samsung, have their own OSes (webOS for LG and Tizen Eden for Samsung). These devices also all compete with the original steaming leaders, PCs and game consoles, which are backed by massive companies like Apple, Microsoft, and Sony.

We believe that the firm's potential network effect is two sided with viewers/users on one side and content providers and advertisers on the other side. Roku players originally gained acclaim and recognition in part for being neutral in terms of content providers as a result of the firm not having any content tie-up. In contrast, both Google and Amazon battled over allowing their competing services on each other platforms. This openness to any provider, willingness to add new entrants, and lower priced hardware has attracted users to the Roku platform. The growth in users helps to attract more services as well as advertisers. Roku can offer advertisers display ads and ad space on their own AVOD service, The Roku Channel, and the other AVOD services on the Roku platform. While the addition of advertisers is generally not considered a boon to users, the attractiveness of Roku platform and user to advertisers does help to attract more free ad-supported video on demand services like Pluto and Tubi.

Roku also monetizes its network effect via content distribution fees for subscription video on demand service like Netflix or Disney+. Like Apple's App Store or Google's Play Store, the firm only receives a cut of this revenue when the subscriber signs up for the service via the Roku platform. Roku historically took 20% of this revenue on an ongoing basis versus Apple's take rate of 30% in the first year and 15% beyond that. However, some of the larger media firms have been rumored to be pushing back with Disney+ reportedly only paying 10% of revenue acquired via Roku and Hulu only 15%. We believe that Netflix is likely also paying a lower take rate. In addition to distribution fees, these large streaming providers also pay for a specific button on Roku remote controls for both the Roku devices and TCL TVs.

As result of the network effect, the firm's revenue growth has become increasingly driven by its platform segment which generates revenue from advertising, platform and distribution fees, and licensing. As a result, the Player segment (hardware sales) fell from 84% of total revenue in 2015 to 34% in 2019, a period during which total revenue increased from $320 million to $1.1 billion. We estimate that most of the platform revenue is derived from ad sales. We project that platform revenue growth will continue to outpace hardware growth, leading to an 88% share of 2024 revenue for the service-orientated segment. Despite the growth, we remain cautious about the potential for partners like TCL or Hisense to switch some or all of their TV lineup to other platforms which would severely hamper platform revenue growth.

Additionally, active accounts exploded from 6 million at the end of 2014 to 46 million at the end of September 2020. Since well over 90% of the firm's revenue, we assume that Roku has over 40 million active accounts or households in the U.S. While some households may have other options to stream content, the 40 million accounts imply a roughly 40% penetration against the 100 million U.S. broadband households. Streaming hours per quarter on the Roku platform similarly expanded from 1.2 billion in the first quarter of 2015 to 14.8 billion in the third quarter of 2020. This expansion of viewing hours has helped ARPU per household reach $2.39 in third quarter of 2020 from $0.45 in the first quarter of 2015.

One of the methods that Roku has used to gain share in the U.S. has been the lower price points of both its branded hardware and smart TVs using its OS, mainly from TCL and Hisense. Roku currently offers four different players with MSRPs from $30 to $100. In contrast, Apple offer three players with prices ranging from $149 to $199. While these lower entry point devices have helped Roku gain market share in the U.S., we don't believe that this advantage is either strong or long-lasting. Amazon has been equally aggressive on pricing its Fire TV devices from $40 to $120 with constant sales and Google launched its new Android TV dongle at $50 in the fall of 2020. Roku does not charge or charges very little for its OS, but its hardware partners receive little to no upside from advertising revenue. While the manufacturer partners like TCL will continue to price their smart TVs aggressively, both TCL and Hisense have added Android TV to their U.S. product lineups in 2020. We expect partners like TCL to leverage their increasing scale and ability to substitute Android TV to attempt to claw some of the economics back from Roku.

This large audience does contribute to the firm's potential intangible asset moat source. Like their online counterparts, Roku can provide advertisers with a wealth of behavioral information about users including location, time watching, type of content, and other specifics to make the advertising more valuable. This data helps to attract viewers and make the platform more appealing to AVOD services. The content-neutral standpoint of Roku also helps as the service attract new services and retain older ones. According to Parks Associates, Roku offers roughly 65% of the over 225 on-demand services that the firm tracks, well ahead of Apple TV (52%), Chromecast (47%), Fire TV (42%), and the average smart TV (34%). While many of the smaller services have few viewers, the services outside of the five largest (Netflix, Disney+, YouTube, Hulu, and Amazon) actually accounted 23% of the streaming viewing time in the second quarter of 2020 or about 12 billion minutes. Many of these services are ad-supported and have to be on Roku which takes roughly 30% of their ad revenue.

The Roku OS is designed to be relatively easy to navigate and require only modest processing power. Many of its competitors are scaled down versions of full-scale mobile OSs —Android TV and Fire TV from Android, Apple tvOS from iOS, and Tizen Eden from Tizen, an open-source Linux-based mobile OS used mostly by Samsung. While all of these OSs are originally designed for less intensive processors than PC ones, the relatively low requirements for the Roku OS help make the user interface feel snappy and fluid even on the low powered processors in cheaper TVs. Roku heavily invests in research and development with over half of its employees allocated to the function and average research and development spending of 23% of revenue over the last three years.

Unlike Apple which has adherents with Apple-only homes, we do not think there many Roku-only households. Roku customers also do not need to have the Roku OS on every screen to watch content seamlessly as the underlying app or service takes care of that. As a result, we believe that many households use numerous platforms including Roku to interact with OTT content. Additionally, as most viewers use both small and large screens to view online video, the account information and passwords for the OTT services are saved in multiple places, negating the need to stay with Roku when purchasing a new device or TV. There appears to be little to no cost to switch from Roku to one of its competitors for most users unless Roku is billing the customer for most to all of their online services. As a result, we do not believe that Roku benefits from switching costs.

Fair Value and Profit Drivers Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

Our $65 fair value estimate assumes that the firm increases its active accounts to over 98 million over the next five years while streaming hours grow over 139 billion hours a year. Underpinning this growth are the secular trends toward over-the-top viewing for live and on-demand content and the relentless growth in the consumption of filmed content.

We think revenue will grow by 14% on average over the next five years and will then moderate to 8% annual growth over the subsequent five years of our explicit projection. This growth will be driven by active accounts expanding from 70 million at the end of 2022 to 98 million in 2027 and 112 million in 2031. Much of this growth will come from expanding into more international markets via its own players and smart TVs as well as cobranded smart TVs, but we continue to expect more competition in international markets. To frame the international opportunity, Netflix already reaches 156 million households outside the U.S., and we expect that number to exceed 230 million by the end of 2027. The secular trend in increased streaming consumption along with additional Roku devices and screens per household should help to propel monthly streaming hours per household. We assume viewing increases by 1% annually to 122 hours per month in 2031 from 114 at the end of 2022.

For the player segment, we expect anemic growth along with ongoing hardware upgrades will limit the segment gross margin to the single digits for the next 10 years, with negative margins in 2023-26. On the platform side, we believe that Roku will rebound from the current decline in gross margin as it gains leverage on the investment required to build out the platform team and acquire content. However, the company may need to share some its platform revenue with hardware partners like TCL to encourage the usage of the Roku OS. Also, the firm may find gaining leverage on its additional content spending to be challenging. As a result, we expect platform gross margin to bottom out in 2022 at 56.5% and rebound to 59.9% by 2032 but stay well below the 70%-plus margins seen in 2016-18.

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For operating expenses, we project that Roku will continue to invest in research and development to support both the Roku OS, its own hardware, and its partners' hardware. However, we expect R&D as the percentage of revenue to come down from the low 20s where it currently resides. We expect similar leverage to occur on selling, general, and administrative expense. As result, we think that Roku will generate positive adjusted EBITDA in 2024 and operating margin will hit 5% in 2027 and 17% by 2032.

Risk and Uncertainty Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

Roku operates in a highly competitive marketplace against firms with considerably more financial and development resources. If these companies allocate more resources to their streaming platforms, Roku could be at a significant disadvantage. A potential example is Apple, which only offers two Apple TV models from $149 to $199, versus Roku with a product range priced from $30 to $150. Apple could either create its own dongle to compete on the low end or replicate its phone strategy and offer older versions of Apple TV at lower price points.

Roku's subscriber growth over the last few years has been supercharged by smart TV with Roku OS from TCL and other manufacturers. These producers have begun to diversify to other streaming platforms such as Android TV. In order to hold on to TV producers, Roku may have to give up some its platform revenue. Roku's long-term growth depends on international expansion as the majority of its subscribers are in the U.S. Unlike the U.S., Roku has little brand recognition in many markets while Amazon and Google do and both have been willing to price at similar levels to Roku. These factors may impede the international expansion.

While Roku has historically benefited from its openness to services from any providers, the firm has begun to enter into carriage disputes with large media firms like WarnerMedia and NBCUniversal. If these disputes linger or recur, users may migrate to other platforms.

One major potential environmental, social, and governance risk for Roku revolves around data privacy and security. The firm holds for identity and payment information for many of its customers who pay for subscriptions via Roku. If the firm suffers a data breach, there would likely be a negative market reaction.

Capital Allocation Neil Macker, CFA, Senior Equity Analyst, 16 Feb 2023

We assign Roku a Standard Capital Allocation Rating. Our rating is driven primarily by the likelihood that Roku adds value through investments but also takes into account the shape of its balance sheet and its shareholder distribution policies.

The firm ended December 2022 with $2 billion in cash and no long-term debt. While Roku generated positive net income for the first time in 2021, the free cash losses in 2021 were only $137 million. Roku

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has not focused on returning capital to shareholders via stock repurchases or dividends as it invests aggressively to expand the business.

Roku operates in a highly competitive landscape in which its tech competitors have massively more capital. We expect the firm to continue to invest in technology R&D and increase its investment into both original and third-party programming. While we think using capital to improve its tech is likely generate high returns, we are less confident about entering into original content creation. There are a number of firms including Netflix, Disney, Amazon, WarnerMedia, and other legacy firms that are each pouring billions of dollars annually into content creation, and we think Roku lacks both the deep pockets and the expertise required to compete with these companies.

Analyst Notes Archive

Positive Q3 for Roku Overshadowed by Weak Ad Revenue Expectations; Lowering FVE to $65 Neil Macker, CFA, Senior Equity Analyst, 3 Nov 2022

Roku posted a positive third quarter with revenue and EBITDA ahead of the FactSet consensus estimates. However, the management commentary about the weak U.S. ad market continuing into 2023 spooked investors, leading to a 15% decline in the share price in after-hours trading. While the revenue growth of 12% came in well ahead of the 3% quarterly guidance, the third quarter had the lowest growth on record, with more headwinds ahead as the fourth quarter top-line guidance of $800 million implies the first revenue decline quarter for Roku. As a result, we are lowering our FVE to $65 from $80 on lower revenue expectations and slower margin expansion due to higher content and R&D costs.

Revenue growth suffered due to a slowdown in consumer spending, which hurt both ad revenue and customer acquisition. Net new account activation of 2.3 million was the firm's second-highest third quarter, beaten only by the pandemic influenced third quarter of 2020. Streaming hours grew 22% year over year to hit 21.9 billion with streaming hours per account per month up 6% to 113.6.

Average platform revenue per account was flat year over year at $3.48, a relatively decent performance given the generally weak ad market in the U.S. The firm disclosed that the ad scatter market weakened even further in the third quarter than the second as consumers pulled back on spending. Unlike the established linear networks and older online video platforms with robust upfront ad sales, Roku remains heavily dependent on the near-term scatter market which advertisers can pull out of quickly.

Adjusted EBITDA was a loss of $34 million during the quarter, down from a gain of $130 million a year ago as the company continued to heavily invest in R&D (up 73%) and sales and marketing (up 91%). Platform gross margin fell to 56% from 65% as content cost growth once again more than offset the topline expansion.

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Roku Posts Weak Q2 With Top-Line Growth Expected to Weaken in Second Half; Lowering FVE to $80 Neil Macker, CFA, Senior Equity Analyst, 29 Jul 2022

Roku reported a weak second quarter with revenue and EBITDA below FactSet consensus. Revenue growth of 18% year over year came in below management's prior 25% guidance. Management pulled its full-year top-line forecast of 35% growth, which we had viewed as too aggressive. Roku expects the slowing economy to further hurt the ad scatter market, while inflation worries lower consumer spending. The firm forecast 3% growth for the third quarter, which would be the first single-digit growth quarter over the last five and half years. As a result, we are slashing our fair value estimate to $80 from $135 on lower revenue expectations in not only 2022 but over the next five years (14% on average versus 21% previously) due to increasing competition for streaming ad dollars from both incumbent players like Pluto and Hulu and newer ones like Disney+ and Netflix.

Revenue growth suffered due to a slowdown in consumer spending, which hurt both ad revenue and customer acquisition. Top-line growth of 18% was the slowest since the fourth quarter of 2016 when platform revenue was only 25% of total revenue versus 88% this quarter. Net new account activations of 1.6 million was the firm's second highest second quarter, beaten only by the pandemic-influenced second quarter of 2020. Despite the account growth, the firm believes that lower TV and player inventory still impeded customer adds. Streaming hours grew 19% year over year to hit 20.7 billion and only fell 1% sequentially from the all-time high last quarter.

Average platform revenue per account increased 11% year over year to $3.61 but appears to have missed the firm's internal projections as management expected higher pricing growth. The firm disclosed that the ad scatter market weakened tremendously in the second quarter as consumers pulled back on spending. Unlike the established linear networks with robust upfront ad sales, Roku is still very dependent on the near-term scatter market that advertisers can curtail quickly.

Roku Reports Slightly Better-Than-Expected Q1; Weak Top-Line Growth Expected to Continue in Q2 Neil Macker, CFA, Senior Equity Analyst, 29 Apr 2022

Roku posted a slightly better-than-expected start to 2022 with revenue in line and EBITDA ahead of FactSet consensus expectations for the first quarter. Total revenue came in 28% ahead of the same period last year with management guiding for 25% growth in the second quarter. Despite guiding to sub-30% growth in the first half, management reiterated its full-year top-line guidance of 35% growth, which we believe may be too aggressive given the issues in the streaming market, particularly in the United States. We are reducing our fair value estimate to $135 per share from $150 to account for lower revenue expectations.

Revenue growth suffered as a result of the slowdown in viewing coming out of the worst of the pandemic and supply constraints, which hurt both of the firm's segments. Growth was the slowest since the fourth quarter of 2017 and net new account activations of 1.2 million was the lowest since the second quarter of 2018. Streaming hours grew 14% year over year to a high of 20.9 billion. Average platform revenue per account continues to improve, increasing 34% on a trailing 12-month basis, as the firm is benefiting from higher pricing and larger ad inventory. Like Netflix, Roku is suffering from a slowdown that may linger throughout 2022 as it benefited from pandemic-induced customer pull-forward in 2020 and 2021. For Roku, 23.3 million active accounts joined in 2020 and 2021 versus 17.6 million in 2018 and 2019. The 14.3 million net adds in 2020 is 46% higher than any other year.

Adjusted EBITDA was $58 million during the quarter, down from $125 million a year ago, as the company increased spending as expected. Platform gross margin fell to 59% from 67% as content cost growth more than offset the top-line expansion. Player gross margin remained negative for the fourth quarter in a row as the firm is absorbing price increases in chips and shipping.

Roku Reports Mixed Q4; 2022 Guidance Includes Weak Top Line and Elevated Spending Neil Macker, CFA, Senior Equity Analyst, 18 Feb 2022

Roku posted a mixed end to 2021 but shares fell over 20% in aftermarket trading on Feb. 17 due to weak 2022 revenue growth guidance of 35%, significantly below the 55% mark posted in 2021. Management also noted that the firm expects to ramp up operating expense spending that was pulled back in 2021 due to COVID-19 uncertainties. As a result, management expects 2022 adjusted EBITDA to be flat with 2020 on an absolute basis, implying a $300 million drop from 2021. While we view the EBITDA guidance as conservative, we are slashing our fair value estimate to $150 from $195 to account for lower top-line growth and much slower margin expansion.

While management believes that the firm’s investment in more headcount and in the development of the RokuOS will drive greater revenue growth down the road, we remain skeptical. The landscape for streaming devices and software is very competitive, with many players having much deeper pockets. Additionally, we expect Google and Amazon to remain very aggressive in both pricing and incentives to lure TV manufacturers over to their OSes, which Roku may try to match. We also believe the continued investment in content may backfire on the firm as the streaming landscape contains many participants from both media and tech that are ramping their content spending.

Roku posted decent revenue growth of 33% during the quarter as both operating segments continue to be hurt by the supply chain constraints. The firm added 3.7 million accounts, ahead of 1.3 million last quarter but well below the 5.0 million added a year ago. Active accounts broke the 60 million mark for the first time. Streaming hours grew 15% year over year to hit a high of 19.5 billion. Streaming hours per account increased slightly sequentially to 3.6 hours per day. Average platform revenue per account continues to improve, increasing 43% on a trailing 12-month basis, as the firm is benefiting from both higher pricing and larger ad inventory.

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Roku Inc Class A ROKU ★★★ 15 Feb 2023 22:24, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Moat Trend™	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
63.49 USD 15 Feb 2023	65.00 USD 3 Nov 2022 15:45, UTC	0.98	8.84 USD Bil 15 Feb 2023	None	Negative	Very High	Standard	1 Feb 2023 06:00, UTC

Roku Reports Decent Q3; Customer Growth Continues to Slow Neil Macker, CFA, Senior Equity Analyst, 4 Nov 2021

Roku posted a decent third-quarter 2021 result as revenue was in line with FactSet consensus while adjusted EBITDA beat it. Total revenue increased 51% versus a year ago to $680 million as the firm continues to benefit the accounts added during the pandemic. Customer growth remains muted due in part to supply chain issues. We are maintaining our $195 fair value estimate and we view the shares as materially overvalued, pricing in unrealistic expectations for growth in a very competitive market.

While Roku posted impressive revenue growth, the firm only added 1.3 million accounts, down from 1.5 million last quarter and 3.0 million a year ago. Active accounts increased 23% year over year to 56.4 million. Streaming hours grew 21% year over year but remained 2% lower than the first quarter. Streaming hours per account held steady sequentially at 3.5 hours per day. The easing of pandemic restrictions and nicer weather across much of the U.S. impacted usage during the quarter, so it’s hard to draw many conclusions from these numbers. Average platform revenue per account continues to improve, increasing 49% on a trailing 12-month basis.

While ads sold against original programming have helped to grow ARPU, the sustainability of the growth is still up in the air. Management pointed to the success of the This Old House franchise after acquiring it, but we remain convinced that large scale investment in original content by Roku would be problematic given the size and scale of the other players in the content acquisition marketplace. While The Roku Channel has performed well, there are a number of other ad-supported streaming services including Tubi from Fox and Pluto from ViacomCBS that have access to very deep content libraries. These firms are not only investing in content for their services but also in better ad tech to help gain market share.

Roku Posts Strong Q2 as Ad Revenue Expands; Customer Growth Appears to Be Slowing Down Neil Macker, CFA, Senior Equity Analyst, 5 Aug 2021

Roku handily beat expectations during the second quarter of 2021. Total revenue increased 81% versus a year ago to $645 million, topping the high-end of expected range management provided last quarter and the FactSet consensus projection. Customer metrics during the quarter, coupled with management’s third quarter outlook and somewhat muted commentary concerning the second half of 2021, point to slowing growth ahead. We didn’t hear anything that materially changes our long-term view on the firm, especially given the noise the pandemic has introduced.

We don’t expect to materially change our $170 fair value estimate and we view the shares as materially overvalued, pricing in unrealistic expectations for growth in a very competitive market.

While the revenue growth was impressive, Roku only added 1.5 million accounts, down from 2.4 million last quarter and 3.2 million a year ago. Active accounts increased 28% year over year to 55.1 million. Streaming hours increased 19% year over year but declined 5% versus the prior quarter, the first sequential decline on record. The easing of pandemic restrictions and nicer weather across much of the U.S. certainly impacted usage during the quarter, so it’s hard to draw many conclusions from these numbers. Usage per account remains 8% higher than during the same period in 2019 and average platform revenue per account continues to move higher, increasing 46% on a trailing 12-month basis.

Management indicated that the business benefited from both increased ad sales, with ad impressions doubling year over year, and distribution fees. The firm has benefited from the launch of several new streaming services over the past year as firms engage with Roku to drive demand. The Roku Channel also posted solid viewership growth with streaming hours more than doubling versus a year ago. The release of original programming acquired with the Quibi acquisition drove much of this growth.

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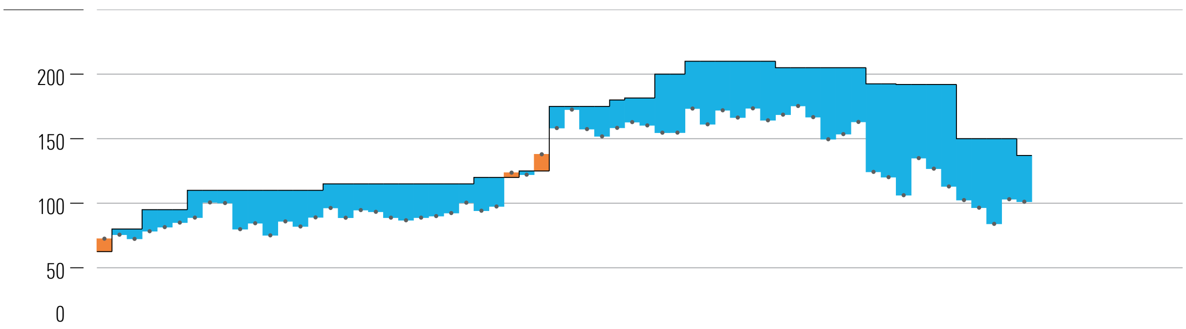
Roku Inc Class A ROKU ★★★ 15 Feb 2023 22:24, UTC

Competitors Price vs. Fair Value

Amazon.com Inc AMZN



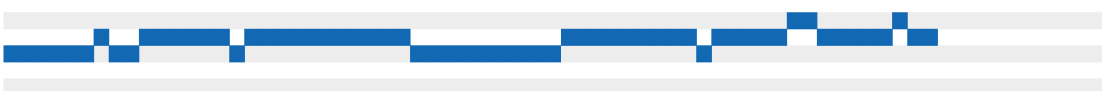
Fair Value: 137.00
3 Feb 2023 05:12, UTC

Last Close: 101.16

Over Valued

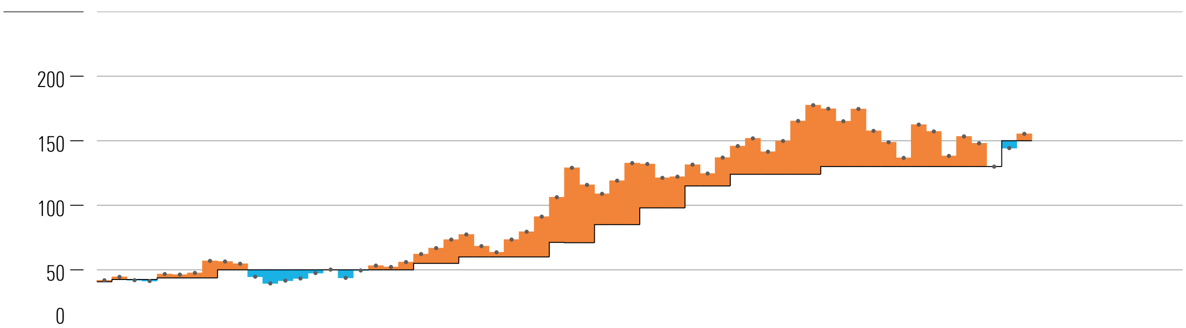
Under Valued

	2018	2019	2020	2021	2022	YTD
Price/Fair Value	0.68	0.80	0.90	0.81	0.56	0.74
Total Return %	28.43	23.03	76.26	2.38	-49.62	20.43



Total Return % as of 15 Feb 2023. Last Close as of 15 Feb 2023. Fair Value as of 3 Feb 2023 05:12, UTC.

Apple Inc AAPL



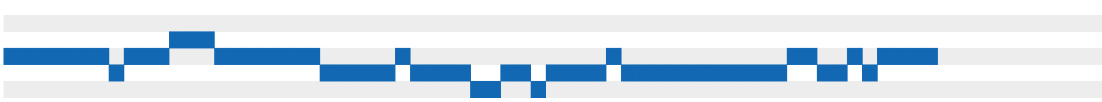
Last Close: 155.33

Fair Value: 150.00
20 Jan 2023 17:37, UTC

Over Valued

Under Valued

	2018	2019	2020	2021	2022	YTD
Price/Fair Value	0.79	1.33	1.56	1.43	1.00	1.04
Total Return %	-5.12	88.09	81.85	34.48	-26.32	19.73



Total Return % as of 15 Feb 2023. Last Close as of 15 Feb 2023. Fair Value as of 20 Jan 2023 17:37, UTC.

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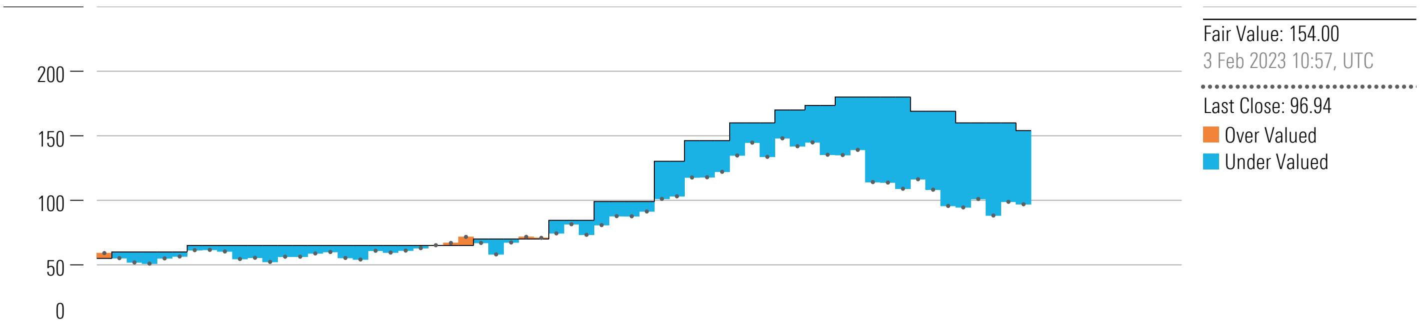
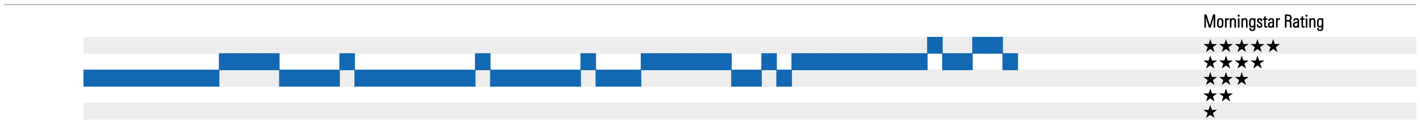
Roku Inc Class A ROKU ★★★ 15 Feb 2023 22:24, UTC

Alphabet Inc Class A GOOGL



	2018	2019	2020	2021	2022	YTD
Price/Fair Value	0.80	1.03	0.89	0.83	0.55	0.63
Total Return %	-0.80	28.18	30.85	65.30	-39.09	9.87



Total Return % as of 15 Feb 2023. Last Close as of 15 Feb 2023. Fair Value as of 3 Feb 2023 10:57, UTC.

Roku Inc Class A ROKU ★★★ 15 Feb 2023 22:24, UTC

Last Price	Fair Value Estimate	Price/FVE	Market Cap	Economic Moat™	Moat Trend™	Uncertainty	Capital Allocation	ESG Risk Rating Assessment[1]
63.49 USD 15 Feb 2023	65.00 USD 3 Nov 2022 15:45, UTC	0.98	8.84 USD Bil 15 Feb 2023	None	Negative	Very High	Standard	1 Feb 2023 06:00, UTC

Morningstar Historical Summary

Financials as of 30 Sep 2022

Fiscal Year, ends 31 Dec	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	YTD	TTM
Revenue (USD K)	—	—	319,857	398,649	512,763	742,506	1,128,921	1,778,388	2,764,584	—	2,259,478	3,124,807
Revenue Growth %	—	—	—	24.6	28.6	44.8	52.0	57.5	55.5	—	19.0	22.6
EBITDA (USD K)	—	—	-37,213	-38,059	-56,246	-598	-20,556	49,929	313,212	—	-174,071	-129,948
EBITDA Margin %	—	—	-11.6	-9.6	-11.0	-0.1	-1.8	2.8	11.3	—	-7.7	-4.2
Operating Income (USD K)	—	—	-37,552	-43,361	-19,616	-13,296	-65,059	-20,253	235,100	—	-280,992	-259,628
Operating Margin %	—	—	-11.7	-10.9	-3.8	-1.8	-5.8	-1.1	8.5	—	-12.4	-8.3
Net Income (USD K)	—	—	-40,611	-42,758	-63,509	-8,857	-59,937	-17,507	242,385	—	-260,810	-237,123
Net Margin %	—	—	-12.7	-10.7	-12.4	-1.2	-5.3	-1.0	8.8	—	-11.5	-7.6
Diluted Shares Outstanding (K)	—	—	85,710	85,710	28,308	104,618	115,218	123,978	141,668	—	136,997	138,221
Diluted Earnings Per Share (USD)	—	—	-0.47	-0.50	-2.24	-0.08	-0.52	-0.14	1.71	—	-1.90	-1.73
Dividends Per Share (USD)	—	—	—	—	—	—	—	—	—	—	—	—

Valuation as of 31 Jan 2023

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Recent Qtr	TTM
Price/Sales	—	—	—	—	10.4	4.8	15.2	26.2	12.4	1.8	1.8	2.5
Price/Earnings	—	—	—	—	-73.0	2.6	-416.7	-400.0	108.7	-23.5	-23.5	-33.2
Price/Cash Flow	—	—	—	—	416.7	-1,000.0	322.6	454.5	105.3	-270.3	-270.3	-384.6
Dividend Yield %	—	—	—	—	—	—	—	—	—	—	—	—
Price/Book	—	—	—	—	-20.0	15.2	34.6	35.0	11.5	2.0	2.0	2.9
EV/EBITDA	0.0	0.0	0.0	0.0	-0.1	-5.5	-0.8	0.8	0.1	0.0	0.0	0.0

Operating Performance / Profitability as of 30 Sep 2022

Fiscal Year, ends 31 Dec	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	YTD	TTM
ROA %	—	—	-23.0	-24.1	-23.1	-2.1	-6.2	-0.9	7.6	—	—	-5.7
ROE %	—	—	—	—	—	-4.5	-12.7	-1.7	11.8	—	—	-8.7
ROIC %	—	—	—	—	—	-4.3	-8.3	-1.0	9.7	—	—	-7.0
Asset Turnover	—	—	1.8	2.2	1.9	1.8	1.2	1.0	0.9	—	—	0.8

Financial Leverage

Fiscal Year, ends 31 Dec	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Recent Qtr	TTM
Debt/Capital %	—	—	—	—	—	—	36.2	23.1	14.6	—	17.0	—
Equity/Assets %	—	—	—	—	40.9	52.6	47.5	58.5	67.8	—	63.2	—
Total Debt/EBITDA	—	—	—	—	—	0.0	-20.4	8.8	1.7	—	-4.0	—
EBITDA/Interest Expense	Infinite	Infinite	-53.5	—	-34.9	-1.7	-8.7	14.6	105.1	Infinite	-53.2	-32.3

Morningstar Analyst Historical/Forecast Summary as of 15 Feb 2023

Financials

			Estimates		
Fiscal Year, ends 12-31-2022	2021	2022	2023	2024	2025
Revenue (USD Mil)	2,765	3,127	3,226	3,845	4,506
Revenue Growth %	55.5	13.1	3.2	19.2	17.2
EBITDA (USD Mil)	465	-122	-185	41	253
EBITDA Margin %	16.8	-3.9	-5.8	1.1	5.6
Operating Income (USD Mil)	235	-531	-449	-249	-73
Operating Margin %	8.5	-17.0	-13.9	-6.5	-1.6
Net Income (USD Mil)	242	-498	-392	-199	-41
Net Margin %	8.8	-15.9	-12.1	-5.2	-0.9
Diluted Shares Outstanding (Mil)	142	138	138	138	138
Diluted Earnings Per Share(USD)	1.71	-3.62	-2.84	-1.45	-0.30
Dividends Per Share(USD)	0.00	0.00	0.00	0.00	0.00

Forward Valuation

			Estimates		
	2021	2022	2023	2024	2025
Price/Sales	15.4	9.9	2.7	2.3	2.0
Price/Earnings	133.5	-11.2	-22.4	-43.8	-211.6
Price/Cash Flow	226.0	-205.7	-175.9	-196.0	103.9
Dividend Yield %	—	—	—	—	—
Price/Book	11.7	2.1	3.9	4.3	4.3
EV/EBITDA	90.0	-238.6	-40.6	185.0	29.7

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Appendix

Historical Morningstar Rating

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Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
—	—	—	—	—	—	—	—	—	—	★★★	★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★	★★★	★★★★	★★★★	★★★	★★★	★★★★	★★★★	★★★★	★★★	★★★	★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★★	★★★	★★	★	★	★	★	★	★	★	★	★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★	★	—	—	—	—	—	—	—	—	—	—
Dec 2019	Nov 2019	Oct 2019	Sep 2019	Aug 2019	Jul 2019	Jun 2019	May 2019	Apr 2019	Mar 2019	Feb 2019	Jan 2019
—	—	—	—	—	—	—	—	—	—	—	—
Dec 2018	Nov 2018	Oct 2018	Sep 2018	Aug 2018	Jul 2018	Jun 2018	May 2018	Apr 2018	Mar 2018	Feb 2018	Jan 2018
—	—	—	—	—	—	—	—	—	—	—	—

Amazon.com Inc AMZN 15 Feb 2023 22:24, UTC

Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
—	—	—	—	—	—	—	—	—	—	★★★★	★★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★★	★★★★★	★★★★	★★★★	★★★★	★★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★★★	★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★★	★★★★	★★★★
Dec 2019	Nov 2019	Oct 2019	Sep 2019	Aug 2019	Jul 2019	Jun 2019	May 2019	Apr 2019	Mar 2019	Feb 2019	Jan 2019
★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★	★★★★	★★★★	★★★★
Dec 2018	Nov 2018	Oct 2018	Sep 2018	Aug 2018	Jul 2018	Jun 2018	May 2018	Apr 2018	Mar 2018	Feb 2018	Jan 2018
★★★★	★★★★	★★★★	★★★	★★★	★★★★	★★★	★★★	★★★	★★★	★★★	★★★

Apple Inc AAPL 15 Feb 2023 22:24, UTC

Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
—	—	—	—	—	—	—	—	—	—	★★★	★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★	★★★	★★	★★★	★★	★★	★★★	★★★	★★	★★	★★	★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★	★★	★★	★★	★★	★★	★★	★★★	★★	★★	★★	★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★	★★	★★	★	★	★★	★★	★★	★★	★★★	★★	★★
Dec 2019	Nov 2019	Oct 2019	Sep 2019	Aug 2019	Jul 2019	Jun 2019	May 2019	Apr 2019	Mar 2019	Feb 2019	Jan 2019
★★	★★	★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★★	★★★★
Dec 2018	Nov 2018	Oct 2018	Sep 2018	Aug 2018	Jul 2018	Jun 2018	May 2018	Apr 2018	Mar 2018	Feb 2018	Jan 2018
★★★★	★★★	★★★	★★★	★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★

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Alphabet Inc Class A GOOGL 15 Feb 2023 22:24, UTC

Dec 2023	Nov 2023	Oct 2023	Sep 2023	Aug 2023	Jul 2023	Jun 2023	May 2023	Apr 2023	Mar 2023	Feb 2023	Jan 2023
—	—	—	—	—	—	—	—	—	—	★★★★	★★★★★
Dec 2022	Nov 2022	Oct 2022	Sep 2022	Aug 2022	Jul 2022	Jun 2022	May 2022	Apr 2022	Mar 2022	Feb 2022	Jan 2022
★★★★★	★★★★	★★★★	★★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★
Dec 2021	Nov 2021	Oct 2021	Sep 2021	Aug 2021	Jul 2021	Jun 2021	May 2021	Apr 2021	Mar 2021	Feb 2021	Jan 2021
★★★★	★★★	★★★★	★★★	★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★★	★★★
Dec 2020	Nov 2020	Oct 2020	Sep 2020	Aug 2020	Jul 2020	Jun 2020	May 2020	Apr 2020	Mar 2020	Feb 2020	Jan 2020
★★★	★★★	★★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★★	★★★	★★★
Dec 2019	Nov 2019	Oct 2019	Sep 2019	Aug 2019	Jul 2019	Jun 2019	May 2019	Apr 2019	Mar 2019	Feb 2019	Jan 2019
★★★	★★★	★★★	★★★	★★★	★★★	★★★★	★★★	★★★	★★★	★★★	★★★★
Dec 2018	Nov 2018	Oct 2018	Sep 2018	Aug 2018	Jul 2018	Jun 2018	May 2018	Apr 2018	Mar 2018	Feb 2018	Jan 2018
★★★★	★★★★	★★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★	★★★

Research Methodology for Valuing Companies

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, indepth 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 shortterm market-price movements), but we believe these negatives are mitigated by deep analysis and our longterm 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 singlepoint 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.

When considering a company's moat, we also assess whether there is a substantial threat of value destruction, stemming from risks related to ESG, industry disruption, financial health, or other idiosyncratic issues. In this context, a risk is considered potentially value destructive if its occurrence would eliminate a firm's economic profit on a cumulative or midcycle basis. If we deem the probability of occurrence sufficiently high, we would not characterize the company as possessing an economic moat.

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 workingcapital 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

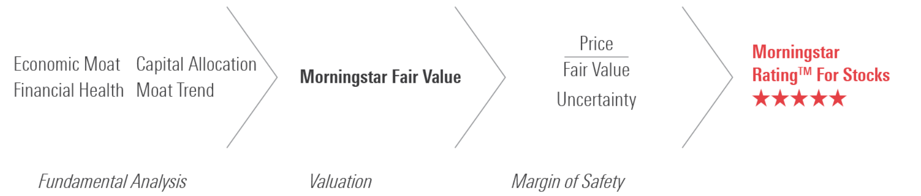
Once a company's marginal ROIC hits its cost of capital, we calculate a continuing value, using a standard perpetuity formula. At perpetuity, we assume that any growth or decline or investment in the business neither creates nor destroys value and that any new investment provides a return in line with 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 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 is designed to capture the range of potential outcomes for a company's intrinsic value. This rating is used to assign the margin of safety required before investing, which in turn explicitly drives our stock star rating system. The Uncertainty Rating is

Morningstar Equity Research Star Rating Methodology



Morningstar Equity Analyst Report | Report as of 16 Feb 2023 14:38, UTC | Reporting Currency: USD | Trading Currency: USD | Exchange: NASDAQ - ALL MARKETS

Research Methodology for Valuing Companies

aimed at identifying the confidence we should have in assigning a fair value estimate for a given stock.

Our Uncertainty Rating is meant to take into account anything that can increase the potential dispersion of future outcomes for the intrinsic value of a company, and anything that can affect our ability to accurately predict these outcomes. The rating begins with a suggested rating produced by a quantitative process based on the trailing 12-month standard deviation of daily stock returns. An analyst overlay is then applied, with analysts using the suggested rating, historical rating data, and their own knowledge of the company to inform them as they make the final Uncertainty Rating decision. Ultimately, the rating decision rests with the analyst. Analysts take into account many characteristics when making their final decision, including cyclical factors, operational and financial factors such as leverage, company-specific events, ESG risks, and anything else that might increase the potential dispersion of future outcomes and our ability to estimate those outcomes.

Our recommended margin of safety—the discount to fair value demanded before we'd recommend buying or selling the stock—widens as our uncertainty of the estimated value of the equity increases. The more uncertain we are about the potential dispersion of outcomes, 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 are: Low, Medium, High, Very High, and Extreme.

	Margin of Safety	
Qualitative Analysis Uncertainty Ratings	★★★★★Rating	★Rating
Low	20% Discount	25% Premium
Medium	30% Discount	35% Premium
High	40% Discount	55% Premium
Very High	50% Discount	75% Premium
Extreme	75% Discount	300% Premium

Our uncertainty rating is based on the interquartile range, or the middle 50% of potential outcomes, covering the 25th percentile–75th percentile. This means that when a stock hits 5 stars, we expect there is a 75% chance that the intrinsic value of that stock lies above the current market price. Similarly, when a stock hits 1 star, we expect there is a 75% chance that the intrinsic value of that stock lies below the current market price.

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.

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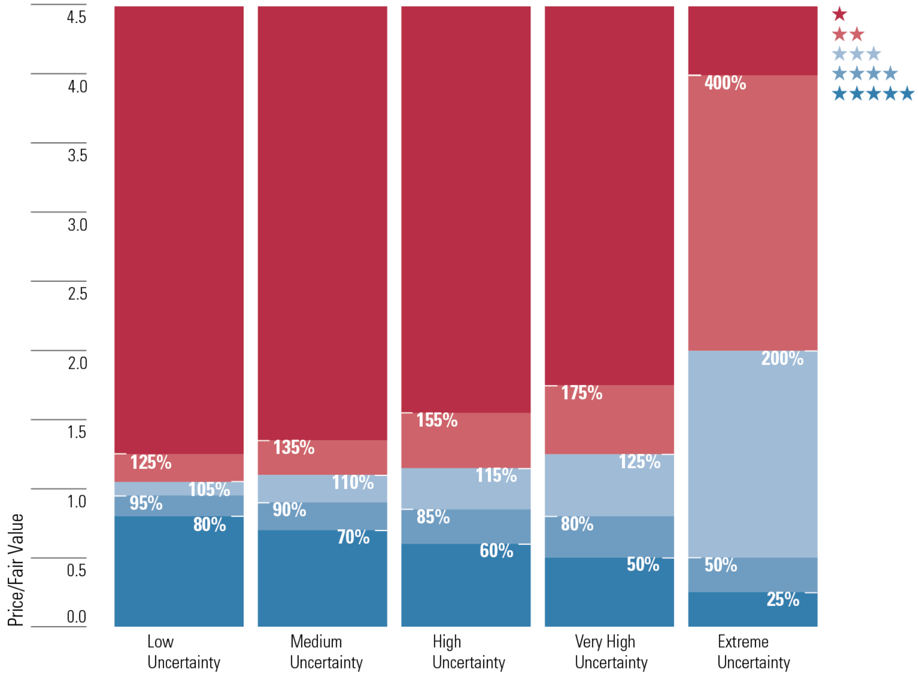

For more details about our methodology, please go to https://shareholders.morningstar.com

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 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:

★★★★★ 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.

★★★★ 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. 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.

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Capital Allocation Rating: Our Capital Allocation (or Stewardship) Rating represents our assessment of the quality of management's capital allocation, with particular emphasis on the firm's balance sheet, investments, and shareholder distributions. Analysts consider companies' investment strategy and valuation, balance sheet management, and dividend and share buyback policies. Corporate governance factors are only considered if they are likely to materially impact shareholder value, though either the balance sheet, investment, or shareholder distributions. Analysts assign one of three ratings: "Exemplary", "Standard", or "Poor". Analysts judge Capital Allocation from an equity holder's perspective. Ratings are determined on a forward looking and absolute basis. The Standard rating is most common as most managers will exhibit neither exceptionally strong nor poor capital allocation.

Capital Allocation (or Stewardship) analysis published prior to Dec. 9, 2020, was determined using a different process. Beyond investment strategy, financial leverage, and dividend and share buyback policies, analysts also considered execution, compensation, related party transactions, and accounting practices in the rating.

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Sustainalytics ESG Risk Rating Assessment: The ESG Risk Rating Assessment is provided by Sustainalytics; a Morningstar company.

Sustainalytics' ESG Risk Ratings measure the degree to which company's economic value at risk is driven by environment, social and governance (ESG) factors. Sustainalytics analyzes over 1,300 data points to assess a company's exposure to and management of ESG risks. In other words, ESG Risk Ratings measures a company's unmanaged ESG Risks represented as a quantitative score. Unmanaged Risk is measured on an open-ended scale starting at zero (no risk) with lower scores representing less unmanaged risk and, for 95% of cases, the unmanaged ESG Risk score is below 50.

Based on their quantitative scores, companies are grouped into one of five Risk Categories (negligible, low, medium, high, severe). These risk categories are absolute, meaning that a 'high risk' assessment reflects a comparable degree of unmanaged ESG risk across all subindustries covered.

The ESG Risk Rating Assessment is a visual representation of Sustainalytics ESG Risk Categories on a 1 to 5 scale. Companies with Negligible Risk = 5 Globes, Low Risk = 4, Medium Risk = 3 Globes, High Risk = 2 Globes, Severe Risk = 1 Globe. For more information, please visit sustainalytics.com/esg-ratings/

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