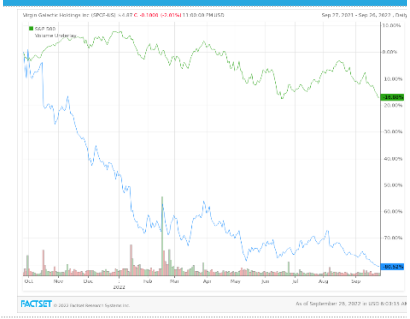
Initiation of Coverage

January 13, 2023

COMPANY AND STOCK INFO	
Company Name	Virgin Galactic
Sector	SpaceTech
Segment(s)	Upstream
Current Price	$4.62
52-Week Range	$3.24 - $12.70
Market Cap.	$1,106 Mn
Shares Out. (Mn	258
Short Int. (% Flt)	24.3%
Avg Daily Vol (3mo)	7,678,248
P/Book	2.1
EV/Sales	250.6

FUNDAMENTALS	
EPS (2019)	($1.09)
EPS (2020)	($1.25)
EPS (2021)	($1.43)
Revenue (2021)	$3.3 Mn
Insider Owner	23.94%
Inst. Owners	34.41%
Others	41.65%
Cash & Sec.	$1.0 bn

RELATIVE PERFORMANCE



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Virgin Galactic Holdings Inc. (NYSE: SPCE)

A Frontrunner in the Nascent Space Tourism Industry

- **A huge, untapped market.** The market for commercial space tourism and related applications is expected to grow to $101 billion by 2040. Virgin Galactic created history on July 11, 2021, when it launched the first commercial spaceflight with a full crew of four mission specialists in the cabin, including Sir Richard Branson. The company is an early mover in the commercial space tourism industry, with hundreds of reservations received from future commercial astronauts. The demand for commercial spaceflights far exceeds its supply as of now, which is a great position for Virgin. The company's primary competitors in the segment are Blue Origin and SpaceX and the three offer differentiated spaceflight services. With a key focus on the suborbital space tourism segment, Virgin Galactic is trying to differentiate itself on comfort and safety, and is also looking to attract customers from the luxury travel market.
- **It's all about the experience.** Government astronauts do not travel into outer space to see the Earth from space and in space while floating weightless in front of a large window. However, this "Overview Effect" experience is at the heart of the "space tourism" value proposition. As each commercial carrier offers different versions of spaceflight, how well they create the experience will likely determine which offering is most successful. Virgin Galactic understands this and can use the deep expertise the Group has gained in creating the best customer experiences under its Virgin Atlantic brand in the space tourism business. The horizontal takeoff and landing technology used by Virgin Galactic requires reduced fuel, oxidizer, and pressurant on board, which makes it more economical. Moreover, horizontal takeoff and landing is believed to provide additional safety and comfort to the passengers, which could be a key differentiating factor in the space tourism market.
- **More spaceflights, at low costs.** Virgin Galactic has seen a strong demand for its commercial spaceflights, with some 800 tickets already sold. It has customer deposits to the tune of $104.8 million. Once its next-generation Delta-class spaceships and motherships are scheduled, the company expects to have an increased annual flight rate with a minimum waiting period between flights. Delta-class spaceships are designed to fly weekly, and the company targets 400 flights per year after these spacecrafts become operational. That translates into revenue of over a billion dollars annually.
- **Multiple revenue sources + Huge potential opportunity.** Private and government research are expected to be additional revenue sources for Virgin Galactic apart from space enthusiasts paying for the space travel experience. In May 2021, the company carried payloads into space for research purposes through NASA's Flight Opportunities Program, and its flight in July 2021 included research payloads from the University of Florida. Finally, the company plans to use the expertise gained in space tourism to eventually tap the international travel market using hypersonic aircraft. This could be another huge market, and one that its space tourism competitors are not planning to tap, at least as of now. Overall, we see meaningful long-term upside for Virgin Galactic driven by 1) its differentiated offering in a huge, untapped market, and 2) multiple potential revenue sources.

Company Overview

Early Mover in Space Tourism

- **Virgin Galactic Holdings is one of the first companies to enter into private space travel, focusing on the suborbital segment.** The company focuses on the development, manufacture, and operation of spaceships and related technologies. The main business of the company is conducting commercial human spaceflight and flying commercial research and development payloads into space. The development and manufacturing activities are located in Tustin, California, and Mojave, California, with plans to operate the commercial spaceflights out of Spaceport America located in New Mexico. Virgin Galactic went public in 2019 via a SPAC transaction with Social Capital Hedosophia Holdings, a partnership between the investment firms Social Capital and Hedosophia. In the long run, the company also intends to offer hypersonic international travel.
- **Virgin Galactic has developed several proprietary technologies. Unlike its competitors, Virgin Galactic uses horizontal takeoff and landing for its spaceflights.** Its mothership is a twin-fuselage, custom-built aircraft. It is used to carry spaceships up to an altitude of 45,000 feet, where the spacecraft is released for its flight. This reduces the energy requirements for the suborbital launch as the spaceships are not required to propel their way through the dense atmosphere nearer to the Earth's surface. The mothership design features include what the company calls a "twin-boom configuration." This configuration accommodates a center wing launch pylon to which the spaceship can be attached. The mothership is primarily made of composite material, which reduces weight. The carrier aircraft is designed to launch thousands of spaceship flights over its lifetime, with rapid turnaround time for launches.
- **Recently, Virgin Galactic partnered with Aurora Flight Sciences, a Boeing company, to design and manufacture the next generation mothership.** According to the company management, the next-generation motherships will be faster to produce and easier to maintain. They will allow the company to fly substantially more missions each year. The new mothership is expected to enter service in 2025.

Chart 1: The Mothership is Used to Carry Spaceships up to an Altitude of 45,000 Feet

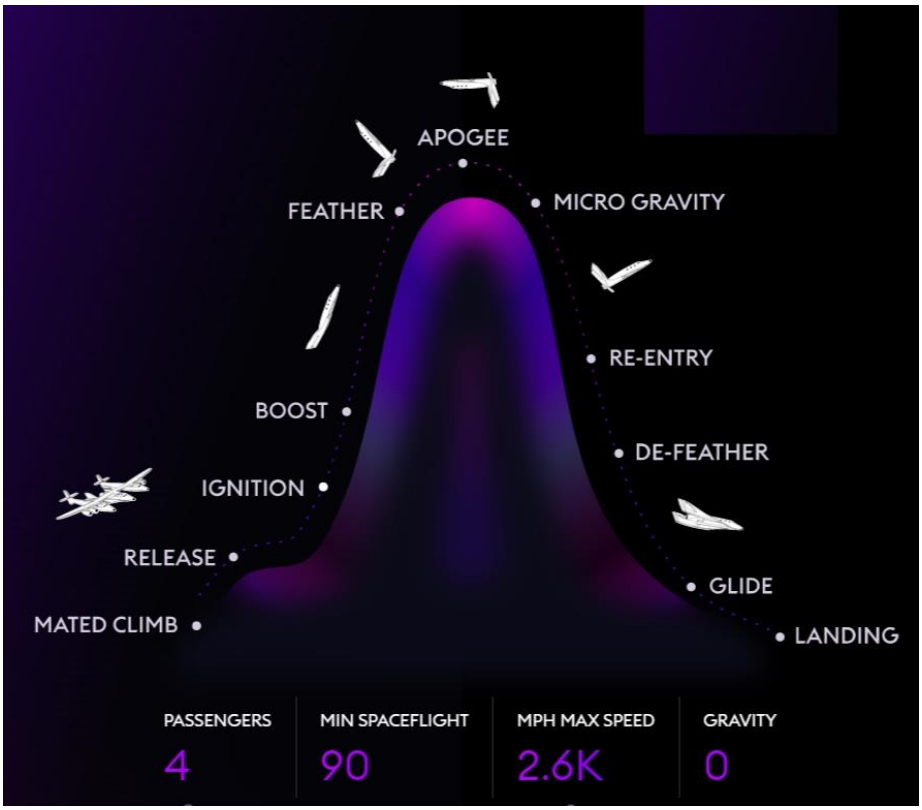
Source: Intro-act, Virgin Galactic

- **Virgin Galactic spaceships are reusable, with a capacity to carry two pilots and up to four private astronauts.** Its VSS Imagine and Delta Class Spaceships will have the capacity of two pilots and six passengers. Virgin Galactic's spaceflight system differs from that of Blue Origin and SpaceX in that it takes off and lands on a runway. Once all

astronauts are on board, the mothership will take off and, as noted earlier, climb to an attitude of about 45,000 feet. At this stage, the pilots will release the spaceship from the mothership. Thereafter, the rocket motor will be fired and the spaceship will undertake a near-vertical climb, achieving more than three times the speed of sound.

The rocket motor will then fire for around one minute and the spaceship will move easily without the use of power to the apogee. The astronauts will be able to exit their seats and experience weightlessness. They can view the outside scene from windows around the cabin sides and top. The pilots will then reconfigure the spaceship into its feathered reentry configuration. After reentry, the vehicle's wings will return to their normal configuration. The spaceship will eventually glide back to the original runway from which the journey started. This whole flight will last for a duration of less than two hours from take-off to landing. Thus, Virgin Galactic's spaceflight takes significantly more time than Blue Origin's, which takes just about 10 minutes from take-off to landing. Virgin Galactic argues that its system is elegant technologically, and offers optimal safety and comfort.

Chart 2: Virgin Galactic Flight Profile Infographic



Source: Intro-act, Virgin Galactic

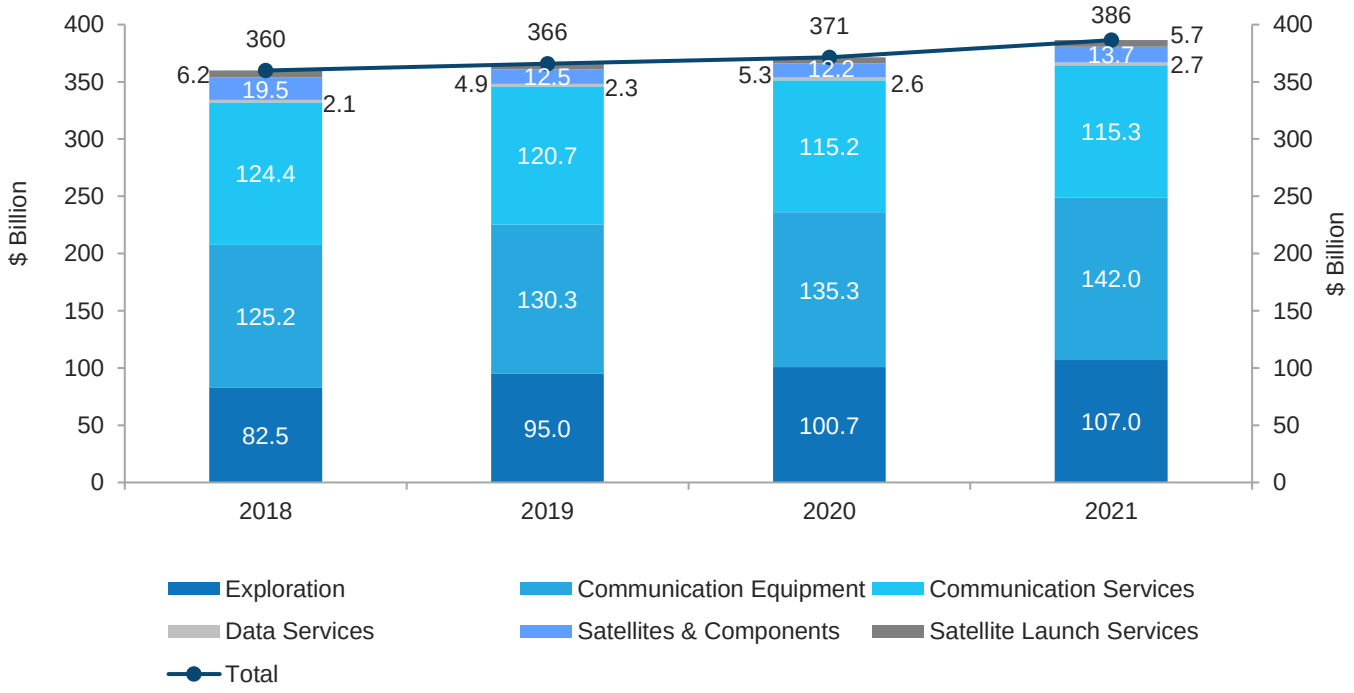
- **New assembly line for Delta-class spaceships.** In July, Virgin Galactic executed a long-term lease for a new final assembly facility for its Delta-class spaceships. The Delta-class spaceship is Virgin Galactic's production vehicle that is designed to fly weekly, supporting the company's target of 400 flights per year. This facility is planned to have capability to produce up to six spaceships per year, providing the scalability needed to support the business model. Construction has already started and management anticipates the facility will be fully operational by late 2023. The company plans two buildings — at 35,896 square feet and 115,200 square feet — to make up the new campus in Mesa. The location at the Phoenix Mesa Gateway Airport provides other benefits as well. The Greater Phoenix area is an innovation hub with outstanding engineering and technical talent, driven by a long history of aerospace development. The first Delta-class spaceships are expected to be available for revenue-generating flights by late 2025, with private astronaut missions starting in 2026.

Industry Overview and Company Strategy

Several Factors are Driving the Industry's Growth

- **The SpaceTech Ecosystem has evolved rapidly in the past decade and has demonstrated resilient growth driven by an accelerated participation of private capital.** The global SpaceTech Ecosystem has seen strong growth in the past decade, primarily due to increased private participation that has opened the space economy to several new commercial models. The private capital infusion is driven by higher participation of private companies in space activities and commercial applications now accounting for more than two-thirds of the industry turnover. The strength of this market can be demonstrated by the fact that it continued to grow steadily, even in the tough COVID years and is now primed to achieve accelerated growth over the coming decade. The SpaceTech ecosystem can be classified into six major business segments that include three upstream segments — Exploration, Satellites & Components, and Satellite Launch Services; and three downstream segments — Communication Equipment, Communication Services, and Data Services. The ecosystem has grown from ~$360 billion in 2018 to $386 billion in 2021. This growth is being driven by strong performance of the exploration and data services segments, coupled with acceleration in satellite demand and launch.

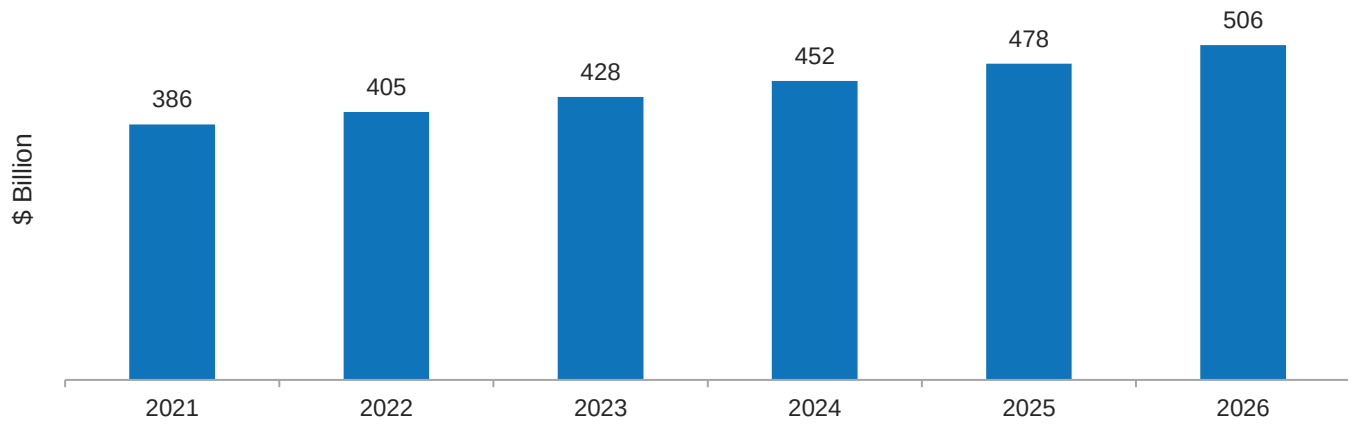
Chart 3: The SpaceTech Ecosystem Was Worth $386 Billion in 2021



Source: Intro-act, BryceTech

- **The global space economy is expected to grow to $506 billion by 2026 and exceed $1 trillion by 2030.** As space innovation goes beyond government space agencies, several industries are closely looking at companies to address long-standing and emerging needs that can be met through SpaceTech solutions. The space ecosystem is responding to this need with rapid technological innovation, fueled by private and government capital, to create new solutions and commercial models. The deepening integration with many industries in the next few years will emerge as one of the key drivers of industry growth and will help expand the SpaceTech Ecosystem**.** Our analysis of data from analytics and engineering firm BryceTech and other sources indicates that the growth of the global space economy is set to accelerate to a 5.7% CAGR, suggesting that it will be worth $506 billion in 2026. These growth rate projections are in line with those by leading banks and research houses that expect the space economy to be worth >$1 trillion by 2030.

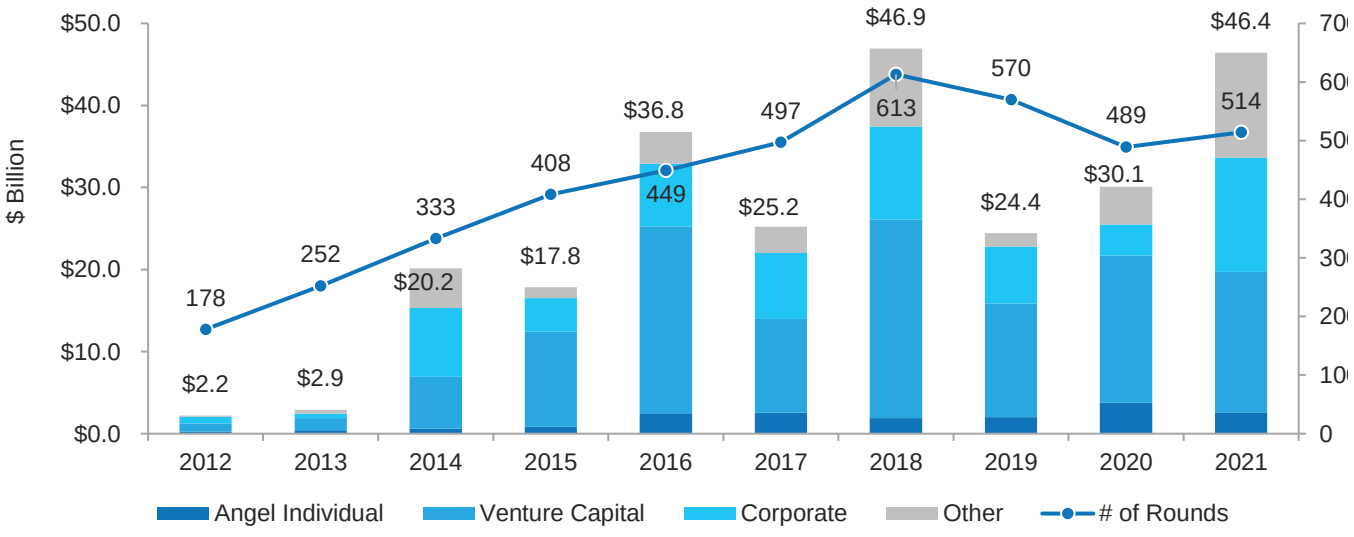
Chart 4: The SpaceTech Ecosystem is Expected to Grow to $506 billion in 2026



Source: Intro-act, BryceTech

- **Given the global SpaceTech industry's growth potential in the long term, investors are flocking toward space businesses – especially in the U.S. and China – to ride the growth wave.** In 2021, equity investments reached $46.4 billion over 514 rounds across all space technology stacks, according to Space Capital. For each round, this implies $90.3 million of capital raisings, which is significantly higher than the $61.5 million equity raised per round in 2020 and is roughly 7.3x the 2012 figure. Over the last 10 years, there has been $252.9 billion of equity investment across 1,694 unique companies over 4,000+ rounds in the broader space economy, driven by investment in companies based in the U.S. ($116.1 billion) and China ($77.3 billion), which collectively account for more than 75% of the global total in 2021.

Chart 5: Equity Funding for Space Companies Reached $46.4 Billion in 2021 Over 514 Rounds



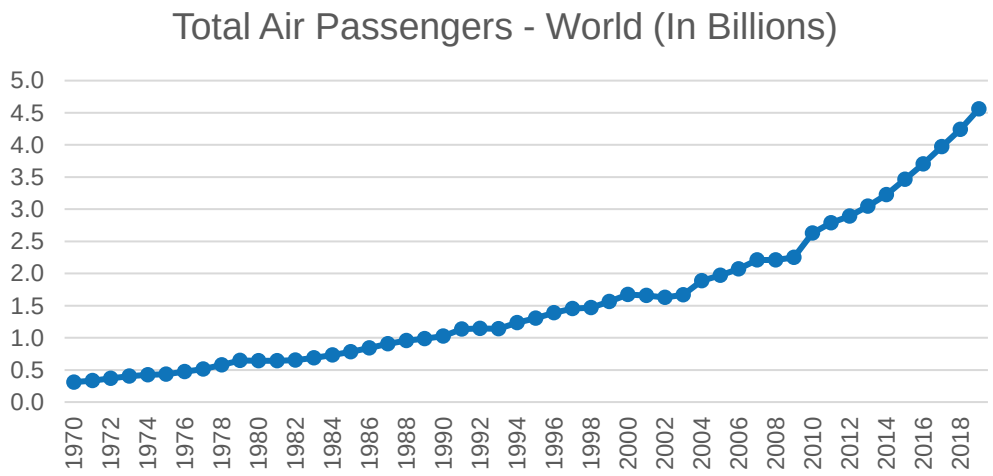
Source: Intro-act, Space Capital – Space Investment Quarterly: Q4 2021

Space Tourism is a Key Segment of the Multi-Billion Dollar SpaceTech Industry

- **It has been more than 60 years since the first person traveled into orbit.** Yet, so far, just over 600 people have had this transformative experience of seeing the Earth from space and in space ("the Overview Effect"). Space tourism companies intend to change that, and the space travel industry is growing dramatically. A key growth driver is the emergence of private companies. Although private space travel has gained a lot of attention recently after the much-publicized trips of Jeff Bezos and Sir Richard Branson, it has a much longer history. Space Adventures, Inc. sent entrepreneur Dennis Tito to the International Space Station in 2001. Tito was the first private "spaceflight participant," who paid a fee to go into orbit. A few others followed, paying a high price to the Russians for a trip to the ISS. Nevertheless, the private space travel industry is still in its early stage.
- **But the industry is transforming.** On July 11, 2021, Virgin Galactic launched the first truly commercial spaceflight to space with a full crew of four mission specialists in the cabin, including Sir Richard Branson. Blue Origin has successfully launched 31 people into space over just six of its New Shepherd missions. SpaceX created history by shuttling U.S. astronauts to the ISS aboard a private vessel, not a NASA rocket.
- **The market for space tourism and emerging applications is expected to grow to $101 billion by 2040.** According to Citi Research, the market for space tourism and related applications is expected to grow in the coming decade with an advancement in launch technology, new products, decreasing costs, and new sources of private and government funding. Apart from Virgin Galactic, Blue Origin is a key player in the private space travel market and is Virgin's primary competitor at this time. Like Virgin Galactic, Blue Origin offers commercial suborbital spaceflights to private astronauts. Blue Origin's spaceflights take about 10 minutes for the entire trip, while going higher (the Kármán line) than Virgin Galactic's altitude of 282,000 feet. Virgin Galactic's Delta Class spaceships will have improved capabilities compared to its VSS Unity and Imagine spaceships. Applying lessons learned from those ships, the company anticipates that Delta ships will have increased performance capabilities, allowing them to reach higher peak altitude.
- **The space tourism market has a long runway for growth.** To gain some perspective on how big the space tourism industry could become in future decades, it might be useful to look at the growth of the airlines industry. The U.S. airline industry began with a single solo airplane flight in 1903. It grew exponentially over the years — to roughly 450,000 passengers in 1934 and 1.9 million by 1939. That just shows the growth in the initial 3 to 4 decades. The numbers kept growing after that as well.

  Globally, the number of air passengers reached 0.3 billion in 1970. It rose nearly 15-fold to 4.6 billion in 2019, before the pandemic reduced the traffic drastically.

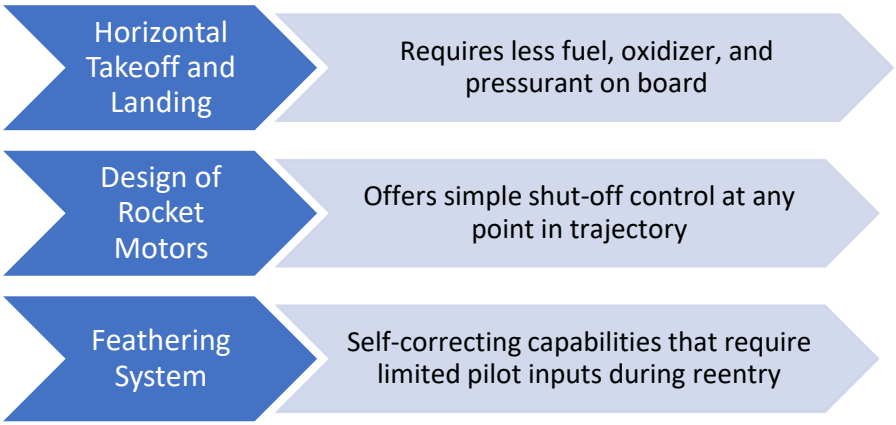
Chart 6: From 1970 to 2019, the Number of Air Passengers Globally Rose 15-Fold



Source: Intro-act, International Civil Aviation Organization, Civil Aviation Statistics of the World, and ICAO staff estimates

Granted, tourism isn't the only reason behind the growth in the number of air passengers. However, this just gives a perspective on the long-term growth runway for the space industry, as well as its growth potential in terms of size. The industry that looks niche and only for the rich today could become commonplace a few decades down the line.

Chart 7: Advantages of Technology Used by Virgin Galactic



Source: Intro-act, Virgin Galactic

- **The Virgin brand is known for its unique customer experience and luxury. The company intends to combine that with the adventure of space travel.** From reservation to conclusion of the trip and even after that, the company has planned everything carefully to offer a unique experience to its astronauts. Its proprietary technology offers several benefits, as the chart above shows.
- **Astronaut campus for a better flying experience.** Before the actual flight to space, astronauts will spend several days training for the launch. In the initial years, this training will be provided at Spaceport America, which has facilities that can support several flight crews per month. However, as the Delta-class ships come into service and flight volume increases, Spaceport America will transition from a multipurpose facility to a high-volume spaceport. It will become a technical and flight operations facility where people arrive to start their trip to space.

  At this stage, Virgin Galactic plans to build facilities to accommodate, train, and engage greater numbers of astronauts and their guests during the multi-day lead up to the flight experience. For this purpose, it plans to build an "astronaut campus." The company has acquired land in Sierra County, New Mexico, which will be home to its first astronaut campus. This facility will be exclusively used by the future astronauts and up to three of their guests in advance of the spaceflight from Spaceport America. The master plan for the campus will include training facilities and accommodation, as well as an observatory, wellness center, recreation activities, and dining options.
- **Future Astronaut Community: one of the many ways in which Virgin Galactic tries to provide unique and lasting customer experiences.** Each ticket purchased after Virgin Galactic's ticket sale's reopening in 2021 includes a membership in the company's Future Astronaut community. This membership provides access to various events and experiences, including exclusive weeks "at home" with Sir Richard Branson. This is one of the many ways in which Virgin Galactic tries to give a customized, unmatched experience to customers and improve brand loyalty.

  As per the company estimates, 90% of the existing reservation holders have a net worth of over $1 million. About 70% have a net worth of less than $20 million. Thus, the company expects the human spaceflight offering to have interest primarily from high net-worth individuals, and in the near-term, individuals with a net worth of $10 million or more will be the potential customers for the human spaceflight program. However, the company expects to follow the model pioneered by airlines, driving the cost down with volume, so that large numbers of people at various income levels can use their services and experience "the Overview Effect." As seen in the figure below, the company has received reservations from across the globe. The majority of the reservations are from the U.S (36%), followed by the U.K. (14%), Canada (5.2%), Australia (5%), Russia (4.7%), and Japan (4.3%).

Chart 8: Future Astronauts are a Global Community

Source: Intro-act, Virgin Galactic

Company's Growth Strategy

- **Launch commercial spaceflights.** The first step in Virgin Galactic's growth strategy is to launch its commercial spaceflights. The launch of the service has been delayed several times in the past due to various reasons. For example, an inflight incident involving an earlier model of SpaceShipTwo led to the loss of that spaceship and significant delays in the planned launch of the company's spaceflight system as it addressed design and safety concerns, including with applicable regulators. Most recently, the launch has been delayed to Q2 2023 as the company is working on enhancing its mothership, Eve. Virgin Galactic has been making spaceflights since December 2018, but without paying customers so far. Virgin was the first spaceline to be licensed by the Federal Aviation Administration to send customers to space. The company got a grounding order from the FAA after its July 2021 spaceflight deviated from its assigned airspace on descent. The FAA investigation is over and it has cleared Virgin Galactic for future flights.
- **Expand the fleet to increase flight rate.** As noted earlier, the company has partnered with Aurora for building its mothership. Apart from this, the Delta spaceships, with a capacity of six astronauts, will be in operation after production at its facility in Phoenix. With this development, the company plans to expand its fleet and increase its flight rate to 400 per year. At $450,000 per ticket, six astronauts per spaceflight, 400 flights could generate revenue of more than $1 billion annually for the company.
- **Reduce operating costs.** The company is focusing on manufacturing and operational efficiencies to reduce cost of production. Additionally, the management believes that with the commencement of commercial spaceflights, the staff will become more cost-efficient in operations.
- **Leverage proprietary technology and manufacturing experience to augment product and service offerings and expand.** Virgin Galactic believes that its technology can be used in other commercial and government activities. It can be used in developing high-speed vehicles, which can help in reducing international travel time. The company also intends to increase its revenue from government and research payload business. The management hints further at collaborating with various international government agencies for projects. (It is worth noting that Virgin Orbit, which launches satellites, is a separate company whose revenues and expenses will not have an impact on Galactic.)

Multiple Revenue Sources

- **The company's spaceflight system is intended to provide the scientific research community access to space for affordable and repeatable high-quality microgravity.** In May 2021, the company carried payloads into space for research purposes through NASA's Flight Opportunities Program, and its flight in July 2021 included research payloads from the University of Florida. This would be another key revenue source for the company, apart from the sale of tickets for the spaceflights. In November 2022, Virgin Galactic entered an agreement with Axiom Space to support a microgravity research and training mission. A Virgin Galactic spaceflight, tentatively scheduled for next year, will prepare an Axiom Space astronaut for an upcoming trip to orbit, while conducting microgravity research to supplement the work they will do on the International Space Station.
- **Additionally, Virgin Galactic is tapping the research and luxury travel market.** The company has put 100 seats, of the initial 1,000 that it offered, into the research market. The company aims to build meaningful research business by offering routine and reliable access to space. This is a strategically helpful market for the company's business model as it commands a significant price premium to its current commercial passenger price point and also provides a positive brand benefit to the company by contributing to scientific advancement. The second market that the company is looking to tap is luxury and adventure travel. For this, the company has partnered with Virtuoso to make a limited number of reservations within Virgin Galactic's first 1,000 seats available to their exclusive global portfolio offering. High-end luxury travel is a huge potential market for Virgin Galactic, once the company is fully set with its regular human spaceflights.

Chart 9: Future Market Opportunities

Source: Intro-act, Virgin Galactic

Potential Opportunity: High-Speed International Travel

- **Hypersonic or high-speed point-to-point travel could be a huge potential opportunity for Virgin Galactic.** While the company's primary focus in the near-term is on commencing and managing its commercial human spaceflight operations, it intends to explore and evaluate the application of its technologies and expertise into point-to-point travel and other ancillary applications. In future, Virgin Galactic aims to use its advanced technologies, design, engineering and manufacturing experience, and flight training to develop additional aerospace applications, including, among others, the manufacturing of aircraft capable of high-speed point-to-point travel. High-speed aircraft are capable of traveling faster than the speed of sound. A significant market opportunity exists for vehicles with this capability, as they could drastically reduce international travel times.

  In August 2020, following the completion of an internal mission concept review that allows progress to the next design phase, Virgin Galactic unveiled the concept for its preliminary design of a high-speed aircraft. Under this initial design, the aircraft would be a Mach 3 certified delta-wing vehicle, with a cabin to accommodate 9 to19 passengers flying at an altitude above 60,000 feet. The company entered into a Space Act Agreement with NASA in 2020 relating to the development of high-speed point-to-point travel technologies, and into a non-binding memorandum of understanding with Rolls-Royce to collaborate in designing and developing engine propulsion technology for high-speed commercial aircraft.

Management Team

Seasoned and Highly Experienced Management

- **Sir Richard Branson, Founder.** Richard is the founder of the Virgin Group, which includes several companies, with more than 40 Virgin companies worldwide in over 35 countries. Virgin Atlantic and Virgin Galactic are two of the largest companies of the Group. Branson has challenged himself with many record-breaking adventures, including the fastest-ever Atlantic Ocean crossing, a series of oceanic balloon journeys, and kitesurfing across the English Channel. In July 2021, Branson traveled to space in Virgin's VSS Unity spacecraft.

- **Michael Colglazier, President and Chief Executive Officer.** Prior to joining Virgin Galactic, Michael served as president and managing director of Disney Parks International and previously served as president of The Disneyland Resort in Southern California. Michael had an extensive career at Disney spanning over 30 years, where he drove new businesses, innovative growth, and operational excellence at Disney locations around the world.

- **Doug Ahrens, CFO.** Doug has over 25 years of operational and strategic finance experience at multinational corporations. He has led global teams at rapidly growing public and privately held companies in complex technology and manufacturing environments. Doug has deep experience helping global manufacturing companies scale and grow, and expertise in capital markets and M&A.

- **Sirisha Bandla, Vice President of Government Affairs and Research/Technical Flight Development.** Sirisha has supported Virgin Galactic over the past five years, successfully growing the presence of the company inside the Beltway through engagement with Congress, the White House, and NASA. Sirisha leads Virgin Galactic's efforts on policy, regulation, and the business development program for scientific payloads. Previously, Sirisha served as the Associate Director for the Commercial Spaceflight Federation, an industry association of commercial spaceflight companies. She also flew with Richard Branson as part of the VSS Unity crew.

- **Alistair Burns, SVP, Chief Information Officer.** Alistair oversees information technology strategy and infrastructure for Virgin Galactic, which supports the company's overall business strategy. Alistair has over 25 years of experience working in some of the largest global companies in a wide variety of industries ranging from manufacturing to media. Prior to joining Virgin Galactic, Alistair was the senior vice president and chief information officer at OSI Systems, a designer and manufacturer of specialized electronic systems and components for critical applications.

- **Mike Moses, President, Space Missions and Safety**. Mike oversees the commercial spaceflight program. He leads the team in all aspects of safe and successful spaceline operations, including vehicle processing, flight planning, astronaut training, and flight crew operations. Mike came to Virgin Galactic following a distinguished career with NASA. From 2008 through July 2011, he served at the Kennedy Space Center in Florida as the launch integration manager, where he led all Space Shuttle processing activities from landing through launch. Mike also chaired the Mission Management Team where he provided ultimate shuttle launch decision authority.

Space Advisory Board

Virgin Galactic's Space Advisory Board brings together aerospace leaders to advise its senior management team. It also serves as a forum to discuss technical and operational best practices.

Chart 10: Space Advisory Board

Source: Intro-act, Virgin Galactic

To read the biographies of all members of the Virgin Galactic management team, click here.

Fundamentals & Valuation Analysis

Virgin Galactic's Customer Deposits are Rising. The Company has a Strong Cash Balance.

- **Virgin Galactic has significant deposits from customers for its spaceflights.** These have grown in the last few years — from $83.4 million in December 2019 to more than $104 million in September 2022. This shows the demand for Virgin Galactic's products. As per management estimates, the tickets sold represent roughly $212 million in expected future revenue on completion of the planned spaceflights. As of September 30, 2022, Virgin Galactic has received reservations for around 800 spaceflight tickets. These tickets entitle the purchaser to a multi-day journey to prepare them for the upcoming flight, including a comprehensive spaceflight training preparation program followed by the trip to space on the final day. The company has initially opened reservations for around 1,000 seats. It has allocated some seats for the research market, and some for luxury and adventure travel in partnership with Virtuoso. Finally, it has also kept some seats for referrals from its own team. It plans to re-open sales once it starts flying customers who have already reserved their seats.

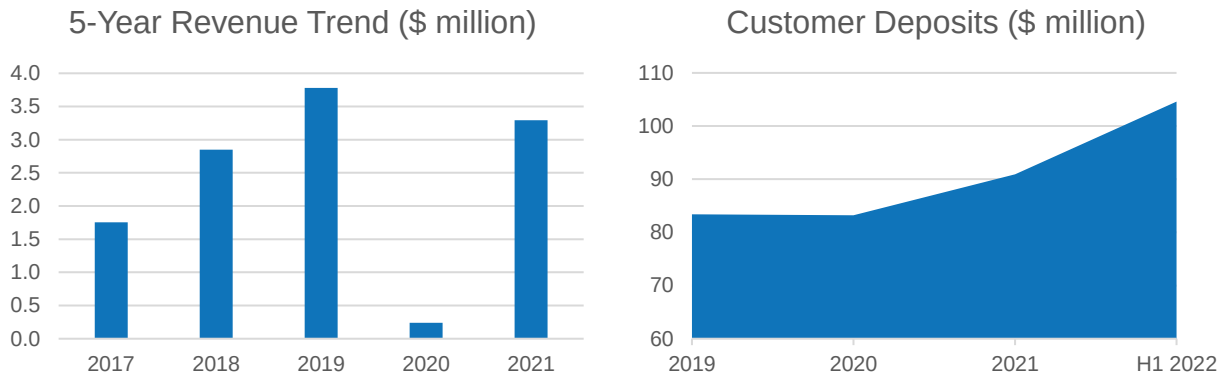
Chart 11: Ticket Payment Schedule

**Includes $125,000 fully refundable deposit plus $25,000 nonrefundable Future Astronaut community access fee.*

Source: Intro-act, Virgin Galactic

- **Revenue growth driven by sponsorship revenue and revenue earned under government contracts payload services.** Revenue related to the performance of spaceflights in May and July of 2021 boosted the company's 2021 revenue. Revenue for 2020 was related to engineering services provided under long-term U.S. government contracts that ended in early 2020. Virgin Galactic's revenue in 2022 also included future astronaut membership fees. Following the commercial launch of its human spaceflight services, the company expects that the significant majority of its revenue will be derived from ticket sales to fly to space and related services.
- **The company currently incurs losses, but as an early-stage company operating in a capital-intensive business, its losses are understandable.** Moreover, Virgin Galactic spends significant amounts of money on research and development. Virgin spent $149 million on R&D in 2021 and $212 million in the first nine months of 2022. We believe that the capital and R&D investments should form the basis for sustainable revenue growth in the years to come. The company has delayed the launch of its commercial spaceflight service to Q2 2023. Thus, although Virgin Galactic is expected to continue incurring losses in the coming quarters, there are several long-term growth drivers for the company that we've discussed in the report.

Chart 12: Revenue and Customer Deposits



Source: Intro-act, Virgin Galactic

Fundamentals & Valuation Analysis

- **Virgin Galactic has sufficient cash to fund growth.** As of September 30, 2022, the company had cash and cash equivalents and marketable securities of over $1.0 billion. So, the company is well-funded to meet its requirements over the coming several quarters. That leaves the company with plenty of funds for its R&D programs, fleet expansion, test missions, and/or accretive acquisitions in near future. Virgin Galactic has the backing of big investment groups (Virgin Investments Ltd, Social Capital, The Vanguard Group, and BlackRock Fund Advisors), which reflect investor confidence in the company's and space tourism's long-term growth prospects.
- **Although the valuation looks rich, it really is not.** Virgin Galactic stock's current price-to-book value, price-to-sales, and EV-to-sales ratios are close to their five-year low levels. So, there is a scope for expansion in its valuation multiples. Importantly, the company's current revenue is miniscule, considering that it hasn't really started its commercial spaceflights. So, its price-to-sales and EV-to-sales ratios look elevated. When the company starts commercial spaceflights, its revenue will rise significantly, and its valuation multiples will look far more reasonable. At $1.1 billion, Virgin Galactic's valuation has a lot of room to grow as the company's sales grow. The company's market valuation is dwarfed by that of its private, much bigger, peer SpaceX, which has a valuation of $127 billion.

Chart 13: Valuation

	Current	5-Year High	Low	Average
P/BV	1.8	177.5	0.9	36.0
P/Sales	671.4	33,473.8	312.9	5,522.4
EV/Sales	315.5	29,459.2	202.9	5,533.7

Source: Intro-act, FactSet

Chart 14: Targets and Ratings

Broker	Analyst	Rating Date	Rating	Price on Rating Date	Tgt Price	Tgt Price Implied Return
Susquehanna Financial Group	Charles Minervino	04 Jan '23	Hold	$3.64	$5.00	24.1%
Jefferies	Greg Konrad	03 Jan '23	Buy	$3.49	$11.00	173.0%
Cowen & Company	Oliver Chen	27 Dec '22	Buy	$3.29	$7.00	73.7%
Wolfe Research	Myles Walton	13 Dec '22	Sell	$4.71	$4.00	-0.7%
Alembic Global Advisors	Pete Skibitski	21 Nov '22	Hold	$5.04	$5.00	24.1%
Canaccord Genuity	Austin Moeller	04 Nov '22	Hold	$4.92	$5.00	24.1%
Wells Fargo Securities	Matthew Akers	04 Nov '22	Sell	$4.92	$3.00	-25.6%
Truist Securities	Michael Ciarmoli	04 Nov '22	Sell	$4.92	$3.00	-25.6%
Mean			**Hold**	**$4.03**	**$5.5**	**36.5%**

Source: Intro-act, FactSet

Chart 15: Top 20 Investors

Rank	All Holder Types	% OS	Position ('000)	Pos Chg ('000) [6M]	Mkt Val (MM)
1	BRANSON SIR RICHARD	11.88	30,745	0	163
2	The Vanguard Group, Inc.	6.82	17,642	948	94
3	The Social+Capital Partnership LLC	6.09	15,750	0	84
4	BlackRock Fund Advisors	5.76	14,910	6,993	79
5	SSgA Funds Management, Inc.	4.61	11,931	6,212	63
6	Mubadala Investment Co. (Investment Company)	4.27	11,055	0	59
7	Morgan Stanley & Co. LLC	1.64	4,234	2,482	22
8	Geode Capital Management LLC	1.33	3,438	1,279	18
9	Susquehanna Financial Group LLLP	0.94	2,419	-1,213	13
10	Northern Trust Investments, Inc. (Investment Mgt)	0.77	2,003	1,196	11
11	Norges Bank Investment Management	0.59	1,537	0	8
12	Charles Schwab Investment Management, Inc.	0.56	1,441	483	8
13	Marshall Wace LLP	0.54	1,389	1,389	7
14	Millennium Management LLC	0.50	1,303	-328	7
15	Barclays Bank Plc (Private Banking)	0.49	1,274	1,274	7
16	Credit Suisse Securities (USA) LLC (Broker)	0.49	1,268	1,206	7
17	BAIN ADAM	0.47	1,219	19	6
18	COLGLAZIER MICHAEL A	0.39	1,016	419	5
19	Citadel Securities LLC	0.35	906	-1,676	5
20	SG Americas Securities LLC	0.33	856	797	5

Source: Intro-act, FactSet

Investment Risks

- **Loss-making company.** The company has incurred significant losses since its inception. The near-term profitability looks less likely with human spaceflight operations being delayed further. Moreover, the success of the business depends largely on how well the company can market human spaceflights. It incurred a net loss of $352.9 million for the year 2021. The net loss for the first nine months of 2022 stood at $349.3 million. By comparison, the company's revenue was $3.3 million for the year 2021 and $1.4 million for the first nine months of 2022. The company has not yet started commercial human spaceflight operations, and it is difficult to predict its future operating results. Its losses may be larger than anticipated, and it may not achieve profitability or may not be able to maintain or increase profitability.
- **Virgin Galactic has delayed its commercial human spaceflight launches several times to date.** Commencement of large-scale flights for customers has been put off until 2023, and it has now been more than a year since founder Sir Richard Branson and four other crew members made history with the first spaceflight of its kind, VSS Unity 22. So far, paying customers have been very patient with Virgin's flight delays. However, going forward, any further delays may not sit well with customers who have paid an initial deposit. Competitors, such as Blue Origin, may capture the market that Virgin Galactic cannot serve due to these postponements. This is a key risk for the company.
- **Virgin's current design does not scale to orbital spaceflight.** As the market evolves to encompass orbital flights, Virgin will need to develop a completely different spacecraft. The existing system cannot reach orbit, nor would it be able to survive a return through the atmosphere, even if it could make it into orbit. SpaceX's Falcon 9 is already orbital-capable and Blue Origin's New Glenn will also be an orbital vehicle. Thus, Virgin's primary competitors may leave it behind as space tourism moves farther out from the Earth's surface.
- **The market for commercial human spaceflight may not grow as expected.** The company's estimates for the total addressable market for commercial human spaceflight are based on a number of factors, such as the company's current backlog, the number of consumers who have expressed interest in its astronaut experience, assumed prices, assumed flight cadence, and the company's ability to leverage its current manufacturing and operational processes. These assumptions and estimates may prove to be incorrect.
- **Adverse publicity.** Any adverse publicity stemming from incidents involving Virgin Galactic or its competitors can have a material adverse effect on the operations. As an example, recently an uncrewed rocket of one of its competitors carrying research payloads crashed shortly after liftoff. An inflight incident involving an earlier model of Virgin Galactic's SpaceShipTwo led to the loss of that spaceship. Such incidents are a setback for the overall space travel segment, with questions being raised about the safety and reliability of the technology.
- **Stiff competition.** The company may face stiff competition going forward. The commercial spaceflight industry is still in its nascent stage. The primary competitor is Blue Origin. SpaceX is also a factor, having participated in two private space missions recently. Going forward, these players can compete in segments where Virgin currently operates.

  As discussed earlier, Virgin Galactic flight takes more time than that of Blue Origin's, which could be an advantage, depending on a customer's preferences. However, the altitude reached by Blue Origin is actually higher at 351,000 feet, crossing the Kármán line (330,000 feet). A Virgin Galactic flight reaches an altitude of 282,000 feet, and this could make Blue Origin a strong competitor to Virgin Galactic. Moreover, both Virgin Galactic and Blue Origin spacecraft reach only suborbital levels. SpaceX flew a private mission that lasted more than three days and reached around 1,917,000 feet altitude. The company also sent 18 private astronauts to the ISS. Thus, going forward, potential customers might opt for higher-reaching SpaceX carrier as against the experiences provided by Virgin Galactic and Blue Origin.
- **Regulatory risks.** The business of the company is subject to a wide variety of government laws and regulations. With the overall industry evolving rapidly, so are the laws. Failure to comply with these laws and regulations can adversely affect the business. Moreover, an evolving regulatory/legal environment could affect the company's operations and increase compliance costs. For example, the FAA has recently released new rules relating to commercial space launches, and the company's ability to achieve compliance with these rules by the 2026 deadline and maintain compliance thereafter could have an impact on its operations.

Investment Risks

- **Pricing power.** China is planning to begin private spaceflights to space, as are European companies. A Chinese company, CAS Space, plans to charge passengers in the range of $285,000 to $427,000, with operations estimated to start by 2025. An entirely different experience will be offered in the future by companies like Space Perspective, World View, and Zero 2 Infinity, which will use balloons to lift customers into the stratosphere. Competition from these and other lower-cost providers could be a risk in the long term.

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