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Space



The Commercialization of Low Earth Orbit

The promise of human spaceflight stands to transform our economy by leveraging the untapped power of LEO

Volume 3: Making the Dream of Space Travel a Reality for Private Citizens

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This is the third volume in a series of Deloitte Consulting publications on the commercialization of low Earth orbit (LEO) and its associated economic impact. In this volume, we conduct a deep dive into the tourism segment of the LEO economy value chain, exploring key market dynamics and charting several potential future scenarios for the tourism segment through 2035.



Scanning the horizon

Are we seeing a breakthrough for space tourism?

2021 was a breakthrough year for space tourism. From multiple debut flights to the edge of space and LEO to the announcement of three new NASA awards for Commercial LEO Destinations (CLD), the segment saw strong catalysts and accelerating activity across the market. At current and near-term projected prices for a ticket to LEO, the market for orbital tourism remains primarily comprised of the upper echelon of high-net-worth individuals. However, our analysis indicates that if government and commercial players can capitalize on synergies between interrelated demand segments for human spaceflight (HSF) in LEO, such as media, entertainment, & advertising (MEA), there is strong potential for growth in space tourism as well. Further, if favorable outcomes are realized within the broader LEO industry, both within the US and globally, tourism could emerge as a viable and self-sustaining commercial enterprise within the next decade and potentially sooner.

Space tourism emerges to boldly go where few have gone before

Space tourism is not a brand new market – seven private citizens paid their way to the International Space Station (ISS) on Russian Soyuz spacecraft between 2001 and 2009 – but historically it has not been serviced by US launch providers. In the decade that followed, the global capacity for crewed launch was focused exclusively on servicing government expeditions to the ISS. But this temporary pause has ended in dramatic fashion, this time with US commercial entities taking the lead.

Interest has emerged to open the tourism market to options outside the orbital regime, for which space tourism providers are accelerating their efforts to bring consumer space access to market. For example, Blue Origin and Virgin Galactic each began service in 2021.ⁱ While they are operating suborbital flights, their initial successes have quickly taken space tourism from a niche ideal to an established concept, eliciting interest from consumers and providing an initial assessment of demand. As of November 2021, roughly 700 people have reserved tickets up to \$450,000 each to fly to the edge of space on Virgin Galacticⁱⁱ, while nearly 7,600 people registered to bid to fly alongside Jeff Bezos on the first commercial flight of Blue Origin's New Shepard vehicle.ⁱⁱⁱ

The recently completed Inspiration4 mission (September 2021) became the world's first all-civilian mission to orbit^{iv} and the upcoming Ax-1 mission (Spring 2022) will be the first private mission to the ISS.^v Additionally, a series of missions in the Polaris program aim to break new ground by testing novel spacesuits,

communications infrastructure, and emerging spaceflight hardware.^{vi} These missions are historic milestones and, coupled with private suborbital spaceflights already completed, demonstrate the viability of the two sub-segments of tourism in LEO: destination and non-destination orbital trips.

While the past two years have been a landmark period for bringing space tourism to the market, they reflect years of public and private investment, technological innovation, and perseverance towards the commercial human spaceflight mission. While we are cautiously optimistic about the growth potential for the space tourism market, its trajectory is still far from certain. In the sections that follow, we analyze the underlying economics and major market dynamics for space tourism, explore possible scenarios that may play out over the next 15 years, and offer a perspective on what it will take to bring space tourism closer to earth.





Scanning the horizon

Supply and demand for space tourism

Defining space tourism within the LEO value chain

Space tourism can be defined as all the activities that support leisure travel to space. We further divide the segment into suborbital tourism and orbital tourism, which includes destination-oriented and non-destination components. **Suborbital tourism** enables human spaceflight to the edge of space without sending the vehicle into orbit, whereas **orbital tourism** enables travelers to experience orbit. **Destination-oriented** tourism encompasses any trip into space that includes a destination, such as docking with the ISS. **Non-destination** orbital flights exist as well, where travelers experience orbit without ever leaving their vehicle (e.g., the Inspiration4 mission). Our tourism market projections cover LEO-based activities, which include destination-oriented and non-destination orbital flight segments on our value chain but exclude suborbital tourism.

To properly size the market and address supply and demand considerations, we established boundaries for what constitutes the segment. To compare the market to terrestrial tourism markets, we adopted the United Nations World Tourism Organization's visitor consumption expenditure components as outlined in their Recommendations on Tourism Statistics. Specifically, we selected the applied transport component to size the market for non-destination orbital tourism and the transport, accommodation, and food and drinks components to size on-orbit destination-oriented tourism. This allows us to model the economic impact of a variety of mission concepts from an Inspiration4 style mission to a multi-day stay on the ISS. Using this definition, space tourism consumers (i.e., space tourists) are those who personally incur tourism expenditures for and during a spaceflight that achieves orbit, and the space tourism industry becomes viable when:

1. Individuals can afford to incur flight expenditures for themselves and/or others;
2. Expenditures on commercial tourism spaceflight represent a significant share of human spaceflight; and
3. Utilization of on-orbit assets for space tourism represents a significant supply of those assets.

Modeling space tourism demand

Our model for the space tourism market within Deloitte's Space Mission and Payload Planning Tool (SMPPT) is based upon Deloitte's economic analysis of the market since 2018. This analysis combines extensive direct consumer research, payload and operational cost modeling, and scenario-based market success assumptions to account for infrastructure availability and price sensitivity.

To assess the market for space tourists, we determined the ability of any demand (serviceable or latent) to be able to afford space travel at various per-seat price points and the ability of the supply to support the mission (i.e., capabilities such as habitats) and any identified demand (i.e., available seats). The model itself produces outlooks that can account for supply-side and demand-side constraints such as the inability to service larger potential demand generated from lower per-seat prices and demand-side constraints such as prices that are too high for most high-net-worth individuals.

Our unconstrained view of the space tourism market assumes that suppliers can supply seats at one or more of the model's identified price inflection points and that the global number of wealthy individuals will continue to grow at specific minimum rates. While the unconstrained outlook is very encouraging for the future market potential of space tourism, we recognize the complexity of market conditions and the limits supply and demand barriers will impose on the market in the near-term.



Scanning the horizon

Ready for liftoff: Supply side analysis

To date, NASA's strategy for commercializing LEO has been a driving force for the early successes in commercial human spaceflight. The operational debut of the Crew Dragon vehicle under the Commercial Crew Program, as well as the forthcoming debut of the CST-100 Starliner, will likely provide stable capacity to satiate both commercial and government demand for human spaceflight at current price points. As Commercial Crew Program providers complete an increasing number of missions to the ISS, we anticipate that tourist ticket prices will fall due to development cost recovery, vehicle reuse, and economies of scale. Our demand elasticity analysis in the following section explores the potential number of tourists and market size at progressively lower price points.

Over the next decade, several new vehicles capable of servicing demand for orbital human spaceflight are under development, both within the US and internationally (Table 1). While Orion and some international vehicles may not directly service space tourism demand, their ability to support human spaceflight operations globally may free up capacity more suitable for tourism. Overall, our analysis suggests that as these vehicles become operational, the increased capacity and competition will put additional downward pressure on ticket prices for tourists.

Once Commercial Crew Program providers come fully online, and as other vehicles under development become operational, the availability of on-orbit destinations will quickly become the largest supply-side constraint on the tourism market. Ax-1 will break ground for NASA's current support of a two-per-year commercial mission cadence to the ISS in the early 2020s^{vii}. This low initial ceiling for commercial missions will begin to rise in the mid to late-2020s with the establishment of the first commercial habitats and free-flyer stations oriented to service commercial demand.

A mix of private and government investment is paving the way for at least four such commercial destinations. Quickly following public announcements made in October 2021 by two teams leading competing designs for commercial space stations, NASA issued three awards totaling over \$400 million to support their development through the Commercial LEO Destinations (CLD) program.^{viii} Axiom Space was previously funded by NASA to develop the first commercial destination module for the ISS.^{ix} Construction of that module is already underway and could establish a functional proof-of-concept for a self-sustaining platform detached from the ISS in the late 2020s.^x

NASA's awards under NextSTEP and CLD provide much needed investments in this area but will only address small increments of the total addressable market for tourism. Our team also recognizes the moderate likelihood of delays or cancellations within these programs. With a limited capacity for destination-oriented tourism in the near term, we anticipate launch services providers will prioritize growth in suborbital and non-destination LEO tourism. Hence, our economic models for LEO tourism size are primarily based on the cost structure for non-destination flights.



A SpaceX Falcon 9 rocket carrying the company's Crew Dragon spacecraft is launched on NASA's SpaceX Demo-2 mission to the International Space Station with NASA astronauts Robert Behnken and Douglas Hurley onboard, Saturday, May 30, 2020, at NASA's Kennedy Space Center in Florida. (NASA/Bill Ingalls)



Scanning the horizon

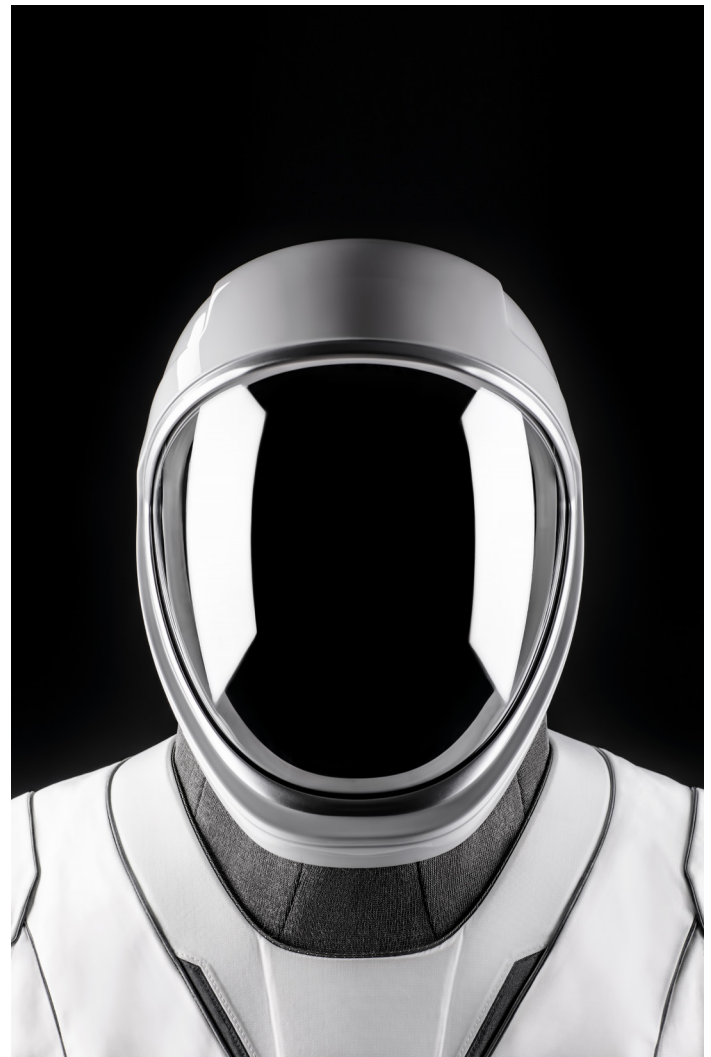
Becoming an astronaut: Demand-side analysis

While LEO tourism activity in 2021 provided initial demand signals, assessing the total addressable market requires a top-down and assumption-driven approach until the segment matures. Our analysis combines data on the high-net-worth individual population, primary surveys, consumer willingness to pay, and select assumptions about various populations' ability to pay. Using this data, we can understand likely consumer demand for LEO tourism and estimate price elasticity.

Our analysis indicates that willingness to pay varies dramatically, from those who would not want to travel to space at any cost to a "passion driven" population willing to spend a high percentage of disposable income on space travel. Using data from multiple sources, we extrapolated the willingness to pay across a wide range of potential ticket prices to estimate demand elasticity. To determine if a person can be categorized as part of the addressable demand, we consider a ticket price as a fraction of the individual's total net worth and determine what impact will occur to their discretionary income and overall financial holdings. We also consider liquidity and the option to secure collateralized loans to further refine estimates.

Our snapshot of orbital tourism supply and demand (Figure 1) depicts likely and highly likely elasticity curves, with a significant inflection in demand below \$10 million per ticket. In Figure 2, we have coupled the elasticity projections with a more detailed perspective of the willingness to pay within each wealth band, plotted against key reference prices for tickets to space. We caution that external factors, such as the ever-present possibility of an accident, have the potential to dramatically impact estimated demand in the future.

Regarding price point, current per-seat costs can range anywhere from \$20-70 million depending on takeoff and landing location sites (considering all are orbital tourism). As seen in Table 2, the number of annual customers will therefore vary depending on the price point. This leads to a range of different market sizes that could be realized. Additionally, revenue can be increased by offering various opportunities with each flight such as full orbits and extended stays at a docking station.



A snapshot of orbital tourism supply

TABLE 1

Human-Rated Orbital-Class Spaceflight Vehicles (as of 2021)

	US-Based	International
Currently Operational	Crew Dragon (SpaceX) Capacity (seats): 5-7 Launch Vehicle: Falcon 9	Soyuz MS (Russia/Roscosmos) Capacity (seats): 3 Launch Vehicle: Soyuz Shenzhou (China) Capacity (seats): 3 Launch Vehicle: Chang Zheng
Under Development	CST-100 Starliner (Boeing) Capacity (seats): 5-7 Potential Launch Vehicles: Atlas V, Delta IV Heavy, Falcon 9, Vulcan Centaur Orion (Lockheed Martin) Capacity (seats): 2-6 Potential Launch Vehicle: Space Launch System Starship (SpaceX) Capacity (seats): TBD Potential Launch Vehicle: Starship Super Heavy Dream Chaser (Sierra Nevada Corp.) Capacity (seats): 3-7 Potential Launch Vehicle: Vulcan Centaur Radian One (Radian Aerospace) Capacity (seats): TBD Potential Launch Vehicle: Self	Orel (Russia/Roscosmos) Capacity (seats): 4-6 Launch Vehicle: TBD Next Generation Crew Spacecraft (China) Capacity (seats): 3-7 Launch Vehicle: Long March 5B Gaganyaan (India) Capacity (seats): 3 Launch Vehicle: GSLV-MkIII

TABLE 2

Demand Elasticity for Historical and Estimated Future Price Points

Provider or Price Point	Price Point (in \$M)	Estimated Annual Demand (# of Tourists per Year)
Soyuz Capsule ^{xi}	\$70	2-5
NASA Commercial Crew Program		
Based on 2019 cost estimate	\$58	3-7
Based on ISS commercial use and pricing policy ^{xii}	\$55	3-8
Commercial Provider Upper-estimate target seat price ^{xiii}	\$36.5	6-18
Commercial Provider Lower-estimate target seat price ^{xii}	\$26.5	11-35
Historic subsidized tourist flight price	\$20	18-61

FIGURE 1

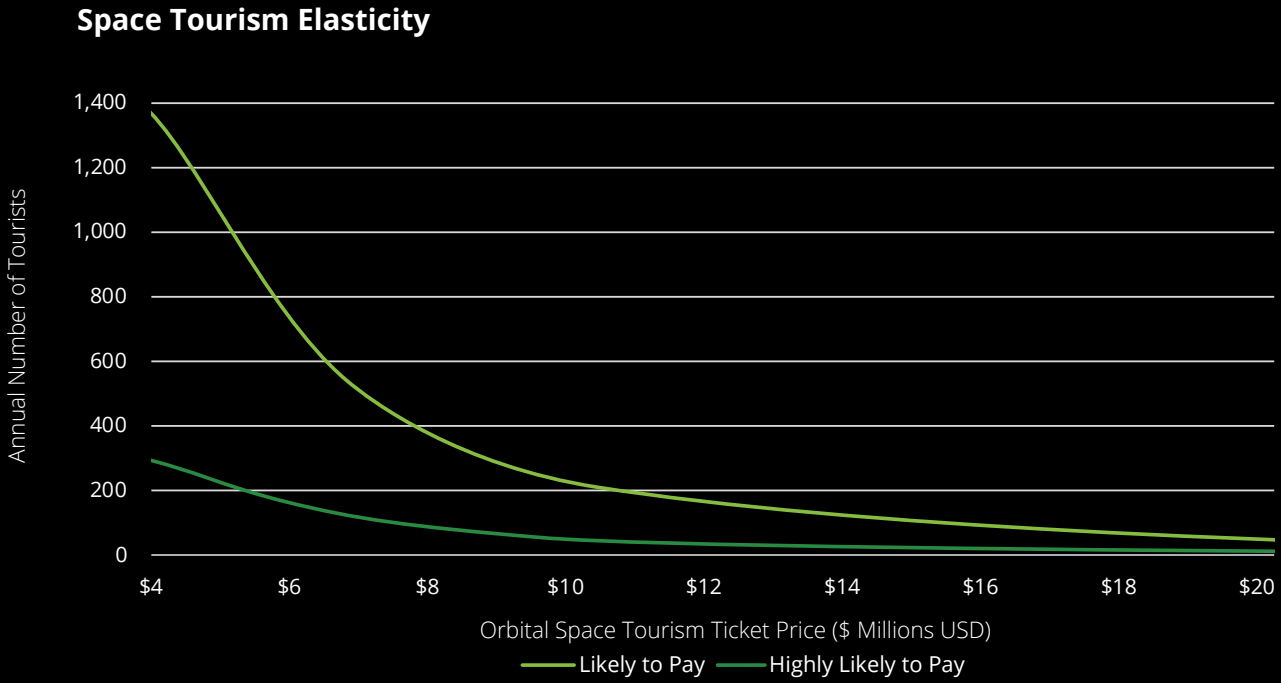


FIGURE 2



Total Amount of Net Worth Available to Purchase an Orbital Tourism Seat

- Likely to Pay
- Highly Likely to Pay



Scanning the horizon

Navigating the complexities of the LEO tourism market

The journey of growth for space tourism is promising but filled with uncertainty. Beyond testing the waters of demand that has long been unserviceable, several dynamics will lead to twists and turns that have the potential to speed, slow, or fundamentally alter the segment's trajectory. Below, we outline our point of view on four major dynamics we envision to have the greatest potential to shape the market. Then, we will translate these dynamics into assumptions that constitute plausible scenarios of the future, ranging from pessimistic to optimistic, and assess the potential growth for tourism in each.

Growth will likely occur in stepwise and possibly sporadic phases

For the launch services industry to effectively address demand on the higher end of the ranges shown in Table 2, providers will need to increase both the production and launch rate. At every stage of the market's growth trajectory, tourism revenues can be reinvested in a feedback cycle that supports capacity increases and economies of scale. Without significant subsidies or private capital investment, this cycle will likely unfold slowly at first, so we anticipate that launch services providers will seek to validate broader demand signals without overcommitting to new production. When also considering the relatively long lead times required to expand launch infrastructure, the cycle time of this feedback loop will likely be several years.

Given the cyclical nature of reinvestment, we anticipate the space tourism market will grow in a stepwise manner. Periodic increases in capacity will reduce costs, unlocking additional tiers of demand along the elasticity curve. The total market size would then experience growth spikes followed by relative stability (or even minor contraction) until serviceable demand grows beyond a few dozen individuals. The forecasted introduction of new launch vehicles and providers over the next decade will likely result in a similar 'staircase' effect as new competitors drive prices lower.

Synergies across demand segments will be paramount to successful business cases

In recent years, demand from the remote sensing market and NASA's Commercial Crew program have allowed select organizations to achieve significant technological breakthroughs needed to proliferate access to space. These breakthroughs helped establish the capabilities that reopened orbital tourism in 2021

and we acknowledge the important role that government demand will continue to play in reaching economies of scale for commercial human spaceflight and, in turn, tourism.

We anticipate that firms' ability to leverage key assets for multiple missions will continue to provide competitive advantages and will soon become a strategic imperative. For example, SpaceX's Falcon program has demonstrated the ability to use shared boosters across satellite launches, crewed missions, and ISS cargo resupply. This will almost certainly be the case for commercial tourism destinations in LEO as firms seek to maximize revenue while managing risk. According to press releases from the companies developing Orbital Reef^{xiv} and Starlab^{xv}, both have explicitly targeted the tourism market among the many other applications for their planned stations.

Finally, the ability to leverage common assets for diverse revenue streams will not only provide advantages across multiple missions, but will also enable viable business cases for tourism on a mission-by-mission basis. Opportunities to integrate branding, product placement, and other media and entertainment into missions that also bring private tourists to orbit effectively serves as an alternative means to subsidize ticket prices and tap additional demand. For example, a documentary of the recently completed Inspiration4 mission is streaming now. TIME Studios' deal for exclusive rights to documentary content may prove to be a promising practice for making the space tourism business case close through sustained media revenues.^{xvi}

Competition will likely drive both differentiation and cost reduction

As the market continues to grow, launch services and tourism providers will likely seek to differentiate their offerings, expanding to both premium experiences and more cost competitive offerings to reach a broader demand base. Some industry players, recognizing emerging competition, are already exploring new offerings – including private spacewalks planned as early as 2022 or 2023.^{xvii, xviii}

With the significant infrastructure growth planned throughout the 2020s, we also anticipate that if new entrants to the human spaceflight services market begin supporting space tourism, greater competition could influence downward pressure on pricing. This includes national spaceflight programs with existing and forecasted human-rated orbital vehicles.^{xix}



While still nascent, the initial success of suborbital tourism – a significantly lower cost expedition – may aggressively siphon demand from the orbital tourism market. However, given the greater length and unique aspects of both destination and non-destination trips in LEO, we anticipate that the impact on well-resourced “passion driven” customers will not reduce demand below the levels serviceable in the near-term.

Regulations, standards, and safety records will shape the economics of space tourism

In the near-term, orbital tourism will be serviced by providers that NASA and the ISS have certified through the Commercial Crew Program. However, while based on the Dragon platform, the vehicle used for the recent Inspiration4 mission was modified from the version certified to dock with the ISS (its docking port was replaced by a cupola window). This introduces the question of how far these platforms can be tailored for non-destination and future commercial destination-oriented trips.^{xx}

That mission was enabled by a relatively lax regulatory environment today, in which there is a moratorium on regulations to stimulate market growth. However, with the moratorium set to expire in 2023,^{xxi} the possibility of new regulations for safety, certification, and launch operations, stands to affect the space tourism market. Due at the end of 2022, the Transportation Advisory Committee will assess whether the commercial space industry and federal government are ready to transition to a safety framework that may include regulations. Calendar year 2022 is a crucial window for industry players to shape the regulatory landscape by establishing consensus standards.^{xxii}

So long as commercial human spaceflight operations avoid any major accidents, future regulations for commercial space tourism will likely fall somewhere between the current “informed consent” approach and highly regimented requirements set by NASA and the ISS. The degree of complexity and rigor of requirements, as well as the balance between industry-driven and government regulation, have the potential to significantly impact tourism in LEO. On one hand, new regulations could lead to higher operating costs for existing tourism providers and raise barriers for new entrants. On the other hand, regulation may positively affect public perception of the safety of space tourism. While the net effect is difficult to predict, regulation will very likely shape both the growth rate and total size of the space tourism market.



Envisioning the future of space tourism

As we have explored, the future of space tourism is filled with opportunities, challenges, and unknowns. It's just as easy to imagine a thriving market where private space travel is increasingly accessible as it is to take a conservative outlook. To understand what can be achieved on a 10-15 year time horizon, we envisioned several plausible scenarios rooted in both optimistic and pessimistic assumptions regarding the key dynamics revealed through our market analysis. We then modeled the resulting market size and growth rates for each scenario. Figure 3 presents a range of estimates for the LEO tourism market between now and 2035 based on our models.

A constrained view: longer go-to-market timelines with persistent regulatory barriers

In what we envision as a pessimistic scenario, technical and operational roadblocks delay next-generation spacecraft and commercial destinations; an increasingly complex regulatory environment stymies competition and cost efficiencies; and consumer demand concentrates in suborbital tourism as a lower cost alternative. By 2035, the market could reach \$1.8 billion, per Figure 3.

A steady-growth view: gradual progression toward a scale market

In a middle case scenario, we anticipate the market to steadily grow over the next decade as economies of scale and competition lead to modest ticket price reduction. Geopolitical and regulatory factors provide net neutral market influence and positive public sentiment supports continued synergies with MEA use cases. By 2035, the market could reach \$2.5 billion, per Figure 3.

A high growth-view: quick to market with synergistic growth

In an optimistic scenario, we anticipate that current-generation launch services mature rapidly and next-generation spacecraft enter the market on schedule; capital influx from subsidies, private investment, and synergistic MEA demand accelerates capacity growth; and efficient regulations facilitate both safe operations and consumer confidence. These assumptions drive our estimate of \$3.3 billion in annual revenues for space tourism by 2035, per Figure 3.

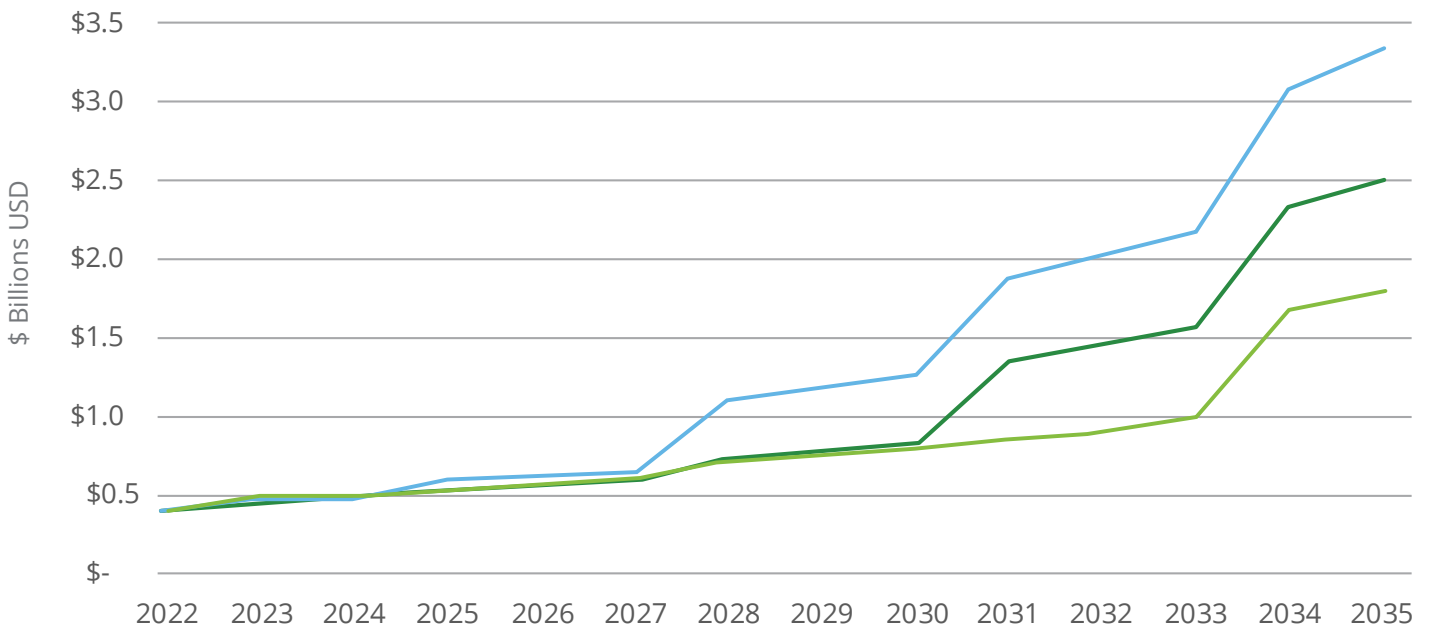
Market estimates

While orbital space tourism is still only accessible to high-net-worth individuals, our analysis indicates that a potential total addressable market between \$600 million and \$930 million annually is plausible within the decade if Commercial Crew providers can lower seat prices to target a range of \$26.5 to \$36.5 million per seat and assuming the current wealthy individual population count. By 2035, under conditions that account for the growth of the global wealthy individual population and the ability to achieve target price points, the space tourism market could be valued at between \$1.8 billion and \$3.3 billion annually.

We caution that delays in market entry, increased capital costs, or the continued presence of other market growth inhibitors may constrain or decrease the overall market potential. If new entrants should fail to reach the market within their assumed timeframes or are unable to maintain profitability into longevity, the 2035 outlook may be much less optimistic. Furthermore, there is not enough supply currently to address demand at the market inflection points, but as crewed launch cadence increases between now and 2035, launch capability (i.e., supply) may ultimately exceed demand as many consumers are only likely to fly once.

FIGURE 3

Orbital Space Tourism Market Size by Year Across Scenarios





Imaging the future

The impact of a ticket price revolution

Since 2018, we have been conducting research into how to incentivize and induce fundamental structural change within the LEO economy market segments. Orbital space tourism has consistently been a key focus of this research given our findings in 2018: space tourism has the potential to put the most humans into space and has a sizeable yet mostly latent (i.e., not addressable) demand pool due to the prohibitive per-seat costs for orbital spaceflight.

To determine the market tipping point for space tourism, we have conducted multiple in-depth surveys representing the socioeconomic makeup of the United States to determine the public sentiment towards space tourism, motivators for travel, barriers and other limiting factors, and, most importantly, a willingness to pay various per-seat prices. We then correlated these findings with global wealth data and produced archetypes for space tourists to identify why and how a private citizen would go to space.

Our Deloitte Space Mission and Payload Planning Tool (SMPPT) is designed to analyze the market potential at per-seat ticket prices between \$25,000 and \$70M. We revalidated our 2018 analysis with a September 2021 survey and the following key findings have remained:

1. At current per-seat costs (\$70M) and projected future per-seat costs (\$20M), the addressable market remains primarily comprised of high-net-worth individuals.
2. Orbital Space Tourism is still out of the reach of “Millionaires Next Door” or those with US \$1M-\$5M in net wealth.
3. There is a key market inflection or tipping point when per-seat costs are reduced below \$10M.

Per-seat costs required to change the game

Consistently, we have observed a tipping point for annual space tourism demand when per-seat prices are below \$10M. In our full analysis, we found that achieving a per-seat cost between \$8M and \$10M almost doubles the number of global individuals that can afford the experience. We recognize that getting per-seat costs to between \$8M and \$11M per seat will require significant cost reduction, technological maturation, and likely the introduction of additional launch vehicles and associated hardware systems. However, should per-seat costs reach this market inflection point – and pending external factors such as global economic conditions, public sentiment towards space, and the safety record

for human spaceflight – significantly larger demand for orbital space tourism should become sustainable. This possibility leads us to an additional, truly transformative scenario to explore.

A transformative view: revolutionary drop in ticket prices

In a truly transformative scenario, we envision that advances in spacecraft technology, operating models, and cross-sector capital investment contribute to a steep decline in ticket costs to approximately \$8 million per seat. By 2035, the market could reach \$8.4 billion. By comparison with the high-growth market scenario wherein per-seat costs remain above \$20M, this transformative scenario could generate over 250% more market value.



Delivering the future

What is it going to take to get orbital space tourism off the ground?

Having defined plausible scenarios for space tourism by 2035, we can zoom-in on near-term opportunities to steer towards more desirable economic destinations. Realizing any of the market outlooks from high growth (\$3.3B) to constrained (\$1.8B) will likely happen due to action or inaction on a variety of factors. To determine where to start, we return to the Zoom-In component of our analysis. Put simply, what actions can industry or government take in the next six to 12 months that would have the greatest impact on growth for LEO tourism?

Mobilizing for action

Our analysis suggests that organic growth in the space tourism market is unlikely to move quickly because current price points are out of reach for most people. Thus, reducing ticket prices is the most significant near-term means to stimulating growth. Beyond direct investment in enabling and transformative technologies and launch systems, we see the following additional opportunities.

Ticket price subsidies

We have identified multiple opportunities to leverage an increase in other on-orbit activities across the value chain that could generate subsidy capital pools that could yield similar stimulation effects. Industry players may find that seeking more creative opportunities to design missions with multiple synergistic revenue streams (media, product placement, philanthropy, etc.) will broaden the demand pool and accelerate economies of scale. We caution that a portfolio approach would be required to capture these opportunities due to the highly complex and interconnected nature of the LEO value chain and operational infrastructure.

Government, likewise, could catalyze market growth through subsidies or offsets to tourists. In our analysis, we see more favorable market conditions when per-seat ticket costs drop below \$36M: a three hundred percent increase in the potential number of tourists per year. However, unlocking the additional demand at this price would take almost \$300M in subsidies per year.

Incentivization

Beyond direct price subsidies, we also recognize the impact of using traditional and non-traditional incentivization mechanisms. Levers such as additional targeted US Government contract awards that create economies of scale and buy down demand risk for suppliers, as has happened with the Commercial Crew program,

can be powerful tools for creating desired economic and industry outcomes. Additionally, activities such as the creation of shared spaceports or other operational infrastructure can also incentivize desired market scaling through deployment of a shared operating model that promotes multi-user activities (i.e., an airport operating model construct). Furthermore, favorable regulatory conditions from licensing to indemnification will likely continue to directly influence and accelerate orbital space tourism market growth.

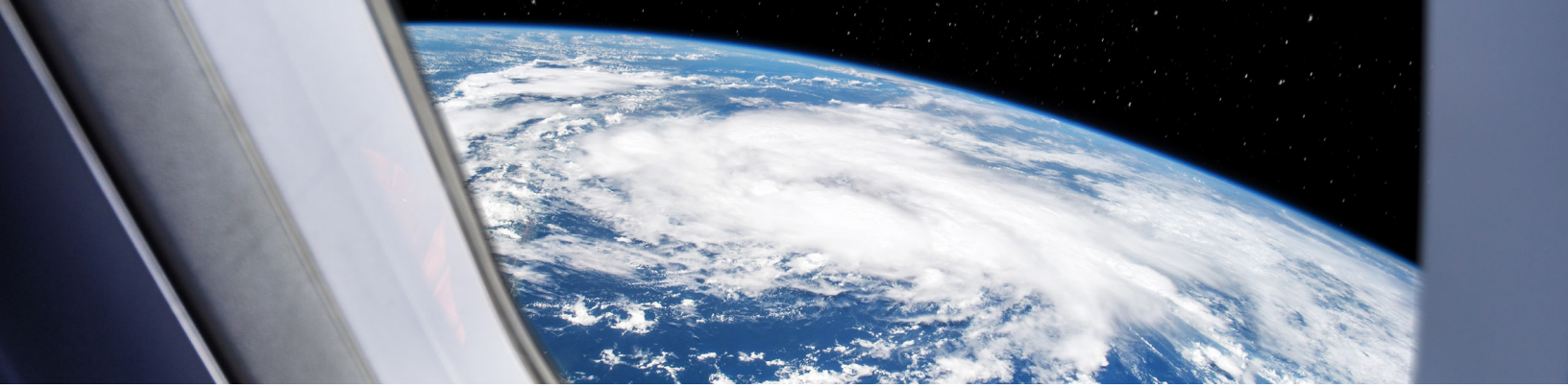
We caution that there is no easy button or blanket approach to using incentivization levers to achieve desired outcomes. In our research, the most effective levers are often the least used due to implementation complexity and the difficulty in achieving stakeholder consensus. We also are aware of the challenges in building shared infrastructure and the dangers of oversupply in a demand constrained market.

Changing the narrative

Finally, we recognize that current public sentiment can be unfavorable to the story of space tourism. As such, we highlight a need to collectively tell the story of space tourism as not a “billionaire’s fancy,” but an opportunity for many to benefit from human spaceflight access to LEO. There has been substantial research into the benefit of humanity understanding our place in space (the “Overview Effect”) as well as the benefit of scientific research conducted on orbit. A concerted effort to amplify the benefits of space tourism may help the nascent segment continue to grow.

Our suggestion: deploy a hybrid approach

Scaling the market and sustaining that growth will require the use of multiple approaches that likely will include both subsidies and incentivization mechanisms. We also realize that ancillary benefits may be realized through an increase in other business cases that send additional private citizens and government astronauts to LEO and its commercial destinations. As such, a hybrid portfolio approach is prudent and required to ensure the scalability of the segment. A hybrid approach should focus on creating the conditions favorable for the high-growth and transformative scenarios through the reduction of per-ticket costs, the reduction or offset of operational costs in ways that benefit all providers, the sustainment of a favorable regulatory environment, and other relevant actions that can increase global addressable demand.



The Deloitte game plan for incentivizing space tourism

We recognize that orbital space tourism in the “new space” economy is just getting off the ground and most of the demand is coming from ultra-high-net-worth individuals with personal and philanthropic motivation. Commercial companies and members of the Fortune 500 are not actively pursuing revenue opportunities in this segment. We maintain that orbital space tourism can be a non-traditional revenue generating opportunity for commercial corporations when coupled with other activities in the media, entertainment, and advertising industries and when properly coupled with suborbital space tourism as an on-ramp or “agile” means of market experimentation.

We have identified ways in which economically viable cross-sector business cases can generate substantial revenue that can be used to offset and subsidize per-seat costs. Achieving the up-side potential of orbital tourism in LEO will require as much creativity and collaboration as it will rigorous business case analysis and technological success. If we, as a collective industry, address the limiting structural price barriers that exist in the market, we can make the dream of space travel a reality for many private citizens in a reasonably short amount of time.

We invite you to join on this journey to the future, today.

Let's Talk.

Let's Talk

Deloitte Space is the world's first professional services practice devoted to supporting the entire space value-chain, from both the government and private sectors, from Fortune 500 companies and aerospace stalwarts to emerging space companies and start-ups who we are supporting today. We have space professionals in Washington, DC, Colorado, California, Texas and Alabama, as well as globally in the U.K., Australia, Canada, Japan, Luxembourg, New Zealand, and the United Arab Emirates. In addition, we are a premier provider of supporting capabilities such finance, cyber, technology, data, and other professional services for government space agencies, commercial aerospace companies, and academic entities focused on space science and systems.

Deloitte is confident that we have and will continue to demonstrate a strong understanding of the space enterprise. Our 360-degree perspective underscores our fresh and holistic thinking about challenges in space. We possess differentiated knowledge of New Space, as well as outside perspectives on the United States Department of Defense, Government, open architecture, and enterprise transformation. Our experts have launched rockets, deployed satellite remote sensing systems, implemented global telecom solutions leveraging commercial satcom, analyzed the commercial space economy, and secured private investment for space technology companies. An advantage we have over our competitors is the broad array of resources available at any given time, allowing us to leverage experience, expertise, eminence, skills, credentials, and – most importantly – perspectives that very few can match.

For more information on Deloitte Space services and solutions, contact our team:



Brett Loubert
Principal
US Space Leader
Deloitte Consulting LLP
bloubert@deloitte.com
+1 240 994 5861



Kathleen Purtill
Principal
Civil Sector Leader
Deloitte Consulting LLP
kpurtill@deloitte.com
+1 571 331 2423



Diane Ashley
Managing Director
Defense Space Leader
Deloitte Consulting LLP
diashley@deloitte.com
+1 703 944 1355



Keith Pfromer
Managing Director
Civil Space Leader
Deloitte Consulting LLP
kpfromer@deloitte.com
+1 703 939 0011



Bill Bastedo
Specialist Executive
Space Mission Systems Engineering
Deloitte Consulting LLP
wbastedo@deloitte.com
+1 713 982 3648

Key contributor

Jeff Matthews, Specialist Leader, Deloitte Consulting LLP

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Endnotes

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