



Suborbital Space Tourism Demand Revisited

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INTRODUCTION

Over the last several years, public space travel—better known as space tourism—has evolved from a fringe market struggling to be taken seriously to an emerging, competitive market in which a large number of companies are seeking to gain a foothold. While orbital space tourism has maintained a steady level of activity, thanks to the occasional flights of tourists on Soyuz taxi missions to the International Space Station (ISS), suborbital space tourism has seen a high degree of company activity and public interest. That is due in large part to the \$10 million Ansari X Prize, won in October 2004 by Scaled Composites' SpaceShipOne, and concomitant activity by companies such as Rocketplane Kistler, Space Adventures, and Virgin Galactic, all of which are selling tickets for commercial suborbital flights scheduled to begin before the end of the decade.

While there has been extensive popular media discussion of consumer demand for commercial suborbital space flights, there is far less rigorous data on the extent of the market for such services. One of the most comprehensive studies of the market is Futron's *Space Tourism Market Study* report, published in 2002.¹ That report provided a forecast for the demand for orbital and suborbital space tourism activities—not the number of passengers expected to fly but instead the number who would demand such services, if available—through 2021. The forecast was based on a comprehensive survey by Futron and polling firm Zogby International of individuals with the means to pay for such flights, which set it apart from many previous surveys that polled the public at large, often through self-selecting non-scientific means.

Since the original forecast was completed, there have been many major developments in the space tourism marketplace, principally in suborbital space tourism. Short of performing an entirely new study, it is possible to recalibrate the original results by examining and changing some of the assumptions used to develop the original forecast based on developments in the last four years. This white paper examines how these changes affect the overall forecast of passenger demand for suborbital space tourism.

METHODOLOGY

Determining the demand for passenger space travel is a multistage process that requires information ranging from the world population of people wealthy enough to afford such flights to their fitness and interest levels. A summary of this procedure is provided below; for more details, readers are referred to the original *Space Tourism Market Study* report.

At the core of this process are the results of a survey performed in 2002 by Zogby International for Futron. Zogby surveyed 450 wealthy people—defined as those with an annual income of at least \$250,000 or a net worth of at least \$1 million—regarding their interest in space tourism and willingness to take part in such flights at a number of price points. The survey pool was selected to best represent those people with the means to purchase such flights. The survey instrument was also carefully crafted to provide a realistic depiction of space tourism, including potential risks and other downsides, and respondents were queried on various related factors, including their perception of risk of spaceflight and other activities, amount of money and time spent on vacations, and fitness levels.

The survey results were then used as a filter to determine what fraction of the worldwide population of people who could afford a space tourism flight would, in fact, take a flight once available. Included in this assessment was a “pioneering” factor, which eliminates people from later years of the demand forecast whose interest in flying in space was primarily to be among the first to go; that is, once space tourism is not so novel, these people would no longer be interested in going, and are thus removed from the forecast.

¹ <http://www.futron.com/spacetourism>

The final step in the forecast process is to model the market diffusion. Market experience has shown that the adoption of new technological services, such as commercial aviation, typically follows an established pattern popularly known as an S-curve, characterized by slow absorption as the market becomes familiar with the product, followed by a period of accelerated adoption as the market embraces the product, and culminating with a deceleration in adoption as the market nears a saturation point. To model this phenomenon in commercial space travel, Futron applied a Fisher-Pry curve to the total potential demand pool for suborbital service, with a 40-year market maturity.

UPDATES TO THE ORIGINAL STUDY

While the same methodology was used in this new analysis as in the original study, as well as the same Zogby poll results, several changes were made in the overall analysis to better reflect the current state of the suborbital space tourism industry. Those changes are listed below:

Change the start date of the market forecast from 2006 to 2008: When the original study was performed in 2002, Futron chose 2006 as the most plausible start date for passenger suborbital flights, based on the progress made to date by companies that were competing for the X Prize or had otherwise announced plans to enter the market. An assumption in that analysis was that whoever won the X Prize would elect to put the winning vehicle into commercial service shortly after capturing the prize. As it turned out, the prize-winning vehicle, SpaceShipOne, was retired by Scaled Composites immediately after winning the prize, as the company elected instead to develop a larger derivative, SpaceShipTwo, under a contract with Virgin Galactic. Other ventures are either taking similar approaches, or finding it is taking longer than expected to develop their vehicles, and as a result the first passenger flights of commercial suborbital vehicles are now anticipated for no sooner than 2008. Futron has accordingly changed the start date of its forecast, which has the effect of shifting the S-curve of market adoption to the right compared to the original study.

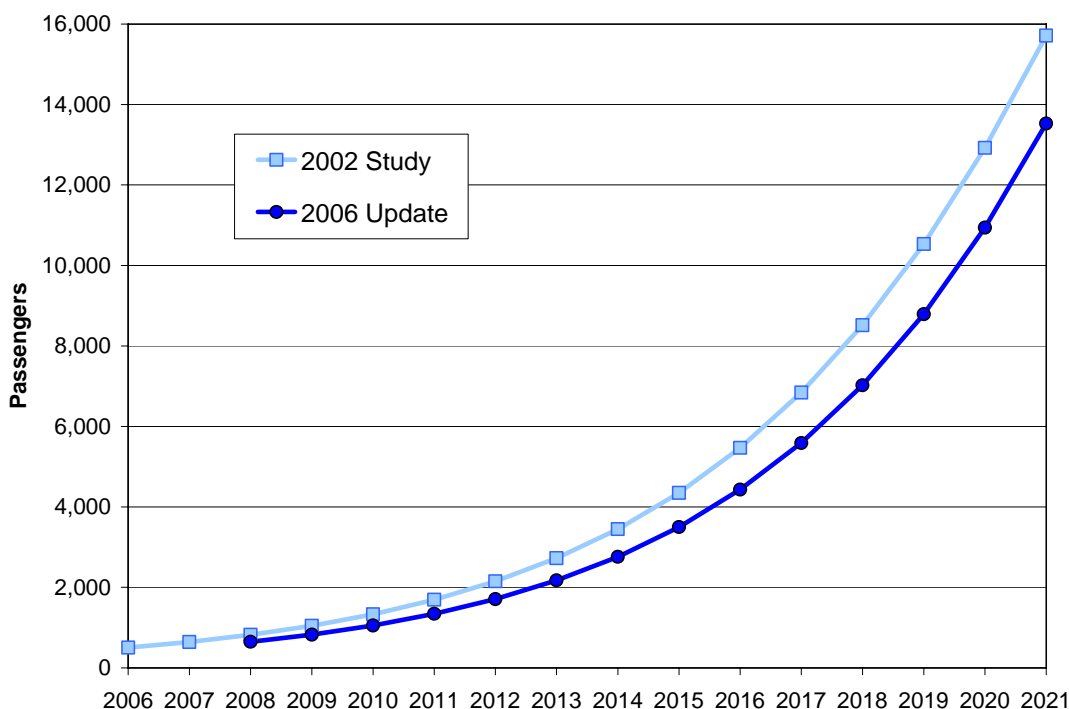
Increase initial ticket prices from \$100,000 to \$200,000: At the time of the original forecast the “going rate” for a suborbital spaceflight was \$100,000 based on sales made by space tourism operator Space Adventures and similar pronouncements by other companies. However, Virgin Galactic, which is projected to be one of the first entrants into the passenger market, is currently selling seats at approximately \$200,000 per person for its initial flights, and other companies have raised their ticket prices accordingly. The initial forecast set ticket prices at \$100,000 for the first five years, then gradually declining to \$50,000 by 2021. To reflect the current situation, the new forecast sets the ticket price at \$200,000 for the first three years, which then gradually declines again to \$50,000 by 2021. This change affects both the overall potential revenue for the industry as well as demand, since some potential passengers will not be able to afford, or willing to pay, the higher initial ticket prices.

Updated population wealth statistics: The population and growth rates worldwide of high net worth individuals has been updated in this forecast using resources such as the Merrill Lynch/Capgemini *World Wealth Report 2005*. The growth in the high net worth population has recovered in the years since publication of the original study, generating a small increase in the target population for the service over the forecast period.

RESULTS

The forecast of suborbital space tourism passenger demand from both the original study as well as the current revision are shown in Figure 1. Passenger demand is lower in the new forecast, with a projected demand of just over 13,000 passengers in the final year of the forecast, 2021, compared to over 15,000 passengers in the original study.

Figure 1: Passenger Demand Forecast for Suborbital Space Tourism



Both the original study and this revision use a 40-year period to market maturity to define the Fisher-Pry S-curve used to project demand. Changing this value will affect the passenger demand forecast: a shorter period will increase demand, particularly in the out-years of the forecast. Figure 2 shows the passenger demand forecasts for the baseline 40-year maturation period as well as 35- and 45-year periods. The results in 2021 range from just under 10,000 passengers in the 45-year forecast to over 20,000 passengers in the 35-year forecast.

The forecast of potential annual revenue from suborbital passenger services from both the revised study is shown in Figure 3. The potential revenue in 2021 in the revised forecast is \$676 million, compared to \$785 million in the original study. The difference in passenger demand causes the lower revenue figures in the revised forecast, although the impact of initial ticket prices actually produces higher revenues in some parts of the forecast period, reflecting the interaction of price changes and user demand.

Figure 2: Passenger Demand Forecast Using Different Market Maturation Periods

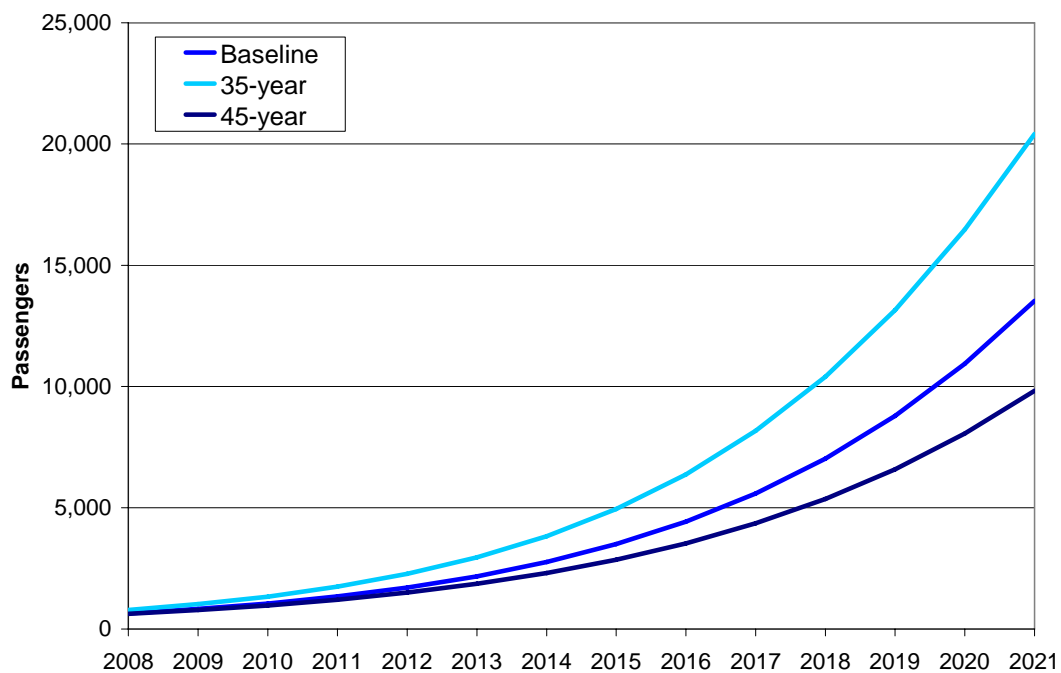
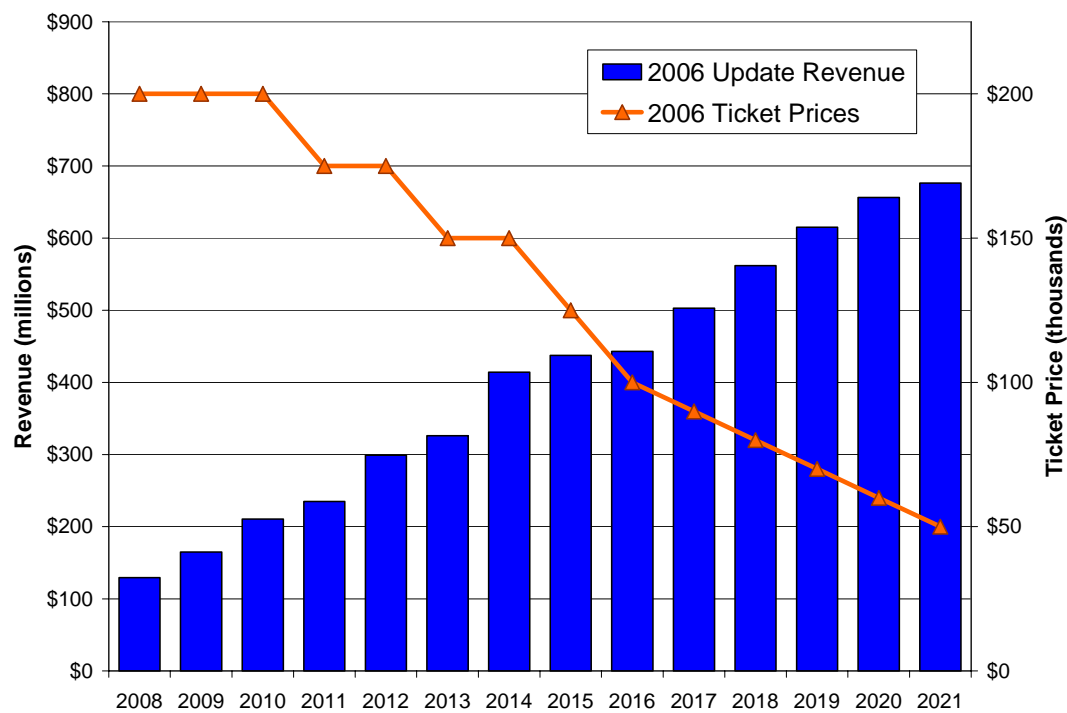


Figure 3: Revenue Forecast for Suborbital Space Tourism

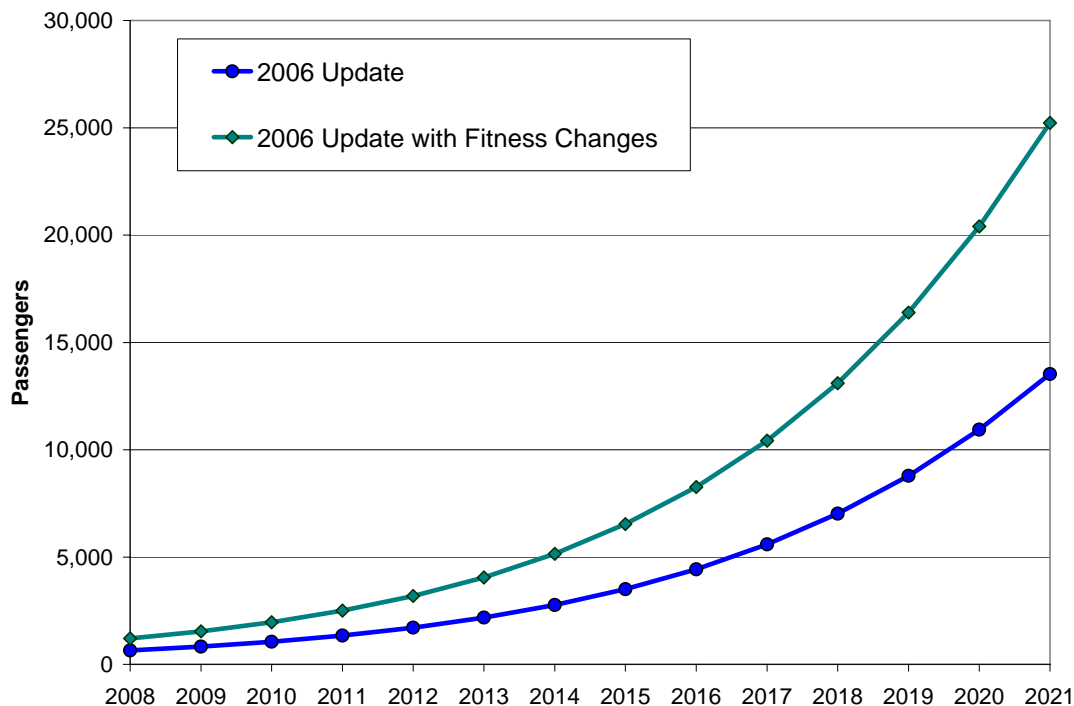


The results above all use the same conditions for passenger interest, wealth, and fitness as in the original forecast. One condition that may be worth reexamining is passenger fitness requirements. In the original study the potential market was restricted to only those people under age 65 who responded to the Zogby survey as being “above average” or “extremely” fit, or those 65 and older who were extremely fit. At the time of the original study the fitness requirements of suborbital space tourists remained uncertain. This analysis was intentionally conservative, since individuals are more likely to overestimate rather than underestimate their fitness levels.

Since that time evidence has emerged that potential suborbital space tourists may only need to be in average health to participate in such flights. A set of draft guidelines for passenger commercial space flights issued by the FAA’s Office of Commercial Space Transportation in 2005 set no specific health or fitness requirements for passengers, instead only recommending that doctors versed in aerospace medicine issues review the medical records of prospective passengers and recommend additional examinations where deemed necessary. In addition, passengers will experience extreme conditions, such as high accelerations and weightlessness, for only brief periods during the flight, and will be strapped into their seats for most, if not all, of the flight. Virgin Galactic founder Richard Branson has also publicly stated that his 91-year-old father plans to fly with him on the first commercial SpaceShipTwo flight.

These factors suggest that the fitness requirements set in the original study may be too restrictive, eliminating potential passengers with lower, but still sufficient, levels of fitness. Figure 4 shows the forecast passenger demand when fitness requirements are relaxed to allow those 64 and under with “average” fitness levels to be included in population of prospective passengers, while retaining the “extremely fit” requirement for those 65 and older. The result is a steeper demand curve, resulting in projected demand for over 25,000 passengers in 2021 and corresponding revenue of \$1.26 billion.

Figure 4: Passenger Demand Forecast Incorporating Revised Fitness Requirements



At the same time, other factors argue against such a change in assumptions. In 2003, Walt Disney World's Epcot Center unveiled a new space-themed amusement park ride called "Mission: SPACE". The ride provides a simulation of space flight from launch to return, with a centrifuge providing the experience of twice the normal pull of gravity on the riders. Though that is lower in terms of G-forces than experienced on other rides in the park, the impact is sustained for longer periods throughout the ride, as it would be on a space flight. The ride is clearly marked with signs indicating that any potential riders with blood pressure, heart, back or neck problems, motion sickness or other conditions that can be aggravated by this adventure should steer clear of the ride. Since its opening, there have been numerous reports of health problems resulting from the ride, including two deaths in less than a year. With a suborbital flight likely to induce up to five times the force of gravity, health conditions may still be an important factor to consider.

CONCLUSION

These results indicate that despite a delayed introduction of commercial passenger suborbital flights, and an increase in initial ticket prices over earlier expectations, demand for suborbital space tourism remains strong, particularly if fitness requirements are less stringent than previously believed.

One factor this revised study does not take into account is any changes in the public's perception of or level of interest in suborbital space tourism. When the original Zogby survey was performed, suborbital space tourism was still very much a theoretical concept, with some vehicle designs on the drawing boards but very little flight hardware actually built; SpaceShipOne was not publicly unveiled until several months after the release of the 2002 *Space Tourism Market Study*. The developments of the last several years have likely reshaped the opinions of potential passengers, and the form and degree of such changes will require further detailed analysis through a new survey.

In sum, while this updated analysis provides a projection of the passenger demand for suborbital flights, the actual number of likely passengers will depend on several factors that are only now emerging as we get closer to realization of the service, such as the number of companies providing services, the number of passengers they can fly, ticket prices, and individual company fitness requirements. As such ventures start their planning, fundraising, and infrastructure development, more detailed analyses can be performed to address specific assumptions in each of these areas, with the baseline models developed by Futron readily modified to reflect such assumptions.