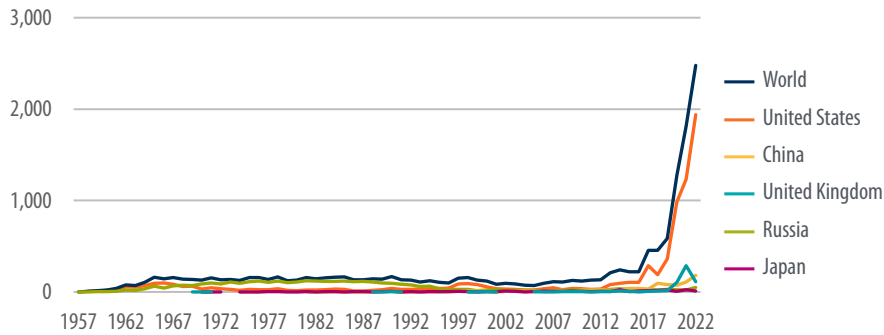


In this week's "Three on Thursday," we explore the space frontier. Advancements in space travel technology have significantly lowered the cost of launching objects into space. From the iconic Apollo missions in the 1960s to today, breakthroughs in materials and propulsion systems, notably by private companies like SpaceX, have driven down once-astronomical space exploration costs. This cost reduction enhances accessibility and fosters competition. It also unlocks opportunities for scientific research, satellite deployment, and potential space tourism. For more insights, see the three charts below.

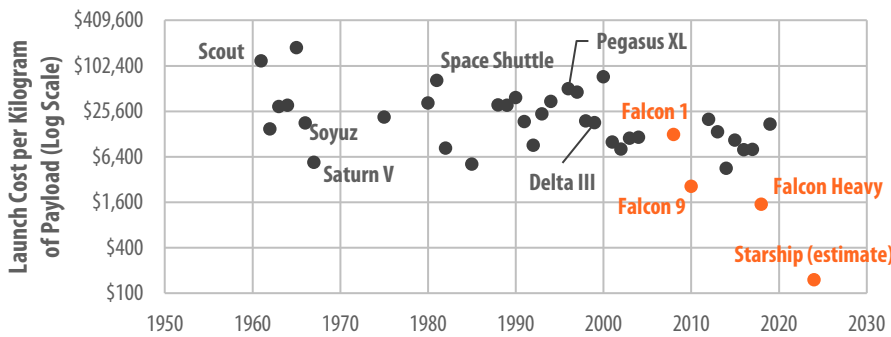
Annual Number of Objects Launched Into Space



Source: United Nations Office for Outer Space Affairs, First Trust Advisors, Annual data through 2022. Chart includes satellites, probes, landers, crewed spacecrafts, and space station flight elements launched into Earth orbit or beyond.

The space launch landscape experienced an unprecedented surge in 2022, setting a record for objects launched into space. Astonishingly, the quantity of objects launched into space over the last five years, including projections for 2023, surpasses the cumulative total from the dawn of space exploration in 1957 all the way through 2018! The United States has been a driving force, contributing the majority of these new launches in the past five years. This surge is largely attributed to SpaceX's prolific endeavors, marked by the deployment of thousands of low-earth orbit Starlink satellites. These satellites, a technological marvel, have not only propelled the U.S. to represent 78% of all launches in 2022 but have also enabled affordable internet access to remote locations, revolutionizing connectivity. In contrast, China, the second-highest contributor, accounted for a distant 7.3% of launches in the same year.

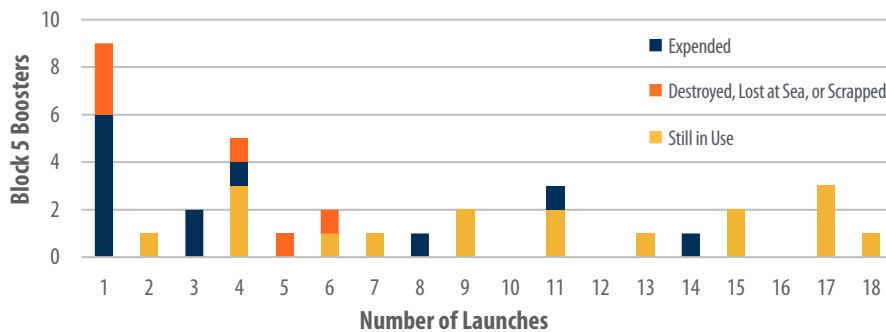
Cost of Space Launches to Low Earth Orbit



Source: CSIS Aerospace Security Project, First Trust Advisors. Data is adjusted for inflation.

Determining the costs of space launch vehicles is a complex task. One metric used for analysis is the launch cost per kilogram of payload. While this cost has gradually decreased over time adjusted for inflation, the significant drop began around 2010 when increased competition among private companies for contracts became prevalent. Presently, the launch cost per kilogram of payload for SpaceX's Falcon Heavy has plummeted to approximately \$1,500. Excitingly, projections for SpaceX's upcoming vehicle, Starship, suggest the potential for costs to drop to less than \$100 per kilogram, signaling a remarkable advancement in affordability and efficiency.

Number of Times the Same Block 5 Booster Has Been Used



Source: SpaceX, First Trust Advisors. Data through December 1, 2023.

The significant decline in the cost of new space launches can be traced back to a pivotal moment on December 21, 2015. It marked the historic occasion when, for the first time ever, a rocket's first stage was successfully returned to Earth and landed. This marked the initiation of SpaceX's commitment to reusing these first stage rockets, with an initial goal of achieving up to 10 reuses before retirement. However, on November 3, 2023, SpaceX surpassed their own expectations, breaking their previous record for rocket reuse as one of their rockets completed its 18th successful launch. Block 5 is the latest iteration of the booster and was initially launched in 2018. So far, SpaceX has used a total of 35 new Block 5 boosters. 18 are no longer active (12 expended and 6 either destroyed, lost, or scrapped) and 17 are currently active with at least two successful flights.

This report was prepared by First Trust Advisors L.P. and reflects the current opinion of the authors. It is based upon sources and data believed to be accurate and reliable. Opinions and forward looking statements expressed are subject to change without notice. This information does not constitute a solicitation or an offer to buy or sell any security.