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SpaceX's Success Revives the Tradition of Private-Sector Space Science

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SPACEFLIGHT, which started in the private sector, returned to it recently when SpaceX's Falcon 9 rocket took two astronauts into orbit.

Actually, all powered flight started in the private sector, for the Wright brothers were not government-funded researchers. Rather, they were cycle mechanics from Dayton, Ohio, who in 1903, in their spare time, transformed the world. A team of full-time government-funded researchers, operating out of the Smithsonian Institution, were then also trying to launch heavier-than-air machines. Even though the Smithsonian team enjoyed a budget that was a hundred times larger than that of the Wrights, its prototypes always crashed. Airplanes are but one of the many gifts that private research and development has bestowed on humanity.

As are space rockets. The great space-rocket pioneer was Robert "Moonie" Goddard (1882–1945), a professor at Clark College in Massachusetts. Funded with \$100,000 from the Guggenheims and \$10,000 from the Hodgkins Fund, the projects that resulted in his achievements were extraordinary: By 1925 he had created the first liquid-fueled rocket. By 1932 he had developed a gyro stabilizer, and by 1937 one of his rockets had climbed 9,000 feet.

Goddard had his setbacks: In 1929, when one of his launches failed, a local newspaper ran the headline "Moon rocket misses target by 239,799½ miles." But had the Second World War not intervened (he spent it, as he had the First World War, working on bazookas), Goddard would have launched the first artificial satellite.

Instead the Soviets did, and they gave the West a terrible fright in 1957 when *Sputnik* orbited the globe. Would the Communists bomb us from space? So in 1958 the U.S. created NASA, to win the space race.

Sputnik's legacy went even deeper, because it motivated two left-leaning economists, Richard Nelson and Kenneth Arrow, to publish papers arguing that only governments would fund science properly. Their papers were palpably incorrect, but they met the needs of every vested interest: The federal government wanted to justify copying Communist economics, scientists love money without strings attached, and companies are always looking for corporate welfare ("the

government will fund our R&D?”), and so the Nelson and Arrow papers have rarely been challenged.

But last Saturday, Elon Musk’s company, SpaceX, took Robert L Behnken and Douglas G. Hurley to the International Space Station, doing something — namely, putting humans into orbit — that previously had been achieved only by governments. NASA could now be seen as only a temporary interruption of a process that had started in the private sector. Through his actions, Elon Musk has disproved the false ideas of the economists.

If there is a science that proves the resilience of the private sector, it is space science, including, of course, astronomy. Time again, what at the time was the largest optical telescope in the world was privately funded, whether it was the Earl of Rosse’s 72-inch Leviathan (built with his own money in 1845) or the 100-inch Mount Wilson telescope (built in 1917 with funding from the Carnegie Institution) or the 200-inch Mount Palomar telescope (built in 1949 with \$6 million from the Rockefeller Foundation).

Radio astronomy, moreover, was actually born in the private sector, when Karl Jansky of Bell Labs discovered in 1931 that stars emitted radio waves. Grote Reber, a radio engineer, built the first radio telescope, a parabolic dish reflector in his backyard in Chicago in 1937. And in 1964, Arno Penzias and Robert Wilson of Bell Labs (again) discovered the cosmic microwave background radiation that established the Big Bang hypothesis. Their achievement won them a Nobel Prize in Physics in 1978.

Such facts would not have surprised our grandparents, because until recently Americans had understood that the U.S., like the United Kingdom, had powered the Industrial Revolution by *laissez-faire*. Indeed, Americans had until recently celebrated that their great innovators were funded privately, such as Edison and Tesla or indeed the Wright brothers. But we are governed by ideas, and the Nelson–Arrow idea has so permeated today’s world that now it’s Musk’s SpaceX company that seems to require explaining.

Or Jeff Bezos’s Blue Origin company or Richard Branson’s Virgin Galactic company. Space has always enthralled us. If there is a law of history, it is that whenever humans are empowered, either by religion (the first scientists were the priest-astronomers of Sumerian times, 3,000 years ago) or by politics (the Medicis supported Galileo; King Frederick II supported Tycho Brahe) or by money (Musk, Bezos, and Branson), they will reach for the stars.

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