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Title: Neoliberal Evolution of the Space Exploration Industry in Relation to the Tech Industry

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Abstract: Ingenuity is a part of the American character. As Americans, we must reflect on the mistakes of our past in the evolution of Tech to best approach the coming evolution of the space exploration industry.

“Space exploration is a force of nature unto itself that no other force in society can rival.” -Niel DeGrasse Tyson.

Space exploration is booming in the private sector, in a very similar pattern to the way Tech accelerated through the late 20th century. As Americans, we must reflect on the mistakes of our past in the evolution of Tech to best approach the coming evolution of the space exploration industry. This can be done by looking at broad economic markers exhibited by each industry as it has progressed. Insight from this pursuit will enable us to better use the free market to achieve progress, and avoid issues such as oligopolization yielding uncompetitive markets.

In the past 50 years, human kind has made strides of extreme measures to set foot in places unthinkable to generations before. The extreme drive to slake human curiosity has evolved in new and unique ways in a neoliberal politico-economic climate that yields unprecedented economic growth and instability. This is particularly evident in the technology industry. Indeed, the trend is not limited to tech, but tech serves as a clear indicator of the way rapid privatization and technological growth in an industry can change the dynamic of that industry.

In the following, I discuss how neoliberal traditions are behind massive expansion in the tech industry. I will then use this discussion to influence the way we look at the relatively young space exploration industry, and the way we think of its bright future. We must ask what factors led to the more rapid growth of the tech industry. What are the most significant shared factors between these two industries that lead to economic growth and instability? And what may the ultimate culmination of these factors lead to in the space industry in light of what we have witnessed in the tech industry? By answering these important questions, we can enable ourselves to ease investment bubbles, and stem the tide of oligopolization in the market in order to ensure more perfect competition, thus a more efficient market. Among the advantages to exploring the cosmos, there come additional risks in the management of power between the free market and government. While we embrace curiosity and discovery we take steps on ground few have trod, and through evaluation of historic trends and market norms we can do so under informed policy and positive insight.

Neoliberal Ideals

To understand the economic world these industries inhabit we must explore some vital tenets of Neo-Liberalism. These tenets are privatization, fiscal austerity, and free trade. Privatization is the practice of transferring a business or industry from public to private control and ownership. Both the tech and space exploration industries began as government funded endeavors for the sake of advancing national defense. Through World War II, the advancement of computer technologies was of interest to the Allied Powers for the sake of cracking Axis codes. In the years to follow, the advancement of computers served a more capitalist interest, leading to the development of the transistor in AT&T's Bell Labs which revolutionized the ability of computers and started the path towards the modern computer, cellular phone, and the internet itself. The space travel industry was born in the Cold War, which many consider to be NASA's golden age. It stemmed from a need to direct ICBMs, primary navigation for which was done via satellite. Both of these industries have since gone into the private sector through the process of privatization.

Fiscal austerity is a main driving force of privatization. Fiscal austerity is the practice of limiting government expenditures. Amidst funding military, entitlements, and non-defense spending, fiscally austere governments push out industries that are a burden on the budget. In the case of the tech industry this happened quickly following World War II. Companies had been treading water already in the research and development of computer technologies, so it was with relative ease that the government could push for the privatization of this field. When it comes to the space exploration industry the process was much more difficult as there were no companies fully in the field, but, nonetheless, in a free market people tend to fill the gaps.

Free trade stands in opposition to mercantilism and protectionist economic policy. It seeks to utilize fully the theory of comparative advantage, which readily acknowledges the fact that some countries are better at producing certain goods than others. Just as most of these tenets of neoliberalism jointly rely on lesser tenets of the free market, so does free trade. It is a type of deregulation that involves the removal of obstructive policies like tariffs to let commerce flow. In this paper, I focus primarily on companies and the market within the United States, as such this final tenet will not come in to play as often, it is however still important to the purpose of fully understanding the economic setting.

The Space Exploration Companies

Now that the economic and ideological settings for the space exploration industry have been addressed, I will identify what I call the space exploration industry by outlining the companies in question. Firstly, there is NASA, the National Aeronautics and Space Administration. This American grandfather of the industry was born out of competition with the Soviet Union to send men and satellites into orbit and beyond. The NASA of today receives the smallest cut of the federal budget since 1960 at 0.47% of the national budget. While they are still a player in the game, NASA is beginning to be eclipsed by private companies. Many predicted this eclipse, including David Baker an ex-engineer for NASA and editor for SpaceFlight Magazine: “The future lies not with grand visionary mega-concepts of the Von Braun era but the solid consolidation of private corporations wresting it away from government” (Hollingham, R). The private companies he is referencing are numerous, but the largest ones today are SpaceX, OrbitalATK, Virgin Galactic, and United Launch Alliance.

SpaceX is easily the hottest name on the list, as it is responsible for brilliant innovation in the reusable stage 1 rocket. SpaceX’s well known reusable vehicle is the Falcon9 rocket. It has already been used in more than one launch, which makes it a first in the industry. OrbitalATK is less of a household name but this company plays major behind the scenes roles. It launches and operates satellites for the sake of guiding both defensive and offensive missiles. Its contribution to the space industry comes most notably in the form of Pegasus, Minotaur, and Antares rockets, as well as ongoing development of its “Next Generation Launch System.” These are all launch vehicles to be used for the sake of sending small (1000 lbs) to mid-sized (17000 lbs) payloads to space (OrbitalATK.com). Next comes Virgin Galactic, which has a profound interest in space tourism. Richard Branson’s model for space exploration consists of a similar launch method to OrbitalATK’s, in that it uses a large commercial plane to lift a shuttle or external vehicle attached to the plane to get it to an altitude appropriate for escaping earth’s atmosphere. Branson’s vision fosters a regard for the space industry akin to the way entrepreneurs looked at

early aviation, refrigeration, and automobiles. It is an opportunity available only the exorbitantly wealthy for the time being, but technological advancements will widen the consumer base by driving down costs. Finally, comes the joint venture of Lockheed Martin and Boeing: United Launch Alliance (ULA). For the past 20 years, this has been the primary private corporation to facilitate satellite launch and resupply missions to the International Space Station with contracts from the federal government. Only in this past year has SpaceX managed to beat out ULA to the tune of more than 80 million to launch a resupply mission to the ISS. ULA has been the reigning kingpin, but without any new tricks to reduce the cost of launch, lack of innovation is causing a loss in market share.

Tech Industry Offers Insight to Evolution in Space Exploration

The Tech industry has evolved in a way that allows for valuable insight to the way that the space exploration industry may behave in the years to come. Both of these industries formed around World War II and through the Cold War. They were destined to be advancements in the capacity of government to wage war. Tech benefited from the development of small technologies like cellular communication and personal computers, and were endeavors that could be pursued by small firms and individuals as compared to space exploration. Thus, the privatization of tech was much more rapid than that of the space exploration industry. We face a new age of industry and technological evolution in which the privatization of space exploration is more within grasp than ever before.

Before reaching this point, however, the industry hit several trend markers expressed in the tech industry on its rise to the prominence we see today. These markers suggest that the space exploration industry will continue to follow trends similar to those seen in the tech industry. These markers are initially privatization, then reinvestment of early revenues into advancement and specialization of products. After this first round of investment by pioneers of the market, there is an emergence of many new companies into the market to try and soak up market share. All of these companies, whether they later fail or succeed, are equal parts the cause of an investment bubble in the industry –and such a bubble is another part of the noted trend. Finally, comes consolidation of the market into fewer larger firms. This is a notable problem in the sociopolitical arena today. It creates issues ranging from the most basic levels of price gouging, to near monopolization of internet and mobile services. My argument is that such a trend has been part of the development of the space exploration industry, and that it will continue to be part of the industry. Now, the number of firms involved with space exploration is expanding and investment by private entities is reaching an all-time high; both are symptomatic of the bubble which I mentioned previously. It is vital to look at the trend and recognize the vast potential for rapid change in the space exploration industry in the coming years to preempt some potential issues seen in the tech industry.

What the Future Holds in Space

Over the next fifteen years alone, private space companies plan to go further on their own than any national government has gone even with the aid of its peers. Private companies are in different stages of planning and executing such endeavors as missions to Mars, development of fueling stations and depots in the moon's orbit, and even unmanned exploration of deep space

beyond our galaxy. We have seen over the course of business in the tech industry that there is potential in rapid expansion of an industry to create massive companies which immerse themselves in nearly all aspects of our lives. Those companies are not strangers to the creation of significant and complex issues for the society they inhabit. Markers in economic trends suggest that the space exploration industry and the firms it is comprised of are vulnerable to the same woeful results as seen in the tech market. Paying attention to these markers and creating informed policy on the subject is vital to preventing economic turmoil. Future research into this area will yield answers for how to prevent instability in investment and perhaps lead to business and regulatory methods that are capable of fostering markets that closely resemble perfect competition.

Two quotations of Alexis de Tocqueville's are appropriate, as I conclude: "When the past no longer illuminates the future, the spirit walks in darkness" (*Democracy in America*, II.4.8). "The greatness of America lies not in being more enlightened than any other nation, but rather in her ability to repair her faults" (*Democracy in America*, I.13). In other words, we as Americans can and must continue to use the mistakes of our past to most preparedly address the problems of our present and future. The American character is ingenuity, and we can progress further through thoughtful reflection on our past. This will aid us to prepare more completely as we continue to, in the words of William Shatner, "go boldly where no man has gone before."

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