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Investigating the Federal Government's Continued Allocation of Funds Toward Public Space Endeavors and its Implications Through an Economic Lens

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Abstract: Since the founding of NASA in 1958, many have questioned whether taxpayer dollars should fund space exploration. This paper examines the continued allocation of federal funds toward public space endeavors through an economic lens, drawing on peer reviewed economic literature, government reports, and public opinion data. It reviews arguments that government funding supports innovation through spin-off technologies and public-private partnerships, alongside evidence of inefficiency in centralized programs such as the TOPAZ II technology transfer. It then considers the rise of New Space and the claim that privatization will improve efficiency and accessibility, as well as counterarguments that competition may cause a tragedy of the commons and that private control may limit public access. The paper concludes that the debate remains unsettled, and that weighing the economic implications of a future without a government funded space program offers valuable insight into the evolution of the industry.

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I. INTRODUCTION

Since NASA's founding in 1958 to compete with the Russians in what became the "Space Race", many have debated whether taxpayer dollars should be spent on space exploration. After the end of the Cold War effort, NASA became strictly research and development oriented, raising even more concern regarding its place in federal expenditure. Today, the rise of privatization in the industry is changing the implications of public space endeavors. With nearly 40% of Americans viewing NASA unfavorably (Kennedy et.al), citizens viewing the circumstances through an economic lens are starting to scrutinize the US government's continued allocation of taxpayer dollars in space endeavors.

II. METHODOLOGY

This paper uses a qualitative literature review approach. It draws on peer-reviewed economic literature, government reports, and public opinion data to examine the economic case for and against continued federal funding of public space endeavors. Sources are grouped by theme: government funding and technological spillovers, inefficiencies in government programs, the commercialization of space under New Space, competition and the tragedy of the commons, and public accessibility under private control. Competing arguments within each theme are compared to assess the economic implications of a future with less government funded space activity.

III. LITERATURE REVIEW

- *Government Funding and Technological Spillovers*

While not directly funding projects to benefit citizens, researchers at NASA argue that government funding indirectly benefits its citizens through various means most of which come in the form of "Spin off" products, or products derived from other creations. Spin-off products and technologies such as the microwave and GPS systems, NASA researchers argue, constitute as government funded Research and Development (R&D), and contribute to the overall growth and development of a country (NASA).

At the same time, not all R&D is done exclusively by public organizations. Economic scientists such as Gordon Rausser and colleagues note that historically, Public–Private Partnerships (PPPs) between NASA and commercial enterprises have successfully encouraged both private and public sector research and development (Rausser et.al), This, in turn, brings capital and technological advancements to the public. By doing so the government is able to directly support companies investing in innovation, enabling corporations to focus on long-term R&D instead of focusing on immediate gains in order to satisfy shareholders. Mathurin

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et.al, a prominent figure in space entrepreneurship and finance, notes the importance of government partnership, pointing out the tendency of investment funds in the field without government funding to have a lifespan limited to ten years. Speculating that this is due to their reluctance to invest capital in risky areas such as high technology businesses, he asserts that "it is clear that these firms have spectacular profits in mind when they engage these transactions and are not generally interested in the uncontrollable risk, high up-front capital expenditures and uncertain timelines of space exploration projects" (Mathurin et.al). Mathurin continues to validate the importance of PPP's and government funded programs, claiming that "These initiatives, coupled with the maturity of launch companies and declining launch costs, spurred commercial partnerships to invest, participate, and innovate in the space industry" (Mathurin et.al).

- *Inefficiencies in Government Programs*

However, not all funds allocated to PPPs have been used efficiently. An investigation carried out by the United States General Accounting Office regarding the technology transfer of the TOPAZ II nuclear power plant, a Russian R&D project, found various management oversights and illegal commercial conduct costing nearly 25 million taxpayer dollars (Bowron). Economic scientists such as Weinzierl, a Professor of Business Administration, note that this tendency of inefficiencies within centralized government programs is consistent with economic theory, asserting that "The vulnerabilities of centralized control will be familiar to any economist: weak incentives for the efficient allocation of resources, poor aggregation of dispersed information, and resistance to innovation due to reduced competition" (Weinzierl). He continues to point out inefficiencies observed in NASA's effectiveness as a public space agency, arguing that "In addition to these concerns, NASA's funding and priorities were subject to frequent, at times dramatic, revision by policymakers, making it hard for the space sector to achieve even the objectives set at the center" (Weinzierl). To avoid these vulnerabilities, Wienzierl argues that the most effective course of action would be to decentralize the existing space ecosystem.

- *Commercialization and the Rise of New Space*

The privatization of space endeavors would decentralize the space ecosystem, and is a natural consequence of a declining prominence of government funded space programs, says experts such as Denis and colleagues. This consequence of the modern scene shifting towards privatization is commonly referred to as "New Space" and it describes the commercialization, decentralization, and inclusion of non-state players in space endeavors, while introducing different approaches to space exploration such as increased accessibility to space technologies and increased overall citizen participation (Paikowsky). As private actors begin to assume responsibilities once held exclusively by national institutions, concerns are being raised about the effectiveness and necessity of a government space program. New Space also brings in many other sources of funding such as venture capitalism, which in turn brings new incentives into space exploration R&D progress, such as reaching a minimum acceptable rate of return (Hertzfeld et.al). Economic scientists such as Denis and colleagues point out that public space endeavors lack these incentivising factors, and that historically, such factors increase efficiency and service quality in order to reach a broader audience, leading them to predict a more cost effective and accessible space environment for consumers in a future without government funded space endeavors (Denis et.al).

- *Competition and the Tragedy of the Commons*

However, other scientists directly challenge the notion that competition improves efficiency or service quality. They argue instead that a competitive market may actually lower the quality of services provided, as a result of the "tragedy of the commons" dilemma (Rausser et.al, Weinzierl). Rausser and colleagues define the tragedy of common dilemma as "a situation where individuals acting in their own self-interest deplete a shared and finite pool of resources, leading to its degradation for everyone." They assert that this concern extends beyond physical resources, pointing out that competition for things such as orbits and launch opportunities are limited in nature and vulnerable to the tragedy of the commons (Rausser et.al, Weinzierl). Observing that the pursuit of short-term gains is prone to decreasing the quality of the resource, with low quality satellites creating large amounts of space debris as an example, scientists contend that a competitive environment may not encourage sustainable developments but rather marketable and accessible ones.

- *Public Accessibility and Private Control*

Some scientists even challenge the notion that privatization will bring meaningful increases in accessibility. Shammas and colleagues assert that the privatization of space is unlikely to result in increased public accessibility to citizens, but rather a strategically limited and expensive commodity monopolized by certain actors in order to maximize returns (Shammas et.al). They argue that "The production of carrier rockets, placement of satellites into orbit around Earth, and the exploration, exploitation, or colonization of outer space (including planets, asteroids, and other celestial objects), will not be the work of humankind as such, a pure species-being, but of particular capitalist entrepreneurs who stand in for and represent humanity" Shammas and colleagues suggest that while a government funded space program is difficult for everyday citizens to access, an influx of private corporations will not necessarily democratize space access and could very well transform space into a strategically limited domain, controlled by a few actors prioritizing profit over public benefit.

IV. CONCLUSION

In conclusion, whether a government should spend its citizens taxpayer dollars on space endeavors is still a highly debated topic. In the US, space expenditure continues to be carefully inspected by departments such as the United States General Accounting Office, and taxpayers are no less scrutinizing. Some scientists argue that the government should treat space exploration like any other federally funded R&D endeavor, or continue to fund research into outer space

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indirectly using private - public partnerships, regardless of whether NASA remains as the central authority. Others argue that taxpayer dollars should be spent directly for the good of the people, or that government involvement in the modern scene that is new space is ineffective and vulnerable to corruption and exploitation. Regardless, examining potential implications of the absence of a government funded space superpower through an economic lens provides valuable insight into the industry's future evolution.

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