Relationship Between NSF Funding and College Social Science Programs

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Research funding in America is a major source of revenue for both public and private educational institutions across the country, and the National Science Foundation, NSF, is the largest government provider of research funding in the U.S. The distribution of this funding, however, is not uniform across disciplines. The result of this gradient is a stark difference in university funding between the hard and soft sciences. Sciences that trend towards more quantitative results, and more perceived technological applications see the overwhelming majority of funding dollars. Consequently, funding opportunities for the soft sciences rarely come in the form of government grants, leaving social sciences programs in these cases comparatively underfunded. This has not always been the case in the United States, however, as research funding used to come more often in the form of philanthropic donations. This allowed institutions more freedom in the research they wished to pursue, and saw comparatively greater amounts of social science research. Alongside this shift in funding, the overall educational landscape has also trended towards the hard sciences in recent years. While establishing a causal relationship between the two events is difficult due to their respective complexities and large timeframes, examining the relationship between the federal funded research landscape and the decline in social science programs at universities since 1950 provides a piece of research that can be used in the future to more wholly understand the complex nature of scientific research in the United States.

Discussion of Literature

While it is easy to understand at a high level how funding is beneficial to an educational institution, it is a bit more difficult to directly measure the extent this money benefits a

university, and how this connection happens. In (Jacobs, 2011), Jacob et. Al. use statistical analysis to confirm a positive correlation between public research funding and university publications. Publications serve to boost university status and help secure funding in the future. Alongside this, (Payne, 2001) uncovers the relationship between research funding and several other growth factors in research universities. The connection being that universities with established presences in the research network tend to reap benefits beyond simply the money granted to them by the NSF. This can manifest in ways such as an increase in private donations, and a boost in the university's perceived status. Such a boost in university status has been seen to have a direct correlation with university wealth, with causal relationships also being hinted at in (Tsikliras, 2014). Taken together, there are a multitude of factors that coincide with public funding that all serve to alter the economic standing of a university. While many of these factors provide direct economic growth to an educational institution, the extent to which funding benefits persist in a university can be impacted by a variety of factors. The trend remains, however, that higher government funding trends with greater economic prosperity for a university, meaning any chance at securing research money can be extremely beneficial to a university.

The NSF is the largest sole provider of college-level research grants, encompassing 25% of all federally funded academic research at this level. It has been linked in many instances to direct growth in scientific fields such as nanotechnology (Chen et. Al, 2013). In doing so, the NSF has established a complex network of relationships with collegiate institutions across the country. Founded in 1950, the institution sought to capitalize on the great success that technological research had brought to the nation during World War Two. By directly funding scientific research projects, it aimed to bring similar technological innovations during peacetime. Prior to its

founding, the majority of research had been funded purely through philanthropy. With the rise of the cold war, NSF funding was one method used by the United States government to bolster the nation's technological arsenal and maintain pace with the Soviet Union during the space race (Cady & Fortenberry, 2008). This is evidenced by the fact that NSF funding dollars over doubled shortly after the launch of Sputnik in 1958 (Cady & Fortenberry, 2008). This direct influx of cash into the research landscape was beneficial to many universities, however, it did not benefit all disciplines evenly. On foundation of the NSF, funds were only to be provided to STEM related fields, with a heavy emphasis towards biomedical and atmospheric based sciences. It took the institution over thirty years to begin offering grants for social, behavioral, or economic sciences. By solidifying itself as the largest American institution for research funding, (Atkinson & Blanpied, 2008) argue that the NSF was able to greatly influence the research conducted at numerous educational institutions from its founding to present, and is responsible in some ways for the overall state of higher education that is seen in the U.S. today.

After a brief social science funding boom in the 60s and early 70s, the late 1970s saw the social science funding landscape stagnate (Scheiding, 2010). In 2023, 300 million dollars in NSF funding was provided for combined social, behavioral, and economic grants. This makes up less than .04% of their total funding allocations for the year, and less than a third of the money provided for strictly computer engineering funding. (Kaiser, 2022) Also establishes a relationship showing how social science research projects tend to require collaboration between multiple institutions more often than other research. (Kaiser, 2022) then makes the connection that cross-cutting projects such as those more often seen in social science research require more money on average to publish. This correlation makes social science research in general more difficult to carry out than other forms of research. In tandem with this, (Burke, 2002) solidifies the notion

that universities with higher rankings tend to receive greater funding from many public sources, including the NSF. Altogether, already limited funding opportunities for less established schools, alongside the low percentage of social science funding across the board lead to an educational landscape that makes social science research exceedingly rare in comparison to other disciplines.

Discussion of Case

Since the creation of the NSF in 1950, the University of Illinois Urbana-Champaign has consistently ranked within the top 5 recipients of NSF grants. In recent years, it consistently ranks among the top three. For universities, it rarely deviates from its position at number one (UIUC, 2023). In 2022, UIUC secured a single deal for $40 million from the NSF for various STEM related projects (NSF Awards Database, 2023). Subsequently, in 2023, admissions rose by 33% (UIUC Reports and Data, 2023). Prior to this time period, the university saw periods of prosperity, but prestige, wealth, and admissions grew rapidly during the time period of the NSF. While attributing this growth solely to the funding provided by the NSF is beyond the scope of this case, establishing a connection between these two events, and admiring how the current state of these two institutions, as well as the relationship between them, has changed during this time period provides for a general understanding of the complex nature of this case.

The question follows then, how did UIUC reach this level of prevalence in NSF funding, and how have they managed to maintain that position for so long? The university opened in 1868 as a land grant school. Initially, the president of the school desired for it to be a liberal arts institution, however, pushback from taxpayers and lawmakers forced the school to turn towards "industrial education" leaving the liberal arts school to be less prominent. The university struggled to grow until the early 20th century, when it began to garner interest from researchers

due to its agricultural work. The university grew steadily until after world war two, when the founding of the NSF saw a massive increase in federal dollars to UIUC. By this point, the federal government was providing nearly 90% of the university's income for research (UIUC, 2023). This spike in NSF funding for UIUC began in 1953, when NSF grants to the university over doubled from three to seven, encompassing a total of over $51,000. 1954 saw over double the funding of the previous year, and this trend of exponential growth continued throughout the century. Figure 1 shows this immense increase in funding from 1952 to 1982 using published NSF data.

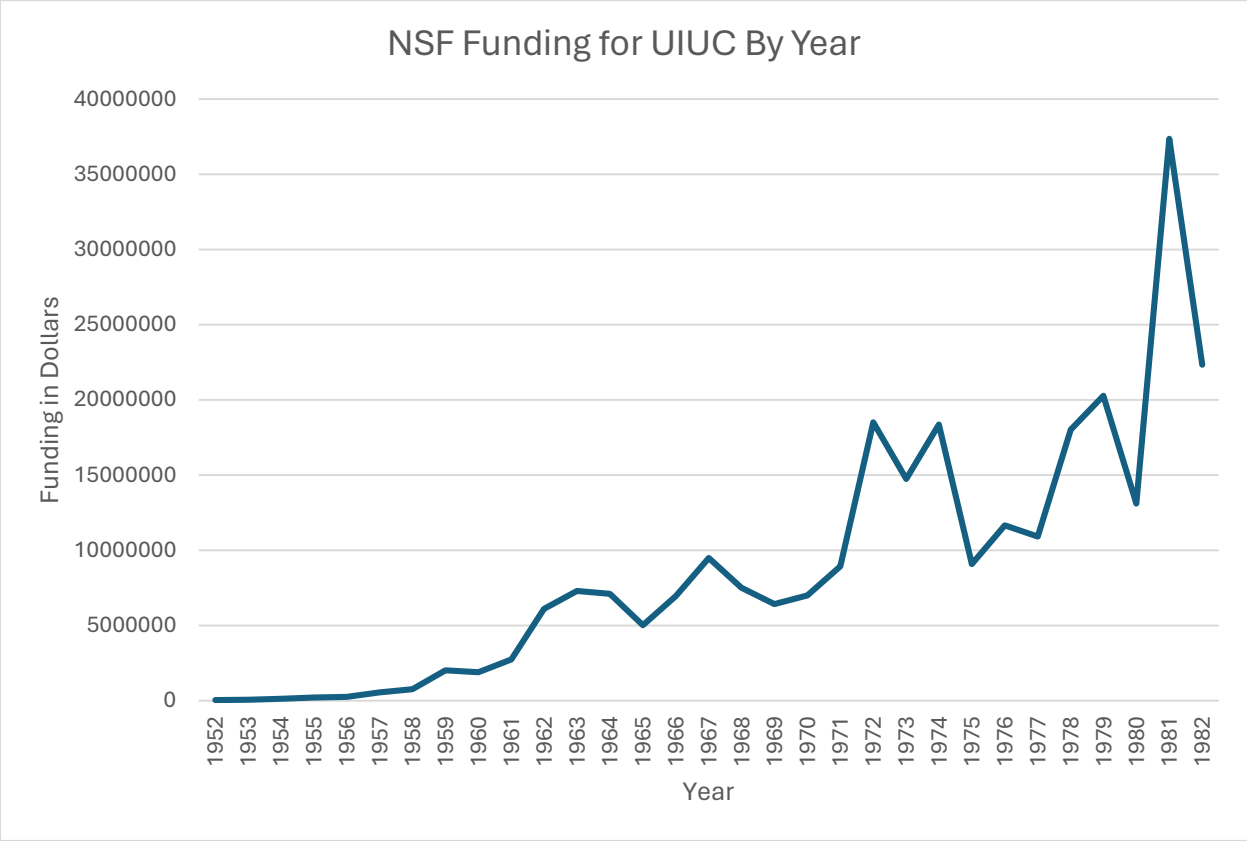

Figure 1: SNF Funding to UIUC by Year

While this was a prosperous time period for many educational institutions due to an increase in research funding across the board, UIUC was able to capitalize on this especially well

because of a number of factors. First, the university targeted its proposals to certain fields that it knew the NSF was more inclined to provide funding for. Between 1952 and 2023, only 567 patents were filed for the entirety of social behavioral and economic sciences. This encompassed less than eight percent of all filed proposals by UIUC, and the total amount of money allocated for these projects over this seventy-year span is less than that allocated for other STEM related projects to UIUC annually since the year 1990 (NSF Awards Database, 2023). By simply visualizing this data, it is clear to see that it is much more profitable for UIUC to focus on the harder sciences when it comes to proposal writing. This is a strategy the university embraced, as no such NSF grant was provided to UIUC for behavioral, social, or economic sciences until 1972. Second, UIUC drafted proposals that boasted quantifiable outcomes rather than focusing on more abstract research. This trend can be shown to reflect the scientific necessities of the time, as proposals from the early twentieth century favor research on agricultural efficiency. As the 20th century progressed, focus shifts more towards electrical engineering and physics based research, ultimately being dominated by computer and materials science research at the turn of the century, providing research proposals that boast tangible outcomes reflecting the largest industries of their time period. Third, the university saw a sharp increase in collaborative proposals. Working with other institutions to propose a research project to the NSF has been proven to provide higher success rates for numerous reasons. Some of which being that it increases the resources of the project group, encourages multiple perspectives on problems, often results in more participants and longer research papers, and simply provides the NSF with multiple chances to approve the same proposal. Beginning in 1970, the number of collaborative proposals from UIUC jumped significantly, each awarding the college with over double the amount of funding a solitary proposal provided on average at the time. While cultivating this

relationship with the NSF, UIUC saw unprecedented growth in certain scientific fields. Specifically, computer science and biomedical sciences saw very rapid expansion. While other disciplines also saw an increase in applicants during this period, their growth often paled in comparison to those that were more heavily funded by the NSF.

In the early days of the university's history, the school was intended to function as a liberal arts college. However, in 2024, their liberal arts departments have been merged with a broader general sciences department, and the majority of funding this college receives goes into institutes for advanced science, biology, and computing as opposed to the humanities, sustainability, or health sciences institutes (Brint et al. 2005). This shift away from the social sciences had begun early in the life of the university, with university archivist Maynard Brichford stating "Instruction in the liberal arts aroused the hostility of legislators" in the late 1800s (Brichford, 1983). However, the final turn away from the social sciences department appeared in tandem with the NSF funding boom of the mid-20th century. The pressure on the university to maintain its status as a top research institution forced UIUC to allocate its capital in ways that it could ensure would maximize its ability to receive funding. As mentioned prior, this often came in the form of strategies the university would use to appeal to NSF grant boards. Tactics such as filing proposals based on historical NSF funding by discipline, limiting proposal drafts to those with tangible societal benefit, and shifting focus towards collaborative proposal writing all served to increase in proposal acceptance, but for a price. Having merged with broader science departments three times now, the college of liberal arts and sciences is completely dominated by the sciences. This department has become a catchall department from which technical colleges arise, and branch off to become more specialized in order to garner more attention from funding institutions (Brint et al. 2005). An example of this process playing

out is with the UIUC computer science department. In 1949, the digital computer laboratory was born under the department of liberal arts and sciences using military funding dollars. From here, the department grew steadily for a decade and a half, after which, the department branched off into its own college in 1964, bringing a hefty amount of funding along with it (UIUC, 2023). This branching happened alongside the creation of the NSF's National Center for Supercomputing Applications, which proceeded to increase funding to the computer science department even more. While an extremely successful department in both prestige and capital, the rise of this department was entirely dictated by the NSF funding trends of the day, and the success it saw came at the price of siphoning funds away from the social sciences.

In total, the University of Illinois at Urbana Champaign has consistently been a top research university for nearly two centuries now. A large portion of this funding comes from the National Science Foundation, and this money has become extremely important to the university. The University has employed a number of tactics during this time period to secure NSF funding, the majority of which tend to favor research proposals for the harder sciences. Furthermore, during this time period, the university has grown massively in many areas. This growth, however, has not been uniform, and fields that are more heavily funded by the NSF have tended to see more growth and representation at UIUC during this time. The complex nature and lengthy timeline of UIUC's research landscape prevents a causal relationship between the two events from being derived. Both may very well be byproducts of more fundamental changes going on in both the United States and the world during this time. Nonetheless, the trend remains that UIUC has seen a boom in its hard science colleges which has coincided chronologically with its status as the biggest recipient of NSF funds. The nature of this growth has eluded social sciences in the same intensity.

Analysis

Some American universities are more able to capitalize on research funding than others. While there are obvious factors as to why this happens such as wealthier universities being able to divert funds from other locations onto specific projects, there are also much more subtle interactions that cause some institutions to have more difficulty converting their funding into tangible products. (Payne, 2001) shows that when liberal arts colleges in America receive a dollar of research funding, they lose approximately 45 cents of donation funding. This is the inverse of the relationship that established research universities have been seen to exhibit between public funding and donations. Inherently, liberal arts schools are disadvantaged in their ability to conduct research. However, the majority of social science research comes from these such institutions (Bourque, 1999). This connection provides another barrier for the social sciences, and shows that they are underprivileged to a point such that an increase in funding may not be enough to bridge this gap. This pitfall of social sciences has grown to the point that many liberal arts schools have been forced to embrace a more technical curriculum (Brint et. Al, 2005). This scenario is well represented in the case of UIUC. While the school may have begun in the realm of liberal arts, it saw much greater success as a research institution. While the entirety of this success is unable to be attributed to any one event, it does coincide heavily with an increase of federal funding from the NSF. By utilizing several strategies, UIUC has been able to cultivate a relationship with this institution. Based on NSF funding data, as well as UIUC grant proposals in recent years, it can be seen that the majority of the relationship between these institutions hinges on the hard sciences. Since the NSF has become an important source of revenue for the university, it makes sense for UIUC to tailor research proposals more towards the realm of hard sciences. This provides for growth in more STEM related fields for the university, but stagnation

in the realms of social sciences. While this is only one isolated case, the trend of movement towards the hard sciences is becoming more popular with educational institutions in recent years. With this uptick, the amount of federal funding that goes into research for the hard sciences trends upward as well. This correlation is not unexpected. However, it is interesting to note (Atkinson & Blanpied, 2008)'s claim of the power the NSF has to alter the research landscape. If the power this institution holds is truly able to change the funding profile of certain disciplines, then it would stand to reason that it has contributed to some degree in the academic disparity seen between the hard and soft sciences. In researching this paper, no such proof of this power has been uncovered, and any sort of correlation discussed in this paper is simply making notes of trends during this time period. However, if further research is to be conducted int this vein, the relationship between social science programs and the NSF could be utilized as a piece of supporting evidence. Certainly, these interactions cannot be ignored in the broader realm of social sciences in the United States, and in admiring prior work in this field, as well as researching individual instances of how university programs have been impacted by NSF funding, a basis for further research can be established.

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