Fathers of Neoliberalism: The Academic and Professional Performance of the Chicago School, 1960-1985*

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Abstract: One reason why neoliberal economic ideas are powerful is that they are assumed to stem from a position of scientific dominance. We empirically analyze the professional advance of economists in the United States since the 1960s to examine if Chicago economists, and their networks, performed better than their peers in Harvard and MIT. Specifically, we differentiate mechanisms related to professional behavior, such as publication productivity and relationships in citation networks, from mechanisms related to selection, such as external funding and hiring practices. We suggest that behavior and selection can be traced generationally by studying the relationship between important economists at Chicago, Harvard, and MIT ('Fathers') and their doctoral students ('Children'). Our findings demonstrate that academic and professional prominence alone do not explain the ascension of neoliberalism – not in terms of historic citations, external funding, or post-PhD career paths. Where we do find significant divergence between the Chicago school and their descendants was with respect to observed social norms of reciprocity and in-group cohesion, suggesting an important 'insurgent solidarity' mechanism at play in the neoliberal ascent.

Keywords: neoliberalism; economics; professionalization; socialization; generations; ideas.

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Introduction

How did neoliberalism ascend within the economics profession? The ascendance of neoliberalism is surely one of the most wide-reaching intellectual trends of the last half a century. From a marginal position within a few niche academic departments, neoliberal economics became the prevailing operational ideology not just of the economics discipline but of much economic policy around the world.[1] Numerous accounts have documented the rise of neoliberal thought within economics.[2]

In this paper we empirically analyze the academic and professional performance, as well as the social networks, of the Chicago School economists though a structured comparison with their competitor, what has been termed 'Charles River Group' (CRG) (composed of Harvard and MIT economists). We collect performance data for a carefully curated sample of 'fathers' (supervisors) and children (students) In total we were able to gather information on 566 different students – 270 for Chicago, 197 for Harvard and 99 for MIT, plus information on all Fathers from each university. We focus on the US in the period 1960-1985, a period of heightened intellectual contestation and competition.

Specifically we differentiate mechanisms related to academic behavior, such as publication citations, citation and acknowledgement networks, from mechanisms related to selection, such as external funding and hiring practices. Our study provides insights into how sustained performance between competing schools of thought is not an attribute of individuals but of generational groups.

Doctoral 'Fathers' transmit knowledge to their students, their 'Children'.[3] Socialization effects from common training and shared epistemic outlooks inform the intensity of these transfers, and how they are maintained. Our analysis of e.g. in-group citation patterns support the common assumption that knowledge and status within schools of through is transferred between generations thought e.g. supervisor-student relationships.

Our comparative analysis of academic and professional performance 1960-1985 suggests that over generations the Chicago-based economists did **not** outperform their peers in the CRG. Tracing performance on academic output in terms of citations and grant funding there is no overwhelming evidence that Chicago ascended to be scientifically dominant, although in some respects they did perform better within academia. What did occur over generations is that the 1960s 'fathers' of neoliberalism produced a more socially and ideologically coherent and deferential group of students. This permitted them to project particular economic ideas that, once prevented with political and institutional opportunities in the 1980s, were more efficiently integrated into the architecture of power.

Tracing this ascendency is important for understanding what Margaret Somers and Fred Block have referred to as the "ideational embeddedness of markets", where some ideas count more than others in how policies are constructed and treated.[4] There are contending views on how neoliberal economics ascended within the US and then transnationally. They can be typified as 'elites', 'empire', and 'ecologies'. This classification of approach does not follow any particular normative disposition but cuts across approaches and 'isms'. All three approaches assume that the scientific dominance of the Chicago School is important for the ascendance of neoliberalism.

[1] The ascendance of neoliberals is also notable given the fact that their ideological bias should not, according to some existing sociological literature, find fertile ground within the US academy. Using a randomly based national survey of over 1500 faculty members from 183 four-year colleges and universities, Rothman et. al. (2005) find for example that conservatives and Republicans teach at lower quality schools than do liberals and Democrats.

[2] Stedman Jones 2012. See a more general review in Hirschman and Berman 2014.

[3] And 'grandmothers', of course, though the gender dynamics of senior generations of economists in our study are heavily skewed towards the male sex. See Hilmer and Hilmer 2007.

[4] Somers and Block 2005. See also Block and Somers 2014.

The first 'elites' approach focuses on powerful individuals and foundations that carry neoliberal ideas and propagate them through their networks. For example, scholarship on Mont Pelerin points to how Hayek sought to develop a "neo-liberalism" that broke with simple free market liberalism, and institutionalized it through a society created in 1947.[5] Here there is a keen focus on Friedman and Hayek in promoting core neoliberal economic ideas within the U.S. and transnationally. From this point of view economic elites had an interest in creating their own clubs to combat the transnational post-war swell of welfare-driven social policies. Neoliberalism acts as a "project in motion" that constantly struggles against counter claims as part of its "global marketization and commodification project, ultimately serving the ongoing private accumulation of capital". [6] Other work on elites focuses on ideational entrepreneurs as key players in shaping economic polices during periods of high uncertainty.[7] Important here is the belief that Chicago-based economists rose to professional and political prominence because they systemically provided superior scientific tests of theories against economic experiences. [8] Friedman's 1976 Nobel prize in economics speech, on inflation and unemployment, made this point clearly.[9] The Chicago School were elites because they achieved scientific dominance in the profession, and a dominance that rejected normative judgments as part of economic sciences, an agenda that affirmed elite interests and rallied influential economists to Chicago.[10]

A second 'empire' approach makes a direct connection between U.S. neoliberal economics and international politics. In this approach the core of neoliberalism is a "a deep, taken-for-granted belief in neoclassical economics".[11] The development of neoliberal economics, and neoliberal economists, in the 1960s to 1980s is important since these actors and their knowledge were involved in transnational networks. The University of Chicago is assumed to be the epicenter of this 'Chicago Boys' movement. They were active as "money doctors" advising developing countries in the post-war period.[12] They were also important in propagating a view of scientific dominance through a form of economics that rejected structuralism and the role of moral judgments in analysis.[13] To promote such views Chicago would have had to be a major scientific competitor within the American economics profession, if not predominant. This is especially the case for training policy elites in countries of interest to American foreign economic policy. Arnold Harberger, for example, recounted in 1999 that at Chicago he had personally trained more than a dozen central bank presidents and more than two dozen ministers, including those of Argentina, Chile, and Israel.[14] From this view neoliberal economics and the "imperialism of mathematical economics" has been embedded not only into direct training of policy elites but also into the operations of the IMF and the World Bank, and, in turn, how they transmit economic knowledge to their member states.[15]

This approach has been applied to analyzing U.S. relations to South America, and especially in studies of the economic transformation of Eastern Europe.[16] It has also led to a focus on the transmission belts for neoliberal economists in the International Monetary Fund[17], as well as international training centers for economic policymaking. [18] This work typically argues that doctoral education in 'neoliberal' economic departments creates shared beliefs among IMF economists who are then further socialized in the Fund and more likely to offer better 'deals' to borrowing countries staffed with policy economists of

[5] See Mirowski and Plehwe 2015; Block and Somers 2014: 27, 243 fn17.
[6] van Appeldoorn and Overbeek 2012: 6, 10. See also van Apeldoorn and de Graaff 2012.
[7] Blyth 2002.
[8] Schliesser 2010.
[9] Friedman 1976..
[10] Van Overtveldt 2007.
[11] Campbell and Pedersen 2001: 5.
[12] Helleiner 2003.
[13] Valdés 1995.
[14] Fourcade 2006: 180-181.
[15] Dezalay and Garth 2002: 91; Babb 2013.
[16] Bockmann 2011; Ban 2016.
[17] Chwieroth 2009; Nelson 2014.
[18] Kogut and Macpherson 2008; Broome and Seabrooke 2015; Johnson 2016.

similar backgrounds.[19] Other work has concentrated on the influence of neoliberal economics on a range of intergovernmental organizations.[20] From this perspective the 1960-1985 period was critical for neoliberal economists establishing their scientific dominance. The 1980s change in macroeconomic policymaking, and who was making the policies, is well documented in the case of the International Monetary Fund.[21]

A third 'ecologies' approach places greater emphasis on the domestic institutional drivers behind neoliberal economics. From this perspective choices made by political and university administrations, as well as research foundations, are critical in promoting neoliberal economics in the 1960-1980 period. Such choices are made in an ecological environment, as a push for domination within a domestic setting. Important changes here include an increased emphasis on economics as a mathematical science, as well as greater stress on particular neoliberal ideas as critical for the development of policy and business knowledge.[22]

Work in this direction has shown how Chicago was a unique institutional and social environment. Chicago economics graduate students certainly formed a coherent school of thought compared to Harvard and MIT, especially in maintaining a distinction between positive and normative economics, and in having a belief in neoclassical economics that was overwhelming affirmed during the process of graduate training.[23] This coherence came from, and reinforced scientific dominance within the American economics profession. Chicago's recent excellent performance surely rests on the scientific dominance established in our period of study.[24] This approach also suggests that economics is tightly governed through intense professional socialization and is, in contrast to sociology and political science, governed in the U.S. by the top 5% of departments.[25] As such, neoliberal economists have formed tight control mechanisms to replicate themselves over generations, as well as to continue their policy influence. This approach has also been applied transnationally, where the emphasis is on how neoliberal economists have networked to infiltrate down national professional economics associations and push forward their own ideas.[26]

Our task in this paper is to assess mechanisms of neoliberal ascendance by tracing back the lineages of professional economists, following the chains of student-supervisor doctoral relationships back to 'neoliberal fathers'. By utilizing a variety of data and methods designed to assess forms of professional advancement, intellectual lineage, and institutional prestige, we seek to adjudicate between two forces at work in neoliberal ascendance. Specifically we differentiate mechanisms related to professional behavior (publication strategy, in-group citation practices) from mechanisms related to selection (such as external funding, hiring practices).

We examine these mechanisms of neoliberal ascendance by tracing back the lineages of professional economists based on PhD student-supervisor relationships since the 1960s, and by measuring numerous characteristics of professional advancement. To ground such measurements we compare the lineages of economists emerging from 'neoliberal fathers' (hereafter NL fathers) to their matched peer groups, using historical matching of university prestige and graduate training. We trace from 1960 to 1985 because then it is commonly understood that neoliberalism moved from economic theory to policy practice, especially with the Reagan and Thatcher administrations.[27] In addition there is a need for a practical cut-off point in time at which neoliberal ideas ceased to become an insurgent set of ideas and became hegemonic within the economics discipline.

[19] Chwieroth 2015; Nelson 2017.
[20] Chorev 2005; Chorev 2013.
[21] Including by the official IMF historian, see Boughton 2001: 25-8.
[22] Fourcade and Khurana 2013.
[23] Colander and Klamer 1987.
[24] Wu 2007.
[25] Fourcade et al. 2015. For a study of similar dynamics in the academic field International Political Economy see Seabrooke and Young 2017.
[26] Fourcade 2009; Helgadottír 2016.
[27] For example, Palley 2005: 24-5.

The importance of the University of Chicago to the advance of neoliberal thought is well established in the secondary literature.[28] In the first and second generations of the school it was a closely-knit group that permitted internal disagreement but also intense in-group socialization,[29] an important characteristic of club governance.[30] They even met in private homes to vote on the validity of theoretical discussions and applications to economic policy.[31] The influence of this group on a range of economic policies has been well established, with recent work focusing on how prominent Chicagoans framed the "epistemic superiority of markets" the policy reform networks (such as in pharmaceuticals).[32]

The most prominent father of neoliberalism is Milton Friedman.[33] Friedman had an unambiguously large impact on the advance of neoliberal thought, for a variety of reasons discussed extensively in existing literature.[34] The second NL father from the University of Chicago is George Stigler. Though much less of a public figure than Friedman, Stigler "did as much, if not more, to form what became known as the Chicago School of Economics" (Freedman 2008: 22). For example he played a crucial role as an organizer within the University of Chicago in the buildup of the Graduate School of Business (see Van Horn et al. 2011). Unlike Friedman who became a public intellectual mid-way through his career, Stigler "…deliberately eschewed a public presence. Yet without him providing micro based research, Friedman and his counter-revolution against the forces of Keynesianism and other non-mainstream approaches would have failed to achieve its overwhelming success" (Freedman 2008: 23).

To assess the professional performance of neoliberalism within the economics profession, we compare the performance of neoliberal (hereafter NL) fathers and their first-generation descendants to a peer group. Universities act as critical staging environments affecting reproductive success– both for the reproduction of particular traditions of economic thought and for the pursuit of professional advancement in its numerous forms.[35] Appendix A illustrates our extensive efforts to find detailed *historically relevant* markers of prestige and graduate training excellence across US economics departments. It is clear that, over the 1950-1980 period, two key institutions shuffled for supremacy alongside Chicago, and those were Harvard and MIT. Choosing these two universities is also appealing because they form a geographically proximate community of scholars and the individuals we select from each were both part of a similar intellectual milieu at the time, though very different institutional environments. At the same time Harvard and MIT were known for being strongholds of Keynesianism and institutional economics, theoretical paradigms that the Chicagoans were explicitly attacking.

In total we selected 13 NL fathers and 13 peer fathers from the CRG. This is an intentionally small group so that we can obtain quality information on the importance of these

[28] van Overtveldt 2007; van Horn, Mirowski, and Stapleford 2011.

[29] The importance of the "Chicago School" is noted in Miller 1962: 65. It is noteworthy that in the same issue of the journal Stigler rejected the term Chicago School for its geographic bias, especially given that many economists were not from Chicago or engaged in Chicago. Rather he asserted that Friedman should be recognized as the leader of the "Berkeley-Cambridge axis". Stigler 1962: 71.

[30] Tsingou 2015.

[31] Medema 2009: 104. Medema's example included 21 people gathering to discuss Ronald Coases' work, where Friedman played the lead role in debate. Coase wrote up the findings as "The Problem of Social Cost" (which has been cited more than 28,000 times).

[32] Nik-Khah 2014: 507.

[33] We are also aware the Friedman's generation were not the originators of neoliberalism. They also have doctoral fathers and grandfathers. However, we consider this generation as important for pushing forward the breakthrough of neoliberalism into orthodox economic policy.

[34] Stedman Jones 2012. Emmet 2008.

[35] With respect to the professional advancement, a young scholar who lands their first job at a low-ranked university for example does not have the same chances of getting published, getting external grants to advance research, having access to robust social network opportunities, or having successful graduate students, than a young scholar who lands their first job at a highly-ranked university.

scholars to the neoliberal advance and knowledge about their respective professional environments. Having a small number of 'fathers' also makes the process of peer matching, and the data collection process associated with it, more manageable.

Table 1 sets out the fathers selected for our study. These 26 economists made important, and different, contributions to the economics profession as a whole. Each of the Chicago Group economists waged different kinds of battles associated with the neoliberal counterinsurgency within different areas. There is also variation between them in terms of the extent to which they became public intellectuals, as well as their respective roles within public institutions. The criteria of inclusion for the peer group are discussed at length in section 3.

Table 1. Economist 'Fathers' Studied

Chicago Group	Charles River Group
Becker, G. S. (Chicago)	Duesenberry, J.S. (Harvard)
Fama, E. F. (Chicago)	Dunlop, J.T. (Harvard)
Fogel, R. W. (Chicago)	Eckstein, O. (Harvard)
Friedman, M. (Chicago)	Galbraith, J.K. (Harvard)
Harberger, A. (Chicago)	Gerschenkron, A. (Harvard)
Johnson, H.G. (Chicago)	Hirschman, A. (Harvard)
Lewis, H.G. (Chicago)	Leontief, W. (Harvard)
Lucas, R. E. Jr. (Chicago)	Musgrave, R. A. (Harvard)
Miller, M. H. (Chicago)	Smithies, A. (Harvard)
Shultz, G. (Chicago)	Kindleberger, C. P. (MIT)
Schultz, T. W. (Chicago)	Modigliani, F. (MIT)
Stigler, G. J. (Chicago)	Samuelson, P. A. (MIT)
Telser, L. G. (Chicago)	Solow, R. M. (MIT)

Most importantly for the purposes of this study is the fact that they all contributed significantly to debates in the economics profession during a period in which the neoliberal ascendance occurred. By tracking the supervisor-student lineages of these individuals we are able to obtain a population of economists descended from a line of NL fathers and a separate population of economists descended from their Charles River Group peers.

The three approaches we have identified have suspicions on how 'fathers' and their 'children' compare over time. The elites approach may suggest that elite networks give support to successive generations of economists, and that they will be supported by think tanks and foundation pushing neoliberal policies. Elite scholars may also suggest that the key elite scholars, our 'fathers', are much more likely to be cited for their ideas than their descendants. The 'Matthew Effect' [36] of cumulative advantage in renown and citations may well be in effect, leaving descendants with a problem in gaining an audience if they simply stick to what became a neoliberal economic orthodoxy.

The 'empire' approach may expect that while NL fathers had to cohere and produce clear economic ideas that could be adopted by intergovernmental organizations, the job of descendants is not to preach from the pulpit but to man the decks. As such we would expect to see a clear pattern emerge where recently graduated doctoral students enter professional positions with the International Monetary Fund and similar institutions. [37] Rewards in these institutions may be greater than in academic economics.

The 'ecologies' approach would also suggest that descendants have an advantage in being able to move between academia, policy, and business. 'Children' and 'children' who cannot perform like their 'fathers' in academia may then take up policy position and create demand for neoliberal ideas, since it would provide them with an exit strategy. Inferior academic performance may simply be an indication that they are busy doing other things.

We justify this perspective on economic lineages in what follows below and discuss our data collection in what follows below in three sections. First, we describe our data on economic lineages, emphasizing the benefits, costs and controversies with using these data. Second we describe how we paired the father groups for comparison. Third, we describe the attribute-level data that we utilize to measure variable levels of professional advancement within the studied population. Fourth, we provide evidence on in-group citations from the father groups and their students.

[36] Merton 1968.
[37] Chwieroth 2009.

Before discussing our data and findings, we find it critical to highlight that our analysis is contexualized by an important but often neglected stylized fact. Neoliberal ideas were not only marginal before their ascent but *faced entrenched professional competitors* that were already integrated within the architecture of power. We refer to the dominance not just of the Keynesian-Neoclassical synthesis that reined supreme in the 1950s and 1960s, but also the intellectual culture and associated institutions that advanced what Chicagoans later referred to as "the dark ages of Keynesian despotism".

Keynesianism was broadly hegemonic in the 1950s and 1960s in the US economics profession (see Lilly 1977). Buchanan (1987: 131) remarked that "…by the middle of the 1940s, economists almost everywhere had become 'Keynesians' in their conceptualization of the macroeconomy. They had quickly learned to look at their world through the Keynesian window." As Samuelson remarked in 1947, "Keynesian analysis has begun to filter down into the elementary textbooks; and, as everybody knows, once an idea gets into these, however bad it may be, *it becomes practically immortal*" (Emphasis added to original; Leeson 1998: 609; quoting Samuelson 1947: 147). Keynesian economics dominated textbooks, classroom discussion and policymaking forums in the 1950s and 1960s, in addition to policy (Frazer 1988b: 436-437; Heller 1966: 72).

The 1960s in particular were a high point for the Harvard economics department, and in particular for its Keynesian faculty. There was a strong confidence of the Keynesian neoclassical synthesis on the Kennedy and Johnson administrations at the time (see Frazer 1988b: 436-437). The 1962 Kennedy tax cut was advised by Keynesians such as Walter Heller (Wisconsin) was seen at the time to have reversed the 1961 recession. The 'Charles River approach' to development economics, mainly economists, from MIT and Harvard, directly influenced Kennedy and had a distinct set of messages (see Packenham 1973: 61-62). By the early 1960s overtures by the US Federal government were seen as evidence that "the American Government, a generation after the General Theory, had accepted the Keynesian revolution" (Schlesinger, 1964, p. 769). As Tobin put it, "Keynes had been more or less absorbed into mainstream" (Tobin, 1987, pp. 104, 172; in Leeson 1998: 605).

There was also social stigma associated with the ideas coming out of the Chicago School. Duke University refused to carry Friedman's books, for example (Skousen 2005: 73). In his memoirs Friedman describes the social environment outside Chicago as inhospitable: "Those of us who were deeply concerned about the danger to freedom and prosperity from the growth of government, from the triumph of the welfare state and Keynesian ideas, were a small beleaguered minority regarded as eccentrics by the great majority of our fellow intellectuals" (Friedman 1982: vi). Not only Friedman but other scholars were questioned about their Chicago School affiliations (for example see this depiction of H. Gregg Lewis in Biddle 1966: 182). Importantly, the particular 'stain' of a Chicago reputation followed recent PhD graduates around at the time.[38] From the perspective of those not sympathetic to Keynesianism, such as Harry Johnson, the 1960s were the "dark ages of the Keynesian despotism" (Johnson 1975: 103).

This situation obviously, and dramatically, changed by 1980. The story of that change has been told many times. What we seek to understand is the importance of professional

[38] An account by a then-recent graduate of Chicago, who had joined the department at the University of Winconsin recounted in 1962 of an experience some years earlier:

> I never heard of any "Chicago School" until I left Chicago. I thought of my teachers and my older fellow students as good economists, not as members of a sect or cult or clique. Shortly after leaving the Midway, however, I encountered the term full force. It was usually used pejoratively, especially when I was included in the membership. On the banks of Lake Mendota *[explanatory note: Bronfenbrenner taught at U Wisconsin for a time]*, for example, "the Chicago School" meant Pangloss plus Gradgrind, with touches of Peachum, Torquemada, and the Marquis de Sade thrown in as "insulter's surplus." (Bronfenbrenner 1962: 72)

performance in that change. We know the neoliberal insurgency 'won' in terms of professional dominance. It is the mechanisms of 'how' that we seek to understand.

Data on Lineages in Economics

Our analysis hinges on obtaining not only data on the professional performance of NL Fathers and Charles River Fathers but also their first-generation descendants: their PhD students. To obtain student-supervisory lineages, we followed the following multi-faceted procedure.

Two key initial sources were the RepEc and Mathematics Genealogy repositories, which contain information about student-supervisory lineages for most of our fathers. Wikipedia profiles occasionally also provided information on student-supervisory relations, though these were usually thin and were mindful of the fact that these tended to display the more prominent economists. For some scholars we were able to consult their personal memoirs (in particular for Stigler, Friedman, Galbraith, Kindleberger, Hirschman, Modigliani), which account for experiences and names of students over the course of a career. Festschrifts were another good source of information, as well as memorial dedications within journals and department websites, and within the news media. Since most of our fathers had prolific and often very public careers, memorials of their careers were relatively common after they passed away or sometimes as they were entering into retirement. In some cases, transcripts of oral histories were available (Harberger, Shultz) that provided PhD student names. We also contacted academic departments (at Harvard and MIT) for lists of students that a given academic supervised. Historical archives were also consulted. For John Kenneth Galbraith and Milton Friedman in particular, we consulted the JFK Memorial Library and the Hoover Institution archives, respectively, in search for recommendation letters and student correspondence.

Finally, we also pursued a strategy based on contacting cohorts of graduate students from a given department. Because we were able to find, from published AEA records, the names and PhD completion years of students, we pursued the strategy of contacting these individuals to ask them who they supervisor was, and also who graduated within their cohort and who was supervised by whom at the time. This was useful in cases where we were not able to find many supervisor-student relationships (e.g. for John Dunlop at Harvard), but because it was so labour intensive it could only be used to supplement existing data collection strategies rather than being a primary method.

Despite this exhaustive and multi-faceted approach, we knew that our sample was still likely to exhibit unknown and multiple selection bias issues. Some selection bias was certainly mitigated by the use of multiple sources – for example economists with more recently active careers might be more likely to be in the RepEc; hence the search for multiple sources. However in some occasions we were able to find very large rosters of students, seemingly all the students a given father supervised. Given that this known coverage highly uneven, we needed a sampling strategy.

Once we exhausted multiple sources to find as many students as possible, we had to establish a sample size. The sample was determined by establishing the 'average reproductive rate' (how many PhD graduated per staff per year) for a given department over the period of analysis (See Figure B.1. Appendix B for details on number of staff and PhD graduates at the respective departments).

For those scholars for whom we had a larger number of students than the reproductive rate suggested, we randomly sampled to ensure we obtained the number of students suggested by the average reproductive rate multiplied by the number of years a faculty member was at a given university. For some scholars we did not sample from an existing population, because we had below the rate suggested, after exhausting all possible sources. In this regard, information from memoirs and other accounts of departmental culture also helped to establish whether the number of students we were able

to obtain was an accurate reflection of the father's reproductive career or not.[39]

The use of academic genealogical data has come under some criticism, depending on the application. For example Adams (2010) argues that academic genealogies do not establish evidence of intellectual traditions. Just as biological genealogies in human family trees do not carry with them the attitudes and ideologies of their forbearers: It is not necessarily true that a supervisor-student lineage carries all of the bias of the previous generation with it. We agree that academic genealogies should not be interpreted as an unbroken bloodline of actual thought or ideology. Individual academics deviate from their supervisors all the time. To the extent that supervisor-student relationships convey a particular set of intellectual alleles, this is certainly not as deterministic as the alleles that biological children inherit from their parents.

Yet academic genealogies do tell us valuable information on professional training and socialization. Students trained within a given university department share certain common forms of socialization; students who are supervised by the same individual share an even more common core of guidance, professional advice, and intellectual training. Mentoring networks within academia are of course wider than a given individuals' PhD supervisor, but that supervisor is likely to leave a lasting trace on the way the PhD student-cum-new-Assistant Professor thinks about the field, including their orientation toward particular 'schools' of thought within economics.

The important question is whether genealogical data confers useful information at the point in history of the profession – a period of significant division. In this regard the notion that a student of Joan Robinson is likely to have the same perspective and research agenda as someone who was a student of Milton Friedman seems very unlikely. A reasonable assumption is that a student carries more of their teachers' intellectual imprint than from other individuals remote to their professional socialization. Thus while we agree that genealogical links don't necessarily confer distinct and continuous intellectual traditions or specific ideas, they do convey a variety of useful information.

To know that a scholar was trained at MIT in the late 1970s tells us something about the environment that they were exposed to. University departments are institutional machines designed to forge a particular routine of socialization on students. Because faculty within a department design those very routines, university departments can be seen as 'replicators' in the sense of transmitting intellectual orientations from one generation to the next. Each department has a particular culture at a given point in time, and this is likely to make an imprint on the minds of the generation of scholars that emerge from a given department. The history of economic thought implicitly recognizes this when it emphasizes particular economic departments and institutional environments at particular points in time as being unique in generating distinct intellectual work. The socialization of students into a given academic department makes an important difference to how people think and the work they do. As George Stigler (2004: 92), one of our NL fathers, put it himself in a retrospective lecture on his own intellectual development,

> "Possibly if I had gone to Harvard instead of Chicago, I would have been a believer in monopolistic competition, a student of input-output tables, or a member of the Mason school of industrial organization."[40]

Academic lineages have currency because these relationships are inter-subjectively understood to be important. Where you trained matters. It

[39] For example we found very few students for John Kenneth Galbraith, even when scouring his personal archives and exhausting many biographies, autobiographies and other sources listed above. Yet in most accounts, and after contacting a prominent biographer it became clear that Galbraith did not supervise many PhD students over the course of his career. The same finding was true of George Stigler, for example.

[40] He notably added, "But I do not attach high probabilities to these possibilities."

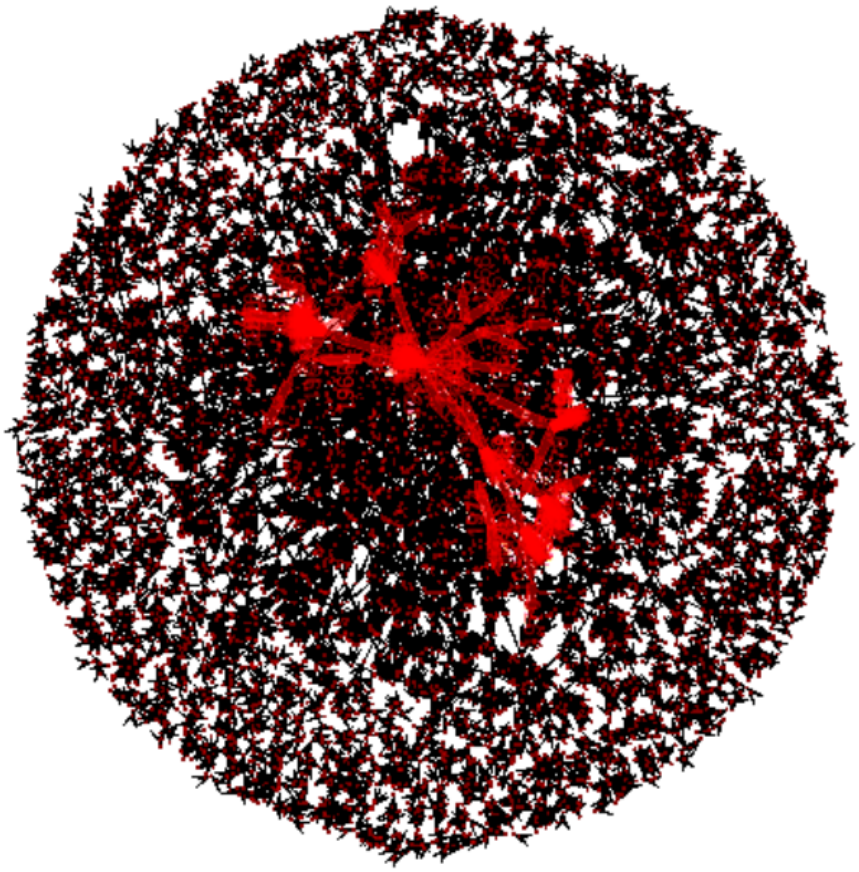
is a well-established social fact that who your supervisor was is an important component of professional advance. Particular intellectual trends within economic thought are traced back to particular university departments at key points of intellectual flourishing. Naming one's supervisor – or being asked who they were – is an important piece of information when one is on the academic job market: 'Who did you work with?' is a very frequent question when economists are first introduced to one another, especially at the early career stage. Even when this is not asked, many academics will signal their academic lineage as a way to position themselves among their peers.

While academic lineages matter, the causal chain across a lineage is not deterministic. A given economists' lineage is important, but it is important as an 'imprint' that tells us something about common forms of socialization and professional training. To say that supervisory lineages convey an important intellectual imprint is not the same thing as assuming that a lineage *determines* someone's thinking. Moreover, it is reasonable to imagine a particular decay 'across generations'.[41]

Figure 1 above depicts RepEc Genealogy data and the forward path of Milton Friedman's genealogy within it, as an illustration how far successive generations can spread along the entire network of economists. The red ties show he linked chains of supervisor-student relationships that flow from just this one central node. Across just a few generations the number of students with this lineage increases considerably.

[41] For example both Ludwig Von Mises and Joseph Schumpeter were both students of Eugen Böhm von Bawerk. Von Mises showed greater continuity with what became known as the 'Austrian School' of economic thought than Schumpeter did, but both of these famous economists were profoundly influenced by Böhm von Bawerk in terms of their theory of capital, business cycles, and the nature of innovation and markets. Students of Schumpeter clearly drifted further afield of Böhm von Bawerk's economics in significant ways, though some (e.g. F.A. Hayek) continued within that particular tradition.

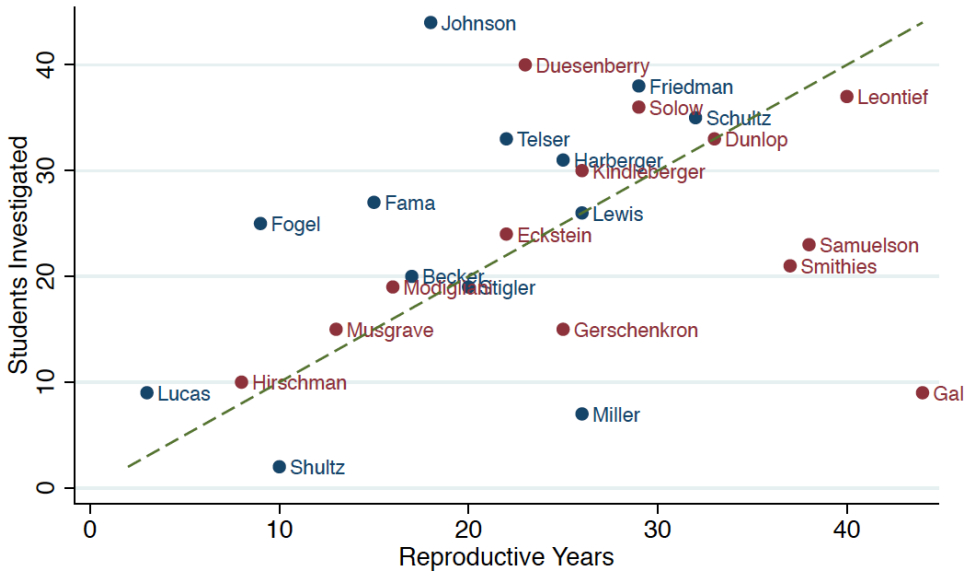
Figure 1: Milton Friedman's Genealogical Forward Path in the RepEc Network



While this kind of multiple-generational analysis is useful we decided to stick with the first-generation descendants of NL and Charles River descendants, for three reasons. First, Using the RepEc data alone proved patchy at best when it came to constructing even first-generation lineages, suggesting the need for supplementation and using a diversity of sources as described below. Second, we found some evidence of bias in the RepEc records - not surprisingly given the breadth of genealogical data for NL father lines (since they won out). Third, and most importantly, the strongest case to be made for the transfer of ideas, culture, and professional socialization from one generation to the next is clearly from the Fathers to their PhD students. Further down the line the decay rate and drift from a core set of ideas is increasingly uncertain.

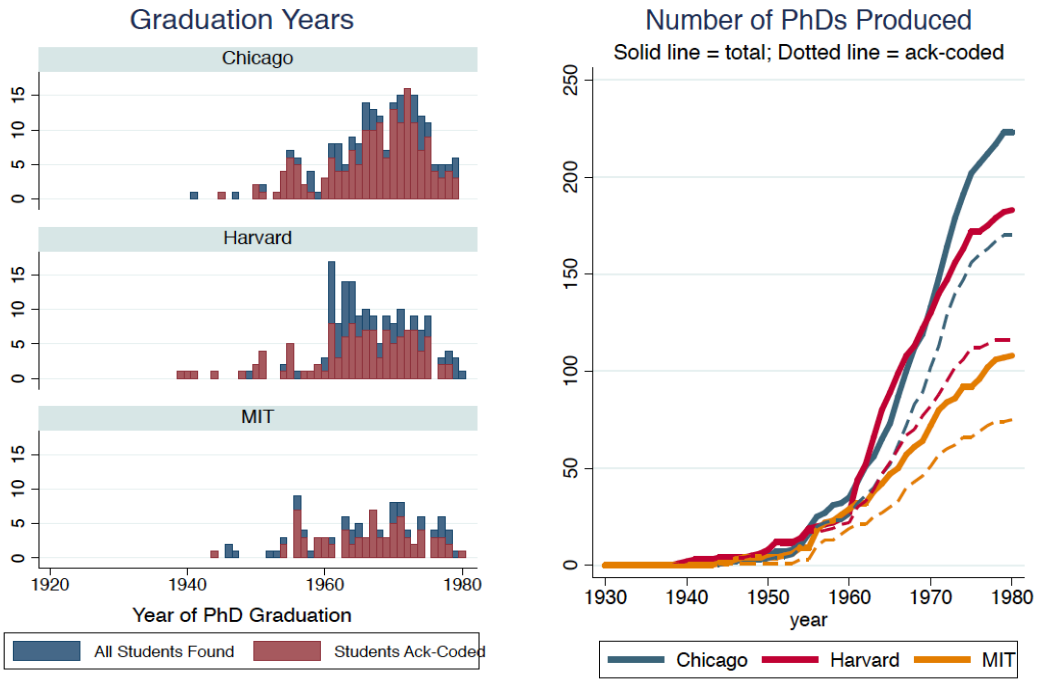
After finding as many first-generation students as we could for each father in our study, we then compared coverage across both the NL and Charles River groups. Figure 2 below maps out the number of PhD students we were able to find, measured against the total 'reproductive years' of each Father – measured as the total number of years they were working at their respective Universities until 1980. While this varied across fathers, we did not find a significant bias across the two groups on aggregate.

Figure 2. Number of students sampled per father and the number of reproductive years



There was a divergence in the total number of students we were able to find career and publication information on, relative to all the students we found. Figure 3 below plots the frequency reproduction rates of economists across the three universities studied, with the left graphic showing the cumulative number of PhD students 'produced' during this period and the right showing a bar graph representation of the actual reproduction rate at each year in time.

Figure 3. Number of PhDs graduated and years of graduation.



Attributes of Economists' Current Achievement

In total we were able to gather information on 566 different students – 270 for Chicago, 197 for Harvard and 99 for MIT, plus information on all Fathers from each university. We first assessed whether or not the different groups had different levels of success in having their work **cited by the rest of the economics profession at large**. We then move to patterns of **in-group citations:** the extent to which each group cited works within their own group vis-à-vis the other group.

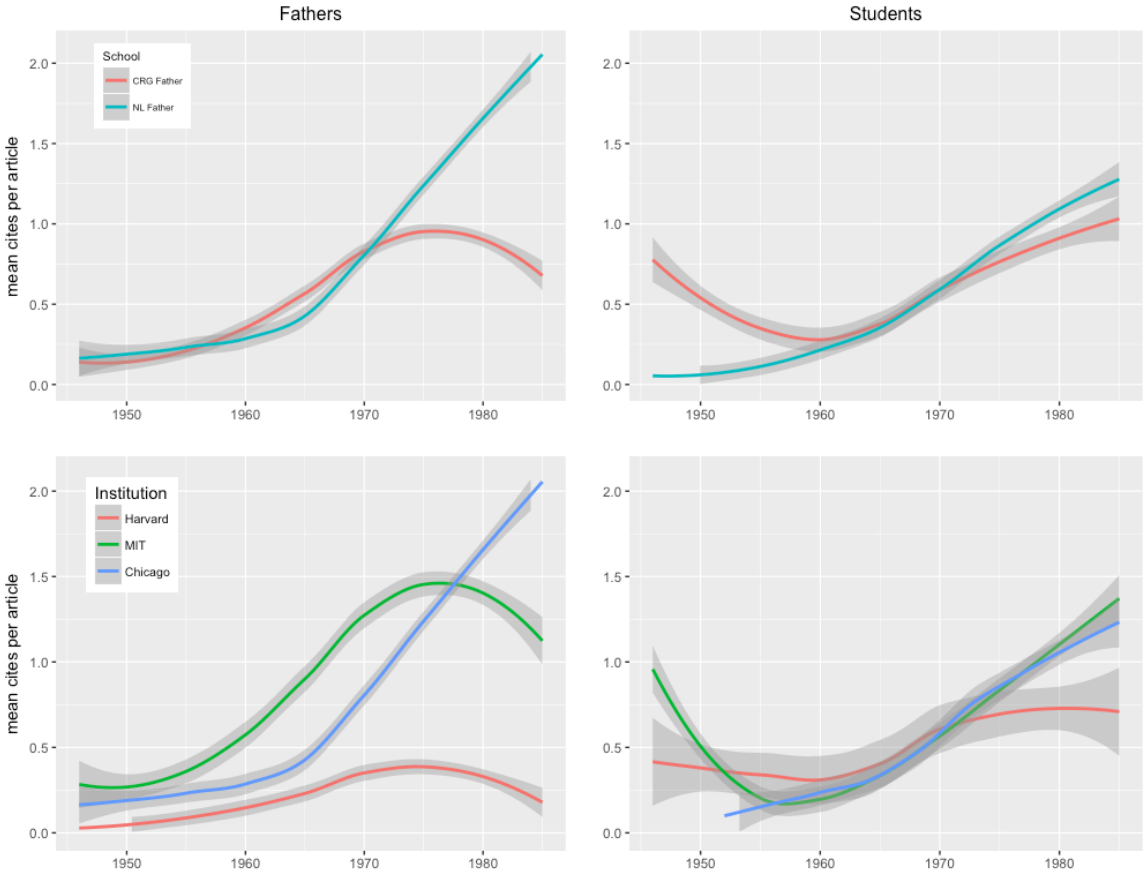
Citations

We constructed a data set containing the time-variant citation count for both father and students. This enabled us to compare the relative academic performance of our treatment groups over time. We used Web of Science (WoS) as the primary data source when collecting this data. For historical citation data, WoS is superior to e.g. Scopus and given our interest in mapping the period 1960-1985, we opted for WoS. However, we also scraped citations from Scopus to check the robustness of results for the later part of the period. In some cases coverage was slightly better for Scopus data for the later part of the period, but the relative citations scores remained unchanged. The importance of counting citations back in time, lead us to opt for WoS data. We recorded only citations from and to "articles", "reviews", "notes" and "letter". We discounted self-citations.

As shown in Figure 4 below, we disaggregated the citation into fathers and students for the two schools of thought groups as well as for departments, breaking the CRG group into Harvard and MIT. The Figure tells us a number of things. Starting with the fathers, while the two schools of thought followed each other up until 1970, the neoliberals took off between 1970 and 1985. At the end of the observation period, the neoliberal fathers on average get cited almost three times more per article than the CRG group. Yet, the story is somewhat different when we disaggregate to the level of departments. Here, the Chicago take over is later with the MIT group taking the lead up until the late 1970s when their citations start to decline.

When it comes to the students, roughly the same pattern can be seen although the difference between the groups is harder to trace. While the CRG students in the late 1940s and 1950s received many more citations than students of the neoliberals, they followed each other closely through the 1960s only to see the tables turning during the 1970s where the mean citations count for students of the neoliberals increased relative to the CRG group. However, when we disaggregate to the level of departments, again this story is complicated. Clearly, the MIT students account for the difference during the early period, but from the mid-1950s and onwards the three groups follow each other closely into the 1970s when citations among the Harvard students started to stagnate. During the 1970s and 1980s, the Chicagoans and MIT students followed each other closely.

Figure 4. Mean cites per article for schools of thought and departments



In-group citing

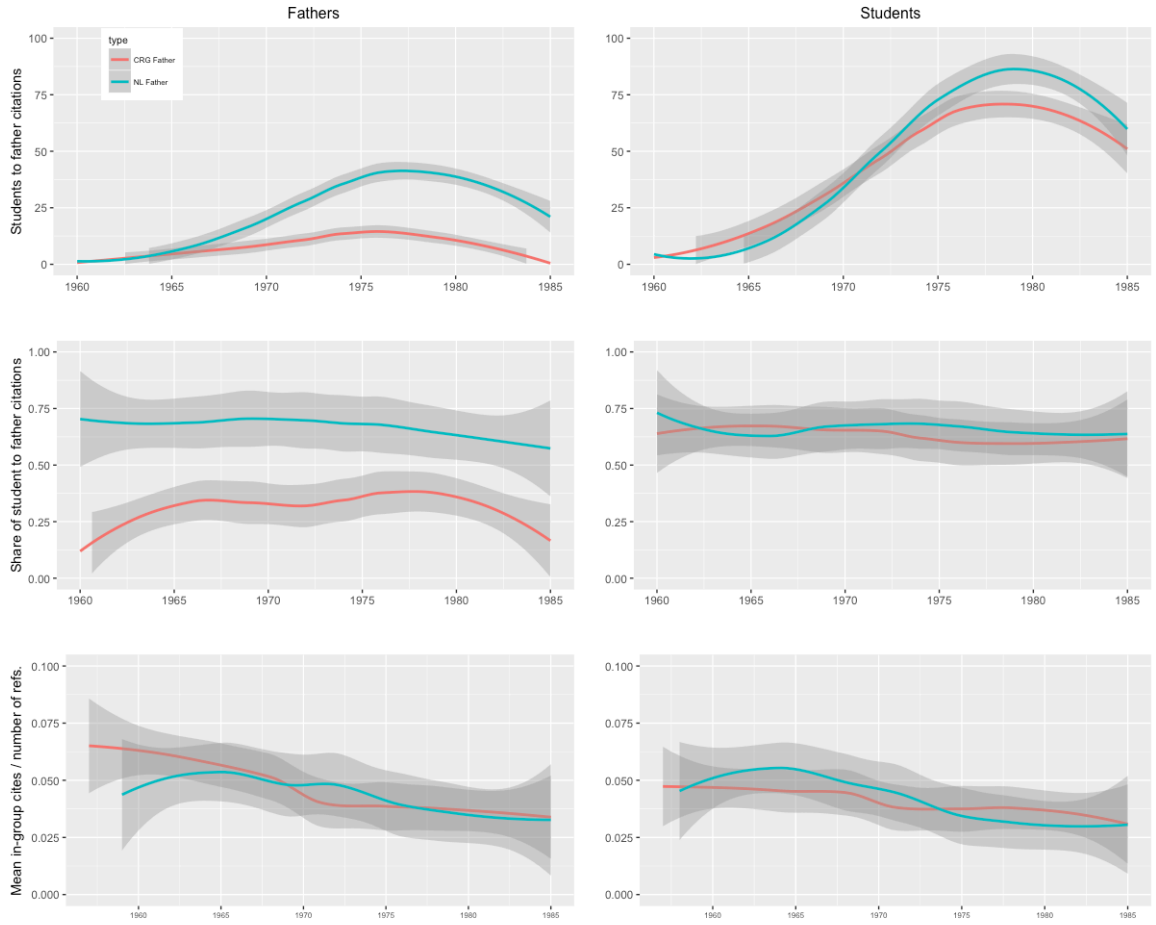
Besides citation counts, we also constructed the time-variant network of citations occurring within our sampled population. Again we opted for WoS data. All articles of our sample population were scraped from 1940-1985, including the article's reference list. Names in the reference list were manually coded and matched to the author names of the articles, enabling us to track citations between any one of the individuals in our population (both fathers and students). Via this data we could observe citations within and between students from the varying schools of thought as well as within between students and their supervisors. This enabled us to interrogate whether our socialization assumption held, and whether this socialization involved a transfer of ideas and sense of belonging in the group. We measured 1) the total number of in-group citations, 2) the share of in-group citations among all citations within the population and 3) the mean in-group citation per reference listed in the sample publications. All three measures were broken down to 1) student-father in-group citations (a student of the school of thought citing a father of the same school of thought) and 2) the student-student in-group citations (a student of the school of thought citing another students of the same school of thought). To avoid censoring issues, we only counted a publication's citation for a time window of 20 years from the date of publication. We report our measures in Figure 5 below.

A number of trends stand out. First, in terms of total in-group citations (top row), the 1970s represented a period of rapid growth where the two schools peaked both in terms of student-father and student-student citations. Part of this growth was likely to be due to the

overall growth in the number of students that graduated. Yet, the decline starting in the late 1970s suggests that the previous years did represent a period of heightened intensity in terms of in-group citation behavior.

The second point on citations is that the relative propensity to cite a father within one's own group vis-à-vis the counter-group, a significant difference can be traced between the two schools (leftmost middle row). Of all their father citations, students of the neoliberals inclined much more toward in-group citations. In contrast, the CRG students in fact were more inclined to cite the fathers of their counter-part than they were citing their own. Whether these citations were negative or positive citations is an issue we need to look further into, but nonetheless it suggests that that the neoliberal fathers were setting an unavoidable agenda that the new generation of economists had dealt with across ideological divides (we note here that our analysis of acknowledgements within and between the schools similarly revealed that the CRG students acknowledged the neoliberal fathers to a greater extent than their own – see below). In fact, when we consider only the relative propensity of citing a fellow student, the two groups display en equal propensity towards homophily in their citation behavior. In-group citations namely represent roughly 70% of all student-student citations within the sample across the period (rightmost middle row). This number is equally high for neoliberal student-father citations, but well below 50% for the CRG students suggesting heterophilous citations behavior on their part.

Figure 5. Selected in-group citation measures for the two schools of thought



This leads us to the third point on citations. The question remains whether the relative share of, not merely our sampled citations, but all citations published constituting in-group citations differed between the two groups.

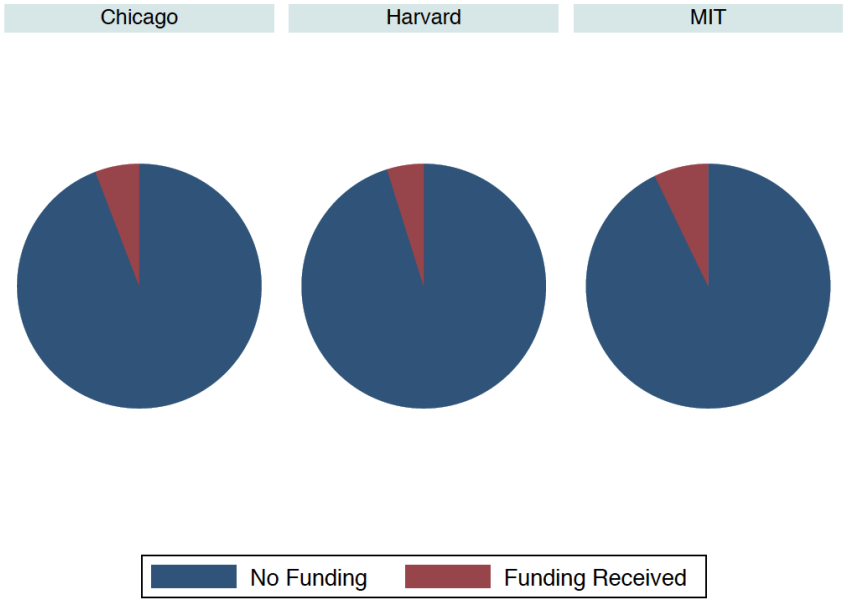
To measure the relative propensity to cite one's own peers given the total number of references one direct at all peers, we counted the share of a publication's references that were in-group citations. This reveals that in fact the neoliberal students not only cited their fathers and each other more, but they also generally cited more. Therefore, when accounting for the total number of references, not only was the difference between the two groups in terms of total citations glossed over, a decline in the propensity to "spend" a citation on a father or a student from one's own school could also be traced. However, here we must consider that as the number of references in publications grew, the baseline likelihood of in-citing fell.

Funding

To what extent was the neoliberal ascendance the result of selection mechanisms such as external funding? Our data allows us to assess this, because external funding is revealed through acknowledgements of published articles. We also match names to specific amounts of NSF funding.

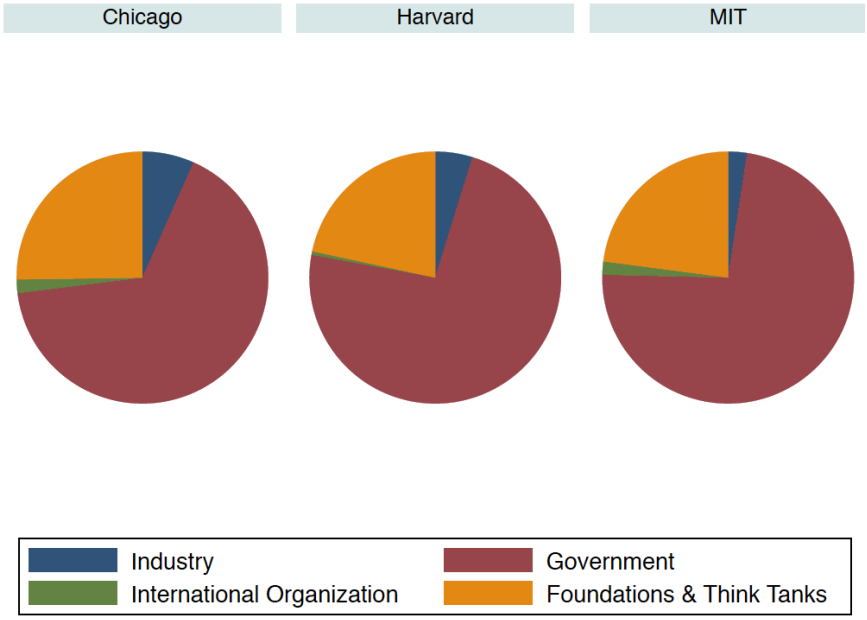
Figure 6 shows the proportion of all articles published that had flagged external funding in their acknowledgements. We excluded internal university funding for counting these proportions. There appears to be no significant difference in funding of journal articles. If anything, MIT is slightly more well-funded by proportion.

Figure 6. Proportion of articles flagging funding.



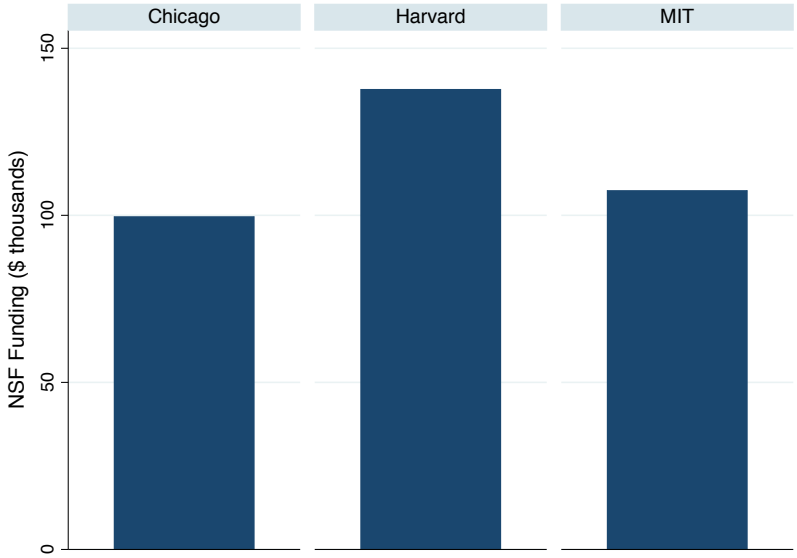
We then investigated whether the sources of funding (within the red pie slice above) was differently apportioned for each of the universities. To do this we split funding into four categories: Industry, Government, international organizations, and foundations and think tanks. We found only superficial differences across these groups, as illustrated in Figure 7.

Figure 7. Funding sources.



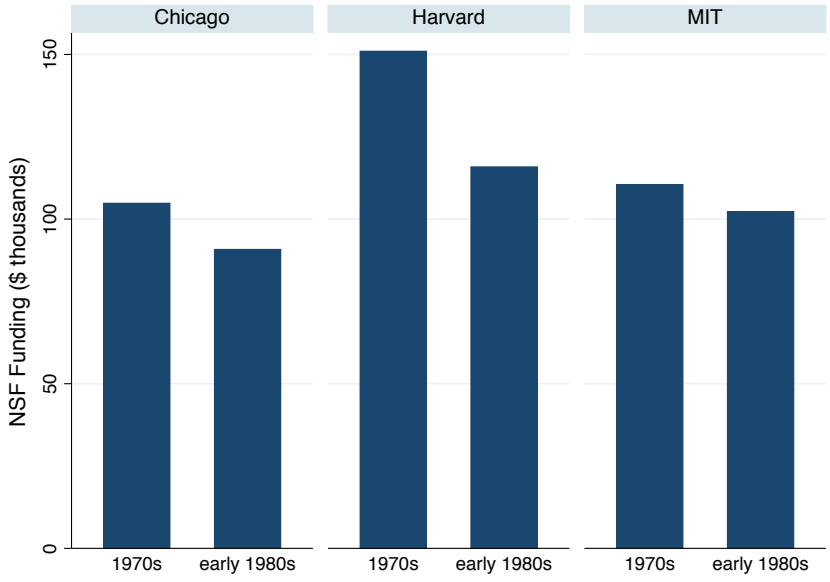
The results of this simple comparative analysis are shown in Figure 8 below. NL descendants were slightly underfunded relative to the journals they published in during this period. For the peers of NL descendants, there is a much higher funding rate than other scholars within the same journals they published in during this period. Government funding is clearly the largest contributor, by frequency, of all the articles in our sample. Among government institutions the National Science Foundation (NSF) is by far the largest. We matched names of economists in our sample into a database of NSF funding from the 1970s until 1985 (data fidelity is patchy in the early 1970s). Figure 8, showing average NSF funding rates for the three groups, suggests it was Harvard that was relatively advantaged, and not Chicago.

Figure 8: NSF Mean Grant Funding to Economists (in $ 1000), early 1970s-1985



To better assess the presence of a potential 'selection effect' in which, over time, more NSF money gets thrown at Chicago economists because of the attraction of neoliberal ideas by the early 1980s, we broke the data down into two periods, as shown in Figure 10 below. This advances more 'null evidence' of a funding advantage for Chicago economists.

Figure 9: NSF Funding to Departments in the 1970s and early 1980s



Career Paths

We then assessed whether students of the different Father groups had different career trajectories, following graduation from Chicago, Harvard and MIT respectively. To investigate this we examined the career trajectories of students in our sample as well as their current placement (n.b. we have not completed the matching process of all

students to date) based on the AEA directory in 1985). We coded sectors of employment for trajectories as well as current placement.

Assessing career paths helps us to adjudicate two potential causes of the NL ascent. It is possible, for example, that descendants of NL Fathers went on to more government positions than students of Charles River Group Fathers, suggesting a form of infiltration not related to academic performance. Alternatively, it is possible that the descendants of NL Fathers went on to take up positions at more prestigious academic institutions, while Charles River Group descendants did not. Of course it is easy to think of exceptions to both of these trajectories, but we are interested mostly in aggregate effects, not the very famous economists that came from each of these universities historically.

At first, we inspected the distribution of sectors in which the different groups worked over time. Figure 10 tells is that for most of the observation window, there was little difference in the sectoral distribution of our alumni. If anything, children of Chicagoans tended to find employment within academia a bit more than out comparison group. Harvard and MIT students, by contrast, moved to industry and government jobs slightly more than their peers from Chicago.

Figure 10: Sector Distribution by University Over Time

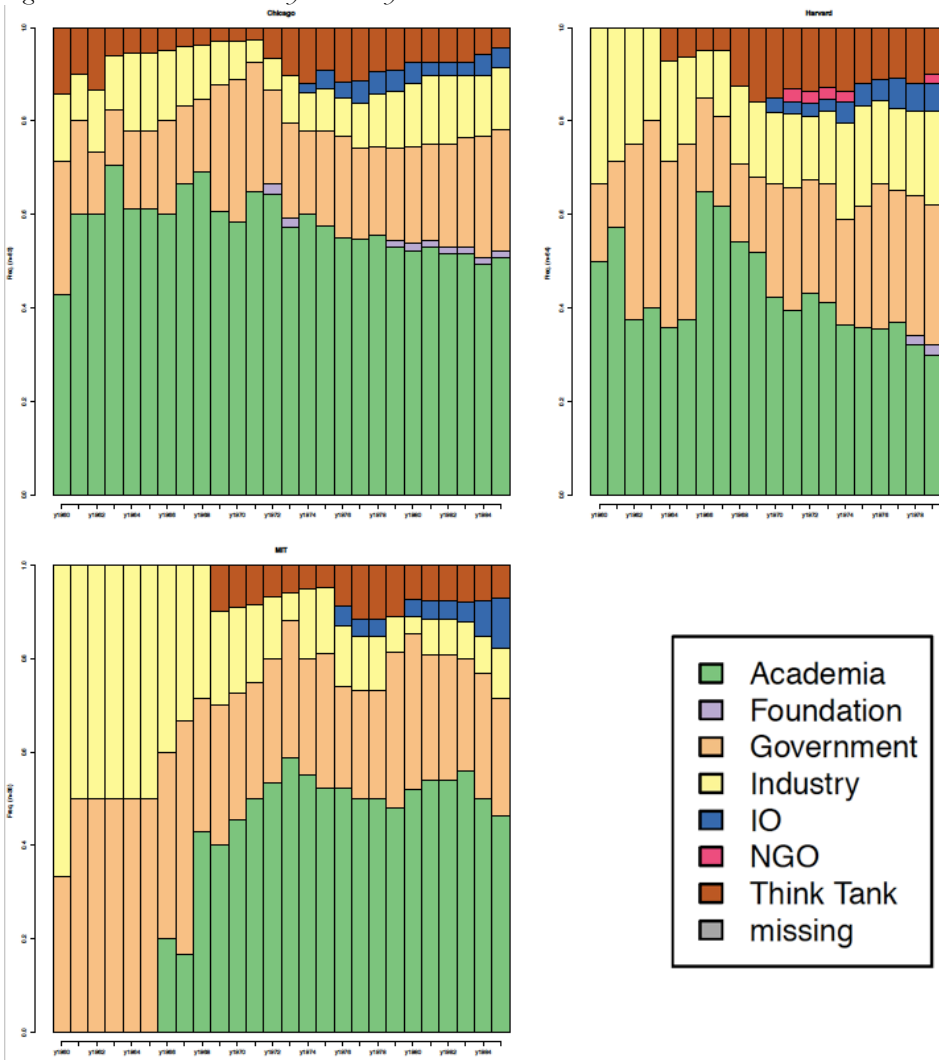


Figure 11 illustrates, via an alluvial flow diagram, the 'flow' of students from the three universities into different kinds of positions by 1985, taking each of their positions into account over the course of their career up until that point. Figure 12 then breaks this down by non-academic placements, and Figure 13 shows the range of governmental institutions where economists were placed. Figure 14 shows the flow of career paths from universities in academic institutions of high and low prestige, which we classified based on an historical study of the prestige of US economics departments in 1985 (Tchichart 1985).

Figure 11: Careers Paths from Universities to Sector

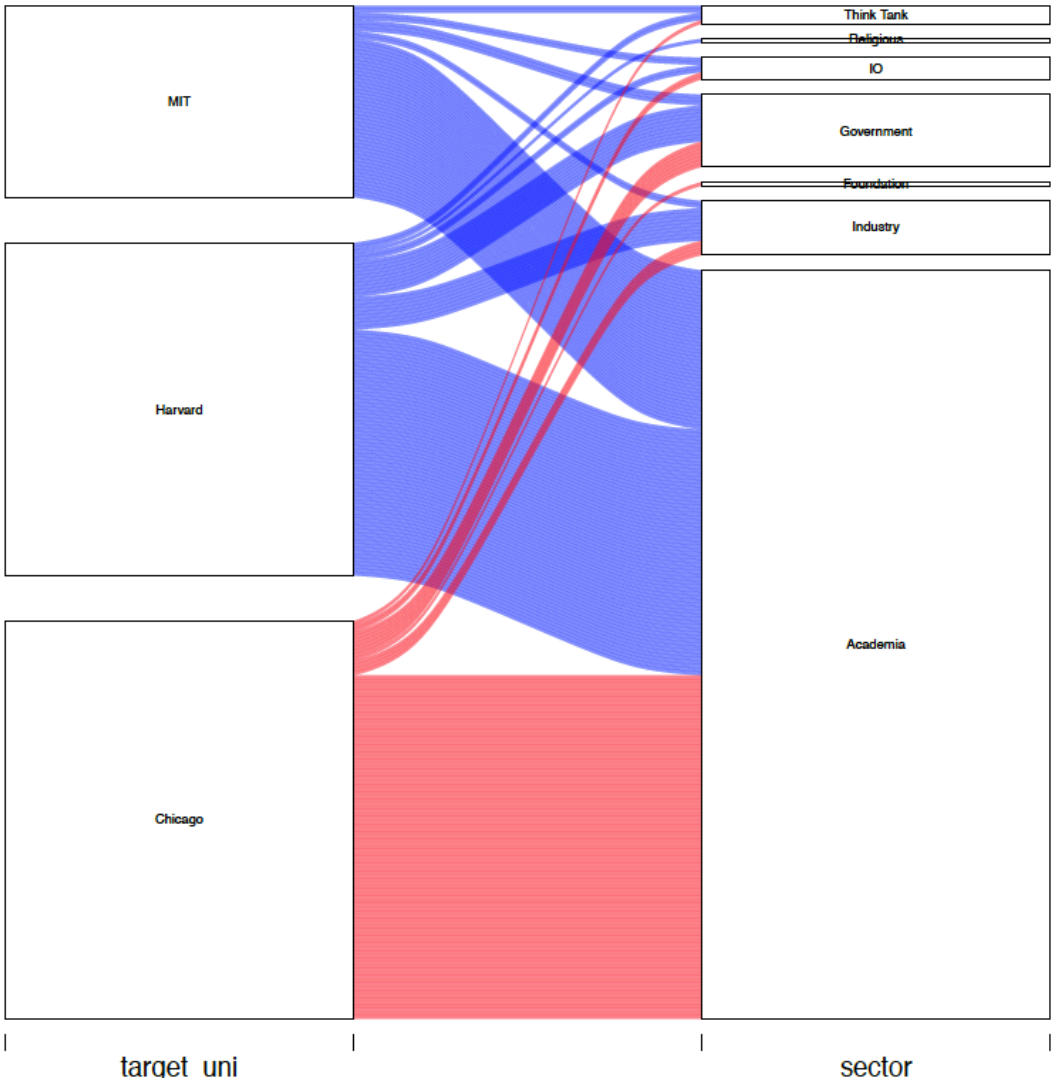


Figure 12: Careers Paths from Universities to Non-Academic Sectors

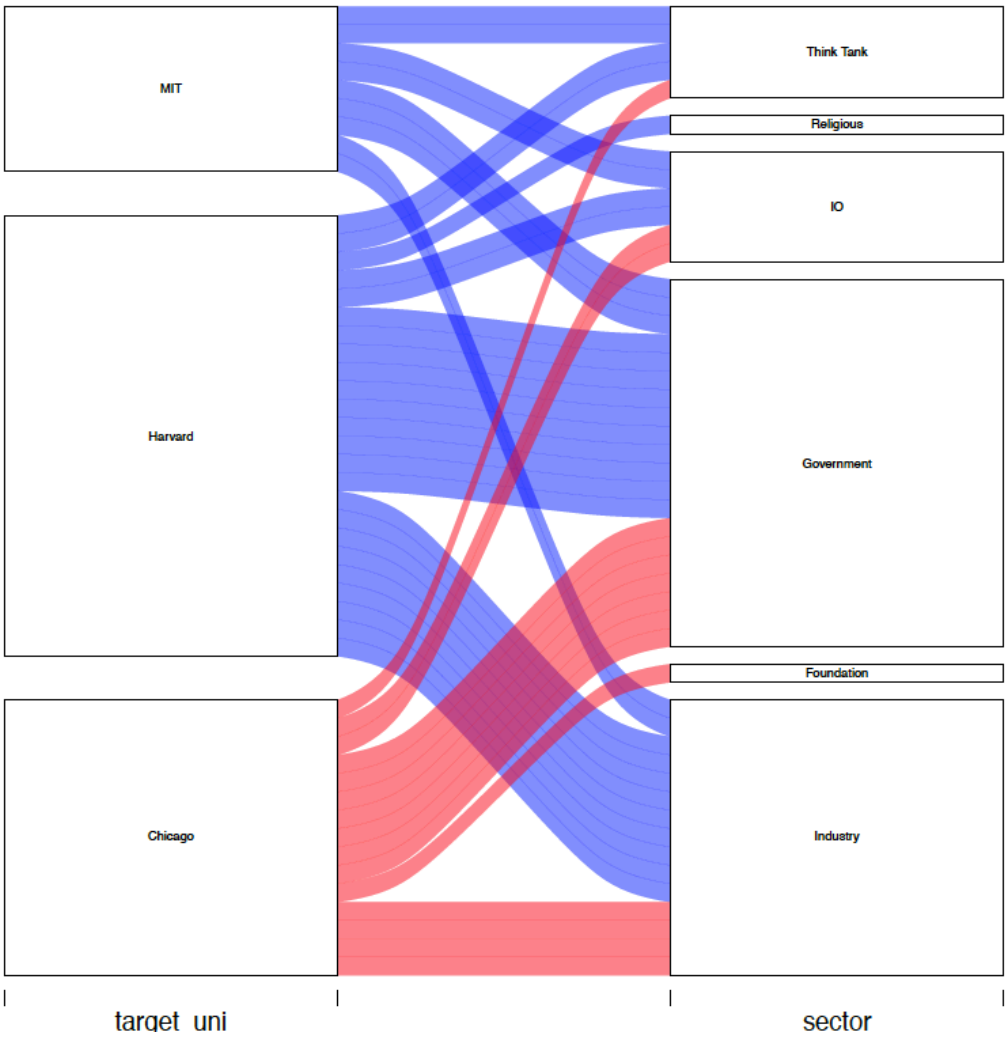


Figure 13: Careers Paths from Universities to Government Agencies

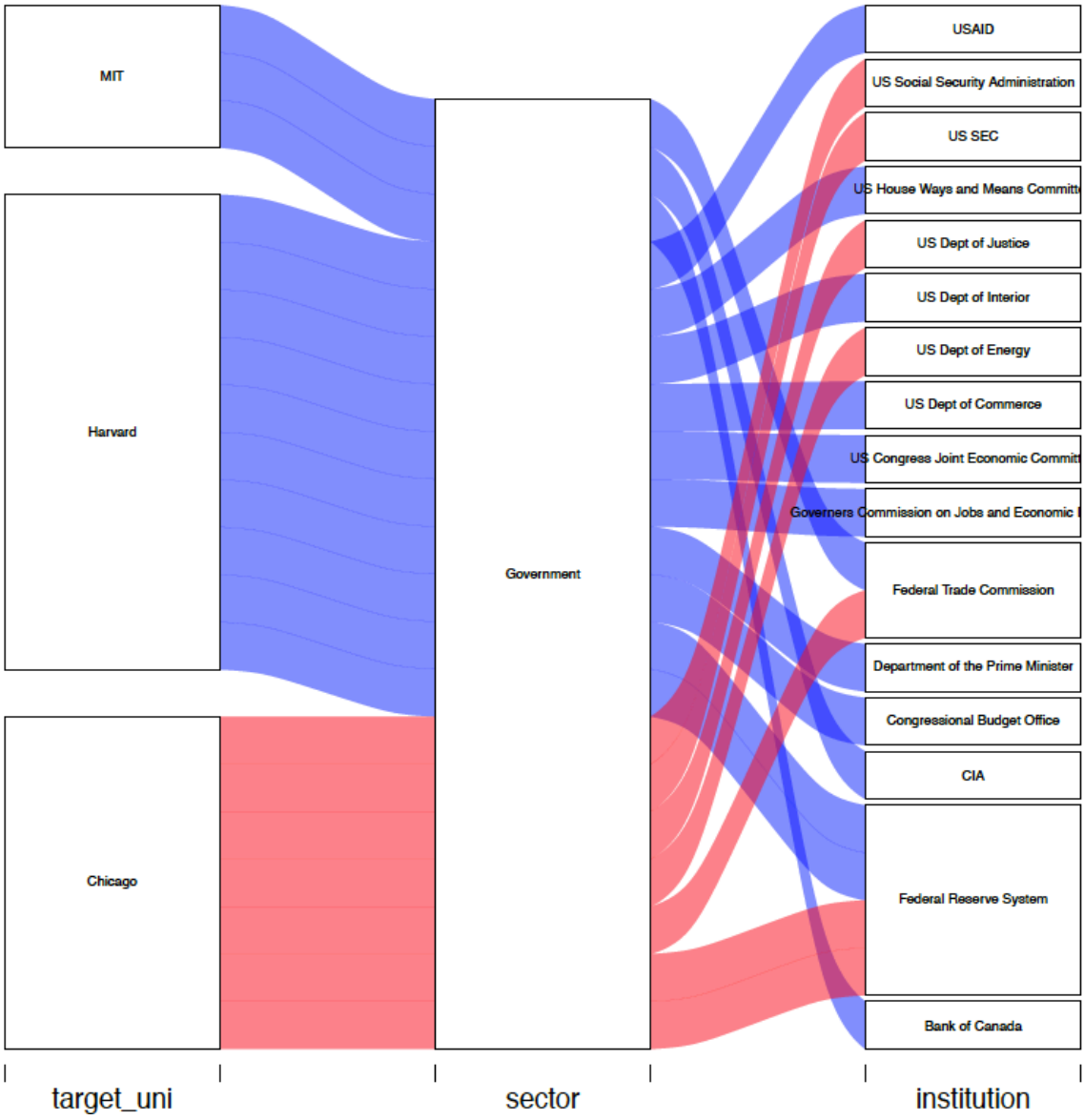
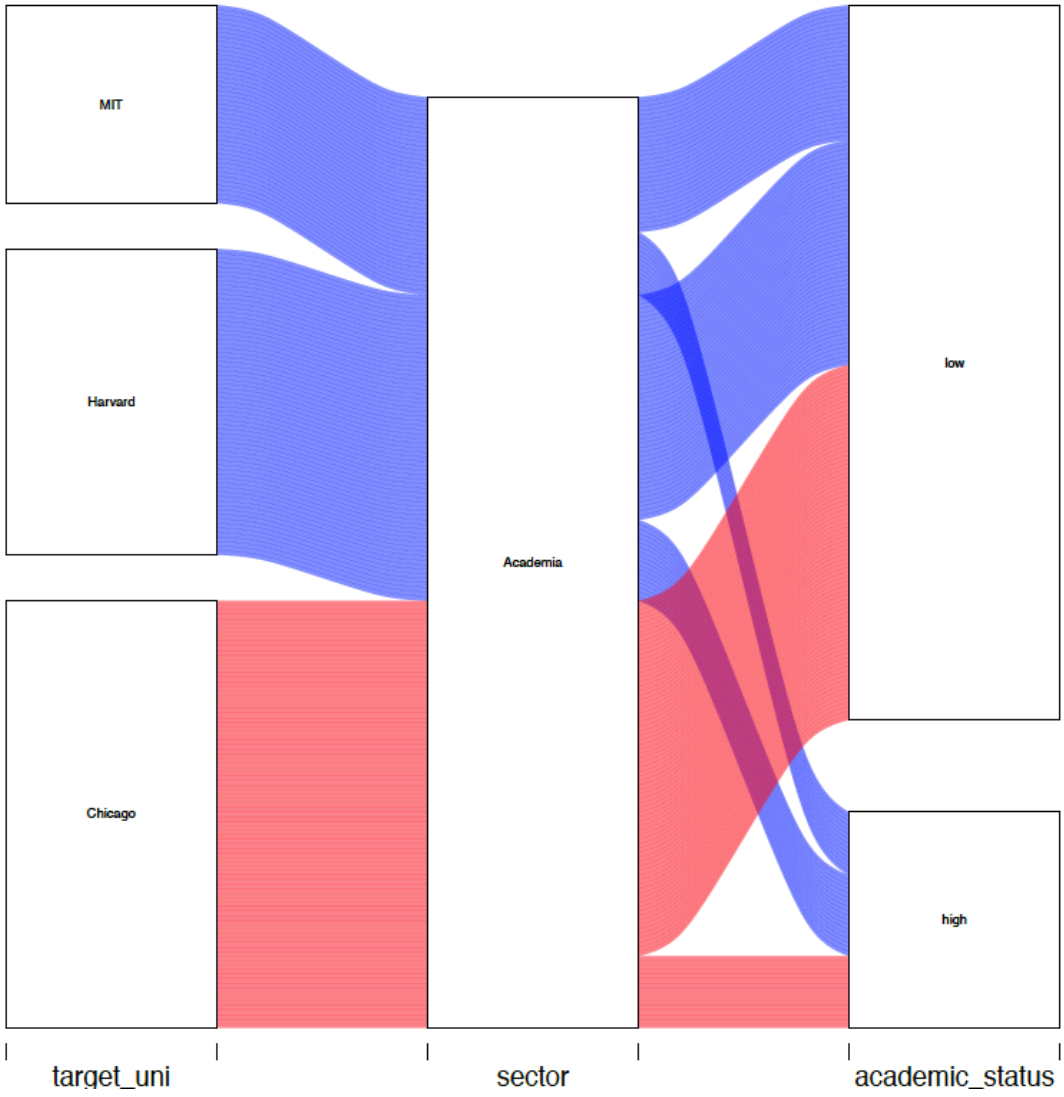


Figure 14: Careers Paths from Universities to Prestige of Employing Academic Institution



If the lack of a significant pattern of career paths was not evident by these figures, then a simpler table makes the point even more starkly. Table 2 shows the proportion of positions solely in 1985 for the different categories.

Table 2: Employers by Sector, 1985

	Chicago	Harvard	MIT
Academia	86.36	73.91	83.02
Government	6.36	10.87	5.66
International Org.	1.82	2.17	3.77
Industry	3.64	9.78	3.77
Religious	0	1.09	0
Foundation or Think Tank	1.8	2.1	3.7

If anything, former Harvard PhDs are more well-represented in government by this point, as well as in industry, the former of which is more remarkable given the political climate in the US at the time. Most significantly for our study is the fact that former Chicago PhD students are no more represented in industry or think tanks than thee other two universities' PhD students by 1985.

Acknowledgement Networks

We then turned to the analysis of social dynamics at work within the economics profession, in terms of professional practices related to in-group identity and referential practices. Our evidence above points to only one significant difference that may have advantaged the NL Fathers and their children over time, and that was the higher degree of intellectual allegiance to the Father figure, as shown in the much higher in-cite rates.

Numerous accounts of what the Chicago economics department was like in the 1950s-1970s offer accounts that suggest something very important at work: a unique intellectual culture. While sometimes there is a careful differentiated between 'the Chicago School' and 'Chicago economics', these differences certainly come out in numerous historical accounts of what made the Chicago school unique – beyond the particular (ideological) content of economic research or the ways in which it was pursued (methodology). From the 1950s to the 1970s especially, Chicago was a special place.

Accounts of a distinct economics culture within Chicago during this period are quite common (Bronfenbrenner 1962: 72; Hammond 1999). Already in 1962, Miller asserted that "Chicagoans do in fact form an interconnected group with a set of common attitudes and interest which distinguishes them from the rest of the economics profession". (Miller 1962: 64). Many manifestations of this uniqueness have had to do not just with the department's internal culture but its graduate program. For example the Department had a very strong commitment to graduate student training and support (Patinkin 1981: 10-11; Biddle 1996: 189), the department focused intensely on its graduate student cohorts (Zellner in Rossi interview 1993: 290). Early on in his tenure, Friedman made a series of critical changes to the graduate curriculum and to PhD examination processes early on, and remained a pivotal figure to the flair of the department's attitude to graduate training; by all accounts he was a rigorous, but intellectually generous figure (Reder 1982: 10). Chicago PhD students had very few restrictions on graduate students to pursue their interest (Zellner in Rossi interview 1989: 306-307). The business school was also kept intentionally close to social sciences, most notably to economics (Shultz 2016 Oral History: 56; Zellner interview by Rossi : 290). The department had a special culture, unique and esteemed for its time (see Schultz 2016). For example weekly seminars were a unique contribution to the field at the time (McCloskey 1992: 19), and were regarded as extremely intense 'bloodthirsty' workshops at that (see Van Overtveldt 2007: 39-41).

One characteristic that shines through in these and other accounts is not just that Chicago was 'good' and/or that it was 'rigorous' but that it was *cohesive*. This suggests one particular way in which the NL ascent might have occurred: stronger in-group identity, and a tighter, more coherent group of early adherents. This has face validity in the sense that insurgents within many movements have greater internal solidarity than those already entrenched in power. It has more historical validity when one considers that, for example, the Harvard Economics department was by the late 1960s, having major internal problems.

Internal cohesion is not something easy to measure in terms of professional performance metrics. However we devised a new method that serves as a useful proxy for in-group affective ties among Fathers and Children of both the NL and Charles River groups of economists.

Figure 15: Network of Journal Acknowledgement Ties, with NL group in Blue and Charles River in Pink.

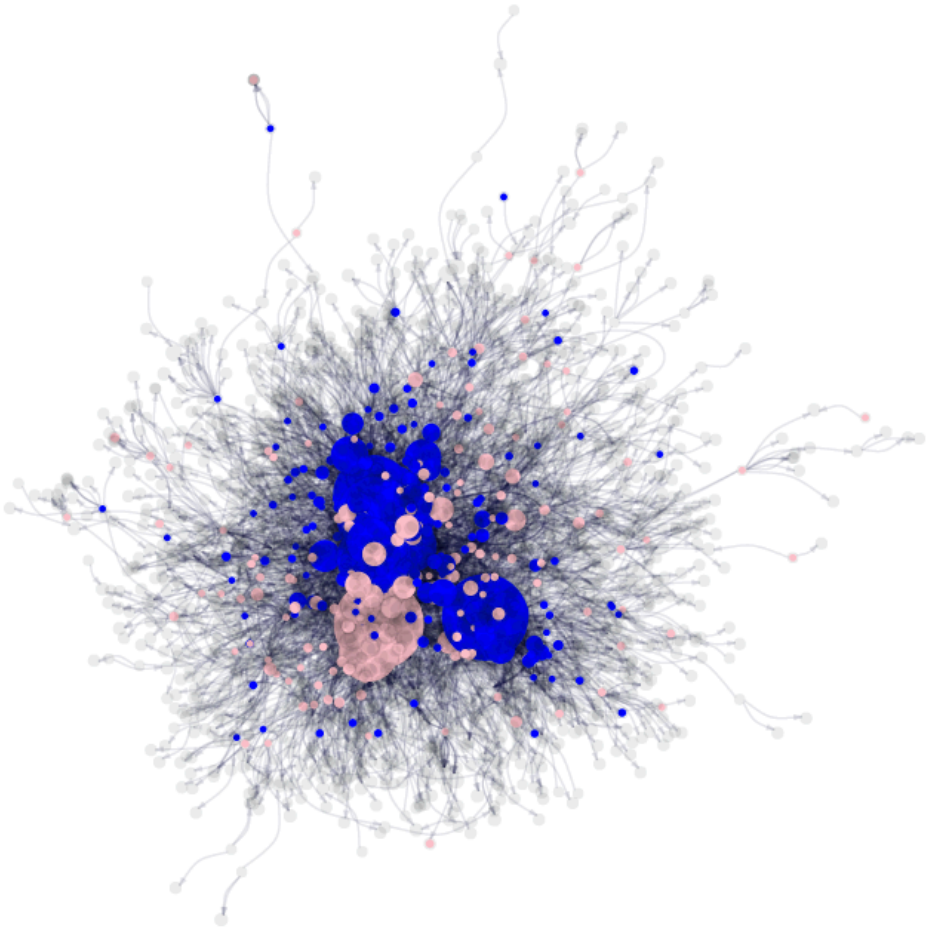
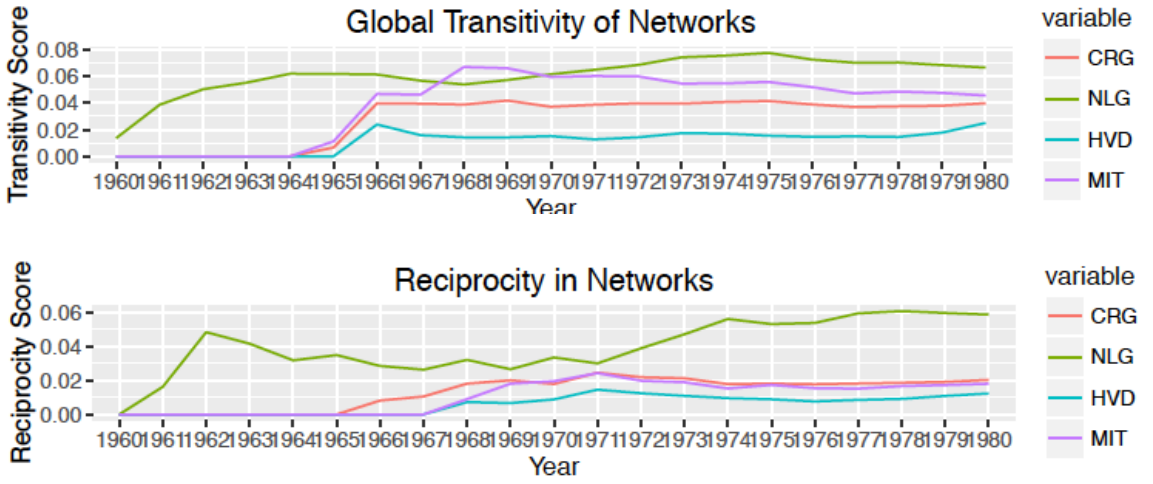


Figure 15 shows our large acknowledgement network that resulted, after extensive cleaning and matching of these acknowledgement data, which were coded by hand. To assess relevant forms of sociality we divided this network into separate networks for Chicago, Harvard and MIT and for acknowledgments that were made on articles in each specific year from 1960 to 1980. Specifically we used two network-relational measures. The first, global transitivity, measures the extent to which a given acknowledgement tie is transitive. This is a measure of in-group sociality in that it measures the extent of clique formation. As Figure 16 illustrates, the global transitivity scores were significantly higher for NL/Chicago-descended economists than for the Charles River Group economists. Even more significant were our findings for reciprocity within these networks over time – which literally means 'I thank you, you thank me' dynamics within the journal publications of the time. NL descended economists were much more frequently engaging in these observable behaviors, which lends credence to the idea that in-group identity and cohesion was an important part of professional performance of NL children and may have contributed to the NL ascent. This is also exemplified in the different publication venues that NL Fathers and Children published in during this period. Appendix

Figure B.2 shows a striking difference between the Charles River group economists, in terms of the relative prominence of the American Economic Review and the Journal of Political Economy – the latter of which which was a Chicago-based publication and thus served to both help cement a common vision and to help build up a 'safe space' for neoliberal ideas during an otherwise hostile period toward them in the profession.

Figure 16: Transitivity and Reciprocity in Economists' Acknowledgement Networks



Concluding Remarks

Why did neoliberal economics ascend? The literature suggests that scientific dominance was important for the Chicago School to be a key driver of neoliberalism. This can be seen in approaches that we typify as 'elites', 'empire', and 'ecologies'. Scholars working within these approaches suggest that the University of Chicago's scientific dominance was important for the propagation of elite power, for the training of foreign economic policymakers to align with the interests of American empire, and to spur on the unique institutional and social environment that made Chicago so competitive. In this paper we have provided a test of Chicago's scientific dominance in the 1960-1985 period. We emphasize the following empirical findings:

- In terms of academic recognition, measured by the mean number of citations per article, Chicagoans did outperform their peers, yet this effect really held for the fathers much more than their students. Also this difference was largely due to the underperformance of the Harvard group, since both fathers and students of MIT were on par with the Chicagoans at least until the late 1970s.

- The inter-generational cohesion and transfer of ideas was stronger among the Chicagoans than their peers. When it comes to 'citing the gospel', Chicago students cited their fathers more than their peers. In fact, students of CRG fathers cited Chicago fathers more than their own father. Yet, when accounting for the number of references listed in publications, this difference leveled out.

- Differential research funding did not drive neoliberal ascendance. In terms of funding amounts from NSF, Chicagoans received less than their peers. In terms of the relative distribution of grant mentions in acknowledgement sections, they had a slightly proportion of grants from

foundations and think tanks but correspondingly less from government.

- In terms of their placement and careers after graduating, the NL Children were not overrepresented in government, industrial, and international organization positions relative to their Charles River peers. NL Children went more often into academia, but overall placement performance is not significantly stronger than Harvard or MIT.

- One significant difference – possibly advantage – that the NL children had in terms of propagating their Father's style of economics was stronger in-group cohesion. This is a position supported by historical-qualitative knowledge of what the University of Chicago was like in the period under study and has the observable implication of higher transitivity and reciprocity in economists acknowledging one another in their published work.

Recent research on neoliberal economists has found that economists are important as intellectuals in policy change, but subordinate to politicians [42] and business people. [43] Our findings that while neoliberal 'fathers' were able to rely very heavily on their intellectual authority, in the early years this was more difficult for their doctoral 'children'. This may be due to the Matthew Effect - why cite an unknown economist when you can cite Friedman for the same idea? A further element is that winning intellectual victories may no longer have been the aim of descendants of the Chicago School.[44] Rather, a central aim was squarely focused on public policy change.[45]

Poorer academic performance in the early years compared to the peer group does not mean that they were not powerful. Poorer academic performance in the early years could very well be due to the profession in general seeing the scholarly community around the Chicago School as a (contested) normative project. The legacy of neoliberal economics as a radical movement still has traces and serious scholarship at the time may have wanted to disassociate. This may have left them less cited in the early years and less recognized by research councils. In later years however their academic recognition has increased tremendously and assessing their impact from a contemporary point of view places them above their peers.

Our data suggest that the NL children taking over their peers in terms of academic recognition in more recent years is unrelated to characteristics in the quality of their scholarship or early recognition of their work in academia. Yet we can speculate that their early success in creating ties with government may have worked in their favor, explaining their later academic success. The large uptake of neoliberal economics in policy is likely to have worked as a feedback mechanism 'mainstreaming' this school of thought, and thus working to boost their academic recognition by future generations.

Our results show that Chicago was not the overwhelmingly scientifically dominant institution, but was more socially coherent across generations, even if the children could not live up their fathers. Our findings also suggest that assuming the scientific dominance of the Chicago School serves to empower the standing of the scholars associated with that institution, if not the body of thought it propagated. Caution is needed here in avoiding a trap in which other economic ideas and models of the period are dismissed because they do not fit our construction of what was dominant economic science.

[42] Lindvall 2009.

[43] Fairbrother 2014.

[44] Another consideration here is that Friedman was known for his use of frameworks rather than strict adherence to models, and purported the view that assumptions were to be tested against their capacity to predict. Friedman's kind of economist was rigorously intellectual with an eye to policy application rather than maintaining science for science's sake. See Yonay 1998: 97, 189-190.

[45] Nelson 2001: 157.

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Appendix A: Measuring Social Standing of US Economics Departments, 1938-1984

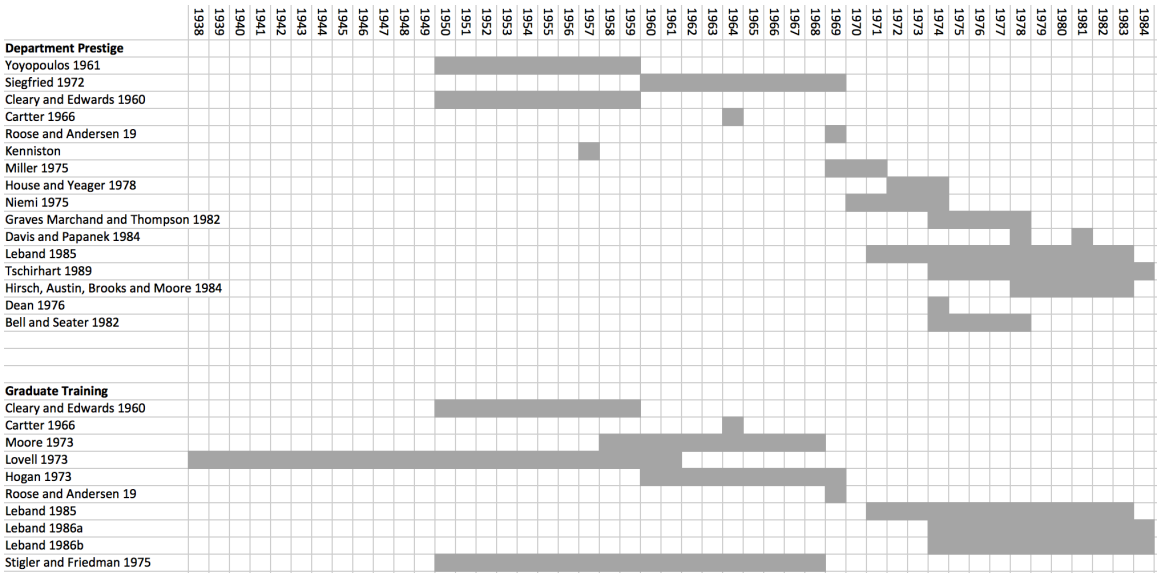
We pursued the measurement of two particular characteristics of university economics departments at specific periods of time. The first is the academic prestige of the university – how well regarded, within the academic community that particular university is, in terms of 'rank'. The second is the caliber of graduate training of the university – how well a given university prepares its graduate students for their future career paths as professional economists. Importantly, both of these criteria have to be attentive to the *historical* conditions of a given period, and cannot based on characteristics of a university that may or may not currently prevail.[46] The prestige of a given university department is after all not static but changes over time.

We consulted a wide variety of literature on departmental rankings during the period, and utilized historic data from 26 different quantitative studies conducted during this time, depicted in Figure A1, to build a new dataset.

Different studies utilized different methodologies for assessing departmental rankings, and these notably changed over time as different metrics became available and/or fashionable. The earliest studies of economics departmental rankings in the United States (or any other graduate program for that matter) began with peer assessments in large surveys – beginning with A.R. Hughes study in 1925, 'A Study of Graduate Schools of America' and then later looped into the American Council of Education's more extensive studies conducted in 1957 and 1964. While the sample group and precise measurements differed, all of these studies ranked departments by reaching out to department chairs, and later faculty in general, and asking which institutions were the most prestigious (Hughes 1925; Kenniston 1958; Cartter 1966; Roose and Andersen 1970). Such 'intersubjectively determined' ratings quickly were replaced when other studies (e.g. see Cleary and Edwards 1960) began to use publication *output* as a way to measure departmental prestige. These output-based measures took the number of pages within a given journal (first the *AER*, then an expanded list of up to the top 9 economics journals) and counted how much space within a given journal was associated with authors from a given institution.

[46] For example it is not the prestige of the Stanford Department of Economics *today* that matters for reproductive fitness of a given economist in 1965, but rather the prestige of the Stanford Department of Economics in 1965 that matters.

Figure A1: Studies of Economics Department Prestige and Graduate Training Included in our Data and Their Timelines



These various measures of general 'departmental prestige' were different from ratings of 'graduate training caliber'. Beginning in the 1964 study of the American Council of Education (see Cartter 1966), larger studies of ranking within the economics field began to assess not just 'where' scholars were at but also where they received their terminal degrees, i.e. their PhDs. In some cases surveys were conducted to assess the 'effectiveness' of the graduate program; whereas just as with the general department prestige indicators these also moved to a process of counting publication output, and in this case tracing back that output to where scholars had received their PhD, and in many cases calibrating those scores to the total number of PhDs awarded within a given department (e.g. see Cleary and Edwards 1960; Moore 1973; Hogan 1973).

In more recent times, departmental rankings have been challenged on a number of grounds. For example Thursby (2000) has shown the very high standard error on departmental ranks; Bair et. al (1991) show that elite academic institutions tend to hire one another's graduates, affecting the subjective ranks of elite institutions in a way that bolsters the subjective ratings of already well-established departments. Yet during the *historical* period under analysis, economists – and, importantly, Deans - treated these rankings very seriously. Scholarship conducted during this time and using data for the late 1960s suggests strong empirical support to the notion that the prestige of a graduate's department was being used as a predictor of their future performance in faculty recruitment (see Crane 1970). Studies of economic mobility conducted at the time suggest a clear predictor of job market success is the quality of the institution at which an economist earned their PhD (Ault 1982).[47]

Publication output in highly ranked journals was another indicator that begun to be used in the late 1960s and 1970s. In analysis of the latter period, Ault et al. (1982) found that it was not the quality of journals published in that mattered, but rather the sheer volume of publications that predicted

[47] A more recent study suggests the same pattern persisting more recently when it comes to publication success in top economics journals. Baghestanian and Popov (2014) find that the rank of an economists graduate institution works as a powerful signal when early career economists wants to get published in top-journals (2014).

upward job mobility. Of course the ranking of journals itself may be contentious.[48] Only some of the studies utilized quality ranks of particular journals to calibrate scores. One of them, however, specifically Tschirhart (1989: 210) demonstrated that the rankings are strikingly similar when such journal rankings are excluded.

We gathered historic data of a variety of studies, reported in the Appendix. Because we drew from a significant number of different studies, debates and corrections arose with respect to the best metric for departmental prestige at the time. By following these historical debates closely our data accommodates multiple corrections and data critiques that took place within the departmental rankings literature.[49] We excluded notable studies conducted during this period that focused on particular regions (e.g. Gerritz and McKenzie's (1978) study on southern economics departments) or on universities that did not offer PhD programs but rather were rated on the basis of Masters' degrees (e.g. see Blair et al. 1986). We also excluded ranking data that was particular to specific areas of expertise (e.g. Tschirhart 1989).[50] Our data does not suggest specific cutoff dates. We chose categorically to include measures for the 1950s, 1960s, and one for the early and late 1970s respectively. The 1970s were a period of not only great change within the profession but also one in which there was a larger volume of studies.

For each historic measure we gathered data on, we took the 'raw' measure, upon which ranks were based, rather than the rank itself. The reason for this is that rank positions exclude potentially valuable information about the true social hierarchy across departments, since they generate the sense that the difference between #3 and #4 is the same as #50 and #51. Many distributions related to social hierarchy look a lot more like power-law distributions, with a few institutions *far ahead* of the rest of the pack at the top end of an ordered scale; departmental rankings of economics departments are no different. An example of this is shown in Figure A2 below, which includes a rank of economic department's prestige scores (based on standardized article publication scoring) based on data by Tschirhart (1989: 203-208). Figure A3 breaks these down by decade.

[48] Recent evidence by Stern (2013) suggests that for top-ranked economics journals, reported impact factors do provide a meaningful way to distinguish between journals at the very top of the ranked distribution; however for the majority of journals below the top, there is considerable overlap in calculated confidence intervals.

[49] For example, Gilly (1986) criticized the Laband (1986a) study for, among other things, not accounting well for the number of graduates of a given department. Laband (1986b) replied to this critique at the time, and published new data. We incorporated these changes. We also checked Erratum of Graves et. al (1984) and the differences/errors acknowledged in this study are not material to our data, as they concern a different measure of 'AER-equivalent sized publications', which we decided not to use because of incomparability with other rank-based data from other studies.

[50] Though we do use general standardized scores from Tschirhart (1989).

Figure A2: Distribution of Prestige Among 152 US Economics Departments

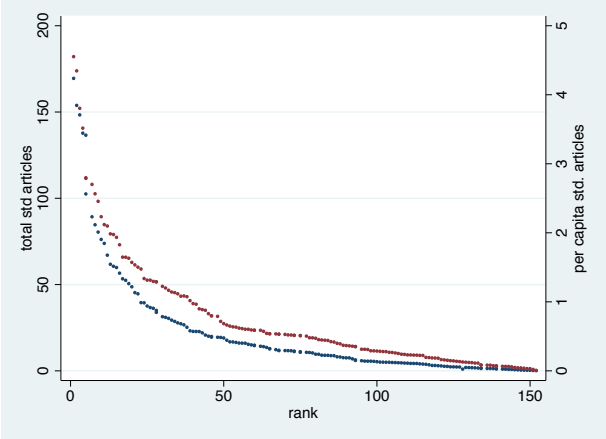
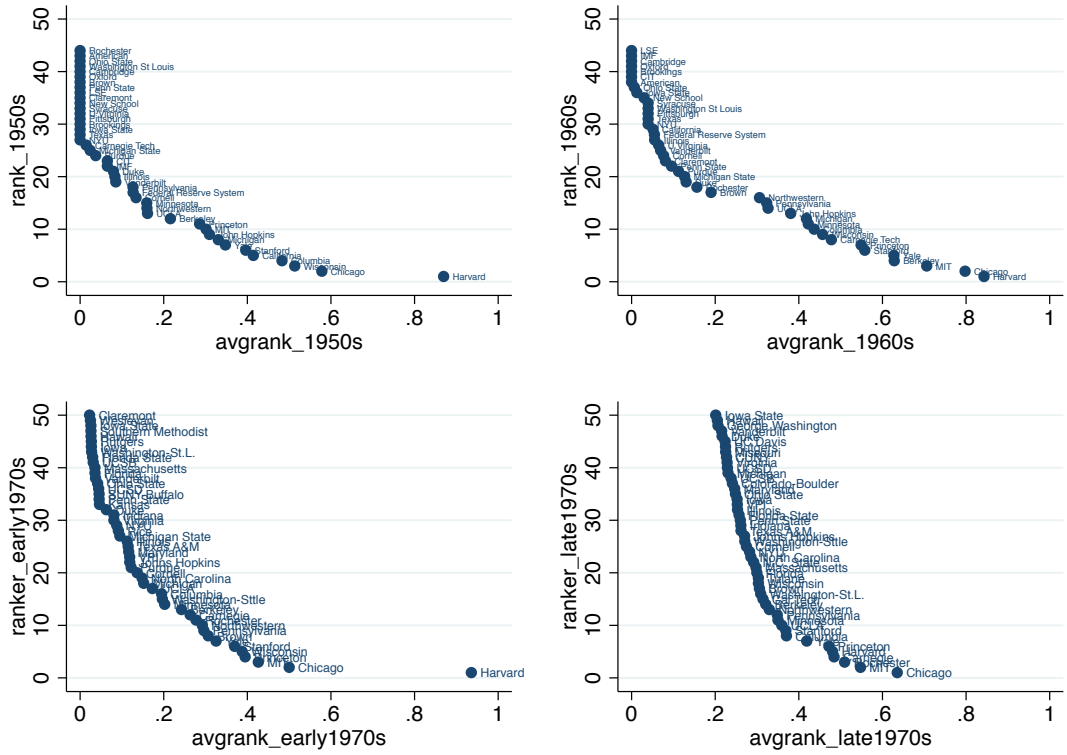


Figure A3: Averaged Standardized Department Standing of 50 US Econ departments, 1950s-late 1970s

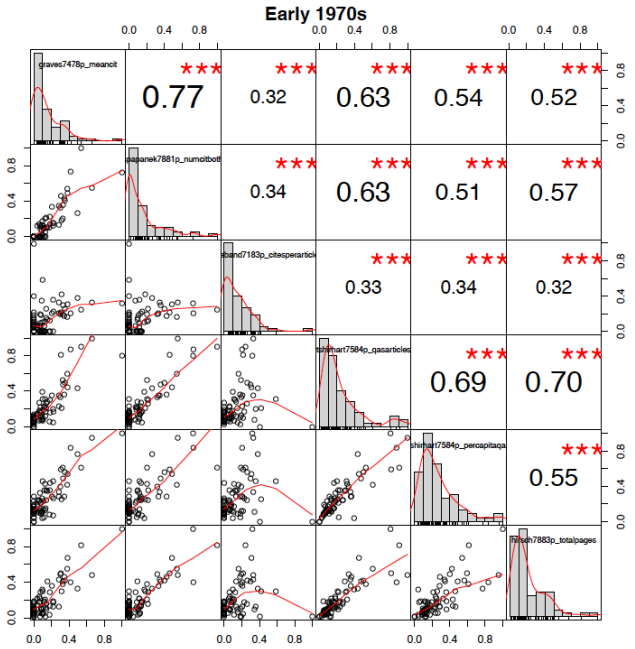


Because different measures used different metrics, we standardized scores to 1 indicating the highest-regarded department for each indicator. To fully accommodate what was fundamentally a range of measures during a given period, we had to investigate whether and how departmental prestige and graduate training caliber measures were related to one another. Scholarship at the time did consider many of these indicators to be highly correlated.[51] One study found that only top-ranked schools can

[51] For example, a study by Hogan (1973) suggested strong evidence of a relationship between publishing performance of economics graduates and data from surveys regarding perceived quality of graduate training. Moore (1973) found a significant relationship between prestige studies of the 1960s and publication outputs in the major journals of that period.

be consistently recognized by all rating systems.[52] We investigated this empirically and found variability in the degree to which different indicators were correlated with one another. Figure A4 below shows a scatterplot with fitted trend line, histogram, Pearson correlation coefficients and significance levels for the indicators we used for the early 1970s period.

Figure A4: Pearson Correlation Matrix for Different Indicators of Economics Department Prestige and Graduate Training Caliber, for early 1970s period.

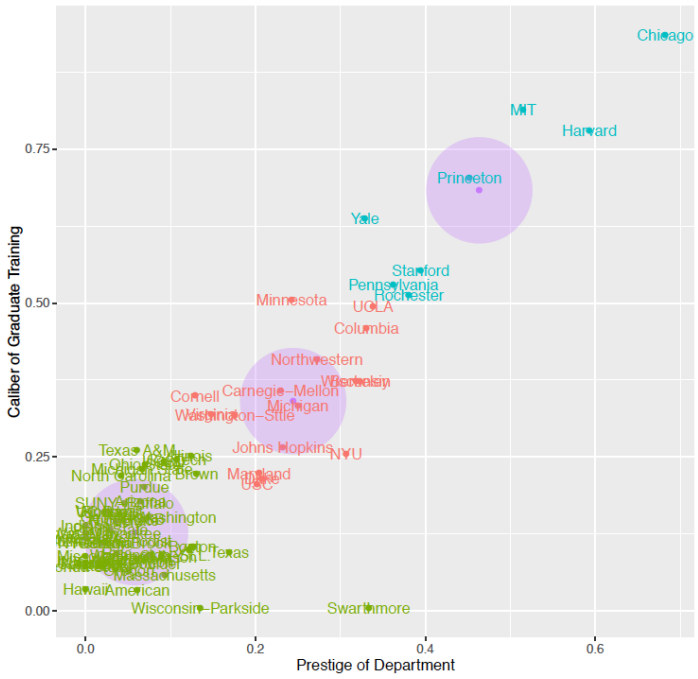


Because these measures were highly correlated in some cases and not others, and they existed as multiple studies that were taken seriously during the historic period under investigation, we decided to take the simple mean of multiple studies for each category – i.e. a mean measure for departmental prestige and a mean measure for graduate training caliber. Figure 6 below shows a scatterplot of these mean standardized scores for both indicators, for the 1970s. It colors economics departments differently based on k-means clustering, the centers of which are represented by the purple circles.

Bell and Seater (1978) showed that measures of faculty quality correlate highly well measures of PhD program effectiveness.

[52] Specifically, Stolen and Gnuschke (1977) compare a variety of existing studies we used (the Carrter, Dean Moore Seigfried and Hogan studies) and found that only 'distinguished' schools can be consistently recognized by all rating systems.

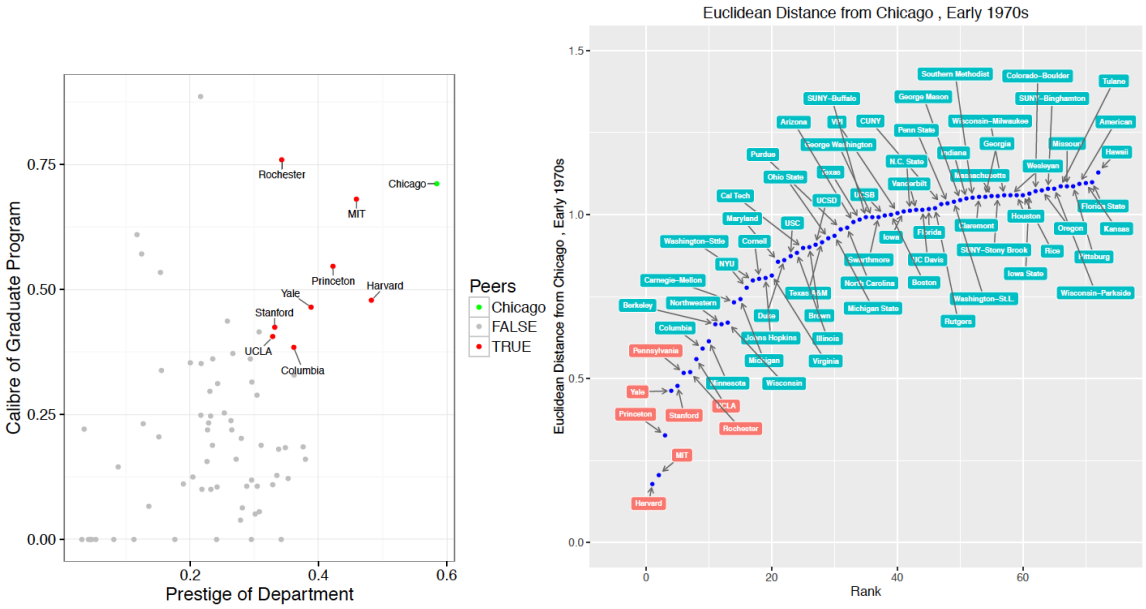
Figure A5: Scatterplot of Departmental Prowess during the Early 1970s Period, with 3 K-clustered Areas



While k-means clustering is a reliable form of cluster analysis to determine groups, the number of clusters needs to be established in advance. Because we need to determine clusters within each period and there is no external reference point to do so, we elected to find the optimal number of clusters based on the structure of our data in each period, using Partitioning Around Metoids (PAM). This analysis suggested in each case a very conservative number of clusters – 2 in each period. This was no doubt a result of the power-law-like distributions in our data. We then used the optimal number of clusters provided to determine separation of economics departments on the basis of hierarchical clustering through dendrogram analysis (see Appendix 4)

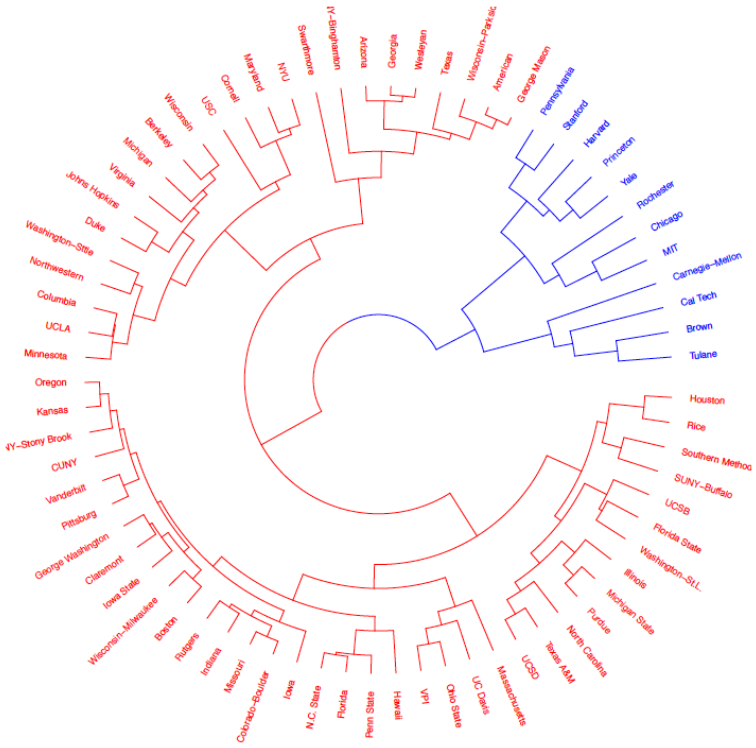
The fact that PAM found only 2 clusters within the data for a given period is not necessarily problematic, given that it usually suggests a clear peer group of economics departments to locations from which neoliberal fathers were reproducing between 1950-1980 – which include institutions such as the University of Chicago, Columbia, Carnegie-Mellon and Minnesota. However, there was significant variation in the number of metrics we could use for cluster analysis across different historical periods. For historical reasons the late 1970s had many more studies of departmental prestige than did the 1950s, for example. Because of the sensitivity we interpreted the mean standardized scores for departmental prestige and graduate training caliber (e.g. reported above in Figure 6 for the late 1970s) to be a more realistic metric from which to generate peer institutions. Using the simple geometry of two our two indicators of departmental prestige and graduate training caliber we thus calculated the Euclidean distance between a given department and period of time where a NL father reproduced (e.g. Robert Lucas 1977 = University of Chicago, late 1970s) and it's nearby relatives, calculated on the basis of the top 10th percentile of other economics departments closest to it. This allowed us to generate a very precise list of 'neighbors' of *any* economics department, at any period of time. Figure A6 illustrates the 'matched peer' institutions to the University of Chicago for the late 1970s period (left) based on its closest neighbors, which are highlighted in red, and the same peer institutions' Euclidean distance from University of Chicago by rank order (right).

Figure A6: Generating Peer Institutions Based on Euclidean Distance Considering the Dual Factors of Departmental Prestige and Calibre of Graduate Training, Based on the University of Chicago in Late 1970s



On this basis we rigorously established a set of matched peer institutions and selected the Charles River Group (CRG) and its respective fathers .

Figure A7. Hierarchical Clustering of US Economics Departments, Early 1970s



Appendix B: Number of staff and PhD graduates at the three departments.

In order to develop a sampling scheme for our analysis, we needed to make sure that the PhD productivity per staff across our departments did not differ significantly, as this would affect how many students we would need to sample. To get the number of PhDs graduating per staff from each of the three departments, we combined two data sources.

First, we estimated the number of staff per economics department by inspecting the American Economics Associations (AEA) member list from 1974 (available from the AEA website), which included a short biography of each member (this was unfortunately not the case for other member lists during this early period). These bios included information about when faculty positions started at the respective departments in which economists worked. Assuming that the norm is for faculty to stay within departments throughout their career, we estimated number of staff within departments based on the assumption that: 1) promotions from junior to mid-level to senior positions each take six years and 2) staff enter emeritus status at the age of 60 after having worked for 30 years within the department. While this method was not perfect, it provided us with an approximation of how large departments were 1960-1974.

Second, we used the annual AEA Annual Dissertation Lists (published each year in the AER over our period of analysis) to count the number of PhDs that graduated from each department per year. This list was published annually in one of the final yearly issues of the American Economic Review from 1940-1975. The results of our estimation are presented in Figure B1 below. While Harvard has consistently been markedly larger than both MIT and especially Chicago, and therefore also produced significantly more PhD graduate, the relative PhD productivity, seen over the entirety of the period, Chicago staff had the highest PhD productivity per year.

Figure B1. Number of staff and PhD graduates at Harvard, MIT and Chicago

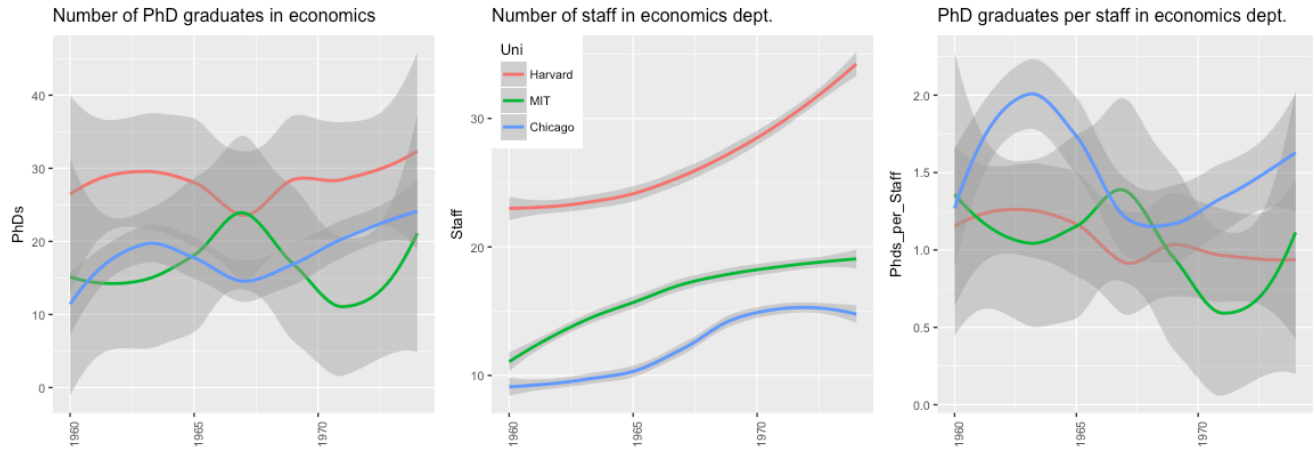


Figure B2: Publication Venues 1960-1980, Represented as Frequency-Scaled Wordclouds

Chicago Harvard MIT