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Fossil Fuel Divestment in U.S. Higher Education: Endowment Dependence and Temporal Dynamics

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Fossil fuel divestment in U.S. higher education: Endowment dependence and temporal dynamics

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Abstract

Since 2012, students and others have pushed U.S. Higher Education Institutions (HEIs) to divest their endowments from fossil fuel producing industries. In the past decade, fossil fuel divestment has become the fastest growing divestment movement in history, with over 140 U.S. HEIs announcing divestment commitments. We conduct a quantitative analysis of the three phases of U.S. 4-year HEI divestment announcements (as well as rejections of divestment) to better understand the dynamics. Announcements began (2012-2017) with a number of schools divesting, followed by a second phase where new divestment announcements slowed. The current phase, which began around 2019, shows a renewed increase in divestments. Formal rejections of divestment followed a similar pattern in the early years, where rejections were slightly more common and represented more endowment value, but have declined as some schools reversed public positions. Schools that have divested from fossil fuels now represent roughly 3% of 4-year U.S. HEIs and 35% of endowment value. Roughly 85% more endowment value is now associated with U.S. schools that have divested from fossil fuels than with those that have rejected it. Our analysis points to endowment dependence (the share of operating expenses derived from the endowment) as a potentially important indicator of whether a school would divest, with early divestments from all fossil fuels coming nearly exclusively from schools with a relatively low endowment dependence. We discuss the implications of these findings in the context of different theories of change for the divestment movement. In particular, we note that over 99% of 4-year HEIs representing roughly 95% of endowment value are less dependent upon their endowment than at least one recently divested HEI, suggesting that large endowment or high dependence on endowment are no longer strict barriers to FFD for most schools.

Background

With U.S. politics deeply divided on climate change and Congressional climate policy largely stalled over the last several decades, activists have pursued climate actions through other institutions and at other scales (e.g. state and local policy, corporate pressure, direct action) (Ayling and Gunningham, 2017). Fossil fuel divestment has emerged globally as a rapidly growing climate action and movement. Roughly 1500 institutions with assets over \$40 trillion have committed to divest from fossil fuels (Lipman, 2021).

The fossil fuel divestment movement has its roots in earlier movements to divest from South Africa, tobacco, and Sudan - which similarly engaged on issues of human rights and public health. The movement aims to stigmatize the fossil fuel industry and revoke “moral license to operate” as well as serving as a movement building activity and tool to envision a post-fossil-fuel world (Grady-Benson and Sarathy, 2016; Hestres and Hopke, 2019). Like the broader socially responsible investing movement (King and Gish, 2015), activists see fossil fuel divestment as one tool in a broader toolkit. Messaging from the movement has connected it to the broader climate justice movement, combining themes around the ethics of climate action, social justice, fossil fuel industries as bad actors, and financial risks associated with fossil fuels (Mangat et al., 2018; Gibson and Duram, 2020).

The first fossil fuel divestment (FFD, all subsequent references to divestment refer to fossil fuel divestment) campaigns in U.S. higher education were in 2011 at Swarthmore College, University of North Carolina at Chapel Hill and the University of Illinois Urbana-Champaign and grew into a national effort spearheaded by Bill McKibben and 350.org. The first formal divestment announcement came from Unity College in 2012 - a small college that bills itself as “America’s Environmental College” (Grady-Benson and Sarathy, 2016). The college announced it would divest from fossil fuels, limiting investments to less than 1% of the endowment (3-5% of endowment at the time) (Mogilyanskaya, 2013).

Since then the movement has grown rapidly, with 141 U.S. higher education institutions (HEIs) having divested (either fully or partially, see Methods) as of 8/22. Campaigns have been roughly split in line with the mix of public/private HEIs in the US and concentrated in coastal states (Gibson and Duram, 2020) and range from small institutions of around 100 students to the extensive University of California system.

As the movement has grown, it has also attracted the attention of researchers who have noted the potential of the movement to promote dialog and progression to goals beyond divestment and to move from compliance-oriented sustainability behavior towards a more proactive focus on intergenerational equity (Seidman, 2015; Healy and Debski, 2017). Researchers seeking to understand the movement have suggested that early divestment announcements tended to be at schools with smaller endowments and institutional values around sustainability and social justice (Grady-Benson and Sarathy, 2016). The movement has been primarily student-driven with faculty support also present in many cases (Stephens et al., 2018). Very little of this research has been quantitative, with Mikkelsen et al., (2021) finding that HEI divestment globally was positively correlated with ranking, but not with endowment size, endowment type, or number of students - but that study omitted small liberal arts colleges (they do not have international rankings) which compose a notable share of early US FFD activity.

At the same time, not all campaigns have been successful - with many schools publicly rejecting divestment, arguing fiduciary responsibilities to their endowment, the lack of impact on fossil fuel companies, and other factors (Grady-Benson and Sarathy, 2016). For example, Swarthmore College, the first U.S. college to face calls for FFD, has still not divested after a decade of student activism (McKibben, 2021).

This research seeks to build on this earlier work by analyzing a dataset of announcements and rejections of FFD for HEIs to date. We seek to understand two key questions. First: how has divestment activity and rejection of divestment changed over time? Second, what school characteristics could plausibly explain a school's decision to divest or reject divestment? In particular, we examine endowment dependence (ED) as a novel metric by which to judge whether a school will divest. Previous research had already established that schools were likely to cite fiduciary responsibilities as a reason to reject divestment, which led us to hypothesize that the more dependent a school is on its endowment, the less likely it is to make a significant divestment action (e.g. full FFD) - so long as it perceives significant risk to returns associated with FFD. We discuss the implications of our findings for the success of the movement and future actions.

Methods

The first step of this project was to build a dataset of announcements and rejections of fossil fuel divestment in Higher Education, as we were not aware of a research-grade database covering the desired details. The 350.org website gofossilfree.org maintains a voluntarily reported list which we used to cross-check our results. Our list was constructed by reviewing prior research (e.g. Grady-Benson and Sarathy, 2016), setting google news alerts, following announcements covered by the Association for the Advancement of Sustainability in Higher Education, and schools listed by gofossilfree.org. Because gofossilfree.org does not track rejections we began with a non-peer-reviewed report (Wood and Peterson, 2015), and fact checked and updated the analysis with news searches. Statements associated with rejections were coded for the key motivations cited. Here rejections refer to explicit public rejections of FFD, in the same way that we do not count “quiet” divestments that are not announced or might not reflect a shift in policy. This current analysis covers 2011-2022.

We limited subsequent analysis to 4 year U.S HEIs (n=132 of 141 total) as two year institutions have very different business models and often have small or no endowments, and were much less frequently the subject of FFD campaigns.

Supplementary data about HEIs came from the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS). IPEDS does not report endowment spend rates so we estimated the rate for each school by using the average endowment offtake rate of 4.5% reported by the National Association of College and University Business Officers for 2012-2021 (NACUBO and TIAA, 2022). Endowment dependence was calculated as the endowment offtake as a share of operational expenses (where operational expenses were total expenses minus expenses likely to come from independent sources (research, hospital, independent operations and auxiliary enterprises)) for reporting year 2020.

Multiple metrics could be appropriate to measure FFD activity. From a purely fiscal perspective, the total size of the endowment divested serves as a useful indicator. However, because research suggests that activists are actually focused on other goals besides direct

financial impact on companies (e.g. revoking moral license), we also track the number of institutions making announcements. While the amount of funds divested from fossil fuels as the result of the announcement would also be a very useful metric, we found that many schools did not have an estimate of this number even when contacted directly.

In addition, we distinguished between different types of divestment activity. We distinguish four rough categories in our analysis, based on our best interpretation of publicly available information about each commitment:

- Coal only - reflecting schools that pledge to divest only from coal companies. An institution was coded for “coal only” even if the announcement covered only direct investments but not indirect mutual funds and private equity.
- Coal and tar sands only - reflecting schools that pledge to divest from both coal and the also-very high emissions tar sands (also known as oil sands). An institution was coded for “coal and tar sands only” even if the announcement covered only direct investments but not indirect mutual funds and private equity.
- Full - reflecting schools that commit to divest from all categories of fossil fuels - coal, tar sands, oil and fossil (natural) gas for both direct and indirect (e.g. mutual funds, private equity) investments.
- Intermediate - This category reflects any institutions that do not meet the full criteria but are divesting beyond coal and tar sands. This may include institutions that are divesting from all fossil fuels except natural gas (e.g. Yale University) or ones whose announcements are vague about whether they are only addressing direct holdings and investment vehicles “solely invested” in fossil fuels, or all vehicles that include fossil fuels.

These classifications differ slightly from those used by gofossilfree.org which includes a “fossil free” category that requires more detail about accountability and reporting. Given variability in the detail of public announcements, we found it difficult to reliably distinguish between “fossil free” and “full” categories.

Assignments of divestment status and documentation are included in the Supplementary Data and more information on data collection and coding can be found in Detailed Methods. In the rest of the text, we use the term “divesting” to refer to any form of FFD and specify “full divestment” for the most comprehensive category.

Results

Divestment and rejections over time

Analysis of the announcements of divestment of any kind reveals three distinct phases over time (Figure 1). In the first phase (2012-mid 2016), the number of schools divesting rose rapidly. This was followed by a period of relative stasis from late 2016 to early 2019 with few new announcements. In the third phase the number of announcements has begun to rise. Full divestments followed a very similar numerical pattern.

Interestingly, announced institutional rejections of FFD rose even more rapidly than divestments and represented (18.5%) more institutions by 2016. However, since that time the number of public rejections that we were able to document actually declined as several schools reversed earlier rejections and moved to divest (e.g. Middlebury College). In 2019, cumulative full divestments outpaced rejections for the first time.

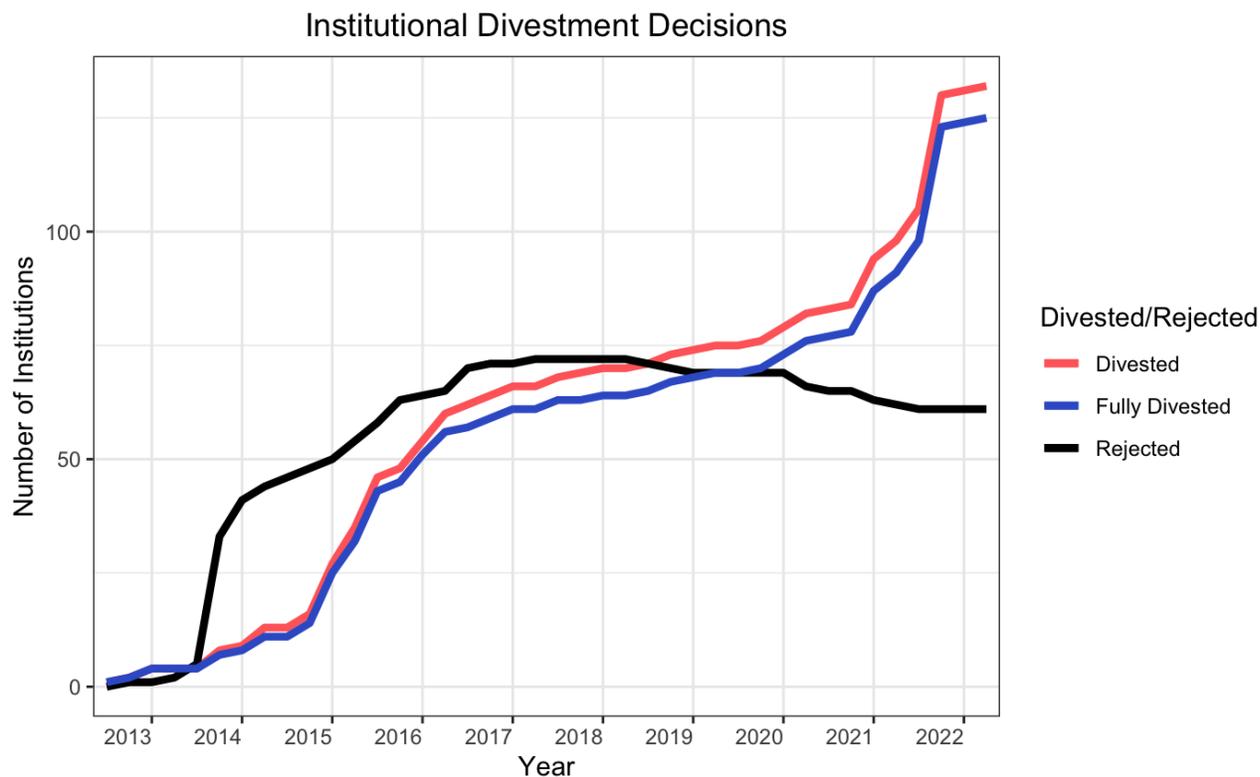


Figure 1: Cumulative U.S. Higher Education Institutions Announcing Fossil Fuel Divestment (or Rejecting Divestment) by Quarter. Divested includes partial divestments. (n=132 divesting schools (all forms of FFD), 125 fully divesting schools, and 61 rejecting schools (max), 4 year institutions)

Divestments by size of institutional endowment follow a slightly different pattern (Fig 2). Endowment value from 4 year institutions with any sort of divestment or from HEIs rejecting divestment follow the same general pattern of increasing to mid-2016 and then leveling off but the collective endowment value of schools rejecting divestment was over twice that of schools divesting. The amount of endowment value represented by schools fully divesting is comparatively small and rises only gradually until mid-2019 when it begins to rise rapidly. The year 2021 represents a crossover point where more U.S. HEI endowment value had committed to intermediate or even full divestment than those that had rejected divestment.

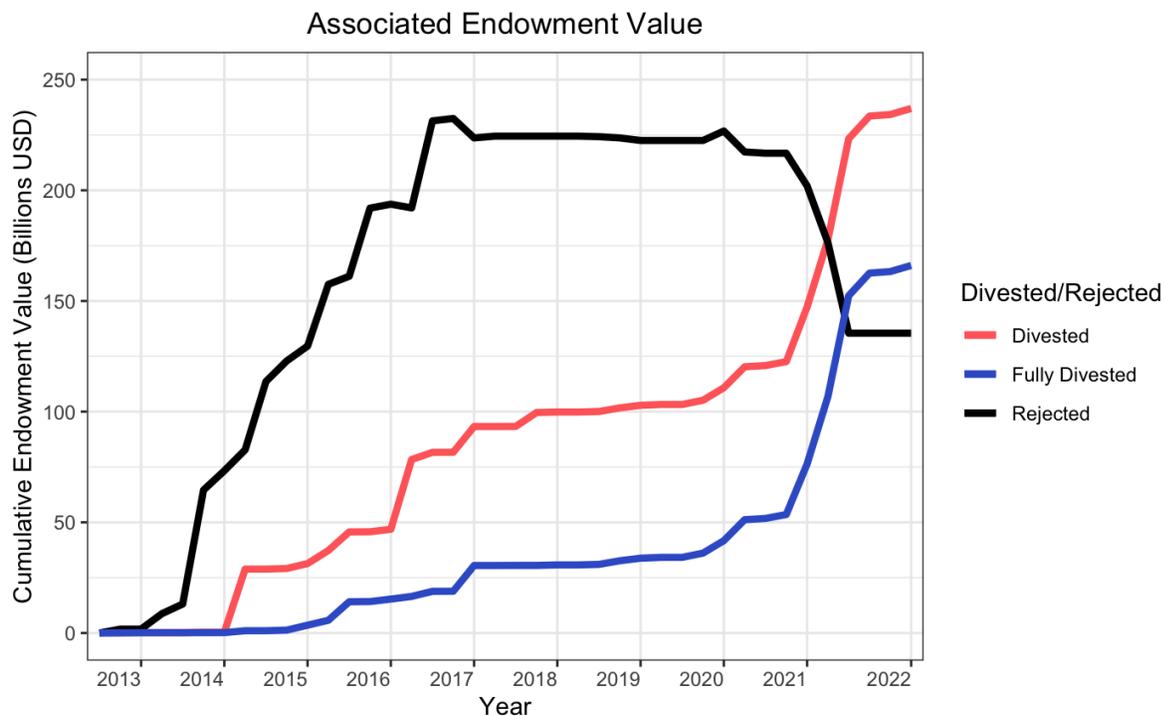


Figure 2: Cumulative Endowment Value of U.S. Higher Education Institutions Announcing Fossil Fuel Divestment (or Rejecting Divestment) by Quarter. (Sample sizes as in figure 1).

Shifts in Endowment Dependence

While earlier work focused on the size of endowment (smaller more likely to divest early), we also examined the role of endowment dependence (share of operating expenses coming from the endowment) (Figure 3). While the 2 variables are associated with each other there is not always a close alignment between the two (SI Figure 1). In particular, schools with endowments less than \$3B range in ED from near zero to nearly 100%, suggesting no relationship at all for the majority of HEIs in this category. The limited correlation (0.33) across all 4-year HEIs appears to be driven by a handful of schools with very large endowments which, not surprisingly, rely on them for a notable share of their operational expenses. A large state school might have a large endowment but be less reliant on it to meet expenses and therefore perceive less financial risk associated with divestment. Conversely, a very small school could rely heavily on a much smaller endowment to support free or reduced tuition (or for some other purpose) - making them very risk averse.

Full divestments before mid-2018 were all at institutions below 12% endowment dependence with the exceptions of Union Theological Seminary and Pacific School of Religion. No schools with an endowment dependence above 30% divested fully before Q3 2018 (Whitman College). The highest endowment dependence of any full FFD in our dataset is Princeton University (~66%). Logistic regression suggests that a low endowment dependence was associated with a

higher likelihood of full divestment (Odds ratio 0.054, 95% CI 0.006-.423, $1.2726 + (-2.9137) * \text{Endowment Dependency}$, $p(\text{ED}) < 0.007$, $\text{AIC} = 200$). Endowment size was not predictive, on its own ($p = 0.14$, $\text{AIC} = 205$) or added to the model with endowment dependence ($p = 0.87$, $\text{AIC} = 202$).

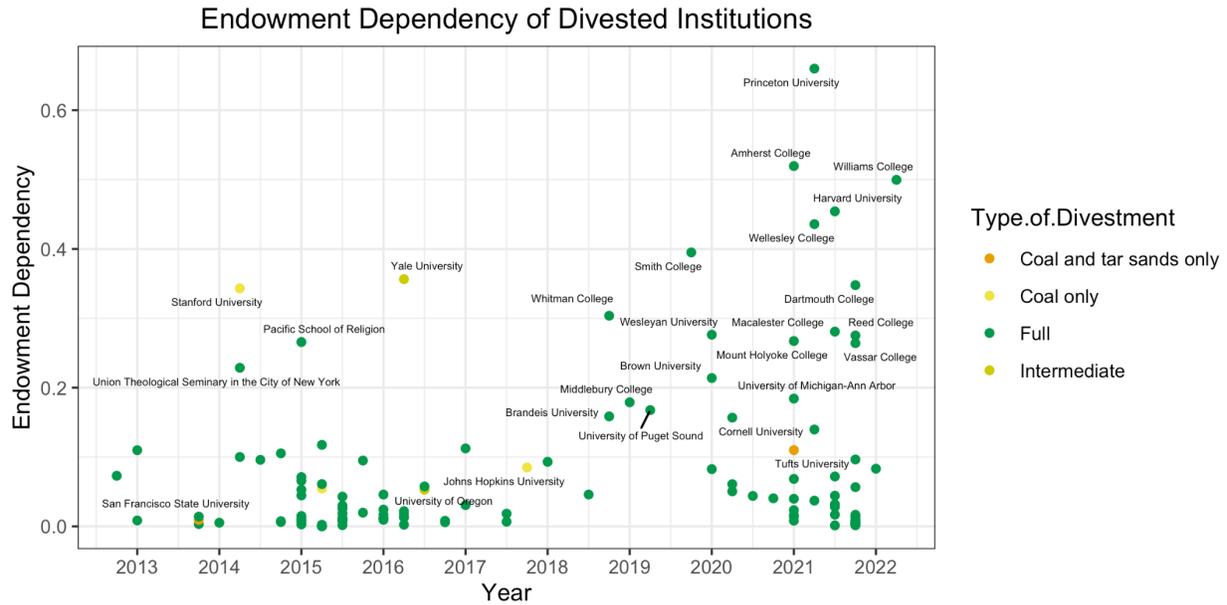


Figure 3: Divestment actions by year, type, and endowment dependency (n=132).

For the subset of schools that reported fossil fuel share of endowment (80%), it is clear that schools that divested early tended to have low endowment dependency regardless of their exposure to fossil fuels (Figure 4a). It is only in late 2018 that schools began to make announcements that reflected a significant shift in stance with respect to all fossil fuels (i.e. full divestment) *and* a high endowment dependence (Figure 4b). University of Michigan - Ann Arbor, Smith College, and Princeton University represent the current horizon of action with a combination of significant exposure to fossil fuels and endowment dependence, with endowment dependencies of less than 20% to over 50%.

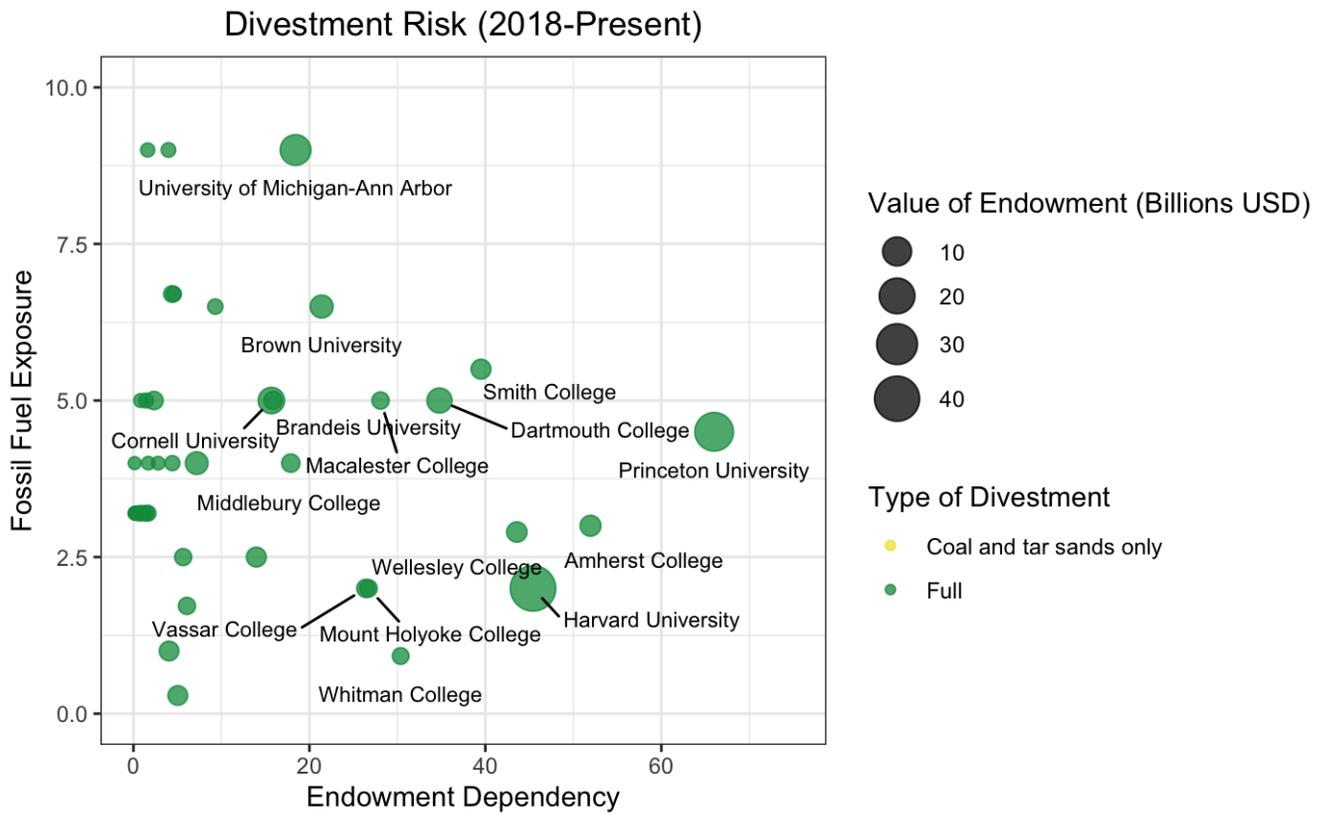
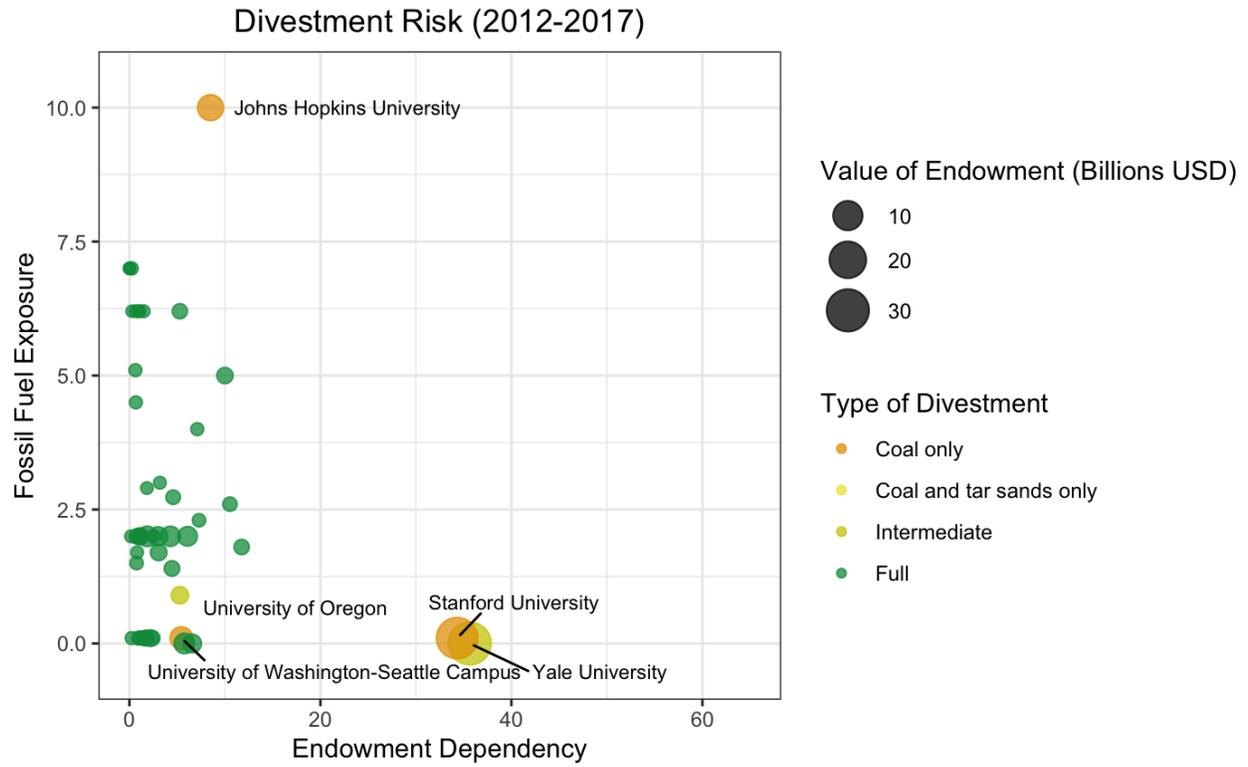


Figure 4: Endowment dependence vs fossil fuel exposure of the endowment for schools which reported fossil fuel exposure, all shares in percent. Panel (a) shows divestment announcements 2012-2017, panel (b) shows announcements 2018 through 8/2022. Note that only 106 of 132 divesting 4-yr schools reported fossil fuel exposure (percentage of endowment in fossil fuels).

Motivations for rejection of divestment

For schools that rejected divestment (Figure 5), a fiduciary responsibility to provide adequate growth in the endowment was by far the most common reason given - in over 60% of divestment rejections. A concern that divestment is ineffective at reducing emissions was the next most common reasons, with a significant minority of schools planning to implement or highlighting existing alternative sustainability measures.

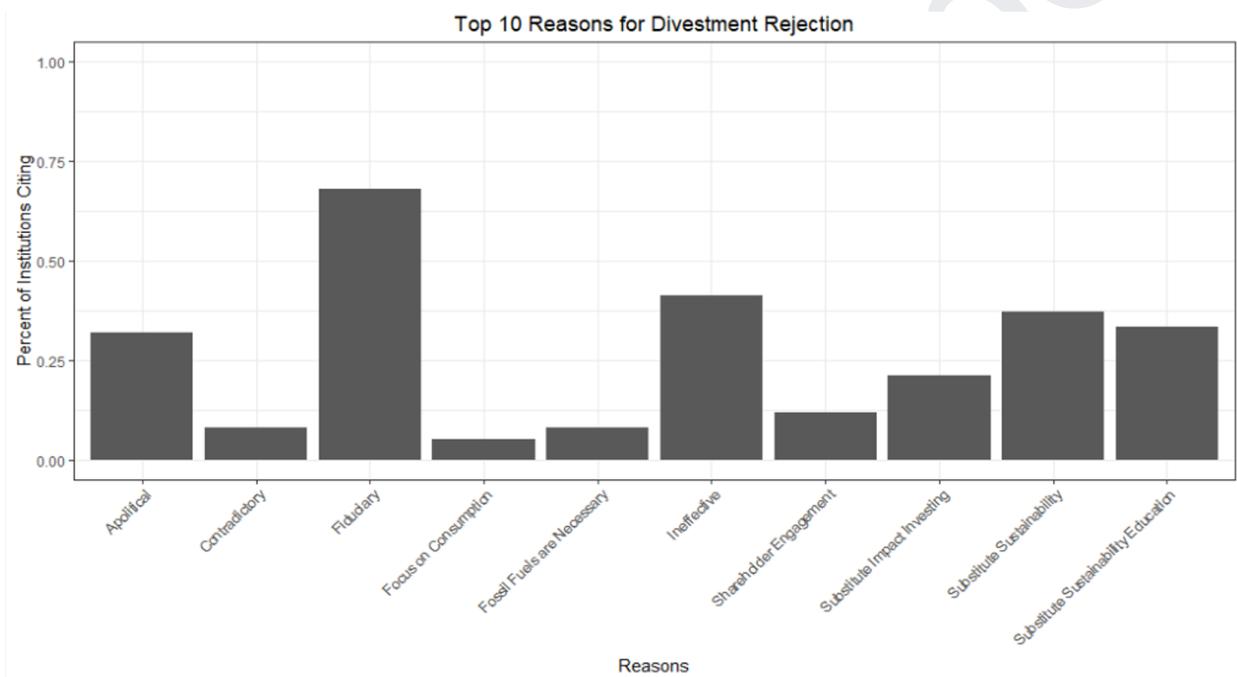


Figure 5: Reasons for rejection from U.S. HEI rejections of fossil fuel divestment [sample size = 75, includes schools that later divested]

Discussion

Divestment decision making

Our analysis of higher education fossil fuel divestment announcements reveals clear patterns in divestment activity over time, but our interpretation of those patterns is necessarily speculative. Each divestment decision is a result of structural factors that might make an institution more or less likely to divest combined with institution-specific factors that are very challenging to measure without detailed interview work, such as institutional values and the views of key leadership positions (e.g. President, Vice President of Finance) (Abrash Walton, 2018). However,

it is clear that, at least in public statements rejecting divestment, concerns about impacts on the health of the endowment from divestment were the most common publicly-stated concern for administrators (Figure 5) (Deeks, 2017).

The Three Phases of Divestment

The first phase of divestment (2012-mid 2016) we would characterize as the “low hanging fruit” - these are schools where a low endowment dependence may have reduced the perceived risk of any decision to divest (see below). These are likely also schools with an alignment of active student groups, prominent environmental values, and leadership amenable to FFD (Grady-Benson and Sarathy, 2016). This is consistent with work showing alignment with institutional values as a key factor for FFD in foundations (Abrash Walton, 2018) and supported by the fact that the only two high ED institutions divesting in this time period were progressive seminaries (Union Theological Seminary and Pacific School of Religion). This early wave also included a few schools divesting from direct holdings in coal - another lower-risk strategy given that spot market coal futures were rapidly declining during this time period and the general policy outlook for coal continued to be negative (Moritz Rabson, 2019). Rejections of divestment in this time period featured schools with higher endowment dependencies, for example any school making a FFD announcement with an ED higher than 40%.

However, based on our data, the FFD movement seems to have relatively quickly exhausted the low hanging fruit and late 2016 to early 2019 was characterized by limited new announcements. We suspect many of the easiest targets for change had already been exhausted with many other schools in “study” mode or activists waiting for a turnover to leadership that might be more amenable to divestment. This pause in announcements is even more striking given that the 2016 election of Donald Trump as president of the United States foreclosed any chance of climate action to reduce fossil fuels at the federal level, potentially creating increased pressure on institutions to take their own steps (e.g. We Are Still In).

In the third phase, conditions seem to have shifted so that more schools are now willing to divest from fossil fuels, even those with considerably higher endowment dependence. While multiple factors may have contributed to this shift, we believe the availability of a new approach to divestment, combined with market conditions, may have played a role. Two of the earliest announcements in this phase were Middlebury College and Smith College (our own institution) (we note that both schools also have commitments to eliminate fossil fuels for electricity and thermal by 2028/2030). Both schools’ endowments were managed at the time by the same external investment office, Investure, LLC. As schools with >\$1Billion endowments, a significant portion of the endowment was held in private equity and other specialty investments which allow higher returns (Piketty and Goldhammer, 2014). In return for the promise of higher returns, private equity can often feature much longer investment commitments and reduced liquidity, which make rapid divestment actions carry very costly penalties. In response to input

from investors, Investure worked with these schools to focus on fossil-fuel specific managers (FFSM) for private equity. Both schools committed to an approach with no new investments with FFSM and a phase out of existing investments with FFSM which would take roughly 15 years. This approach covers ~90% of each schools' fossil fuel investments, omitting only diversified funds that may hold small amounts of fossil fuel investments. A clear pathway to full FFD without the expensive prospect of prematurely exiting private equity seems to have enabled sufficient de-risking for these schools and allowed them to respond to continued student and faculty pressure and support institutional value alignment in the endowments without compromising fiduciary responsibility.

At the same time, market conditions leading up to the start of the third phase were not particularly favorable for fossil fuels, especially coal. The University of California's divestment announcement in 2019 stands out as flagging divestment as primarily a financial decision, stating "hanging on to fossil fuel assets is a financial risk... The reason we sold some \$150 million in fossil fuel assets from our endowment was the reason we sell other assets: They posed a long-term risk to generating strong returns for UC's diversified portfolios." (Singh Bachher and Sherman, 2019). Some researchers have similarly found that performance of FFD portfolios does not significantly differ in terms of risk and return from unrestricted portfolios (Plantinga and Scholtens, 2020). At same time, the recent invasion of Ukraine has driven up the value of some fossil fuel holdings (Nerlinger and Utz, 2022).

Endowment dependence

While a mechanistic link is impossible to establish, endowment dependence does seem a potential factor in influencing which institutions pursue full FFD over time based on our data, especially in the early years of the movement. Unity College, the first school to fully divest only relied on its endowment for ~4% of operating expenses and, as we noted, no schools with estimated endowment dependence above 25% divested fully before 2018. This may be due to a combination of the perceived risk to finances associated with increased reliance on the endowment, the fiduciary duties of trustees, and the logistical challenges associated with larger endowments that contain a larger share of private equity or other complex instruments. While Mikkelsen et al. (2021) find evidence for correlation with rankings, we believe endowment dependence provides a more direct explanation for the patterns we see here. Rankings are a challenging variable to interpret; they contain a wide range of factors, have been subject to manipulation (Gadd, 2021), and a high endowment dependency (ED) can be used to impact a large number of other factors in the ranking (Bulman, 2022). Additionally, we are not aware of a uniform ranking metric that would cover both larger research HEIs and small colleges in the U.S. We stress that endowment dependence should be considered in the context of other non-quantified factors such as institutional values and the views of key HEI decision makers.

FFD in the context of activist goals

While critics of divestment often focus on the lack of a direct link between divestment and market impacts or emissions or invoke other theories of change centered around carbon pricing (Tollefson, 2015), when judged by the movement's own goals of creating stigma and building a movement (Grady-Benson and Sarathy, 2016; Hestres and Hopke, 2019) our data suggests some success over time. Activists were able to quickly grow the number of campaigns and schools divesting over time and the long-term campaigns have begun to succeed at schools more dependent on their endowment - with Harvard and Princeton University being the latest high profile examples. We are unable to assess the movement-building activity with our dataset, but we note that the Sunrise Movement, which played a major role in framing climate change as a key priority in the run up to the 2020 U.S. election, was founded by several individuals who began their activism in higher education FFD. The early rise in rejections can be viewed through multiple lenses. From one perspective, these can be regarded as failures - often with public distancing from either goals or principles of the FFD movement; from another perspective they can be seen as bringing attention to the issue, training activists, and pushing schools to other sustainability-related commitments. For example, while Yale University has yet to fully divest they have adopted principles avoiding "high GHG emissions relative to energy supplied" as well as screens associated with firms that undermine regulations or climate science.

Collectively, 132 schools representing \$166B in endowment have now committed to full divestment, in some cases pushing external fund managers to adopt practices to support such actions. However, the system-scale numerical impact remains modest as schools that have divested from fossil fuels only represent roughly 3% of U.S. 4-year HEIs and 25% of U.S. 4-year HEI endowment value.

Strategies for FFD have also shifted over time to incorporate a broader range of approaches. Barnard College is the first school we are aware of that divested (2017) from companies that "deny climate science or otherwise seek to thwart efforts to mitigate the impact of climate change" (Barnard College, 2017). Princeton's recent announcement is notable not only because of the large size of the endowment (~\$36 Billion) and endowment dependence (~66%), but because the announcement coincided with a decision to "dissociate from fossil fuel companies engaged in climate disinformation and those materially participating in the thermal coal and tar sands segments of the fossil fuel industry unless able to meet a rigorous standard for greenhouse gas emissions". Dissociation includes not just removal from the endowment, but also "refraining, to the greatest extent possible, from any relationships that involve a financial component with a particular company. It includes no longer soliciting or accepting gifts or grants from a company, purchasing the company's products, or forming partnerships with the company that depend upon the exchange of money" (Princeton University, 2022). While no companies met the "exceedingly high" bar for dissociation on the basis of disinformation, roughly 90 companies were identified based on revenue or production/processing. We are not aware of any other U.S. schools that have taken this approach but it seems likely that others will investigate the option. Similarly, many

institutions may increase their focus on proactive investment in climate solutions (e.g. impact investing) as part of their response to social pressure and shifting markets.

Our results offer some perspective on future FFD campaigns. First, our results emphasize that a large endowment or high dependence on endowment are no longer strict barriers to FFD. 99.6% of U.S. schools (for which we can estimate endowment dependency) have an endowment dependency below 66% (the highest endowment dependence of a divesting school (i.e. Princeton)). Collectively these schools represent 95% of total endowment value. At the same time schools with very high dependence on endowments, may continue to be challenging targets for activists. Indeed, Swarthmore College - the first U.S. school to be targeted by a student FFD campaign - is, in retrospect, one of the most challenging targets that could have been chosen as its endowment dependence is nearly 60%, in the top 24% of U.S. institutions. Given the prominence of fiduciary concerns in our rejection data, many institutions may continue to be resistant to FFD until the market consensus about fossil fuels as an investment shifts further. For example, markets may not have fully internalized the roughly \$1T in potential stranded assets under scenarios of robust climate action (Semieniuk et al., 2022). For many of these schools (which are often relatively well-resourced) near term campaigns around other climate actions such as on-campus decarbonization (Barron et al., 2021) or investments in research and teaching may be more successful.

Conclusion

Ultimately, it is impossible to evaluate a movement based on norms and values by analyzing quantitative metrics alone. It is clear that the FFD movement has had an impact on discourse about climate change and fossil fuels (Mangat et al., 2018) - as part of a larger campaign (Hestres and Hopke, 2019) for climate action. Our results suggest that continuing activist pressure, combined with structural changes in markets and fund management, have now made fossil fuel divestment a potentially feasible action for all but the most endowment-dependent institutions. However, as we note above, several recent high profile wins should be considered in balance with the fact that the movement has yet to impact the majority of either institutions or endowment value.

It is unclear how the pace of divestment announcements will change going forward. Recent geopolitical unrest had led to rallies in both oil and coal stocks while the recent passage of the Inflation Reduction Act, combined with climate action at the state level and abroad, should accelerate the transition away from fossil fuels. Student activist pressure seems likely to continue (Svrluga, 2022), with calls for dissociation becoming more frequent, but a primary focus on divestment comes with potentially significant opportunity costs relative to other finance strategies and other climate actions (Deeks, 2017). HEI's decisions to divest will depend upon how they weigh these trends against a range of other policy considerations. At the same time, pressure is rising on all institutions to take rapid action towards decarbonization (Barron et al.,

2021), which may prompt institutions to focus on the planning and physical capital investments required to eliminate fossil fuel combustion on campus instead of holdings in the endowment (although many in our dataset do both). For contrast, while schools do not always report when they complete their divestment commitment, the number of schools that have *completed* divestment is likely larger than the relatively small number of schools (~14) that have claimed carbon neutrality (Barron et al., 2021), and larger still than the number of U.S. HEIs that have fully eliminated fossil fuels from campus operations (to our knowledge, zero).

Data Accessibility Statement

All data are available in the [github repo TBD].

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Conflict of Interest

The authors declare no conflict of interest but note that E.C. and J.A. were involved with Divest Smith College during their time as students. A.B. has consulted in the past for the Environmental Defense Fund on topics unrelated to this paper.

Author Contributions

Contributed to conception and design: ARB, DD

Contributed to acquisition of data: ARB, RCV, EC, JKA

Contributed to analysis and interpretation of data: ARB, RCV, EC, JKA, JD

Drafted and/or revised the article: ARB, RCV, EC, JKA, JD, DD

Approved the submitted version for publication: ARB, RCV, EC, JKA, JD, DD

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DETAILED METHODS

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Data Collection: IPEDS

Institutional data used for this research was obtained from the Integrated Postsecondary Education Data System (IPEDS) database published by the National Center for Education Statistics (NCES). The IPEDS database contains data gathered through annual NCES surveys. The NCES surveys all postsecondary institutions that participate in federal student financial aid programs to collect information on enrollments, finances, admissions, and more, per the Higher Education Act of 1965.¹

For this research the IPEDS database served two purposes. To begin, the IPEDS database was used to compose peerlists for data analysis. Two peerlists had to be composed initially as IPEDS has separate datasets for public vs. private institutions. The goal for the peerlists was to create a list of all institutions comparable to those which have divested or rejected divestment: all institutions which have divested or rejected divestment are included on the peerlists.² One peerlist contained data from IPEDS' F_F1A (public institutions) dataset. The other contained data from the F_F2 (private-not-for-profit institutions) dataset. Private-for-profit were omitted as we were not able to locate any private-for-profit institutions that had divested or rejected divestment. For both the private-not-for-profit and public peerlists, 4 year institutions that were degree-granting and had an endowment in FY2020 (the most recent year of data available)³ were included.

The peerlists generated from IPEDS contained both the IPEDS UnitID numbers (used instead of institution names in the dataset) and the institution names. The public institutions peerlist

¹ Introduction to the Integrated Postsecondary Education Data System (IPEDS)
https://nces.ed.gov/training/datauser/IPEDS_01.html

² The University of Colorado had to be manually added to the public institutions peerlist as its endowment was listed under its systems office in IPEDS, not its campuses. Inspection of other institutions with systems offices suggests that this is not a pattern; other institutions do not list their endowments under their systems offices.

³ We decided to use the most recent fiscal year for all endowment data rather than take endowment values from the year in which institutions made decisions to reject or divest. Some institutions have made divestment decisions in multiple years (which includes institutions both reiterating and changing their initial decisions).

consists of 684 institutions.⁴ The private-not-for-profit institutions peerlist consists of 1304 institutions.⁵

The "f_f1a_data" and the "f_f2_data" datasets (see R code) are also from the IPEDS database and contain financial data about the institutions in the above peerlists. These data sets were generated by running the peerlists through the online IPEDS Data Compiler.⁶ The IPEDS Data Compiler was a collaborative effort of the Tufts University and Smith College Offices of Institutional Research. Data compilation is necessary as the raw IPEDS data is encoded.

Data Collection: Divested/Rejecting Institutions

Lists of divested and rejecting institutions were compiled manually. The divested institutions list was initially based off of 350.org's gofossilfree.org list of divested institutions and an initial list compiled by Smith College's finance office. 350.org is a non-profit organization which leads activism on climate change, specifically relating to fossil fuels.⁷ The rejecting institutions list was based off of a list compiled by the National Association of Scholars (NAS) in a November 2015 report entitled "Inside Divestment: The Illiberal Movement to Turn a Generation Against Fossil Fuels" as well as another list compiled by Smith College finance office. The NAS is a non-profit organization which focuses primarily on issues of "academic freedom"⁸ but has a history of denying climate science⁹.

To complete both our lists and check for bias w.r.t. inclusion or omission, we added verified entries from the initial lists. Entries were verified by finding documentation of the divested/rejected verdict. Searches on Google, Nexus Uni, and Access World News using the terms "fossil fuel" divestment and (college or university) including (oppose* or reject* or decline* or refuse*) were used to supplement the lists. Additional divestment announcements were collected from newsletters sent by the Association for the Advancement of Sustainability in Higher Education and Inside Higher Education.

Only public announcements were included in our dataset. We do not include schools like Colby College which removed some fossil investments (in this case from direct holdings) but did not

⁴ Including the manually-added University of Colorado Systems Office.

⁵ The data analysis was originally completed using FY 2016 data. Based on FY 2016 data there were 1252 institutions (including the University of Colorado Systems Office) on the public institutions peerlist. Based on FY 2016 data there were 1347 institutions on the private-not-for-profit institutions peerlist. There is therefore some variance in the institutions counted in the peerlist (some institutions do not report/fully report each year).

⁶ When we began this project in Fall 2018, the online IPEDS Data Compiler was an R program that had to be manually run. This was used for the initial FY 2016 analysis. The final FY 2017 data analysis used the online Data Compiler. Link to Data Compiler: https://sc-kaloisio.shinyapps.io/ipeds_compiler/.

⁷ About 350, 350.org, <https://350.org/about/>

⁸ About Us, National Association of Scholars, 2019 <https://www.nas.org/about-us>

⁹ National Association of Scholars, Sourcewatch.org entry 2022.

publicly announce the step or commit to divestment on an ongoing basis (Colby Alliance for Renewable Energy, 2016). Dates either reflect the date of a board decision vote where relevant or the date of an announcement by a President if no board vote date is available.

We cross referenced our list of divestment announcements against the one used by Mikkelson et al. in their 2021 paper. Our list ended up including more U.S. 4-year schools due to both the longer timeframe we included in the study and our more inclusive search criteria, which allowed for schools not ranked in the Times Higher Education World University rankings, (such as small liberal arts colleges), to make the list as well.

Fossil Fuel Exposure

Additionally, the values for Fossil Fuel Exposure (FFE; fossil fuel share of endowment - only used for analysis of divested institutions) were taken from divestment announcements. In the case that multiple figures or a range was provided, the higher number was used. FFE values were found for 80% of institutions. Given the lack of detail in reporting, we were unable to evaluate for differences in what was included in fossil fuel investments.

Endowment Dependence

Most of the information used in the data analysis are directly derived from the IPEDS F_F1A and F_F2 datasets. However the estimated values for Endowment Dependency (ED) are calculated based on operational expenditures drawn from IPEDS and endowment offtake rates (described in greater detail below).

Figures for operating expenses (OPEX) were calculated using values in the IPEDS database. For our research: $OPEX = Total\ Expenses - (Research + Auxiliary\ Enterprises + Hospital\ Services + Independent\ Operations)$. This is based on input from the Smith College Office of Institutional Research and is designed to exclude operations not likely to be funded by the endowment.

Endowment offtake rates come from the 2022 National Association of College and University Business Officers (NACUBO) - Teachers Insurance and Annuity Association of America (TIAA) Study of Endowments (NTSE).¹⁰ Average offtake rates have been relatively steady over the last few years.

¹⁰ NACUBO, TIAA. 2022. 2021 NACUBO-TIAA Study of Endowments. New York, NY: National Association of College and University Business Officers.

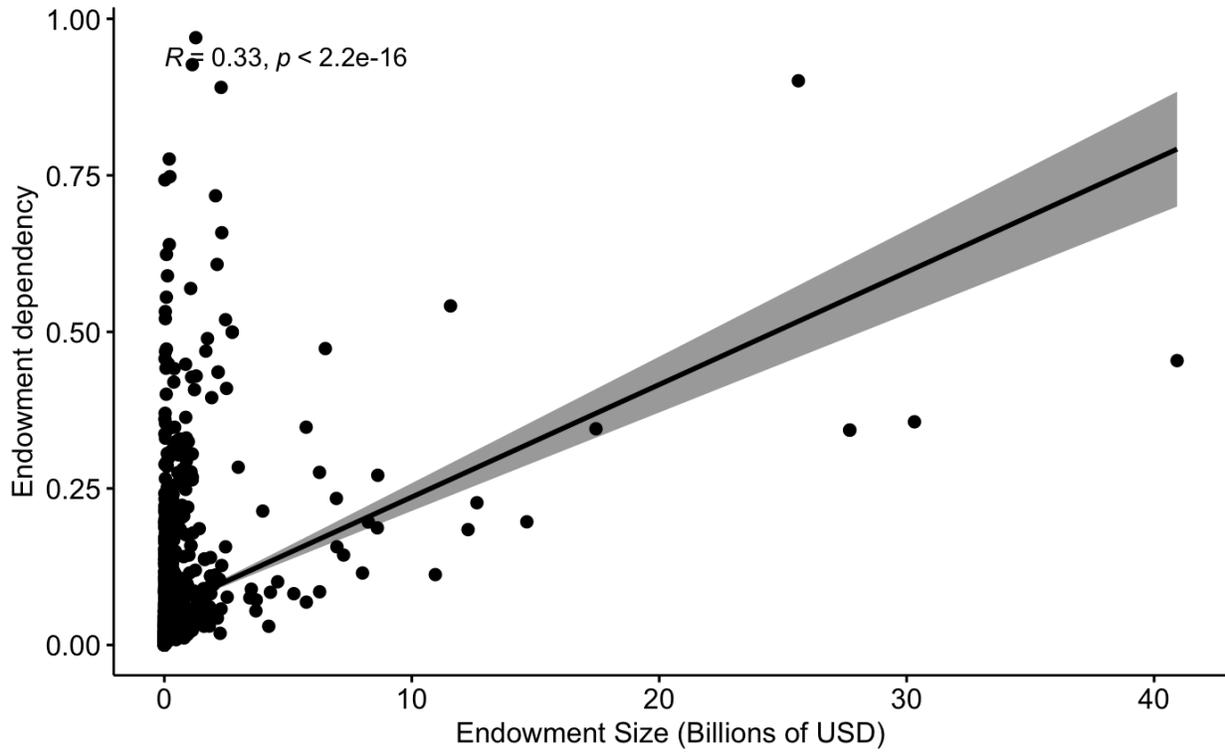
Endowment dependencies are calculated using IPEDS and NACUBO-TIAA data. For our research: Endowment Dependency = (Endowment Value (start of fiscal year) * endowment bracket average withdrawal rate of 0.045) / OPEX. A cross check of ED against 12 schools reporting endowment dependency found a 91% correlation between predicted and reported ED.

Statistics

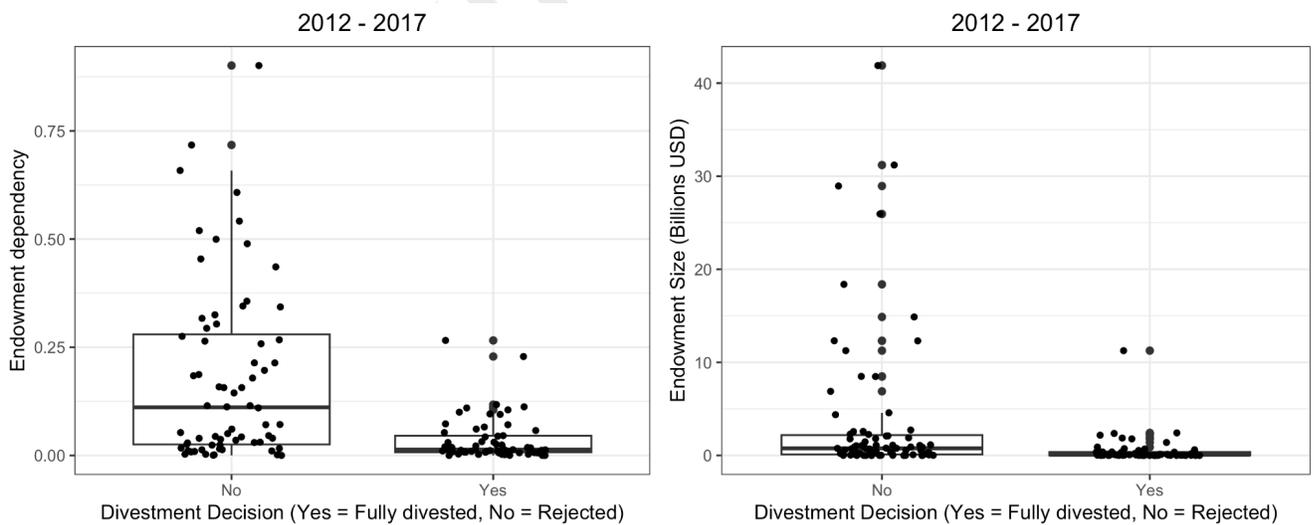
Statistical tests were conducted using R (4.2.2) and the glm package (family=binomial). Further documentation of calculations and statistical tests may be found in the R code.

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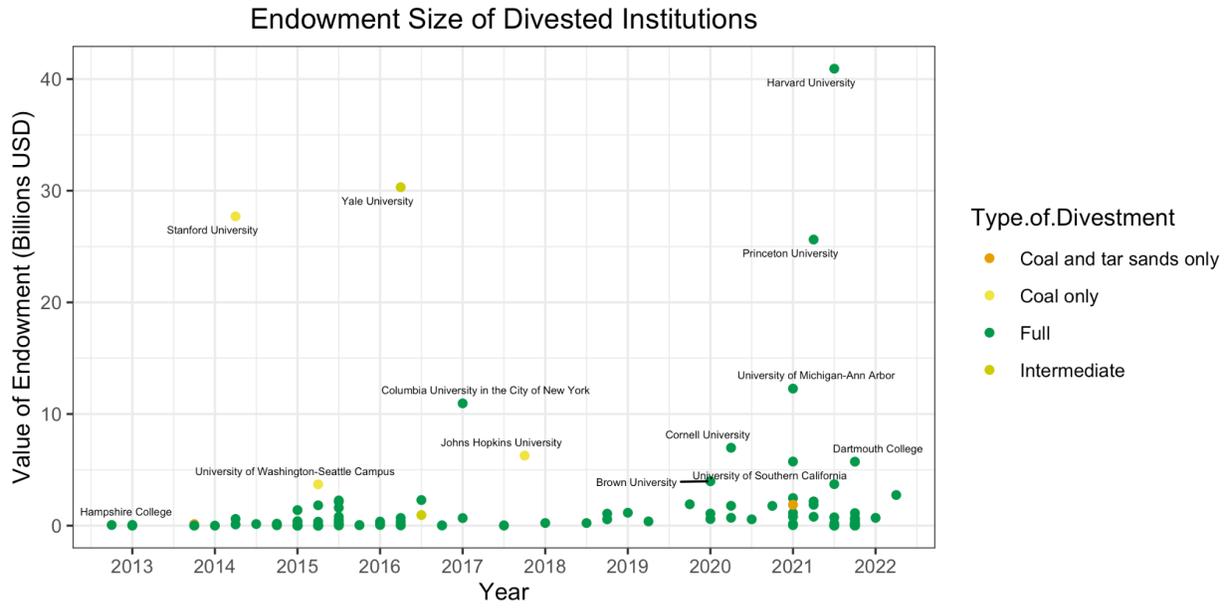
Supplementary Information Figures



SI Figure 1: Relationship Between Endowment Size and Dependence (n=1957). Correlation coefficient = 0.33



SI Figure 2: Endowment dependence and endowment size between fully divesting and rejecting institutions 2012-2017.



SI Figure 3: Divestment actions by year, type and endowment size.

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