THREE STUDIES ON PERFORMANCE-BASED FUNDING IN EUROPE: POLICY FORMATION AND OUTCOMES

By

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ABSTRACT

This dissertation utilizes performance-based funding for higher education in Europe as the mechanism through which to interrogate broader relationships between universities and their external resource environments. Structured as three distinct journal-length articles, I first explore the emergence of performance-based funding systems for higher education in the United Kingdom (UK), France, and Germany. I then devote the latter two studies of my dissertation to exploring the relationship between performance-based funding allocations and organizational behavior at UK universities.

This dissertation is dedicated to and is in honor of Kyle. I'm honored to have finished what you started, and not a day goes by when I don't miss you.

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DISSERTATION INTRODUCTION

In recent years, the relationship between universities and their environments has become a topic of considerable study. Informed by sociology, economics, and policy analysis, scholars of higher education have moved away from a view of universities as cloistered and set aside from the rest of society towards a view of universities that understands them as organizations embedded within larger environmental contexts (Barringer et al., 2019; Capano et al., 2020; de Wit & Altbach, 2021; Jaquette, 2019; Marques & Powell, 2020; Yeung et al., 2019). Researchers studying the relationship between universities and their environments have delved into a diverse array of topics, ranging from the relationship between state funding allocations and enrollment patterns (Jaquette, 2019) to the composition and functions of governing boards (Barringer et al., 2019), the impact of external sources of scholarship funding on student success (Gershenfeld et al., 2019), and the compensation of university presidents in response to changes in university rankings (Yeung et al., 2019), to name just a few. While the specifics of these studies vary, what unites them is a shared conceptualization of universities not as organizations set off from society, but rather as organizations that must engage with and respond to their external worlds in strategic ways. Undergirding such studies is a view of organizations as sociopolitical entities, ones with the ability to engage with and react to changes in their external environments. My dissertation follows this intellectual tradition by investigating the relationship that European universities have with performance-based funding.

Over the last forty years, one of the largest changes to the higher education funding landscape around the world has been the rapid introduction of performance-based funding systems for higher education. Since its introduction in the U.S. state of Tennessee in 1979, performance-based funding for higher education has spread to all six inhabited continents

(Dougherty et al., 2014). Performance-based funding has many different definitions, but most researchers consider a funding policy to constitute performance-based funding if it includes some sort of outcomes assessment (Dougherty et al., 2014; Kivisto & Kohtamaki, 2016; Zacharewicz et al., 2019). This means that funding allocations are provided not upfront, but in response to the degree to which a university meets the goals associated with that funding. While different states and countries have implemented a diverse array of performance-based funding policies for higher education, the common theme that unites these policies is a desire to improve the performance of higher education institutions (Dougherty et al., 2014). Because performance-based funding ties the receipt of funding to ex post assessment of outcomes, performance-based funding systems are designed to incentivize universities to behave in ways deemed desirable by funders, usually governments. Understanding whether these incentives encourage colleges and universities to align themselves with the priorities of performance-based funding systems has become a minor industry in higher education policy research over the last few decades (Checchi et al., 2019; Dohmen, 2016; Kelchen & Stedrak, 2016; Kivisto & Kohtamaki, 2016; Li, 2017; Pisár & Šipikal, 2017).

Like much of the rest of the world, European higher education has witnessed the rapid introduction of performance-based funding. Beginning with the United Kingdom (UK) in the mid-1980s, most European governments have introduced some sort of performance-based funding system for higher education (Zacharewicz et al., 2019). Two broad, transnational influences contributed to the widespread adoption of performance-based funding in Europe. The first driver of performance-based funding was political desire to improve the accountability and responsiveness of the public sector at large without increasing the government's role in managing the day-to-day operations of public sector organizations, of which universities are a

key constituent in most European countries (Brown, 2013). The second impetus for the introduction of performance-based funding was concern about the competitiveness of European universities (Altbach, 2016; Sörlin, 2007). At a time when universities around the world, particularly in East Asia, began to climb global rankings tables, many European countries felt that their universities either lagged or risked soon lagging. Policymakers believed that tying university funding to the attainment of specific goals deemed desirable for their home countries would provide universities with the incentive to improve performance in these areas.

Dissertation Topic and Structure

In this dissertation, I explore the policy formation process and outcomes of higher education performance-based funding in Europe. While my research broadly examines the relationships between universities and their external environments, I do this by using performance-based funding as my topic of study. Because the format of my dissertation differs from most education dissertations, a discussion of structure is worth providing before proceeding. The most common dissertation structure in higher education is the "five chapter" dissertation. These dissertations consist of one large study broken down into five chapters with one chapter each for the introduction, literature review, research design and methods, results, and discussion/conclusion. I did not write this type of dissertation. Instead, I wrote a "three article" dissertation. The three-article dissertation involves a student conducting and writing three separate research studies of the size, scope, and quality necessary for publication as a full-length article in a peer-reviewed journal in the field. All three articles relate to the same topic but interrogate it in different ways. It is important to note that in reading my dissertation, each of the three papers that constitutes it is designed to be read as a separate study, interpretable and understandable on its own. All three studies share commonalities, not the least of which is their

focus on performance-based funding in Europe, but are meant to be understandable alone, without reference to the other two papers included. The topic of my dissertation, performance-based funding for higher education in Europe, lends itself well to the three-article format. A three-article dissertation enables me to study performance-based funding for higher education in Europe from three different perspectives, with each article of the dissertation exploring a different aspect of performance-based funding for higher education in Europe. In contrast to a traditional "five chapter" dissertation, a three-article dissertation gives me a broader ability to study one overarching topic through the selective use of three different sub-studies.

Overview of Articles Included

I begin my dissertation by studying the ways in which performance-based funding policies came to be widely adopted in Europe. Most research on the spread of performance-based funding policies have used policy diffusion as a theoretical framework through which to understand the proliferation of these policies, focusing primarily on the transnational pressures that led to the emergence of performance-based funding systems for higher education. Policy diffusion is a theoretical framework that originated in political science (Li, 2017). It argues that policy makers tend to "copy" policies already in place in other political systems or subunits (Li, 2017). Faced with a similar policy problem as another state or country, policy diffusion suggests that policy makers will tend to duplicate the policy solutions in place elsewhere (Li, 2017). Applied to the concept of performance-based funding, policy diffusion makes considerable sense. Since its emergence in the late 1970s, performance-based funding spread rapidly. The policy went from nonexistent to globally widespread in just a couple of decades, underscoring the degree to which policy makers in different locations, including Europe, almost certainly adopted performance-based funding policies as part of a wider diffusion of the policy. While

policy diffusion offers a compelling way of understanding how and why performance-based funding spread through much of Europe in the span of a couple decades, it omits an important consideration. Most European countries adopted some sort of performance-based funding system for higher education between the mid-1980s and mid-2000s, but these policies often bear little resemblance to one another (Adam, 2020; Chowdhury et al., 2016; Dobbins & Knill, 2017; Dohmen, 2016; Frølich et al., 2010; Koya & Chowdhury, 2017). In the first paper of my dissertation, I argue that institutional logics (Cai et al., 2018) offers an important complement to policy diffusion and emphases on transnational pressures when understanding the process through which European governments came to adopt performance-based funding policies for higher education.

The first article of my dissertation is comparative, utilizing the cases of the UK, Germany, and France to understand the processes through which European governments adopted performance-based funding. This comparative approach is intentional. The processes through which European governments came to adopt the logic of performance-based funding for higher education are fundamentally transnational. While a deep dive into the policy formation process in one country would make for a compelling study, what it would omit is an understanding of how these shared influences led to diverse performance-based funding policies across the continent. I would be able to devote considerable attention to the specific circumstances that influenced the adoption of performance-based funding in one country, but I would not be able to develop an understanding of how transnational pressures resulted in unique policies across multiple countries. While it is important to devote attention to the specifics of one country in my dissertation, I consider it critical to begin at a pan-European level. Thus, in addition to advancing an argument about the processes through which European governments adopted performance-

based funding systems for higher education, the first article of my dissertation serves an important role in framing the broader context into which the second and third articles fit.

After beginning in a transnational and comparative context, the second and third articles of my dissertation address performance-based funding in a national setting. Both papers focus on the outcomes of performance-based funding in the UK. I selected the UK for several reasons. First, the UK is home to Europe's first performance-based funding system, making it a key policy in influencing the subsequent development of other performance-based funding systems in Europe. Second, it is a large exercise, constituting the 3rd largest source of funding for UK universities (Universities UK, 2022). The fact that the UK's performance-based funding system makes up such a significant proportion of the total UK higher education budget suggests that it may have a strong ability to influence universities to behave in ways deemed desirable by the UK government. Finally, I selected the UK because of the size and influence of its higher education sector. The UK has one of Europe's largest higher education systems, and it is a system with considerable global influence as well. Many of the world's top-ranked universities are in the UK, giving the UK higher education sector considerable influence in setting the agenda across the global higher education system (Allen, 2017; Altbach, 2016).

The second article in my dissertation examines the relationship between performance-based funding allocations and undergraduate student enrollment patterns at English universities. At English universities, performance-based funding constitutes the 3rd largest source of revenue; tuition represents by far the largest funding source, with competitive research grants and contracts narrowly exceeding performance-based funding as the 2nd largest (Universities UK, 2022). Because tuition, which comes from student enrollment, and performance-based funding allocations are two of the largest revenue streams for English universities, examining these

together offers a compelling way to understand the way in which universities respond to policies in their environments. The UK's performance-based funding system is a fully research-based performance funding system, providing financial incentives to universities with research deemed to be the highest quality (Chowdhury et al., 2016). The logic of the UK's performance-based funding system is that universities will strive to improve the quantity and quality of their research outputs, a goal that is to be attained through financial incentives. It is possible that English universities do indeed behave in this way, trying to improve the quality and quantity of their research outputs wherever possible. It is also possible that their response is fundamentally different, however. Instead of attempting to bring in additional revenue via the performance-based funding system by improving their research, English universities might decide that a more prudent strategy is to obtain additional financial resources by either enrolling more students or shifting the demographics of their student bodies away from lower tuition-paying UK-domiciled students and towards higher tuition-paying EU-domiciled and international students. In doing so, these universities might be able to make up revenue lost from the performance-based funding exercise. The second article of my dissertation uses panel data from 2008 through 2019 to explore whether English universities offset reductions in performance-based funding revenue with higher enrollment.

Key to note is that this article does not suggest that increasing student enrollment is inherently a negative outcome. Increasing student enrollment could, and likely does, have important implications for improving access to the English higher education system, increasing the proportion of the UK's workforce that holds a postsecondary credential, and so on. In this specific context, however, the important aspect of enrollment is about what enrollment patterns might tell us about how English universities respond to financial (dis)incentives imposed upon

them from their external environments. If English universities, particularly institutions that are lower-resourced and may struggle to compete with the top-ranked universities, decide to make up for lost revenue by increasing enrollment or shifting student populations towards higher-tuition students, it would suggest that there is a policy failure occurring within the UK's performance-based funding system. The purpose of the UK's performance-based funding system is to incentivize universities to improve their research outputs. If universities respond to financial losses in the performance-based funding system not by focusing on research but by increasing or changing their enrollment patterns, I will have evidence against the overall effectiveness of the UK's performance-based funding system to entice universities to behave in ways deemed desirable by policymakers.

The third article of my dissertation, like the second article, provides an empirical examination of the relationship between performance-based funding in the UK and university behavior. In this paper, I explore how performance in the UK's 2014 performance-based funding exercise relates to subsequent expenditures in different academic fields at Russell Group universities. The Russell Group consists of 24 universities across the UK, widely regarded as among the UK's most prestigious (Universities, 2020). The stated purpose of the UK's performance-based funding exercise is to entice universities to publish the highest-quality research possible, a goal rooted in the UK government's desire to preserve the international reputation of the nation's universities (Chowdhury et al., 2016). Because they represent the most prestigious group of universities in the UK, the Russell Group has become the primary set of institutions through which the UK's higher education sector engages and competes globally (Williams & Filippakou, 2010). I hypothesize that if there is to be a group of universities in the UK at which the desire to produce world-leading research is strongest and where success in the

UK's performance-based funding exercise is most likely, it is likely to be the Russell Group. This is the group of UK universities most involved in international competition within the stratified global higher education system and best-equipped to compete not only for performance-based funding allocations based on research output, but with other universities outside the UK as well (Williams & Filippakou, 2010).

With the assumption that Russell Group universities are actively engaged in global competition in a stratified higher education system guiding my work, I studied the degree to which stronger or weaker performance in the 2014 performance-based funding exercise is associated with changes in subsequent expenditure patterns. There are two ways that competition and stratification might inform institutional behavior in this context. One approach that universities might take is to reduce expenditures in fields that perform the strongest, opting to allocate additional financial resources to academic fields with lower performance in hopes of strengthening them for the next exercise. If this is the case, it would suggest that Russell Group universities engage in a capacity-building relationship vis-à-vis the UK's performance-based funding system. The other action universities could take is to funnel additional resources into academic fields that are already particularly strong, thereby trying to create a few academic areas of exceptional strength at the expense of lower performance in other fields. I contend that these funding decisions provide valuable insights into the strategic activity that Russell Groups engage in to bolster their research performance in a competitive, globally linked higher education system. Exploring how the most prestigious group of UK universities responds to the UK's performance-based funding system offers important insights about how a particular type of university, the global research university, responds to changes in resource allocations from its external environment (Cantwell & Taylor, 2013).

I close with a conclusion which synthesizes the findings from the three articles that constitute my dissertation. I reach multiple conclusions. First, I contend that while performance-based funding systems have similar transnational concerns as an impetus for change and reform, local conditions also strongly inform the policy formation process. The role of the local extends to university behavior in response to performance-based funding. I argue that the results from my second and third papers suggest that there is no one way in which universities, or even groups of like universities, behave in response to performance-based funding. There are discernible patterns, but the unique conditions facing each university ultimately contribute to the impossibility of generalizing across higher education institutions more broadly. This suggests that higher education institutions are engaged in strategic activity, deeply informed by their positionality within national and international systems of higher education, that seeks to optimize their own position. The paths to optimization differ across institutions depending upon the circumstances in which that institution finds itself.

Overall Research Problem

While my dissertation is composed of three journal-length articles that are designed to be read independently, the dissertation addresses one overall problem. In this dissertation, I use performance-based funding to interrogate the broader relationships between higher education institutions and their responses to changes in their external environments. I begin from a sociological view that higher education institutions are embedded within and responsive to changes in their organizational environments. Performance-based funding represents one of the primary and furthest-reaching changes to the higher education policy landscape in Europe over the last forty years. Performance-based funding in Europe is designed to entice universities to behave in certain ways deemed desirable to policymakers, and substantial sums of money can be

at stake. These two observations make it reasonable to suspect that performance-based funding is associated with organizational decision-making at European colleges and universities. The three articles in my dissertation each approach this relationship between performance-based funding and organizational behavior in slightly different ways. The first article addresses this overarching question in a comparative manner, utilizing the UK, Germany, and France as case studies. The second article studies how performance-based funding relates to enrollment patterns within a national (England-only) higher education system. The third article explores how performance-based funding is associated with changes in internal resource allocation, also in a national market but one defined differently from the second article (Russell Group universities across the UK rather than English universities only). Taken together, these three articles offer complementary perspectives into the relationship between universities and their external environments, using performance-based funding in Europe as the topic of study.

REFERENCES

Adam, E. (2020). 'Governments base performance-based funding on global rankings indicators': A global trend in higher education finance or a global rankings literature fiction? A comparative analysis of four performance-based funding programs. *International Journal of Educational Development, 76*. https://doi.org/10.1016/j.ijedudev.2020.102197

Allen, R. M. (2017). A comparison of China's "Ivy League" to other peer groupings through global university rankings. *Journal of Studies in International Education*, *21*(5), 395–411. https://doi.org/10.1177/1028315317697539

Altbach, P. G. (2016). *Global perspectives on higher education*. Johns Hopkins University Press.

Barringer, S. N., Taylor, B. J., & Slaughter, S. (2019). Trustees in turbulent times: External affiliations and stratification among U.S. research universities, 1975–2015. *Journal of Higher Education*, *90*(6), 884–914.

Brown, R. (2013). Mutuality meets the market: Analysing changes in the control of quality assurance in United Kingdom higher education 1992-2012. *Higher Education Quarterly*, *67*(4), 420–437. https://doi.org/10.1111/hequ.12028

Cai, Y., Normann, R., Pinheiro, R., & Sotarauta, M. (2018). Economic specialization and diversification at the country and regional level: introducing a conceptual framework to study innovation policy logics. *European Planning Studies*, *26*(12), 2407–2426. https://doi.org/10.1080/09654313.2018.1529142

Cantwell, B., & Taylor, B. J. (2013). Global status, intra-institutional stratification and organizational segmentation: A time-dynamic tobit analysis of ARWU position among U.S. universities. *Minerva*, *51*(2), 195–223. https://doi.org/10.1007/s11024-013-9228-8

Capano, G., Pritoni, A., & Vicentini, G. (2020). Do policy instruments matter? Governments' choice of policy mix and higher education performance in Western Europe. *Journal of Public Policy*, *40*(3), 375–401. https://doi.org/10.1017/S0143814X19000047

Checchi, D., Malgarini, M., & Sarlo, S. (2019). Do performance-based research funding systems affect research production and impact? *Higher Education Quarterly*, *73*(1), 45–69. https://doi.org/10.1111/hequ.12185

Chowdhury, G., Koya, K., & Philipson, P. (2016). Measuring the impact of research: Lessons from the UK's Research Excellence Framework 2014. *PLoS ONE*, *11*(6), 1–16. https://doi.org/10.1371/journal.pone.0156978

de Wit, H., & Altbach, P. G. (2021). Internationalization in higher education: Global trends and recommendations for its future. *Policy Reviews in Higher Education*, *5*(1), 28–46. https://doi.org/10.1080/23322969.2020.1820898

Dobbins, M., & Knill, C. (2017). Higher education governance in France, Germany, and Italy: Change and variation in the impact of transnational soft governance. *Policy and Society*, *36*(1), 67–88. https://doi.org/10.1080/14494035.2017.1278868

Dohmen, D. (2016). Performance-based funding of universities in Germany – an empirical analysis. *Investigaciones de Economía de La Educación Volume 11*, *11*, 111–132. https://ideas.repec.org/h/aec/ieed11/11-05.html

Dougherty, K. J., Jones, S. M., Lahr, H., Natow, R. S., Pheatt, L., & Reddy, V. (2014). Performance funding for higher education: Forms, origins, impacts, and futures. *The Annals of the American Academy of Political and Social Sciences*, *655*(September), 163–184. https://doi.org/10.1177/0002716214541042

Frølich, N., Coate, K., Mignot-Gerard, S., & Knill, C. (2010). Einheit von Forschung und Lehre: Implications for state funding of universities. *Higher Education Policy*, *23*(2), 195–211. https://doi.org/10.1057/hep.2010.2

Gershenfeld, S., Zhan, M., & Ward Hood, D. (2019). The impact of a promise: A loan replacement grant, low-income students, and college graduation. *The Review of Higher Education*, *42*(3), 1073–1100. https://doi.org/10.1353/rhe.2019.0030

Jaquette, O. (2019). Do public universities replace state appropriations with master's students? *Review of Higher Education*, *42*(3), 1101–1144. https://doi.org/10.1353/rhe.2019.0031

Kelchen, R., & Stedrak, L. J. (2016). Does performance-based funding affect colleges' financial priorities? *Journal of Education Finance*, *41*(3), 302–321. https://doi.org/10.1353/jef.2016.0006

Kivisto, J., & Kohtamaki, V. (2016). Does performance-based funding work? Reviewing the impacts of performance-based funding on higher education institutions. In R. M. O. Pritchard, A. Pausits, & J. Williams (Eds.), *Positioning higher education institutions: From here to there* (pp. 215–226). Sense Publishers.

Koya, K., & Chowdhury, G. (2017). Metric-based vs peer-reviewed evaluation of a research output: Lesson learnt from UK's national Research Assessment Exercise. *PLoS ONE*, *12*(7), 1–19. https://doi.org/10.1371/journal.pone.0179722

Li, A. Y. (2017). Covet thy neighbor or "reverse policy diffusion"? State adoption of performance funding 2.0. *Research in Higher Education*, *58*(7), 746–772.

Marques, M., & Powell, J. J. W. (2020). Ratings, rankings, research evaluation: how do schools of education behave strategically within stratified UK higher education? *Higher Education*, *79*(5), 847. https://doi.org/10.1007/s10734-019-00471-8

Pisár, P., & Šipikal, M. (2017). Negative effects of performance based funding of universities: The case of Slovakia. *NISPAcee Journal of Public Administration and Policy*, *10*(2), 171–189. https://doi.org/10.1515/nispa-2017-0017

Sörlin, S. (2007). Funding diversity: Performance-based funding regimes as drivers of differentiation in higher education systems. *Higher Education Policy*, *20*(4), 413–440. https://doi.org/10.1057/palgrave.hep.8300165

Universities, R. G. of. (2020). *About the Russell Group*.

Universities UK. (2022, February 10). *Higher education in facts and figures: 2021*.

Williams, G., & Filippakou, O. (2010). Higher education and UK elite formation in the twentieth century. *Higher Education*, *59*(1), 1–20.

Yeung, R., Gigliotti, P., & Nguyen-Hoang, P. (2019). The impact of U.S. News college rankings on the compensation of college and university presidents. *Research in Higher Education*, *60*(1), 1–17.

Zacharewicz, T., Lepori, B., Reale, E., & Jonkers, K. (2019). Performance-based research funding in EU Member States - A comparative assessment. *Science and Public Policy*, *46*(1), 105–115. https://doi.org/10.1093/scipol/scy041

PAPER 1: INSTITUTIONAL LOGICS AS A THEORETICAL FRAMEWORK: A COMPARISON OF PERFORMANCE-BASED FUNDING POLICIES IN THE UNITED KINGDOM, GERMANY, AND FRANCE

Introduction

Since the 1980s, European governments have taken steps to make higher education better accountable for public funds, more responsive to the needs of the public and the nation, and increasingly aligned with the needs of the labor market (Capano et al., 2020; Mathisen Nyhagen, 2015). One of the ways in which this desire for accountability and market competitiveness manifested itself in European higher education is through the widespread adoption of performance-based funding systems for higher education. Performance-based funding for higher education began in the United States when Tennessee introduced it in 1979; in the years since, it has spread around the world (Dougherty et al., 2014). The United Kingdom (UK) became the first European country to implement a performance-based funding system in 1986 (Broadbent, 2010). Over the next two decades, most European countries implemented some form of performance-based funding for higher education (Zacharewicz et al., 2019). While the specifics of these systems vary, an underlying policy objective—to increase the accountability, responsiveness, and competitiveness of a country's higher education sector—provided a common rationale for implementing performance-based funding (Jonkers & Zacharewicz, 2016; Zacharewicz et al., 2019).

In this paper, I argue that while performance-based funding initiatives in Europe share a broad push for accountability within the public sector and concerns about the global competitiveness of higher education institutions as impetuses for the implementation of performance-based funding systems for higher education, national and local conditions drove the

structure and design of these resultant performance-based funding policies. I begin by exploring two transnational trends that paved the way for the establishment of performance-based funding in Europe: a push towards greater accountability for the public sector as exemplified by New Public Management and concerns about the higher education sector's competitiveness, often operationalized through global rankings. Next, I describe the policy formation process in the UK, Germany, and France, examining the factors that went into the establishment of performance-based funding in each country, the time of implementation, and the resulting policies. In these three cases, the shared objectives of accountability and competitiveness intersected with different national cultures, political desires, and policy objectives to ultimately culminate in three very different performance-based funding systems. I then argue that an institutional logics perspective offers a complementary perspective to policy diffusion—a perspective which explains well the rapid proliferation of performance-based funding systems but does little to advance our understanding of why the resultant policies are so diverse.

Traditional approaches to understanding higher education policy proliferation suggest that policy makers largely copy policies already in place in another locale, applying these policy solutions to their own circumstances. If this is the case, the resulting policy should bear strong resemblance to the policy being copied. The rationale for suspecting that performance-based funding initiatives across Europe might be similar to one another is amplified by the movement towards organizational harmonization in European higher education, best exemplified by the Bologna Process (Neave & Veiga, 2013). Given that pan-European harmonization in the higher education sector has become increasingly central, it might make even more sense that performance-based funding policies resemble one another. It is the disconnect between the

widespread adoption of performance-based funding in Europe and the substantial differences between these performance-based funding systems that I address in this paper.

Foundations of Performance-Based Funding in Western Europe

Defining Performance-Based Funding

While performance-based funding is a relatively new form of institutional resource allocation, it represents one of the quickest-developing and farthest-reaching. Scholars of higher education have articulated a variety of definitions of what constitutes performance-based a funding. Zacharewicz et al. (2019, p. 105) defined performance-based funding as "the competitive allocation of organizational level (institutional) funding to […] organizations based on the ex post assessment of their […] performance." Kivisto and Kohtamaki (2016, p. 216) suggested that performance-based funding is "an allocation mechanism where the amount of funding is tied via a formula to the achievement of HEIs as reflected by performance indicators." Doughterty et al. (2014) defined performance-based funding in reference to non-performance-based funding, arguing that performance-based funding differs from non-performance-based funding in that performance-based funding is tied to outcomes rather than to inputs. Across most definitions, the primary feature of performance-based funding is that performance-based funding systems must involve ex post assessment. Funding systems wherein money is provided up front without regard to the outcomes associated with that funding do not constitute performance-based funding. In most cases, this criterion excludes excellence initiatives because most of these pay money up front without regard to the outcomes produced from them (Adam, 2020). It also excludes competitive research grants because these grants generally do not include a post-review in determining the level of funding.

Transnational Forces in the Emergence of Performance-Based Funding

Since the 1980s, most European countries have implemented some sort of performance-based funding system for higher education (Checchi et al., 2019). The push for and design of performance-based funding systems in Europe can be understood as the outcome of two distinctive yet interlocking sets of priorities. The first impetus behind the push for performance-based funding of higher education was a desire for public accountability, oversight, and control over higher education and the public sector more broadly, driven by a popular theory at the time called New Public Management (Brown, 2013; Orr et al., 2007). Underscoring the focus on accountability was a desire to ensure that taxpayer money was being spent "efficiently," to deliver the greatest value possible per unit of currency spent. The second was a desire to foster competitive, global universities, particularly given the emergence of strong higher education sectors outside of Europe and the increasing salience of ranking schemes (Altbach, 2016; Slaughter & Rhoades, 2011; Sörlin, 2007). Strong performance in higher education ranking systems confers benefits upon both individual universities and national systems of higher education, justifying their emphasis (Bastedo & Bowman, 2010; Bowman & Bastedo, 2009; Hazelkorn, 2008, 2014; Marques & Powell, 2020).

Public sector accountability and New Public Management.

Between 1945 and the present, higher education in Europe underwent first a rapid massification, followed by a call for increasing accountability reforms within the sector. During the years after World War Two, most European countries financed higher education through a single block grant, provided by central governments (Checchi et al., 2019; Sörlin, 2007). This was a time of rapidly expanding higher education participation in Europe, with the emergence of new institutions and a transition to a high participation higher education system (Marginson,

2016). By the end of the 1970s, much of western Europe had achieved 40% higher education participation rates, with central and eastern European countries not far behind (Marginson, 2016). But beginning in the 1980s, public sentiment and government policy towards higher education began to change. Higher education had established itself as a key part of the postindustrial economies of European countries, and demands for increased accountability over this burgeoning sector grew.

The desire for accountability and responsiveness led European governments to adopt New Public Management, a series of policies that consist of the adoption of business-like practices in the public sector, a heavy emphasis on outputs rather than inputs, and decentralization of control (Strehl et al., 2006). New Public Management encouraged European governments to grant additional autonomy to their public sectors in exchange for more market-oriented behavior and new systems of accountability. Common changes to European higher education associated with New Public Management included the introduction of tuition fees, evaluation of universities and their outputs, and a reduction in centralized government control over the higher education sector (Capano et al., 2020). One of the primary mechanisms that European governments have utilized in their efforts to increase the accountability and responsiveness of higher education institutions was performance-based funding. Underlying the emergence of New Public Management as a framework for reforming the relationship between higher education and governments in Europe was a desire to ensure that higher education institutions achieved the goals deemed desirable by their respective governments, goals to which I will later return.

Concerns about global competitiveness and rankings.

While public demands for accountability contributed to the emergence of performance-based funding systems founded in a broader push for accountability of the public sector, increasing concern about the global competitiveness of European higher education institutions also contributed to the movement towards the establishment of performance-based funding systems for higher education. While national and global ranking systems have been in existence for at least one hundred years, they have dramatically increased in power and influence over the last few decades (Meredith, 2004). Today, the so-called "global research university" marks the most well-known, most prestigious, and most desirable higher education system in the world (Cantwell & Taylor, 2013, p. 195). Global research universities dominate research output, feature the most highly-educated and highly-mobile students, faculty, and staff, and serve as points of pride for their countries (Altbach, 2016; Cantwell & Taylor, 2013; Taylor & Cantwell, 2015).

In the 1980s, most European governments became increasingly alarmed by the rapid rise in prestige and prominence of higher education systems in other parts of the world and concerned by the lack of universities in their countries featuring prominently in the top global ranking systems. As higher education has become an ever more global system, higher education ranking systems have become not only a way for higher education institutions to compare themselves to other institutions around the world, but also a way for countries to exert influence over the global higher education system, attract top international talent, and enhance their positioning and prestige in the global knowledge economy (Adam, 2020; Hazelkorn, 2018). Rankings are, then, not just about establishing the quality, real or perceived, of institutions. It is also about establishing a global hierarchy where high status comes with an array of advantages,

ranging from agenda setting to recruiting to national pride. This increasing salience of ranking systems as both a signaling device and as a point of national pride led many European governments to feel increasingly threatened by other rising higher education systems, namely those in China, India, Japan, and Singapore (Hazelkorn, 2018). These concerns became one of the impetuses that compelled European governments to implement performance-based funding initiatives (Adam, 2020). European governments argued that one of the ways to improve the rankings of their universities was to implement performance-based funding systems wherein the allocation of financial resources would be tied to organizational outputs—outputs that, not surprisingly, were designed in part to align with metrics used by global ranking systems (Adam, 2020).

Performance-Based Funding Systems in Western Europe

In understanding how performance-based funding emerged from two common pressures yet resulted in rather different performance-based funding systems, I begin by examining the performance-based funding policy formation processes in the UK, Germany, and France. There are a number of reasons why the UK, Germany, and France make strong case studies regarding the formation and implementation of performance-based policies for higher education. All three countries have high levels of college-going behavior, underscoring the centrality of higher education in each country (Capano et al., 2020; Orr et al., 2007). Underscoring their role in the global knowledge economy, the UK, Germany, and France are the top three university research-producing countries in Europe, generating approximately 40% of the university research produced in Europe (Jonkers & Zacharewicz, 2016). Most importantly, all three countries have significant performance-based funding initiatives for higher education, creating situations wherein universities have significant financial incentive to participate in each country's

performance-based funding system. Two insights emerge from my analysis. First, similar sets of transnational concerns drove the performance-based funding implementation process in all three countries. Second, in spite of similar transnational pressures, the performance-based funding systems that resulted are quite different from one another—a reflection of the role that local and national conditions played in the policy formation processes in each country.

United Kingdom

The performance-based funding system in use in the United Kingdom is a research-based exercise, today called the Research Excellence Framework (REF) and prior to 2014 called the Research Assessment Exercise (RAE). The UK held the first Research Assessment Exercise in 1986, with subsequent exercises taking place in 1989, 1992, 1996, 2001, and 2008 before transitioning to become the Research Excellence Framework for 2014 (Rebora & Turri, 2013). The RAE/REF exercise is held every six or seven years, with results informing funding for higher education until the next exercise takes place (Broadbent, 2010). Universities across the UK submit research published by academics working at those institutions. Each paper submitted is categorized into one of 36 academic sub-fields, called Units of Assessment (Broadbent, 2010). The RAE/REF exercises utilize a peer review process whereby Unit of Assessment-specific panels consisting of academics with expertise in that field as well as non-academics who use academic research in their professional work assess the research submitted by each university (Broadbent, 2010; Chowdhury et al., 2016). These panels assign each submitted piece of research a "score" ranging from 1 to 4, with 1 meaning "recognized nationally," 2 meaning "recognized internationally," 3 meaning "internationally excellent," and 4 meaning "world leading" (Chowdhury et al., 2016). Because only research scored a "3" or a "4" is eligible for funding, there is considerable pressure on the part of universities to submit research that will be

scored in these two categories (Jonkers & Zacharewicz, 2016). After the conclusion of each RAE/REF exercise, UK funding bodies utilize the results to allocate available research funding to the higher education institutions under their jurisdiction. Today, the UK's funding councils use REF results to disperse about £1.6 billion per year in direct funding to higher education institutions (Chowdhury et al., 2016).

The moment in which the United Kingdom first established the RAE/REF exercises was a moment in which one government, the government of Margaret Thatcher, sought to address concerns about accountability, responsiveness, and competitiveness in the public sector. Until the 1980s, the UK government awarded universities research funds using subjective criteria determined by committees convened by the government (Butler & McAllister, 2009). A desire to promote responsiveness and competitiveness led the Thatcher government to introduce a formalized evaluation process. The first objective of the new performance-based funding system the Thatcher government devised was to ensure that universities were responsive to the needs of the UK public—a direct reflection of New Public Management and its emphasis on the public good (Rebora & Turri, 2013). In exchange for government funding, the Thatcher government wanted to ensure that the nation's universities delivered in the best interests of the public. In addition to encouraging universities to respond to the needs of the public, the Thatcher government wanted to ensure that UK universities remained globally influential in the midst of ascendant higher education systems in other countries. By designing a performance-based funding system based on research output, the Thatcher government tied university finances to the larger global knowledge economy, prioritizing funding for British universities whose research was deemed to be most competitive.

While the establishment of the RAE/REF exercise underscores the role that transnational pressures for accountability and competitiveness played in UK higher education, the ultimate design of the RAE/REF exercise reflects the role that local conditions in the UK played. First, UK universities retained a considerable degree of autonomy in the RAE/REF process itself (Marques & Powell, 2020). Universities, not the government, determine the Units of Assessment in which each university will be scored, the specific papers that will be submitted for review, and the specific academics whose work will be included (Chowdhury et al., 2016). Review panels also consist primarily of academics, not government employees or industry professionals (Chowdhury et al., 2016). The fact that the introduction of a performance-based funding initiative permitted higher education institutions to maintain a relatively high level of independence from government control underscores a central feature of the UK's higher education system: the historical independence of its universities from centralized authority. Perhaps more importantly is the role that the RAE/REF exercise has played in reinforcing, not breaking down, longstanding stratification within UK higher education. While the RAE/REF exercise was intended to encourage more UK universities to respond to the needs of the public and compete with other universities globally, the exercise has had the opposite effect. Because the incentive structure tends to be self-replicating (i.e., the highest-rated universities reap the greatest rewards, thus enabling them to maintain their position in the next exercise), the UK's most influential universities have been able to use the RAE/REF exercises to reinforce their privileged positions in the UK's status hierarchy (Broadbent, 2010). Key to the RAE/REF's role in reinforcing status hierarchies is its role as a signaling device. Universities actively use RAE/REF results to attract highly desirable, top-caliber foreign faculty to work at UK universities, thereby positioning institutions with higher scores in each exercise for success in a

global market of higher education talent and preparing those universities to compete just as successfully in the next RAE/REF exercise (Broadbent, 2010).

Germany

Performance-based funding in Germany looks quite different from its counterpart in the UK. Whereas the UK features a national system focused on research, Germany features a series of state-level systems primarily focused on teaching outputs. The German Constitution delegates responsibility for higher education primarily to the states (Länder). As a result, performance-based funding in Germany is diffuse because each state, rather than the federal government, establishes (or chooses not to establish) its own performance-based funding system (Strehl et al., 2006). While the UK's performance-based funding initiative is based upon research outputs, Germany's performance-based funding systems are primarily based upon teaching outputs. Metrics for performance-based funding tend to be related to student persistence, number of graduates, and average time to degree attainment (Dohmen, 2016). Some German states have added performance-based metrics related to internationalization and gender equity, though these are less common than teaching-based outputs (Dohmen, 2016; Orr et al., 2007). When German states incorporate research into their performance-based funding systems, the metric used is usually number of doctoral degrees granted; only in Bavaria were publications initially used as a metric (Orr et al., 2007). As a result of this amalgamation of various performance-based funding systems, the German system features considerable variability in terms of how much money is available via performance-based funding (Dohmen, 2016). The percentage of university funding that comes from performance-based funding ranges from 5-20% of each institution's budget, though performance-based funding has less of an influence on German university budgets than it does in the UK (Nagy et al., 2014; Orr et al., 2007).

Like in the UK, the push for performance-based funding for higher education in Germany emerged from broader concerns about the responsiveness and competitiveness of Germany's universities (Dohmen, 2016). Since the end of the Second World War, Germany's higher education system featured a high degree of centralized control The assumption underlying this setup was that as the source of funding, the federal government a right and an obligation to direct the activities of individual universities (Orr et al., 2007). As the Cold War came to an end, however, German policymakers became increasingly concerned that Germany's universities were failing to prepare Germans for the economic realities the country faced after the fall of the Soviet Union and were not featuring prominently on European and global ranking systems (Orr et al., 2007). One of the ways in which the federal government sought to address these concerns was by adopting principles of New Public Management. In 1998, the German government passed a major Framework Law for Higher Education. Following the passage of this law, the federal government granted additional authority over the higher education sector to the states but required the states to reform their own higher education laws in line with the new principles of autonomy, diversity, and competition laid out in the Framework Law (Dobbins et al., 2018; Orr et al., 2007). One of the biggest changes in the wake of the Framework Law for Higher Education, which paved the way for additional performance-based funding, was a general move across German states from line-item budgets to lump sum budgets. No longer would German universities receive funding from the states already allocated for certain purposes. Instead, universities would receive lump sums of financial support from the states and then would have considerable latitude to spend the money as they wished. With this increased diffusion and autonomy, however, came a tradeoff. In exchange for increased institutional autonomy and control, German states developed new systems of accountability to ensure that universities met

the needs of the German people and continued to develop their international profiles (Orr et al., 2007). The primary accountability system that the states implemented in the wake of the Framework Law for Higher Education was performance-based funding. The first states introduced performance-based funding in the early 1990s; by 2004, 11 out of Germany's 16 states had some sort of performance-based funding system for higher education (Orr et al., 2007).

While transnational pressures similar to those in the UK drove the implementation of performance-based funding in Germany, the policies devised reflect a uniquely German approach to performance-based funding. One key feature of the German performance-based funding system that reflects local realities in Germany is the powerful role of state, rather than federal, governments. Unlike most higher education systems in Europe, the German system delegates limited responsibilities for higher education to the federal government and a more extensive set of responsibilities to the states (Dobbins et al., 2018). Each of the German states features its own local conditions, institutional norms, historical legacies, and unique set of institutions (Dobbins et al., 2018). Dobbins et al. (2018) argued that the diversity of local conditions in various German states—particularly political differences and differences in the types and number of higher education institutions present in the state—served as the basis for reform activities. Rather than converge towards a performance-based funding system that would look similar across all of the German states, each state implementing performance-based funding did so in response to the specific needs and conditions present in that state. The result was a national movement towards performance-based funding, but with a variety of different performance-based funding systems each designed at the local level and in response to concerns salient in individual states.

France

France's performance-based funding system revolves around multi-annual contracts between higher education institutions and the federal government. In France, the relationship between the federal government and each public university is governed by four-year framework contracts that are assessed and re-evaluated at the end of each contract period; the effectiveness of each university at achieving their objectives in the prior contract period then informs funding allocations in the next period (Frølich et al., 2010; Nagy et al., 2014). Much of this contract-embedded performance-based funding system focuses on research output. Unlike the UK's system and its discipline-specific panels, France's research-based performance funding system utilizes bibliometric evaluations of academic publications to determine the amount of research-linked funding that each higher education institution will receive in its next contract period (Dobbins & Knill, 2017). Established in 2008, this system entails the High Council for the Evaluation of Research and Higher Education (HCERES) evaluating all French research teams based on quality of research, novelty and risk of the research, and international community engagement (Jonkers & Zacharewicz, 2016). French research teams are scored A+, A, B, or C, with the results then informing funding allocations from the Ministry of Higher Education and Research (Jonkers & Zacharewicz, 2016). At most French higher education institutions, performance-based funding constitutes approximately 20% of the contracted budget negotiated with the French government (Dobbins & Knill, 2017).

Similar to Germany, the proximal basis for the implementation of performance-based funding in France was a change to higher education law, part of a larger restructuring of the historical relationship between higher education institutions and the state designed to increase the responsiveness and competitiveness of French universities. France has long had a higher

education system characterized by a very high degree of centralization and federal control over higher education (Boitier & Rivière, 2013). For years, however, French universities languished in global rankings, a fact that became increasingly troublesome to the French government after the implementation of the Bologna Process (Dobbins & Knill, 2017; Frølich et al., 2010). In 2001, the French government passed the Organic Law on Laws of Finance (LOLF); shortly thereafter, the government passed the Law on the Freedoms and Responsibilities of Universities (LRU) in 2007 (Dobbins & Knill, 2017). Both laws are based on many of the same New Public Management principles that contributed to the passage of the Framework Law for Higher Education in Germany, ceding direct government control of higher education in exchange for increased accountability, responsiveness, and competitiveness. These laws require the public sector at large to adopt performance-oriented accountability practices, transferred financial autonomy from the federal government to universities by replacing line-item budgeting with lump-sum budgeting, reduced the size of administrative councils, and emphasized an increase in the linkages between universities and the labor market (Corbett, 2010; Dobbins & Knill, 2017). The LOLF and LRU transformed French higher education funding, weakening the longstanding tradition of significant state control over higher education, giving more authority to individual universities, and leading to the introduction of performance-based funding (Dobbins & Knill, 2017). The French government granted additional autonomy to universities, but on the condition that they provide for the needs of the French citizenry and work to improve their international standing. French policymakers introduced performance-based funding into the regular contract negotiations between the government and universities as an accountability mechanism to reward universities achieving these goals and financially punish those who fail to do so.

Like in the UK and Germany, national and local priorities determined the eventual format of France's performance-based funding system. As noted previously, France's higher education system had long been among the most centralized in Europe (Mathisen Nyhagen, 2015). It also lacked the international recognition that other higher education systems, particularly the UK's, had. In an attempt to improve the performance of its higher education system, France implemented the current four-year contract system in the 1980s (Frølich et al., 2010). When New Public Management began to assert itself in the oversight of the French higher education system, the French government paired performance-based funding, in particular performance-based funding of research, with the relatively-new four-year contract structure (Frølich et al., 2010). By incorporating performance-based funding into the periodic contract negotiation process undertaken between the French government and higher education institutions, the French government used the performance-based funding policy formation process not only as a way to increase the accountability, responsiveness, and competitiveness of French universities, but also as a way to reinforce a desired logic that at the time was only about twenty years old. The emphasis on bibliometric outputs in France's performance-based funding system also reflects a local reality. For years, France's higher education system had badly languished in global rankings, typically failing to feature any universities among the top in the world. Not only had this made it difficult to recruit top students and faculty to French universities, but it had also become a major issue of national pride (Dobbins & Knill, 2017). Because publications play such a key role in the establishment of global rankings, the focus on bibliometric outputs made clear that one of the French government's priorities was to see universities improve their standing in world ranking tables (Cantwell & Taylor, 2013; Dobbins & Knill, 2017). Thus, anxiety about

France’s lack of standing in global ranking systems expressed itself in the formulation of France’s performance-based funding system by tying funding to bibliometric outputs.

Table 1

Comparison of performance-based funding initiatives for higher education in the UK, Germany, and France

Country	Timing of Implementation	Government Level	Target of Initiative	Frequency	Structure
UK	Mid-1980s	National	Research only	Approx. every 6-7 years	Separate exercise managed by higher education funding councils
Germany	Mid-1990s	State	Primarily teaching, but some states emphasize research	Annually	Varies widely from state to state
France	Late-2000s	National	Primarily research	Approx. every 4 years	Part of contractual negotiations between the state and universities

Institutional Logics as a Complementary Perspective to Policy Diffusion

I have discussed similar transnational pressures that contributed to the widespread rise of performance-based funding for higher education in Europe and have provided a summary of the policy formation process in the UK, Germany, and France. In this section, I address the differences between the performance-based funding systems in these three countries. I augment policy diffusion with institutional logics as an explanatory theoretical framework for the policy formation processes undertaken in the UK, Germany, and France.

Policy Diffusion

Originating in political science, policy diffusion is a theoretical approach to understanding the spread of policies across political subsystems (Li, 2017). When a governmental policy adopted in one political subsystem is influenced by a policy decision undertaken in a different political subsystem, policy diffusion is said to have occurred (Gándara et al., 2017). Under a policy diffusion framework, a policy innovation occurs when a political subsystem becomes the first to adopt a policy (Li, 2017). Policy diffusion suggests that the decision by other political subsystems (most often other countries or other states) to adopt a policy adopted in another political subsystem is influenced by both the internal features of the political subsystem itself and by the policy decisions undertaken in political subsystems proximally related to it (Li, 2017). The specific mechanisms through which policy diffusion occurs remain an area of considerable debate. In its earliest theorization, Walker (1969) suggested that geographic proximity represented the primary determinant of the relative ease by which policy diffusion occurs, a perspective that scholars have subsequently utilized in studies of policy diffusion in higher education (Antonowicz et al., 2017). Other scholars have suggested that diffusion occurs through the knowledge-spreading role played by intermediary organizations such as professional organizations and political parties, through "policy entrepreneurs" (well-connected individuals who advocate for the adoption of a policy), through a "leader and laggard" effect, and through the use of policy signaling (Gándara et al., 2017; Karakhanyan et al., 2011).

Higher education scholars have made extensive use of policy diffusion frameworks in theorizing how and why performance-based funding initiatives spread as widely and as rapidly as they did (Dougherty et al., 2013; Gándara et al., 2017; Li, 2017). Studies of higher education performance-based funding policy proliferation typically emphasize the similarities among

performance-based funding policies in different places. In a study of policy diffusion of performance-based funding policies in the United States, Li (2017) underscored the similarities among states that adopted similar performance-based funding policies between 2000 and 2013. Grisorio and Prota (2020) took a similar approach when they argued that the formation of performance-based funding in Italy closely mimicked the UK's Research Excellence Framework. While some studies (Dougherty et al., 2013) underscore the differences in policies adopted through a policy diffusion process, most studies utilizing a policy diffusion framework emphasize the similarities in diffused policies (Capano et al., 2020; Karakhanyan et al., 2011). Policy diffusion does not necessarily imply that the adopted policy will exactly mirror the initial policy, but its focus on policy translation from one political subunit to another emphasizes homogeneity in the policy implementation process. Considerations of how and why diffused policies might differ in structure from one another are largely absent in higher education studies utilizing policy diffusion as a framework.

Institutional Logics

Today, the UK, Germany, and France all have significant performance-based funding mechanisms in place for their higher education sectors. In my analysis of the emergence of performance-based funding systems in the UK, Germany, and France, I noticed that a similar policy basis (a pan-European movement towards New Public Management and concerns about the competitiveness of European higher education) contrasts with the fact that the performance-based funding policies ultimately adopted in each of these three countries are unique. I suggest that local institutional logics (Cai et al., 2018) offers a more promising theoretical lens through which to understand the emergence of performance-based funding in Europe. While a broad movement towards New Public Management and pan-European interest in bolstering the

reputation and prestige of European universities provided an impetus for the emergence of performance-based funding systems, local and national considerations produced policies that, while originating from a similar set of concerns, are very different from one another.

Building on earlier institutional and neo-institutional theories, institutional logics suggests that decision-making in organizations and political systems is based not upon rationality and objective analysis of choice opportunities, but rather through "socially constructed, historical patterns of cultural symbols and material practices, including assumptions, values, and beliefs" (Graham & Donaldson, 2020, p. 1864). The predominant values, preferences, and behaviors in a specific organization, state, or country at a given time become the policy logics through which decision-makers frame problems, examine possible solutions, and implement changes or new processes or policies (Friedland & Alford, 1991; Pinheiro & Antonowicz, 2015). Institutional logics suggests that even when presented with common challenges or choice opportunities, the unique circumstances—and in particular, values, norms, and standard ways of operating and functioning—of an organization, state, or country will still serve as the primary determinant of the ultimate outcome. Under an institutional logics perspective, policy formation happens not only because a policy solution is presented to policymakers but also because policymakers frame, address, and solve policy issues through the lens of local circumstances and conditions.

Scholars have increasingly used institutional logics as a theory to explain organizational behavior in higher education. Graham and Donaldson (2020) used institutional logics to explain why university leaders' responses to external pressures for university change did not result in an isomorphic effect (DiMaggio & Powell, 1983) to reach a shared policy solution. Bastedo (2008) studied higher education actors in Massachusetts using the same theory, finding that a consistent set of institutional logics dominated activist policymaking. Both studies underscore the ways in

which studies examining the role of institutional logics in higher education suggest that local perspectives, rather than national or transnational perspectives, frequently dominate the higher education policy landscape, influencing policy formation differently in response to different local conditions. Furthermore, these studies point to the fact that different local conditions result in different logics, and logics adopted in one area often compete with or seem to "oppose" logics in another area. The presence of multiple, competing logics underscores the role those sociopolitical interactions among decision-makers play in the policy process, with various decision makers in different policy spaces valuing different logics in different ways (Bastedo, 2008; Vican et al., 2020). Whereas policy diffusion frameworks typically suggest that policy formation will be homogenous across a group of similar political entities, institutional logics suggests that policy formation will be heterogeneous, even in the presence of shared challenges or shared policy solutions. Institutional logics also makes considerable space for different decision-makers to rely upon different logics in approaching the same decision within the same organizational system, be it a government, university, or any other organization, as other decision makers (Bastedo, 2008). The salience of institutional logics is not to suggest that transnational influences (such as New Public Management) have not led to reform in European higher education (Antonowicz et al., 2017). It is instead to suggest that while transnational processes have provided an impetus for reform, the formation of policies remains focused at the national or state level and reflects local, rather than transnational, conditions (Dobbins et al., 2018).

The performance-based funding policies implemented in the UK, Germany, and France share theoretical underpinnings at the confluence of New Public Management and concerns about competitiveness. In each of these three countries, a growing public emphasis on the

accountability of higher education institutions and a push towards improving their global competitiveness served as the impetus for consideration of performance-based funding policies (Adam, 2020). The emphasis on accountability and competitiveness intersected with a desire to reduce bureaucratic control over higher education institutions, a key tenet of New Public Management. These interlocking processes culminated in the emergence of performance-based funding systems designed to improve the accountability and competitiveness of higher education institutions while simultaneously reducing the level of state control exerted over the sector. All three countries utilized performance-based funding as a way to entice higher education to act in ways that governments deemed beneficial. One of the objectives policy makers sought to achieve was ensuring that universities served the needs of the public. Germany's performance-based funding system represents an exemplar of this objective in action. Most German states' performance-based funding systems provide financial incentives for increasing graduation rates, a reflection of the government's desire to ensure that German universities graduate the students they enroll. The second objective was to increase the competitiveness of each country's universities. The UK's and France's performance-based funding systems best exemplify the operationalization of this objective with their emphasis on research.

While the basis of the push for performance-based funding was similar across all three countries, few of the specifics of the performance-based funding initiatives implemented in the UK, Germany, and France resemble one another (see Table 1). The first dimension on which the implementation of performance-based funding for higher education differs is timing, with the UK implementing performance-based funding over two decades before France did and Germany falling in the middle. Governmental levels are inconsistent across the three countries. The states drove performance-based funding in Germany whereas the federal governments implemented it

in the UK and France. Even in the UK and France, however, these federal-level exercises look quite different. In the UK, performance-based funding is segmented into its own standalone exercise, the RAE/REF, held every 6-7 years (Chowdhury et al., 2016). In France, the federal government integrated performance-based funding into the recurring contractual negotiations between the French government and universities (Dobbins & Knill, 2017). Finally, the focus of performance-based funding differs in all three countries. In Germany, the states manage performance-based funding, each creating their own schemes; while teaching is the focus, there are a variety of metrics used throughout the country (Strehl et al., 2006). In contrast, research is the exclusive target of performance-based funding in the UK (Chowdhury et al., 2016). France falls in between; while research is dominant in the French higher education system, there are also teaching elements involved, and the French system's focus on bibliometric outputs differs from the UK's peer review-style performance-based funding system (Dobbins & Knill, 2017; Koya & Chowdhury, 2017).

The differences between the performance-based funding systems in the UK, Germany, and France reflect different logics facing higher education in each of the three countries. I begin with the UK, where desires to maintain the longstanding international stature of universities intersected with an interest in increasing the accountability mechanisms in place for higher education while still maintaining the historical independence of universities. British higher education institutions had long been considered among the most prestigious in the world, exemplified by institutions such as the Universities of Oxford and Cambridge and Scotland's four ancient universities. By the 1980s, higher education systems in other countries had begun to emerge as real competitors to the UK's long-held position atop the global higher education order. One of the strategies the government employed to combat this threat was through the creation of

a research-based performance-based funding system. By tying the receipt of funding to excellence in research, the government's intent was to create a system that incentivized UK universities to pursue and publish globally-excellent research, resulting in maintenance of the UK's position within the global higher education hierarchy. This design had an additional benefit in that it also fulfilled the goals of New Public Management. Performance-based funding offered the UK government a way to increase the accountability of the higher education sector without taking a more direct role in running the nation's universities. In the case of the UK, this latter point is of particular importance. As previously discussed, the UK's universities have historically been among the most autonomous in Europe, relatively free to conduct their business as they saw fit. The exact design of the RAE system reflected this independent nature of UK higher education. While the RAE (and later REF) system would be used to administer government money, the process via which universities submit research and the panel review process through which panels rate the quality and impact of submitted research is run almost entirely by higher education institutions and their faculty/staff. The government allocates financial resources in response to RAE/REF results, but it plays little role in the process itself. What emerges is a unique performance-based funding setup that reflects UK-focused desires to maintain competitiveness, increase accountability, and reduce government management while also embracing the history of university independence. Concerns about the UK's global competitiveness prompted the government to exemplify research in its development of a new accountability system for higher education, but this was an accountability system that incorporated the historically autonomous nature of UK universities by leaving much of the submission and review process to be administered by universities themselves. In the process, the government furthered another of its goals by increasing the responsiveness of the higher

education system also reducing the need for the government to manage the affairs of the higher education sector.

Unlike the UK system with its emphasis on global competitiveness and thus research, a national performance-based funding system, and university autonomy, the emergence of the German performance-based funding system reflected a very different set of dominant local logics. In contrast to the British and French systems, the German system of performance-based funding for higher education centers the role of the German states. Germany now features a higher education system wherein the German states exert the bulk of governmental control over higher education, a trend underscored by the emergence of performance-based funding systems throughout the country. In Germany, then, one aspect of the local logics at play in the emergence of performance-based funding was a respect for and reinforcement of the role of the states in the governance of higher education. The German system is also unusual in that it consists not just of one performance-based funding system, but rather multiple systems designed by different states. Here, too, we see the role of local logics informing policy design decisions. Unlike the UK where concerns about global competition abounded during the 1980s, the more diffuse nature of governmental control for higher education in Germany contributed to a diverse array of performance-based funding policies, each reflecting conditions in each individual state. For example, the German performance-based funding systems tend to emphasize teaching outputs over research outputs. This trend is even stronger in German states that have an above-average share of universities of applied science. Unlike traditional universities, German universities of applied science typically have little research output and generally do not confer doctoral degrees (Dohmen, 2016). To accommodate this, German states with lots of applied science institutions designed performance-based funding policies that underscored the value of teaching-related

outputs. States with higher proportions of research-intensive universities, such as Lower Saxony, have tended to be "outliers" in the German performance-based funding system by emphasizing research outputs in their performance-based funding systems (Dohmen, 2016). Across the country, local logics influenced the decisions of the policymakers who were tasked with designing Germany's performance-based funding systems for higher education.

While France shares with the UK a national focus and an emphasis on research in its performance-based funding system, the way in which local logics contributed to the role of performance-based funding in the French system contrasts with the performance-based funding systems of the UK and Germany. Performance-based funding emerged relatively later in France than it did in the UK or Germany, and it arose alongside a larger conversation, driven by concern about the lack of global competitiveness of France's higher education sector, about the relationship between the national government and French universities. France long featured one of Europe's most centralized higher education systems, with the federal government exerting considerable control over the higher education sector, playing a relatively direct role in employment conditions of faculty and staff, and directing the strategic activities of French universities. It is within the context of concerns about global competitiveness and a desire to reimagine the relationship between universities and the government that France's performance-based funding system emerged. Like the UK's performance-based funding system, France's system primarily focuses on research outputs as the basis for performance funding, a reflection of a desire among French politicians to increase the global ranking and prestige of French universities. What is unique about France's performance-based funding system is the way in which it is integrated into recurring contractual negotiations between universities and the government. It is in this uncommon setup that we most strongly see the role of local logics

informing policy decisions. At the time of implementation, one of the overarching priorities of the French government was to loosen France's historically rigid control over higher education institutions; this desire, however, existed alongside a system that had historically featured strong governmental control over higher education. By designing a performance-based funding exercise integrated into regular contract review periods wherein the French government has considerable sway over the strategic behavior of higher education institutions, the French government paradoxically utilized an existing logic—the tight linkage between the French government and French universities—as a vehicle to both increase the accountability of France's higher education sector and to re-frame the relationship between universities and the state away from such strong state control and towards more university autonomy with increased accountability mechanisms in place.

Conclusion

In this paper, I have used the cases of the UK, Germany, and France to argue that the dominant theoretical perspective used to understand the spread of performance-based funding initiatives for higher education, policy diffusion, does not fully explain the formation of performance-based policy initiatives in Western Europe. Policy diffusion explains the rapid dissemination of New Public Management across the continent, driving governments and their citizens alike to demand increased accountability, responsiveness, and competitiveness of public institutions while simultaneously reducing centralized bureaucratic control over these institutions. It does not, however, provide a strong theoretical explanation for the presence of highly differentiated performance-based funding systems in the three countries studied.

I suggest that the diverse array of performance-based funding systems formulated in the UK, Germany, and France can be better explained through an institutional logics perspective.

Taken together, policy diffusion and institutional logics provide a compelling explanation of the way in which common transnational pressures resulted in distinct performance-based funding systems. This paper advances our understanding of the policy formation process by describing how the introduction of institutional logics both complicates our understanding of policy formation processes, but also offers us the potential to better understand how and why countries sharing similar external pressures for higher education reform formulate policies in very different ways. As scholars continue to advance research on performance-based funding initiatives in Europe and elsewhere, it is my hope that this paper can be used to complicate our understanding of this increasingly common policy, suggesting that policy alone fails to explain observed differences in policies across national (and sometimes within countries) borders. In an era with conversations about the accountability of higher education on the rise, it is unsurprising to see new research emerging which seeks to understand when, how, and why government policies do or do not entice universities to behave in certain ways. Empirical research is important, but underlying high-quality empirical work are solid theoretical foundations. This paper advances the scholarly literature by complicating and advancing our understanding of how theoretical perspectives on performance-based funding policy formation and implementation processes operate in western Europe.

REFERENCES

Adam, E. (2020). 'Governments base performance-based funding on global rankings indicators': A global trend in higher education finance or a global rankings literature fiction? A comparative analysis of four performance-based funding programs. *International Journal of Educational Development*, *76*. https://doi.org/10.1016/j.ijedudev.2020.102197

Altbach, P. G. (2016). *Global perspectives on higher education*. Johns Hopkins University Press.

Antonowicz, D., Kohoutek, J., Pinheiro, R., & Hladchenko, M. (2017). The roads of 'excellence' in Central and Eastern Europe. *European Educational Research Journal*, *16*(5), 547–567. https://doi.org/10.1177/1474904116683186

Bastedo, M. N. (2008). Convergent institutional logics in public higher education: State policymaking and governing board activism. *Review of Higher Education, 32*(2), 209–234. https://doi.org/10.1353/rhe.0.0045

Bastedo, M. N., & Bowman, N. A. (2010). U.S. News & World Report college ranking: Modeling institutional effects on organizational reputation. *American Journal of Education, 116*, 163–183.

Boitier, M., & Rivière, A. (2013). Freedom and responsibility for French universities: From global steering to local management. In *Accounting, Auditing and Accountability Journal* (Vol. 26, Issue 4). https://doi.org/10.1108/09513571311327480

Bowman, N. A., & Bastedo, M. N. (2009). Getting on the front page: Organizational reputation, status signals, and the impact of U.S. News and World Report on student decisions. *Research in Higher Education*, *50*(5), 415–436. https://doi.org/10.1086/649437

Broadbent, J. (2010). The UK research assessment exercise: Performance measurement and resource allocation. *Australian Accounting Review*, *20*(1), 14–23. https://doi.org/10.1111/j.1835-2561.2010.00076.x

Brown, R. (2013). Mutuality meets the market: Analysing changes in the control of quality assurance in United Kingdom higher education 1992-2012. *Higher Education Quarterly*, *67*(4), 420–437. https://doi.org/10.1111/hequ.12028

Butler, L., & McAllister, I. (2009). Metrics or peer review? Evaluating the 2001 UK research assessment exercise in political science. *Political Studies Review*, *7*(1), 3–17. https://doi.org/10.1111/j.1478-9299.2008.00167.x

Cai, Y., Normann, R., Pinheiro, R., & Sotarauta, M. (2018). Economic specialization and diversification at the country and regional level: introducing a conceptual framework to study innovation policy logics. *European Planning Studies*, *26*(12), 2407–2426. https://doi.org/10.1080/09654313.2018.1529142

Cantwell, B., & Taylor, B. J. (2013). Global status, intra-institutional stratification and organizational segmentation: A time-dynamic tobit analysis of ARWU position among U.S. universities. *Minerva, 51*(2), 195–223. https://doi.org/10.1007/s11024-013-9228-8

Capano, G., Pritoni, A., & Vicentini, G. (2020). Do policy instruments matter? Governments' choice of policy mix and higher education performance in Western Europe. *Journal of Public Policy*, *40*(3), 375–401. https://doi.org/10.1017/S0143814X19000047

Checchi, D., Malgarini, M., & Sarlo, S. (2019). Do performance-based research funding systems affect research production and impact? *Higher Education Quarterly*, *73*(1), 45–69. https://doi.org/10.1111/hequ.12185

Chowdhury, G., Koya, K., & Philipson, P. (2016). Measuring the impact of research: Lessons from the UK's Research Excellence Framework 2014. *PLoS ONE*, *11*(6), 1–16. https://doi.org/10.1371/journal.pone.0156978

Corbett, A. (2010). Public management policymaking in France: Legislating the Organic Law on Laws of Finance (LOLF), 1998-2001. *Governance: An International Journal of Policy, Administration, and Institutions*, *23*(2), 225–249. https://doi.org/10.1111/j.1468-0491.2010.01477.x

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review*, *48*(2), 147–160.

Dobbins, M., & Knill, C. (2017). Higher education governance in France, Germany, and Italy: Change and variation in the impact of transnational soft governance. *Policy and Society*, *36*(1), 67–88. https://doi.org/10.1080/14494035.2017.1278868

Dobbins, M., Niemann, D., & Martens, K. (2018). Explaining policy convergence and polity divergence in federal systems: German and Swiss higher education revisited. *Publius*, *48*(4), 607–635. https://doi.org/10.1093/publius/pjy005

Dohmen, D. (2016). Performance-based funding of universities in Germany – an empirical analysis. *Investigaciones de Economía de La Educación Volume 11*, *11*, 111–132. https://ideas.repec.org/h/aec/ieed11/11-05.html

Dougherty, K. J., Jones, S. M., Lahr, H., Natow, R. S., Pheatt, L., & Reddy, V. (2014). Performance funding for higher education: Forms, origins, impacts, and futures. *The Annals of the American Academy of Political and Social Sciences*, *655*(September), 163–184. https://doi.org/10.1177/0002716214541042

Dougherty, K. J., Natow, R. S., Bork, R. H., Jones, S. M., & Vega, B. E. (2013). Accounting for higher education accountability: Political origins of state performance funding for higher education. *Teachers College Record*, *115*(1).

Friedland, R., & Alford, R. R. (1991). Bringing society back in: Symbols, practices, and institutional contradictions. In W. W. Powell & P. J. DiMaggio (Eds.), *The New Institutionalism in Organizational Analysis* (pp. 232–266). University of Chicago Press.

Frølich, N., Coate, K., Mignot-Gerard, S., & Knill, C. (2010). Einheit von Forschung und Lehre: Implications for state funding of universities. *Higher Education Policy*, *23*(2), 195–211. https://doi.org/10.1057/hep.2010.2

Gándara, D., Rippner, J. A., & Ness, Erik, C. (2017). Exploring the "how" in policy diffusion: National intermediary organizations' roles in facilitating the spread of performance-based funding policies in the states. *Journal of Higher Education*, *88*(5), 701–725.

Graham, S. W., & Donaldson, J. F. (2020). Academic leaders' response to the volatility of higher education: the influence of institutional logics. *Studies in Higher Education*, *45*(9), 1864–1877. https://doi.org/10.1080/03075079.2019.1586867

Grisorio, M. J., & Prota, F. (2020). Italy's national research assessment: some unpleasant effects. *Studies in Higher Education*, *45*(4), 736–754. https://doi.org/10.1080/03075079.2019.1693989

Hazelkorn, E. (2008). Learning to live with league tables and ranking: The experience of institutional leaders. *Higher Education Policy*, *21*(2), 193–215.

Hazelkorn, E. (2014). Reflections on a decade of global rankings: What we've learned and outstanding issues. *European Journal of Education*, *49*(1), 12–28.

Hazelkorn, E. (2018). Reshaping the world order of higher education: the role and impact of rankings on national and global systems. *Policy Reviews in Higher Education*, *2*(1), 4–31. https://doi.org/10.1080/23322969.2018.1424562

Jonkers, K., & Zacharewicz, T. (2016). *Research performance based funding systems: A comparative assessment* -. https://doi.org/10.2791/659483

Karakhanyan, S., Veen, K. Van, & Bergen, T. (2011). Educational policy diffusion and transfer: The case of Armenia. *Higher Education Policy*, *24*(1), 53–83. https://doi.org/10.1057/hep.2010.25

Kivisto, J., & Kohtamaki, V. (2016). Does performance-based funding work? Reviewing the impacts of performance-based funding on higher education institutions. In R. M. O. Pritchard, A. Pausits, & J. Williams (Eds.), *Positioning higher education institutions: From here to there* (pp. 215–226). Sense Publishers.

Koya, K., & Chowdhury, G. (2017). Metric-based vs peer-reviewed evaluation of a research output: Lesson learnt from UK's national Research Assessment Exercise. *PLoS ONE*, *12*(7), 1–19. https://doi.org/10.1371/journal.pone.0179722

Li, A. Y. (2017). Covet thy neighbor or "reverse policy diffusion"? State adoption of performance funding 2.0. *Research in Higher Education, 58*(7), 746–772.

Marginson, S. (2016). The worldwide trend to high participation higher education: Dynamics of social stratification in inclusive systems. *Higher Education, 72*(4), 413–434.

Marques, M., & Powell, J. J. W. (2020). Ratings, rankings, research evaluation: how do schools of education behave strategically within stratified UK higher education? *Higher Education, 79*(5), 847. https://doi.org/10.1007/s10734-019-00471-8

Mathisen Nyhagen, G. (2015). Between slow and comprehensive Reformers: Comparing government's funding policies of universities in three European countries. *International Journal of Public Administration, 38*(8), 533–543. https://doi.org/10.1080/01900692.2014.949748

Meredith, M. (2004). Why do universities compete in the ratings game? An empirical analysis of the effects of the U.S. News and World Report college rankings. *Research in Higher Education, 45*(5), 443–461.

Nagy, S. G., Kováts, G., & Németh, A. O. (2014). Governance and funding of higher education: International trends and best practices. *Procedia - Social and Behavioral Sciences, 116*, 180–184. https://doi.org/10.1016/j.sbspro.2014.01.190

Neave, G., & Veiga, A. (2013). The Bologna Process: Inception, "take up" and familiarity. *Higher Education2, 66*(1), 59–77. https://doi.org/10.1007/s10734-012-9590-8

Orr, D., Jaeger, M., & Schwarzenberger, A. (2007). Performance-based funding as an instrument of competition in German higher education. *Journal of Higher Education Policy and Management, 29*(1), 3–23. https://doi.org/10.1080/13600800600980072

Pinheiro, R., & Antonowicz, D. (2015). Opening the gates or coping with the flow? Governing access to higher education in Northern and Central Europe. *Higher Education, 70*(3), 299–313. https://doi.org/10.1007/s10734-014-9830-1

Rebora, G., & Turri, M. (2013). The UK and Italian research assessment exercises face to face. *Research Policy, 42*(9), 1657–1666. https://doi.org/10.1016/j.respol.2013.06.009

Slaughter, S., & Rhoades, G. (2011). Markets in higher education: Trends in academic capitalism. In P. G. Altbach, P. J. Gumport, & R. O. Berdahl (Eds.), *American higher education in the twenty-first century: Social, political, and economic challenges* (3rd ed., pp. 433–464). The Johns Hopkins University Press.

Sörlin, S. (2007). Funding diversity: Performance-based funding regimes as drivers of differentiation in higher education systems. *Higher Education Policy, 20*(4), 413–440. https://doi.org/10.1057/palgrave.hep.8300165

Strehl, F., Reisinger, S., & Kalatschan, M. (2006). Funding systems and their effects on higher education systems - Germany. In *Oecd*.

Taylor, B. J., & Cantwell, B. (2015). Global competition, US research universities, and international doctoral education: Growth and consolidation of an organizational field. *Research in Higher Education*, *56*(5), 411–441. https://doi.org/10.1007/s11162-014-9355-6

Vican, S., Friedman, A., & Andreasen, R. (2020). Metrics, money, and managerialism: Faculty experiences of competing logics in higher education. *Journal of Higher Education*, *91*(1), 139–164. https://doi.org/10.1080/00221546.2019.1615332

Walker, J. L. (1969). The diffusion of innovations among the American states. *The American Political Science Review*, *63*(3), 880–899.

Zacharewicz, T., Lepori, B., Reale, E., & Jonkers, K. (2019). Performance-based research funding in EU Member States - A comparative assessment. *Science and Public Policy*, *46*(1), 105–115. https://doi.org/10.1093/scipol/scy041

PAPER 2: THE RELATIONSHIP BETWEEN PERFORMANCE-BASED FUNDING ALLOCATIONS AND STUDENT ENROLLMENT AT ENGLISH UNIVERSITIES

Introduction

Since its emergence in Tennessee in 1979, performance-based funding systems for higher education have proliferated around the world (Dougherty et al., 2014). Performance-based funding has numerous definitions in scholarly literature, but most authors identify its key features as a focus on outputs rather than inputs or involving ex post assessment (Dougherty et al., 2014; Zacharewicz et al., 2019). The United Kingdom (UK) is home to one of the world's largest higher education performance based funding schemes, today called the Research Excellence Framework (REF) and previously called the Research Assessment Exercise (RAE). The RAE/REF exercise is predicated upon regular (typically every 7 years) reviews of UK universities' research quality (Chowdhury et al., 2016). The RAE/REF system is unusual among higher education performance-based funding systems for its focus and its size. It focuses on research output rather than student outputs (graduation rates, retention rates, etc.) and is a particularly large exercise, determining how over £2 billion worth of research money will be allocated to UK universities (Universities UK, 2022).

In this paper, I use resource dependence theory (Pfeffer & Salancik, 1978) as a framework to hypothesize that English universities losing money in the 2008 and 2014 RAE/REF exercises attempt to make up lost revenue by either increasing undergraduate student enrollment or by shifting the demographics of their undergraduate student bodies away from UK-domiciled students and towards EU-domiciled and international students. The RAE/REF is a performance-based funding system that has the potential to significantly alter institutional finances in the years following each RAE/REF exercise. These potentially dramatic changes in

funding interact with institutional desires to maintain stable finances and to ensure that revenues are sufficient to cover expenses (Serna & Weiler, 2016). By conceptualizing English universities as rational, resource dependent organizations embedded within a distinctive resource environment, I explore the possibility that English universities faced with reductions in performance-based funding revenue decide to redeploy their efforts towards increasing revenue from other sources. The largest source of revenue for English universities is tuition. Changes in enrollment patterns in response to reductions in performance-based funding allocations, then, might reflect that English universities attempt to offset lost performance-based funding money with tuition revenue.

The RAE/REF system is designed to reward institutions that perform "best" in the quality and impact of their research, help allocate limited financial resources such that the highest quality research can come of those pounds, and encourage institutions that did not perform as well to improve their research performance before the next exercise. If, however, the institutions that perform poorly and face funding reductions react not by improving research output but instead by increasing revenue through increased enrollment of tuition-paying students, the RAE/REF may be having a serious unintended outcome. It is important to note that I do not argue that increasing student enrollment is an inherently negative outcome. Growing the size of an institution's undergraduate student body could have important implications for improving access, providing for the needs of the nation in an increasingly knowledge-based economy, and bringing different forms of compositional diversity to the student body, to name just a few benefits. Instead, I contend that in this case, undergraduate student enrollment patterns can be used as a proxy through which to understand university responses to performance-based funding changes. The important element of this study is not whether student enrollment changes, but

rather what these patterns tell us about how English universities respond to changes in resource availability.

Research Questions

To study the degree to which a resource dependence theory explains the behavior of English universities when faced with reductions in performance-based funding allocations, I posed the following research questions:

1. To what extent are performance-based funding resource allocations associated with subsequent overall undergraduate student enrollment patterns at English universities?
2. To what extent are performance-based funding resource allocations associated with subsequent UK-domiciled, EU, and international undergraduate student enrollment patterns at English universities?
3. In what ways do English universities differ in the relationship between performance-based funding allocations and subsequent undergraduate student enrollment patterns based upon institutional ranking?

Literature Review

Structure and Composition of the English Higher Education System

England has one of the oldest and largest higher education systems in the world. Prior to the 1800s, England had a small number of universities, among them the Universities of Oxford and Cambridge (Filippakou et al., 2012; Radice, 2013) Two periods of expansion transformed England's higher education system from a system of two universities into the array of institutions it consists of today. The first major growth period coincided with the rapid industrialization of English cities in the 1800s. During this time, many of the northern cities in England saw the emergence of their first universities, among them the cities of Birmingham, Bristol, Leeds,

Liverpool, Manchester, and Sheffield and the forming of the University of London (Filippakou et al., 2012). A second period of expansion followed the Second World War, when a growing population and an emerging postwar knowledge economy led the government to take a more active role in increasing the size and scope of England's higher education sector (Filippakou et al., 2012). This latter period notably included the creation of several technical-focused institutions called "polytechnics" in the mid-1960s (Filippakou et al., 2012). While not originally classified as universities, most of these polytechnics gained university status in 1992 with the passage of the Further and Higher Education Act (Radice, 2013). As the higher education system has expanded, so too has student enrollment. In the years following the Second World War, less than 5% of the adult population in England had entered higher education; by 2000, this number had reached 40% and exceeded 50% a decade later (British Council, n.d.). Approximately 2.5 million students are currently studying at a UK university, with most of these enrollments at English universities (British Council, n.d.).

The English university system features a high degree of institutional autonomy as well as a clear delineation between universities and other types of postsecondary education institutions (Tight, 2011). English universities have considerable autonomy from the government and are classified as independent, autonomous legal entities (Tight, 2011). While English universities receive considerable governmental revenues, quasi-independent higher education funding councils, rather than the central government itself, manage these funding allocations (British Council, n.d.). Of note for this study is the fact that the English higher education system and the universities that constitute it are clearly delineated from other forms of postsecondary education. In addition to universities and the higher education sector, England features an array of postsecondary education options, such as work-based learning and apprenticeship programs,

adult learning and community learning institutions, post-16 courses, and various types of colleges (Tight, 2011; UK government, n.d.). These postsecondary education options, exclusive of universities and the higher education sector, are collectively referred to as further education (UK government, n.d.). Because non-university postsecondary education institutions do not participate in the RAE/REF process, none of them are included in this study.

Revenue Sources in English Higher Education

Approximately £39.8 billion are spent on higher education in the United Kingdom per year, with most of this taking place in England (Universities UK, 2022). The largest single source of institutional revenue is student tuition fees, making up 52% of university revenues (Universities UK, 2022). The next largest revenue stream, comprising 15% of revenues, comes from competitive research grants and contracts, closely followed by funding body grants with money allocated through the RAE/REF process (Universities UK, 2022). England used to provide substantial teaching grants to institutions, but these have been dramatically cut in the last few years to the point that they now constitute virtually none of the revenue in English higher education. Beyond tuition fees and research grants, other individual sources of revenue are much smaller. Non-governmental research grants comprise 8% of income, endowment returns generate 2% of income, and approximately 18% come from miscellaneous other sources (Universities UK, 2022).

A large change to the revenue structure of English higher education has occurred in the last twenty years through the rapid introduction of student tuition fees. From the expansion of the UK's higher education system after the Second World War until the 1990s, higher education in the United Kingdom was generally free. The government paid for students to go to college, and in most cases provided students with small stipends to provide for living expenses (Anderson,

2016). In the 1990s, John Major and the Labour Party introduced university fees, akin to tuition fees in other higher education systems (Anderson, 2016). The government initially capped fees for UK-domiciled students at £1,000 per student per year, but this limit was quickly raised to £3,000 by 2004 and £9,000 by 2010 (Marginson, 2018). As student fees rose, the UK government rapidly moved towards replacing state teaching grants with these tuition fees (Anderson, 2016). In doing so, the responsibility for providing revenue for English universities shifted from the government to the universities themselves. As a result, English universities must increasingly treat students as consumers, courting them to attend a given institution since tuition revenue can only be obtained through student enrollment (Adcroft et al., 2010; Anderson, 2016; Chankseliani, 2018). As English universities have been forced to secure more and more of their funding through student enrollment and subsequent tuition fees, English universities have marketed themselves more aggressively to students home and abroad(Marginson, 2018; Walker, 2014)

While tuition fees have been introduced for almost all students studying at English universities, the fees that different students pay vary widely. The tuition fees charged to UK students are regulated by the government, but they are not regulated for international students (called overseas students). English universities can charge international students as much as they want, a scenario that has made international students particularly desirable as a source of revenue for English universities (Chankseliani, 2018; Walker, 2014). The United Kingdom is second only to the United States in market share of international students with almost 4 million international students enrolled; these students collectively pay over £2 billion in tuition fees per year (Marginson, 2018; OECD, 2019). Tuition fees charged to EU-domiciled students typically fall somewhere in between tuition fees for UK-domiciled students and overseas/international

students. This makes EU-domiciled students another important source of revenue for English universities, but on a per-student basis less significant than international students.

Performance-Based Funding in the United Kingdom

Since its initial emergence in the United States in the late 1970s, performance-based funding has spread to most of the world's major higher education systems (Kaikkonen, 2016; Taylor, 2011; Ziskin et al., 2018). The primary purpose of performance-based funding is to incentivize individual institutions to behave in a certain way or to achieve certain goals by tying the receipt of funding to the attainment of those goals (Adam, 2020; Kaikkonen, 2016). By using funding incentives and disincentives as motivators, the logic of performance-based funding posits that universities can be driven by a funding organization, most often the government, to pursue certain goals and outcomes. Western European governments have rapidly implemented performance-based funding systems, with most European countries featuring some form of performance-based funding for higher education (Adam, 2020; Broadbent, 2010; Capano et al., 2020). Despite the frequency with which performance-based funding schemes have been implemented across Europe, research on the effectiveness of performance-based funding is generally negative, with most studies showing that European higher education performance-based funding systems do not achieve their stated objectives and fail to entice universities to behave in ways deemed desirable by governments (Enders et al., 2013).

Performance based funding has taken on an increasingly prominent role in the financing of English higher education over the last thirty years. Research-based performance funding, virtually all of which is allocated via the RAE/REF exercises, comprises the third-largest single revenue stream for English higher education institutions, only narrowly behind non-performance-based research grants and contracts (UK, 2016). The emergence of performance-

based funding in the UK grew out of increased governmental interest in strategically allocating funding as well as a general trend towards new public management and market-based competition as a means for improving the performance of UK universities (Furlong, 2011; Martin, 2011). The government of Margaret Thatcher, keen to require that public expenditures produce the greatest possible value for money spent, became the largest governmental advocate of performance-based funding in the public sector as a means of ensuring accountability (Brown, 2013; Martin, 2011). First begun in 1986 and repeated in 1989, 1992, 1996, 2001, 2008, and 2014, the RAE/REF exercises have created an output-based funding mechanism to regulate and finance the production of scholarship and new knowledge in universities across the UK (Marginson, 2018; Trevorrow & Volmer, 2012). As it is structured today, research produced by universities is ranked by panels of experts on a scale from 1 to 4. Research ranked "1" is "recognized nationally," "2" represents "recognized internationally, "3" represents "internationally excellent", and "4" represents "world leading" (Tymms & Higgins, 2018). Because only research ranked a "3" or "4" is eligible for funding, the stakes for performance in each RAE/REF are high, and universities have a strong incentive to submit research only in academic fields, known as units of assessment in the RAE/REF, of relative strength. Funding available through the RAE/REF is considerable; the 2014 REF, for example, led to the allocation of £1.6 billion per year. Losses can also be high; in the wake of the 2014 REF, multiple institutions lost more than 10% of their research funding, a major blow to university budgets (Chowdhury et al., 2016).

The emergence of a performance-based funding scheme to allocate research money in the United Kingdom has not been without its critics. The RAE/REF exercises have been criticized for fostering institutionalizing hierarchy (Marginson, 2018), increasing the commercialization

and market-focused nature of higher education (Furlong, 2011), placing too much emphasis on journal of publication as a method for assessing the subjective excellence of individual research projects (Chowdhury et al., 2016), utilizing a grading methodology that is excessively complicated (Martin, 2011), and being needlessly long and expensive (Broadbent, 2010). Because the RAE/REF system relies upon submissions made by individual institutions, the structure of the exercise itself invites "gamification" (Broadbent, 2010). Universities can choose the areas in which they want to be assessed and can choose how to assemble their dossiers; thus, universities can selectively exclude research and entire departments that are not likely to boost the university's final score.

While performance-based funding of higher education has become a major source of revenue for English universities, scholarship studying the impacts of performance-based funding in the UK is sparse. Much of the scholarship that exists on RAE/REF results addresses one of two dimensions of this performance-based funding exercise. The first strand of literature discusses impacts on individual academic departments or within specific academic fields, such as medicine (Ovseiko et al., 2012). The other major strand of literature critiques the methodologies used in the RAE/REF, with particular emphasis on the 2014 introduction of impact factors as an element of REF methodology (Martin, 2011; Terämä et al., 2016; Trevorrow & Volmer, 2012; Tymms & Higgins, 2018). While scholarship critiquing the specific metrics used by the RAE/REF exercises abound, I found no literature that looks at the outcomes of the RAE/REF exercises and their connection to university interactions with their resource environments. This glaring gap in scholarship is what I hope to address through this study.

Resource Dependence Theory

I have presented a view of English universities that suggests that they are increasingly market-oriented, feature diverse revenue streams, and must navigate regular performance-based funding exercises that determine a significant percentage of their operating budgets. Together, these realities set the stage for the introduction of resource dependence theory, a framework that offers one account of how performance-based funding and student enrollment and fees interact with one another.

Informed by open systems theory, resource dependence theory suggests that institutions such as universities are concerned with the acquisition of resources and will behave in ways that maximize their abilities to acquire resources from their environment (Nisar, 2015; Pfeffer & Salancik, 1978; Scott & Davis, 2007). Resource dependence theory is also notable for its tendency to focus on behavior *within* universities—behavior that is influenced by the external world (via financial resources) but which is internal to the institution itself (Bastedo & Bowman, 2011). Though it does not originally come from education scholarship, resource dependence theory has been utilized to study higher education for a number of years now (Slaughter & Leslie, 1997). In higher education, scholars frequently utilize resource dependence theory to study the relationship between revenue streams and organizational performance, positing that the decisions university leaders make are influenced by inflows of money (Kelchen & Stedrak, 2016; Kholmuminov et al., 2019).

Resource dependence theory offers a compelling account of the relationship between universities and their resource environments. Resource dependence theory centers the fact that universities exist within specific resource environments (Kholmuminov et al., 2019; Pfeffer & Salancik, 1978). This drives two important observations. Because they exist within a particular

resource environment, universities are constrained in the ways that they can pursue resources. Universities do not have access to an infinite number of possible revenue streams; they have access only to those revenue streams which are available within their organizational environment. Universities must work to secure resources through these revenue sources and only these revenue sources. Conceptualizing universities as existing within a specific resource environment also has implications for the relationship between universities and their funding sources. Universities acquire their resources from other organizations in their environment, such as the performance-based funding councils in the UK. This interaction creates an interorganizational dependency between universities and funding organizations (Bastedo & Bowman, 2011). Over time, the existence of this interorganizational dependency leads universities not only to pursue revenue from these funding organizations, but increasingly to reflect the goals, values, and priorities of these funding bodies (Cantwell & Taylor, 2015). English universities are both in part dependent upon and reflective of the priorities of the RAE/REF and its funding bodies as they attempt to meet the funding requirements imposed by the RAE/REF. Over time, English universities should come to adopt many of the goal orientations, values, and priorities of the RAE/REF exercises, in particular its emphasis on research productivity. English universities are simultaneously a reflection of the fact that their largest source of revenue comes from student tuition and fees. To increase tuition revenue, universities must court students and reflect the priorities of potential students, an objective that may pull universities away from the strategic orientations of other revenue sources such as the RAE/REF. Thus, how English universities choose to pursue resources tells us much about how these universities themselves determine priorities, engage in strategic decision-making, and

position themselves to appeal to different organizations and actors within their resource environment.

Resource dependence theory offers a way of understanding how and why performance-based funding schemes such as the RAE/REF might compel universities to behave in certain ways, but also how they might not. Since institutions care about and are driven by their pursuit of resources, external organizations, such as governments, with money available to allocate should be able to shape institutional performance and behavior by tying funding allocations to specific outputs or outcomes (Hillman et al., 2018). In the English higher education system, one of the government's interests is in incentivizing and rewarding universities that produce research of the highest quality. RAE/REF funding allocations reflect this goal, awarding the most money to those institutions whose faculty generate research deemed to be of the highest quality. With research performance thus tied to funding allocations, resource dependence offers a way of understanding why universities may pursue high quality research. But while resource dependence theory provides a theoretical mechanism to explain why financial incentives may entice universities to behave in certain ways, it also offers the possibility that externalities—unintended consequences not designed or constructed into a performance scheme—could emerge from performance-based funding programs like the RAE/REF. English universities have revenue streams that are as diverse as at any time in history. They actively compete in the marketplace for students, complete with one another for both governmental and non-governmental grants, solicit donations and utilize endowments as a source of income, and pursue performance funding through the RAE/REF, among other activities. With these diversified revenue streams comes the possibility of replacing lost revenue in one area with additional revenue from another area (Jaquette, 2019). If universities are indeed reliant upon funding, resource dependence theory

offers the possibility that a reduction in revenue from one stream will encourage a university to "make up" that money by more aggressively pursuing revenue from another revenue stream rather than behave in ways considered desirable by the government or the UK population.

While it is important to discuss the potential of resource dependence theory, it also has limitations. First, the theory is better suited to explain university responses to declining revenue than it is to explain behavior in response to increasing revenue. Resource dependence theory focuses upon the balance of financial resources and suggests that institutions will attempt to diversify revenue when faced with a reduction in one area. When presented with reductions in revenue, resource dependence theory suggests that institutions behaving in rational, self-preserving ways will attempt to compensate by increasing revenue from other sources. The theory is mute, however, on the impact of increased revenue. Perhaps organizations blessed with increased revenues continue to pursue as many sources of financing as they can, keeping their financial options open should leaner times come. Perhaps they instead focus on the source of the increase, attempting to solidify one revenue source in hopes that they can out-compete other universities for revenue in that area. Because resource dependence theory primarily focuses on institutional responses to declining revenues, the theory is ill-equipped to explain university behavior in the case of universities that gain money via RAE/REF performance. Second, resource dependence theory does not lend itself well to consideration of how institutional stratification, ranking, and prestige may influence responses to RAE/REF funding reductions. The UK's higher education system is highly stratified, with a mixture of internationally renowned, top ranked universities and universities without such status (Altbach, 2016; Williams & Filippakou, 2010). Universities at different levels of the prestige hierarchy tend to react to funding changes—such as changes in funding following an RAE/REF exercise—in different

ways, due in part to differential abilities to make up lost revenue (Wilkins & Huisman, 2012). While resource dependence theory does not exclude the possibility that institutions with different levels of prestige may pursue resources in different ways, it also does not center the role of prestige. Finally, it is worth noting that prior studies utilizing resource dependence theory as a framework to interrogate the impact of funding reductions on universities have occasionally found results contrary to what resource dependence theory would predict. While several studies have found that resource dependence theory explains university behavior (Fowles, 2014; Kholmuminov et al., 2019; Ortagus & Yang, 2018), others have not (Jaquette, 2019).

Methods

Utilizing resource dependence theory as a framework, I explored one possible response that could emerge from RAE/REF results: changes in undergraduate student enrollment. Utilizing data from academic years 2008-09 through 2018-19, I used an institution-level fixed effects model to examine the relationship between performance-based research funding and undergraduate student enrollment patterns at English universities. I used an institution-level fixed effects model because of the way fixed effects models handle unobserved variables. Rather than include all unobserved variables in an un-estimated error term like a random effects model does, a fixed effects model separates the error term into two components, variables that vary over time and variables that do not vary over time. By automatically including a dummy variable for each institution, a fixed effect model controls for all time invariant unobservable variables of each institution, leaving only variables that vary over time as part of the inestimable error term (Wooldridge, 2019).

Panel Model and Variables

I estimated the following institution-level fixed effects panel model using ordinary least squares (OLS) regression:

$$Enrollment_{it} = \beta_0 + \beta_1 Funding_{it} + \boldsymbol{X}_{it}\Omega + a_i + u_{it}$$

Where *Enrollment* represents total undergraduate enrollment at institution *i* in time period *t, Funding* represents the amount of performance-based funding awarded at institution *i* in time period *t,* $\boldsymbol{X}_{it}\Omega$ is a matrix of time-varying, institution-varying covariates, a_i is the time-invariant portion of the error term for institution *i* to be estimated via a fixed effect, and u_{it} is the time- and institutional-varying portion of the error term.

To account for the fact that total enrollment may not change at an institution but instead that the composition of an institution's student body might change, I also specified the model described above with *Enrollment* representing a percentage of total undergraduate enrollment instead of number of students. This specification permitted me to examine if the composition of an institution's student body changed, even if total undergraduate enrollment remained stable. This model is:

$$EnrollmentPercent_{it} = \beta_0 + \beta_1 Funding_{it} + \boldsymbol{X}_{it}\Omega + a_i + u_{it}$$

While it is possible that changes in institutional funding due to RAE/REF results appear immediately, it is more likely that they take time to appear. Bachelor's degrees at English universities typically require three years of full-time study. To account for the fact that changes in total enrollment or the composition of a university's undergraduate student body takes time, I lagged my dependent variable by three years in both models.

I utilized an institution-level fixed effects panel model with robust standard errors clustered at the university level (Jaquette, 2019). A panel model is appropriate in this case

because I was interested in knowing how enrollment and research performance funding are related throughout a specific time period (Wooldridge, 2019). It is important to note that I am not attempting to establish causality. I am trying to understand correlations, and none of the analyses presented above should be interpreted as causal. With that said, the use of a carefully selected list of covariates and the inclusion of a university-level fixed effect removes a significant portion of the variance due to unobserved endogenous covariates. My method does not establish causality but offers a significant advance over pooled OLS in moving closer to a causal explanation. I am describing university behavior in relation to performance-based funding allocations, but I am not attempting to isolate performance-based funding as a cause.

Data Sources

The primary data source that I used is the UK's Higher Education Statistical Agency (HESA). Much like the Integrated Postsecondary Education Data System (IPEDS) in the United States, HESA reports data about institutions, students, staff, and graduates from universities across the UK. The primary unit of analysis is the institution; while HESA also reports data nationally (i.e., data about all students participating in higher education, regardless of the individual institution), much of the data are reported by institution. Of note is that HESA provides breakdowns of where students enrolled in higher education are domiciled, disaggregated by institution.

Because I studied only English universities, I first generated a list of all English universities. This was a surprisingly tricky task (Tight, 2011). The UK does not always clearly distinguish between universities and other postsecondary providers such as institutes or technical schools. To determine the institutions that constitute my sample, I started by utilizing the HESA list of higher education providers located in England. Using this list as a starting point, I

eliminated institutions that do not (a) offer 3-year undergraduate degrees in a wide array of fields and (b) offer postgraduate education in a wide array of academic fields. To complete the sample, I then checked that each remaining institution on the list received performance-based funding allocations in at least some panel years. All the institutions contained in the final list (a) are in England, (b) offer 3-year undergraduate degrees in a wide array of fields, (c) offer postgraduate education of some sort, and (d) received performance-based funding allocations in at least some panel years. This yielded a total of 98 institutions (see Appendix A).

After creating the list of English universities for inclusion in the study, I populated my dataset with variables for performance-based research funding and for student enrollment with data from academic years 2008-09 through 2018-19. These panel years encompass results following the RAE 2008 and REF 2014 exercises. I intentionally decided not to include data after year end 2019 because these years coincide with the global COVID-19 pandemic. The pandemic dramatically shifted universities' expenditure patterns worldwide, and as a result any changes in expenditure patterns in years ending after 2019 are almost certainly due to the impact of the pandemic rather than the 2008 RAE or 2014 REF exercises. Because research performance-based funding is distributed as a funding body grant, I used the HESA variable for funding body grants; this represents $Funding_{it}$ in the model. The next piece of data that I included are data on student enrollment at each institution in each time period, $Enrollment_{it}$. I obtained these data from HESA, which provides information about the domicile status of students—UK-domiciled, EU-domiciled, or overseas/international—in higher education disaggregated by university.

The final variables that I included are a variety of time- and institutionally variant control variables, $\boldsymbol{X}_{it}$. Since the dependent variable of interest is related to student enrollment, I

controlled for time-variant factors that research has demonstrated influence student enrollment decisions. Research has demonstrated that student matriculation decisions are strongly influenced by the ranking and reputation of a university, so I utilized *Times Higher Education* (THE) university rankings as a categorical control variable for each institution (Bodycott, 2009; Bowman & Bastedo, 2009; Fang & Wang, 2014; Meredith, 2004; Monks & Ehrenberg, 1999). Rankings have the most influence over enrollment at the top-ranked institutions (Bowman & Bastedo, 2009), so I operationalized ranking as a categorical variable with two categories: ranked in the top 500 globally or not ranked in the top 500 globally. Strong university revenues may reduce a university's desire to enroll additional students; to control for this, I used HESA data to introduce several institution-level financial variables covering the primary sources of income for English universities: tuition and fees, research grants and contracts[1], donations and endowments, and other income. Before beginning my analyses, I adjusted all financial variables for inflation using the UK Office of National Statistics inflation and price indices. Finally, I logged financial and enrollment variables as preliminary analysis, done via inspection of histograms, skewness, kurtosis, variance, and mean, demonstrated that this was most appropriate to achieve normality.

Results

In this section, I begin by presenting relevant descriptive statistics and undergraduate enrollment patterns at English universities over all panel years as well as descriptive statistics for my independent variables. Then, I detail the results and my preferred model specifications for each category of undergraduate student enrollment. I first provide results for UK-domiciled student enrollment, then discuss EU-domiciled student enrollment and international student

[1] While this sounds like it may include performance-based research funding, it does not. This variable represents money received by a university from competitive grants on a project-by-project basis, which is reported separately from performance-based research funding.

enrollment before concluding with total undergraduate student enrollment. I then turn to enrollment patterns as a percentage of total undergraduate student enrollment before concluding with results disaggregated by *Times Higher Education* ranking.

Descriptive Statistics

Table 1 provides descriptive statistics of enrollment patterns at English universities across all panel years. UK-domiciled students constitute an average of 87% of all undergraduate students enrolled at English universities in the sample. International students are the next largest grouping, composing, on average, just under 9% of the average institution's undergraduate student population. EU-domiciled students represent the smallest proportion of enrollment, constituting 4.5% of enrollment. The fact that the minimum values for EU-domiciled and international student enrollment and percentage of enrollment are 0 and 0%, respectively, reflects the fact that there are some universities in the sample that, in at least one year of the panel, had no EU-domiciled undergraduate students enrolled and/or no international undergraduate students enrolled. Figure 1 displays changes in average per-institution UK-domiciled, EU-domiciled, and international undergraduate enrollment across all panel years. Average UK-domiciled student enrollment peaked in 2012 before declining somewhat until 2017, at which point it again began to rise. EU-domiciled and international enrollment grew steadily, but modestly, across all panel years.

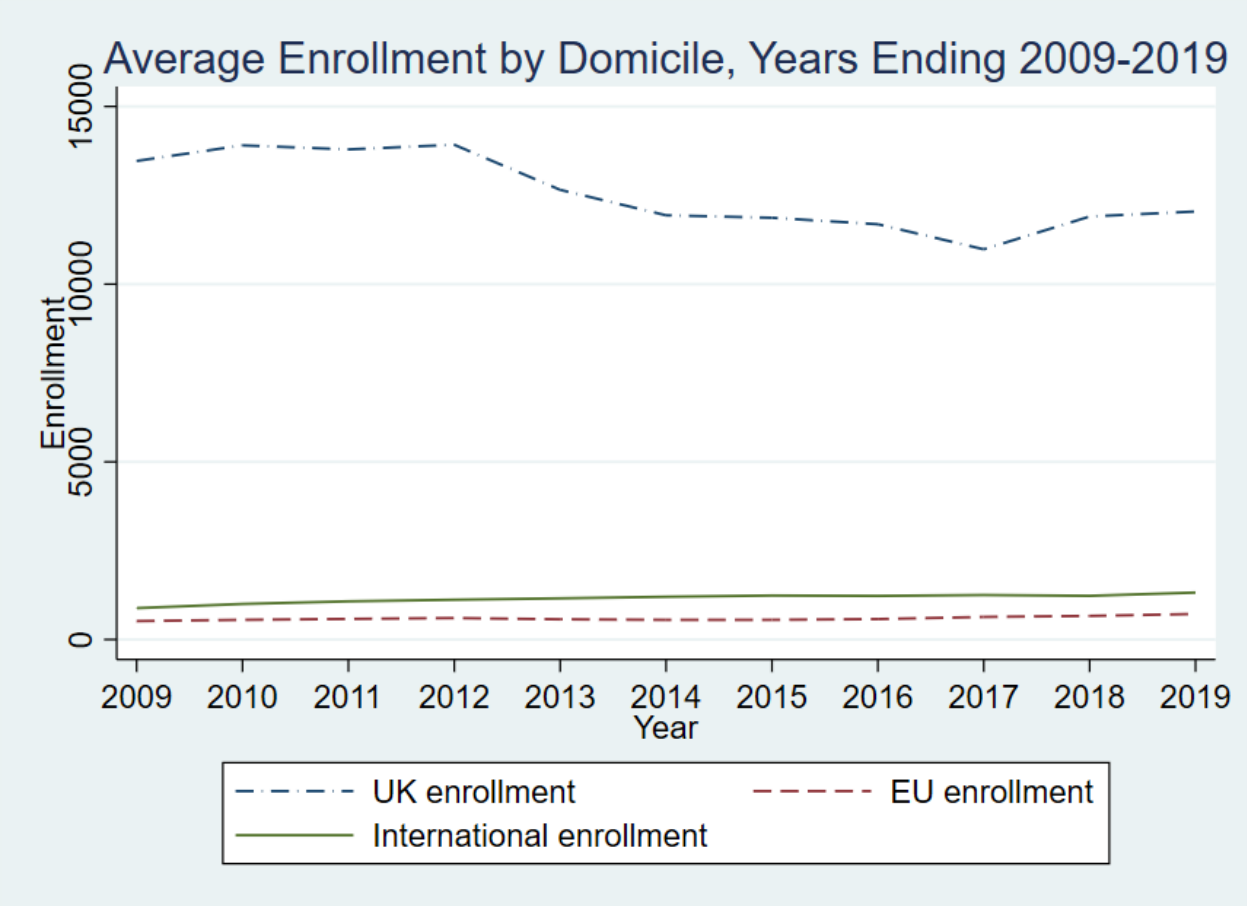
Table 1

Summary Statistics Across All Panel Years, Undergraduate Student Demographics at English Universities

	UK-domiciled UG student enrollment	Percent of UG student body from UK	EU-domiciled UG student enrollment	Percent of UG student body from EU	Intl. UG student enrollment	Percent of UG student body intl.
Mean	12,559	86.8%	594	4.6%	1156	8.7%
Standard Deviation	14,343	9.6%	453	3.1%	1001	7.4%
Minimum Value	120	38.5%	0	0%	0	0%
Maximum Value	195,180	100%	3300	23.3%	6945	54.1%

Figure 1

Average Undergraduate Enrollment per English University, Years Ending 2009-2019



In Table 2, I present descriptive statistics for the independent variables in my model across all panel years. Tuition and associated fees constituted the largest revenue source for English universities, followed by funding body grants (determined by RAE/REF results), research grants and contracts, and donations and endowment income. Figure 2 graphically displays revenue patterns. Tuition revenue increased in prominence across all panel years. Average donation and endowment income also increased, though less so than tuition revenue. Research grants and contracts and other income sources remained at similar levels. Performance-based funding body grants saw the largest decline, particularly in the years following the Great

Recession. The rapid decline in the availability of performance-based funding has implications for my study. If universities see that the availability of performance-based funding is decreasing while tuition is increasing, it may only further incentivize English universities to behave as resource dependence theory would predict and orient themselves away from RAE/REF funding and towards enrollment and tuition revenue.

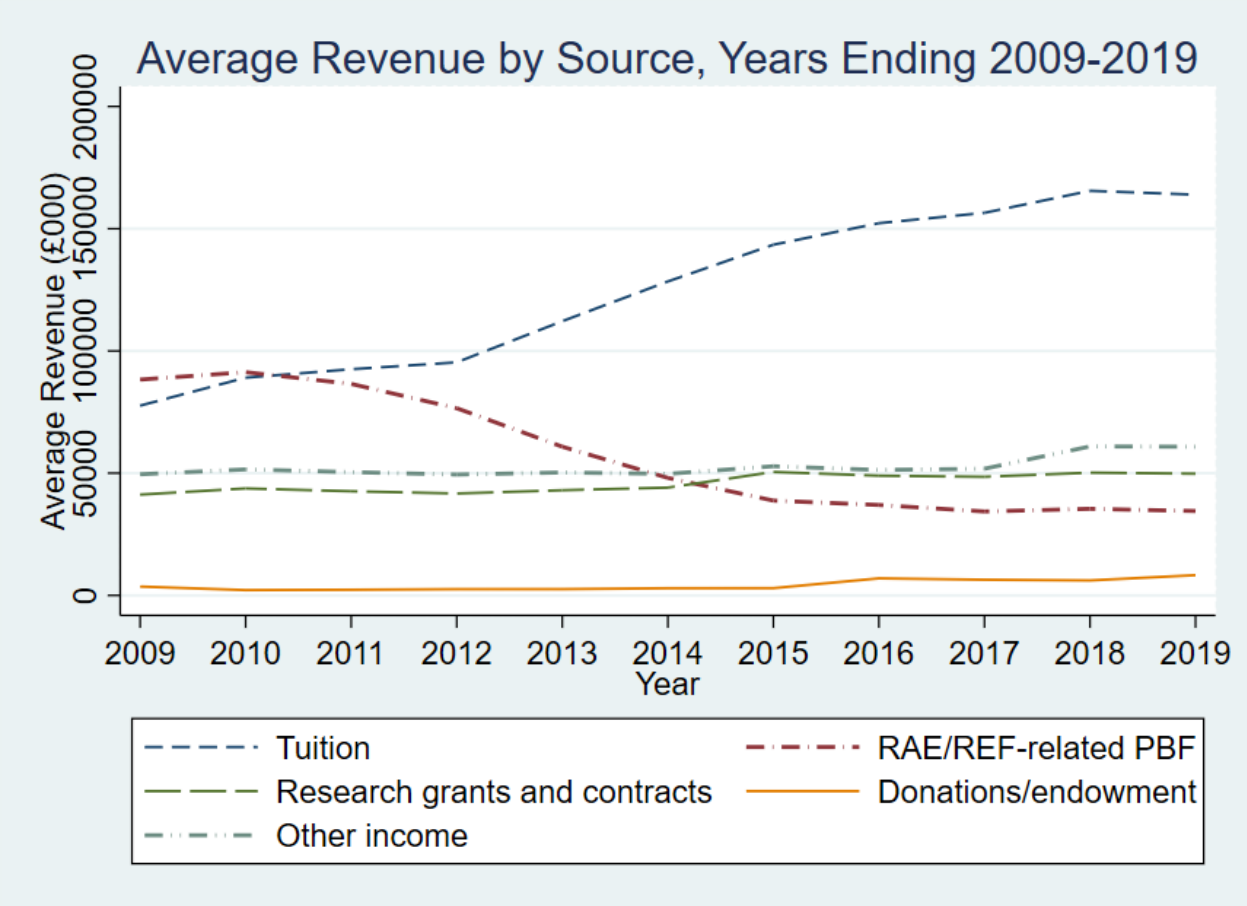
Table 2

Summary Statistics across All Panel Years, Average Inflation-Adjusted Revenue Sources at English Universities

	Tuition and fees (£000)	Funding body grants (performance-based funding) (£000)	Research grants and contracts (£000)	Donation and endowment income (£000)	Other income (£000)
Mean	£125,185.10	£57,405.57	£45,859.36	£4,276.98	£52,614.11
Standard Deviation	£85,864.20	£57,285.06	£99,610.04	£13,510.28	£102,060
Minimum Value	£1,674.84	£0	£0	£4.05	£788.46
Maximum Value	£564,932.10	£332,581.30	£672,691.10	£221,570.50	£1,087,431

Figure 2

Average Inflation-Adjusted Revenue Sources at English Universities, Years Ending 2009-2019



Undergraduate Student Enrollment

Table 3 provides fixed effects panel results for undergraduate student enrollment. Column 1 provides the results from regressing UK-domiciled undergraduate enrollment on logged funding body grants and the specified control variables. In columns 2 through 4, I present the results of regressing EU-domiciled undergraduate enrollment, international undergraduate student enrollment, and overall undergraduate student enrollment onto funding body grants and the same control variables. All four models feature a three-year lag of the dependent variable. Figure 3 presents regression coefficients graphically.

The first row of Table 3 shows the relationship between funding body grants, which are themselves determined by RAE/REF results, and enrollment patterns at English universities. I find that a 1% increase in funding body grants in time *t* is associated with just over a 0.11% increase in UK-domiciled undergraduate student enrollment three years later, controlling for research grant income, tuition income, donations and endowment income, other income, and *Times Higher Education* global university ranking. I find slightly larger coefficients for EU-domiciled undergraduate enrollment and international undergraduate student enrollment. My model shows that a 1% increase in funding body grants is associated with about a 0.23% increase in both EU-domiciled student enrollment international student enrollment. Results for overall undergraduate enrollment are more modest; a 1% increase in funding body grants is associated with a 0.14% increase in total undergraduate student enrollment, controlling for research grant income, tuition income, donations and endowment income, other income, institutional ranking, and all time-invariant aspects of individual universities themselves.

Table 3

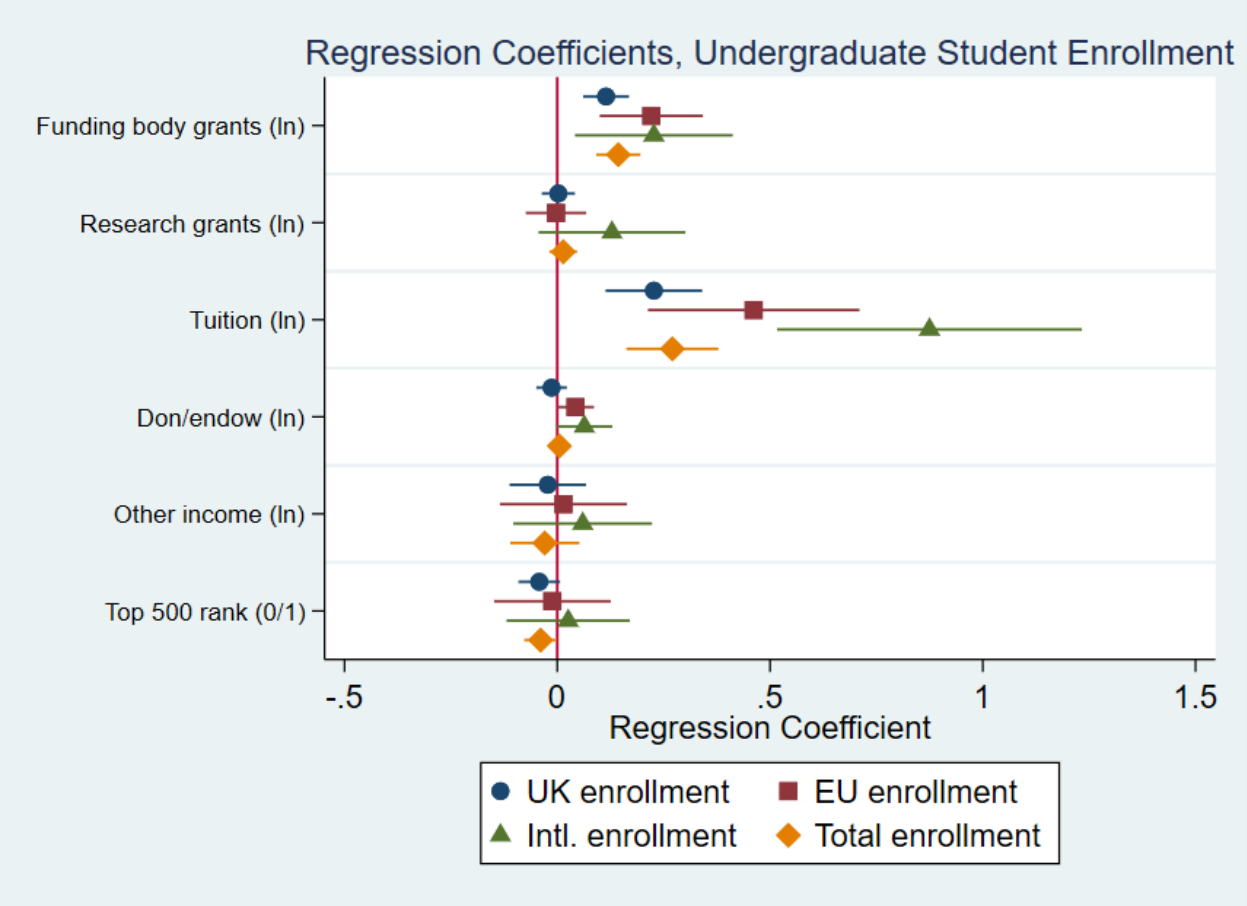
Fixed Effects Model Results, Undergraduate Student Enrollment

VARIABLES	(1) UK-domiciled UG enrollment	(2) EU-domiciled UG enrollment	(3) Intl. UG enrollment	(4) Total UG enrollment
Funding body grants (logged)	0.115***	0.221***	0.227*	0.143***
	(0.027)	(0.061)	(0.094)	(0.026)
Research grants (logged)	0.003	-0.003	0.129	0.014
	(0.020)	(0.036)	(0.087)	(0.016)
Tuition (logged)	0.227***	0.462***	0.875***	0.271***
	(0.057)	(0.125)	(0.181)	(0.054)
Donations and endowments (logged)	-0.013	0.043	0.064	0.005
	(0.018)	(0.022)	(0.033)	(0.012)
Other income (logged)	-0.022	0.015	0.060	-0.029
	(0.045)	(0.075)	(0.082)	(0.041)
Ranked in Top 500 (0 or 1)	-0.042	-0.012	0.026	-0.039*
	(0.025)	(0.069)	(0.073)	(0.019)
Constant	5.726***	-2.063	-8.198**	4.911***
	(0.831)	(1.921)	(2.960)	(0.910)
Observations	785	778	774	785
R-squared	0.958	0.940	0.930	0.969

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Figure 3

Regression Coefficients, Undergraduate Student Enrollment



Undergraduate Enrollment by Domicile as Percent of Total Undergraduate Enrollment

While Table 3 shows the relationship between funding body grants and student enrollment numbers, it is likely the case that not all English universities are able to meaningfully increase or decrease the size of their undergraduate student populations. These institutions may be capped by regulations or physical property constraints from increasing the sizes of matriculating classes. These institutions may instead respond to increases or decreases in funding allocations not by shifting the total number of undergraduate students enrolled, but by changing the composition of the undergraduate student body. By increasing the percentage of the student

body that is EU-domiciled or international, a university could theoretically increase its revenue without increasing total enrollment.

Table 4 presents the results for undergraduate student domicile as a percentage of total undergraduate enrollment. In column 1, I regressed the percentage of an institution's undergraduate population onto funding body grants and the same covariates as in Table 3, inclusive of the same three-year lag. Columns 2 and 3 show the same analyses for the percentage of undergraduate students who are EU-domiciled and the percentage of undergraduate students who are international, respectively. My results in Table 4 demonstrate that funding body grants have no significant relationship with the percentage breakdown of undergraduate student domicile.

Table 4

Undergraduate Enrollment by Domicile as a Percentage of Total Undergraduate Enrollment

VARIABLES	(1) UK-domiciled enrollment as % of total UG enrollment	(2) EU-domiciled enrollment as % of total UG enrollment	(3) Intl. enrollment as % of total UG enrollment
Funding body grants (logged)	-0.010	0.004	0.007
	(0.008)	(0.002)	(0.006)
Research grants (logged)	-0.002	-0.001	0.003
	(0.004)	(0.001)	(0.003)
Tuition (logged)	-0.064***	0.012*	0.052***
	(0.017)	(0.005)	(0.014)
Donations and endowments (logged)	-0.006	0.002***	0.004
	(0.003)	(0.001)	(0.003)
Other income (logged)	-0.008	0.002	0.007
	(0.006)	(0.002)	(0.005)
Ranked in Top 500 (0 or 1)	-0.001	-0.000	0.001
	(0.007)	(0.003)	(0.005)
Constant	1.864***	-0.159*	-0.705***
	(0.248)	(0.074)	(0.205)
Observations	785	785	785
R-squared	0.939	0.919	0.927

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Undergraduate Enrollment Patterns by Institutional Ranking

While *Times Higher Education* global university ranking was a non-significant predictor of both enrollment numbers and the percentage of undergraduate students from each domicile, it remains possible that there are heterogeneous effects within different ranking strata. To assess this, I split the sample into two groups based upon *Times Higher Education* ranking. The first group consisted of universities ranked in the top 500 globally; the second group consisted of universities either ranked outside of the top 500 globally or not ranked at all. Table 5 presents the

results of total undergraduate student enrollment by domicile at English universities ranked in the top 500 globally. Table 6 presents the same models for institutions ranked outside the top 500 globally. Figure 4 presents regression coefficients for logged funding body grants for each of the models displayed in Tables 5 and 6. Tables 5 and 6 demonstrate that institutions ranked in the top 500 differ somewhat from those ranked outside the top 500 with respect to total enrollment. Universities ranked within the top 500 globally see an average increase in UK-domiciled undergraduate enrollment of 0.2% and a 0.2% increase in total undergraduate enrollment in response to a 1% increase in funding body grants, but no relationship between EU-domiciled and international undergraduate enrollment and funding body grants. At universities ranked outside the top 500 globally, I observed statistically significant increases across all domiciles in response to increases in funding body grants. A 1% increase in funding body grants was associated with an approximately 0.12%, 0.18%, 0.24%, and 0.14% increase in UK-domiciled, EU-domiciled, international, and total undergraduate enrollment, respectively.

Table 5

Undergraduate Student Enrollment by Domicile, Top 500 Global Ranking

VARIABLES	(1) UK-domiciled UG enrollment	(2) EU-domiciled UG enrollment	(3) Intl. UG enrollment	(4) Total UG enrollment
Funding body grants (logged)	0.201**	0.222	0.017	0.214**
	(0.063)	(0.113)	(0.128)	(0.066)
Research grants (logged)	-0.054	0.066	-0.135	-0.057
	(0.091)	(0.179)	(0.232)	(0.084)
Tuition (logged)	0.208**	0.718***	0.850***	0.343***
	(0.076)	(0.160)	(0.193)	(0.078)
Donations and endowments (logged)	-0.004	0.035	0.058	0.008
	(0.017)	(0.032)	(0.037)	(0.020)
Other income (logged)	-0.004	-0.027	0.135	0.007
	(0.068)	(0.092)	(0.122)	(0.075)
Constant	5.225*	-5.389	-3.701	3.457
	(1.966)	(3.381)	(3.652)	(2.118)
Observations	308	308	308	308
R-squared	0.936	0.821	0.837	0.902

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 6

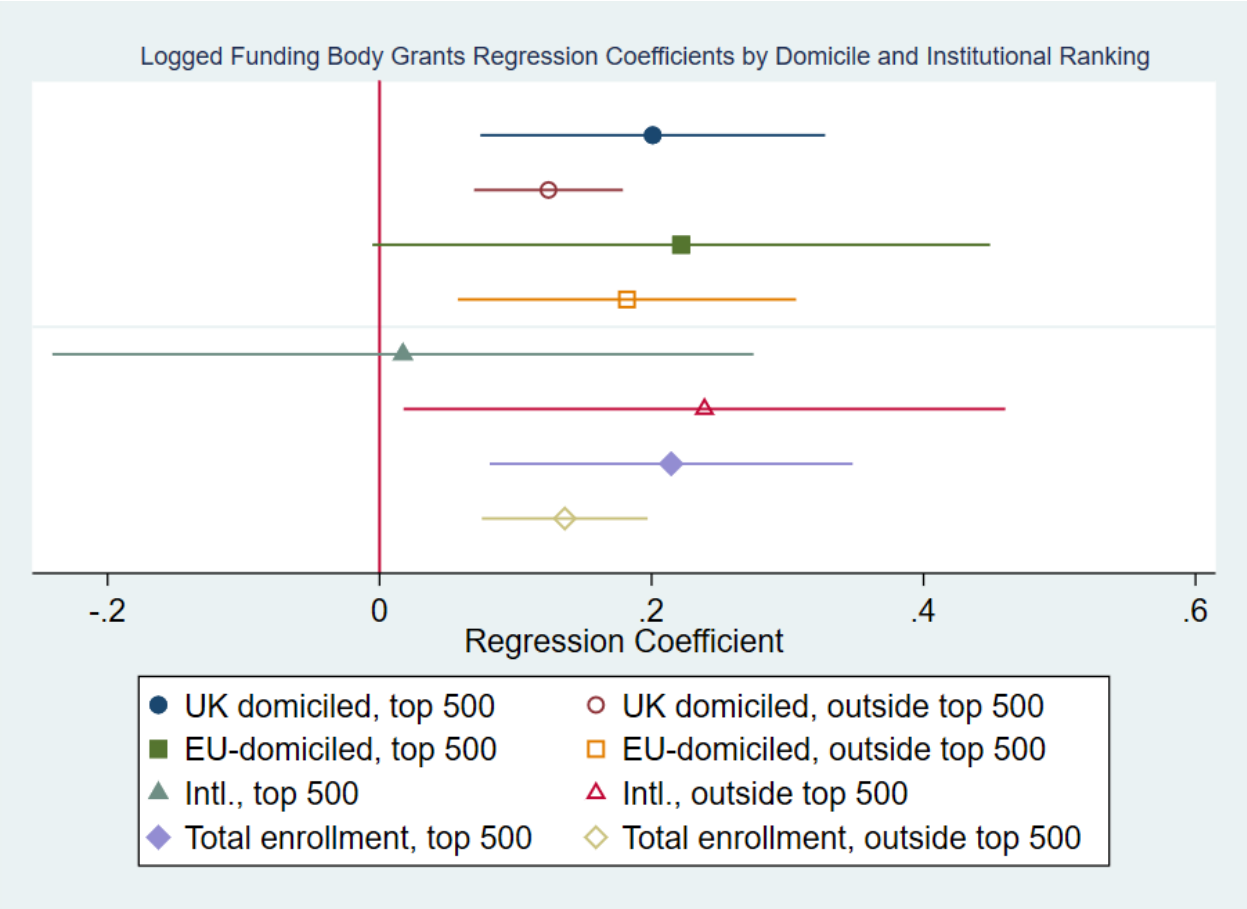
Undergraduate Student Enrollment by Domicile, Ranked Outside Top 500

VARIABLES	(1) UK-domiciled UG enrollment	(2) EU-domiciled UG enrollment	(3) Intl. UG enrollment	(4) Total UG enrollment
Funding body grants (logged)	0.124***	0.182**	0.239*	0.136***
	(0.027)	(0.062)	(0.111)	(0.031)
Research grants (logged)	-0.000	0.015	0.149	0.017
	(0.021)	(0.035)	(0.091)	(0.017)
Tuition (logged)	0.309***	0.253	0.836**	0.262***
	(0.088)	(0.159)	(0.268)	(0.072)
Donations and endowments (logged)	-0.006	0.021	0.045	0.008
	(0.024)	(0.027)	(0.043)	(0.015)
Other income (logged)	-0.023	-0.040	-0.023	-0.045
	(0.061)	(0.096)	(0.103)	(0.051)
Constant	4.735***	1.186	-6.952	5.261***
	(1.173)	(2.276)	(3.984)	(1.066)
Observations	472	465	461	472
R-squared	0.965	0.950	0.926	0.985

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Figure 4

Logged Funding Body Grants Regression Coefficients, Undergraduate Student Enrollment by Domicile and Institutional Ranking



Tables 7 and 8 provide similar modeling specifications as Tables 5 and 6 above, but with raw enrollment numbers replaced with the percentage of the average institution's undergraduate student body hailing from each domicile. The results for enrollment of UK-domiciled, EU-domiciled, and international students as a percentage of total undergraduate enrollment is similar to the results for all institutions combined. I find no statistically significant relationship between funding body grants and the percentage of an institution's undergraduate population coming from the UK, the EU, or outside the EU.

Table 7

Undergraduate Enrollment by Domicile as a Percentage of Total Undergraduate Enrollment, Top 500 Global Ranking

VARIABLES	(1) UK-domiciled enrollment as % of total UG enrollment	(2) EU-domiciled enrollment as % of total UG enrollment	(3) Intl. enrollment as % of total UG enrollment
Funding body grants (logged)	-0.002	0.007	-0.004
	(0.013)	(0.005)	(0.012)
Research grants (logged)	0.010	0.002	-0.012
	(0.029)	(0.008)	(0.031)
Tuition (logged)	-0.105***	0.028**	0.077**
	(0.022)	(0.008)	(0.023)
Donations and endowments (logged)	-0.009*	0.002*	0.006
	(0.004)	(0.001)	(0.003)
Other income (logged)	-0.011	-0.001	0.012
	(0.011)	(0.003)	(0.009)
Constant	2.195***	-0.388*	-0.807*
	(0.355)	(0.154)	(0.334)
Observations	308	308	308
R-squared	0.925	0.919	0.905

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 8

Undergraduate Enrollment by Domicile as a Percentage of Total Undergraduate Enrollment, Ranked Outside Top 500

VARIABLES	(1) UK-domiciled enrollment as % of total UG enrollment	(2) EU-domiciled enrollment as % of total UG enrollment	(3) Intl. enrollment as % of total UG enrollment
Funding body grants (logged)	-0.002	0.001	0.001
	(0.007)	(0.002)	(0.006)
Research grants (logged)	-0.005	-0.000	0.005
	(0.003)	(0.001)	(0.003)
Tuition (logged)	-0.019	-0.001	0.020
	(0.018)	(0.004)	(0.016)
Donations and endowments (logged)	-0.000	0.001	-0.001
	(0.003)	(0.001)	(0.003)
Other income (logged)	-0.003	0.001	0.002
	(0.006)	(0.003)	(0.004)
Constant	1.215***	0.025	-0.240
	(0.265)	(0.068)	(0.231)
Observations	472	472	472
R-squared	0.946	0.921	0.932

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Discussion

In this paper, I used resource dependence theory as a framework to postulate that English universities facing funding reductions from RAE/REF exercises would make up for lost revenue by increasing undergraduate enrollment or shifting their student body demographics away from UK-domiciled and toward EU-domiciled and international students. Resource dependence theory offers a conceptual framework through which to understand the relationship between higher education institutions and revenues. The theory posits that because universities need funding to

carry out their missions and ensure organizational survival, they may attempt to diversify their revenue streams to preserve stable institutional finances. Tuition revenue now represents the largest single revenue stream for English universities, making it an optimal target for English universities seeking to offset lost performance-based funding revenues. The way to increase tuition revenue would be to enroll more students and/or enroll a higher percentage of EU-domiciled and international students, who pay higher tuition fees.

My first research question explored the relationship between performance-based funding allocations and total undergraduate student enrollment at English universities. I found that an increase in performance-based funding allocations is associated with an increase in overall undergraduate student enrollment. This finding is the opposite of what I expected. It suggests that English universities engage in a fundamentally different relationship vis-à-vis financial resources than that which is proposed by resource dependence theory. Rather than using students to offset lost revenue, my results suggest that English universities use additional performance-based funding revenue to bolster their capacity to serve more students. Given that tuition represents by far the largest proportion of funding for English universities, this emphasis on capacity-building may also be due to an attempt to increase overall revenue as effectively as possible. Equipped with additional financial resources, these universities then increase their enrollments, a trend that was particularly strong for UK-domiciled students. This process also increases overall revenue. The relationship that English universities have with performance-based funding and enrollment seems to be one of using performance-based funding as a tool for capacity building. The reason why English universities behave in this way is worthy of future research. I suspect that what English universities are doing is attempting to use performance-based funding, an important but declining source of revenue, to bolster their positioning in

another revenue stream, tuition. If true, such a finding would suggest that English universities respond not to short-term reductions in one revenue stream but rather take a longer-term view of their financial outlook and seek to use their current resources to position themselves for future success.

My second research question interrogated the ways in which performance-based funding allocations might be associated with differential enrollment patterns based upon the domicile of the student. This includes enrollment by domicile as well as the percentage of enrollment from each domicile. Like with overall undergraduate enrollment, I found consistently positive relationships between performance-based funding and UK-domiciled undergraduate enrollment, EU-domiciled undergraduate enrollment, and international undergraduate enrollment. I found no relationship between performance-based funding allocations and the percentage of institutional undergraduate student bodies composed of UK-domiciled, EU-domiciled, and international students. If English universities do attempt to change the demographic percentages of their undergraduate student bodies, it does not appear to be associated with decreases in performance-based funding.

The results I found for my second research question contrast with prior research on the relationship between revenues and student enrollment patterns and provide additional evidence that English universities are engaged in a different resource relationship vis-à-vis the RAE/REF exercises than what resource dependence theory would suggest. Prior research has found that colleges and universities often attempt to use international students as a source of revenue (Cantwell, 2015; de Wit & Altbach, 2021). The logic of why this is the case harkens back to resource dependence theory. Faced with a decrease in revenue, higher education institutions with a rational interest in preserving their financial stability see international students to increase

revenue. In stark contrast to these studies, I did not find evidence that English universities respond to decreases in performance-based funding allocations by increasing either the total number or the percentage of the institution's student body hailing from the EU or outside the EU. Where there are significant relationships, they run in the opposite direction of what resource dependence theory would augur, with higher performance-based funding allocations corresponding with higher enrollment. I interpret these results similarly to overall undergraduate enrollment. Across all domiciles, it appears that English universities use performance-based funding as a capacity-building mechanism, enrolling more students in subsequent years in response to higher performance-based funding allocations.

My third research question examined whether enrollment patterns, expressed either in terms of enrollment or enrollment percentages by domicile, vary based upon institutional ranking. My findings suggest that there are differences between English universities ranked in the top 500 globally and those ranked outside the top 500 globally. While neither group of institutions seems to shift the percentage of UK-domiciled, EU-domiciled, and international undergraduate students, there are differences in terms of raw undergraduate enrollment numbers. Universities ranked in the top 500 globally and outside the top 500 globally both see increased UK-domiciled undergraduate student enrollment in response to increases in performance-based funding allocations, but only institutions ranked outside the top 500 had a statistically significant relationship between EU-domiciled and international undergraduate student enrollment and performance-based funding allocations. I suspect that this result provides insight into the strategic behavior of colleges ranked within and outside of the top 500 globally. English universities ranked within the top 500 globally already command significant prestige and likely are in strong financial positions as a result. If it is the case that English universities utilize

performance-based funding revenue to position themselves for future financial success by using these funds to bolster educational capacity, higher-ranked institutions probably have less of a need to act in the present than lower-ranked institutions. If these higher-ranked institutions wish to increase their enrollment, they probably do not need to acquire additional performance-based funding revenue, or any other type of revenue, to generate the educational capacity necessary to bring more students to campus. Their strategic ability to increase enrollment is independent of any individual revenue stream and the capacity that might be built from it. Institutions ranked outside of the top 500 globally, however, do not have the same prestige and may lack the ability to generate revenue that their higher-ranked peers can. For these institutions, developing the educational capacity to increase enrollment requires funding. The availability of additional funding, particularly funding from a revenue stream that is in decline, may entice these universities to aggressively bolster their capacity now with the expectation that these performance-based funding streams may be limited in the future. While institutions ranked in the top 500 and outside the top 500 seem to use performance-based funding to increase their capacity to enroll students, this effect is strongest at lower-ranked English universities. I contend that while both sets of institutions are engaged in forward-looking revenue management strategies, the financial cushion available to higher-ranked institutions and their increased ability to recruit more students in the future leads them to use performance-based funds less aggressively than their lower-ranked counterparts.

Limitations

There are several limitations to this paper that must be mentioned. The first major limitation is the lack of causality. While the fixed effects panels that I utilized control for all time-invariant unobservable characteristics of universities themselves, they fail to control for

time-variant unobservable characteristics (Wooldridge, 2019); these might include characteristics such as the cognitive and non-cognitive skills of faculty publishing research, the motivation of research assistants, or changes in economic conditions local to a particular university. If these time-variant unobservable characteristics are indeed endogenous, their omission from my modeling will introduce bias into my estimates. I encourage future researchers to consider ways in which non-experimental designs might be employed to generate causal findings. This study also faces a limitation in that it does not control for all the variables that influence student college choice processes. While I have centered the behavior of higher education institutions, it is important to remember that prospective undergraduate students also have choices regarding their college attendance. Those choices are influenced by a wide array of unobservable individual factors. Finally, my study faces a limitation in that I constructed my sample only out of English universities. I made this choice intentionally. While the RAE/REF is a national exercise, the four higher education funding councils, one each for England, Wales, Scotland, and Northern Ireland, then take the results and allocate available performance-based funding financial resources to institutions. Because each of these four funding councils has some latitude to determine how it will allocate revenues to the universities under its purview, I could not meaningfully include all UK universities in my sample as the ways in which universities in each of these four constituent countries receive performance-based funding allocations differs. Nonetheless, the fact that I am unable to include universities from across the UK limits the generalizability of my findings.

Conclusion

Using resource dependence theory as a framework, this paper studied the relationship between performance-based funding allocations and subsequent undergraduate student

enrollment patterns at English universities. Instead of incentivizing universities that perform poorly in each exercise to improve the quality of their research outputs, resource dependence theory introduces the possibility that such institutions might instead choose to offset lost performance-based funding revenues with another source of revenue. Because the largest revenue source for English universities is tuition, either increasing total undergraduate enrollment or shifting the demographics of an institution's student body away from UK-domiciled and towards EU-domiciled and international students might be a compelling strategic choice for universities seeking to offset lost performance-based funds. It is important to note that increasing student enrollment is not in and of itself a "bad" outcome. A negative relationship between performance-based funding allocations and subsequent student enrollment patterns, however, might suggest that the UK's performance-based funding system for higher education fails to entice universities to change their behavior towards increasing the quality of their research outputs because universities can replace this lost revenue by enrolling more students or enrolling a larger proportion of higher tuition paying students. In this study, enrollment is of value not because of what it says about educational attainment for students at English universities but rather for what it tells us about the behavior of English universities in a resource-constrained environment.

I found no evidence that English universities replace performance-based funding revenues with undergraduate students or with higher tuition paying EU-domiciled and international students. To the contrary, I found consistent evidence that increases in performance-based funding allocations are associated with subsequent increases in enrollment. This suggests that English universities engage in capacity-building behavior, transforming increases in their largest revenue streams of tuition and performance-based funding into future

revenue maximization by increasing undergraduate enrollment. Much of this increased student enrollment seems to be from UK-domiciled students. British policy makers interested in ensuring that the nation's universities provide first and foremost for the educational needs of UK-domiciled students will be glad to know that there is evidence that these increases in enrollment in response to RAE/REF revenues primarily impact UK-domiciled students.

This paper makes an important contribution to the literature by examining the ways in which English universities respond to changes in their organizational environments. Research in this area has been mixed, with different scholars finding an array of university responses to external changes (Jaquette, 2019; McClure & Titus, 2018; Shin, 2010; Yeung et al., 2019). This study increases our understanding of the relationship between universities and their external environments by providing evidence that English universities do not replace lost performance-based funding with additional revenue in their largest revenue stream, tuition. More broadly, this study underscores the need to better understand when resource dependence accounts explain university behavior and when they do not. It remains unclear when and under what conditions resource dependence theory provides a compelling account of institutional resource acquisition strategies and when it does not. This paper builds upon a growing literature suggesting that we may need to rethink how universities pursue resources within their organizational environments and the strategic choices that they make in those pursuits.

My research also has important implications for policymakers. This study does not demonstrate that the RAE/REF exercises improve the quality of research conducted at English universities. Instead, it provides insights into the spillover effects of the RAE/REF exercises. To the extent that English universities respond to RAE/REF funding allocations through enrollment changes, it appears that English universities use increased RAE/REF funding to increase their

educational capacity, with total enrollment and enrollment by domicile increasing as a result. It appears that English universities that receive generous research performance-based funding allocations use these resources at least in part to increase the size of their undergraduate student bodies, particularly at lower-ranked English universities. If further massification of English higher education and an increase in the percentage of the English population that holds a bachelor's degree or higher is desired, continuation of the RAE/REF system may offer one way to achieve this.

REFERENCES

Adam, E. (2020). 'Governments base performance-based funding on global rankings indicators': A global trend in higher education finance or a global rankings literature fiction? A comparative analysis of four performance-based funding programs. *International Journal of Educational Development*, *76*(February). https://doi.org/10.1016/j.ijedudev.2020.102197

Adcroft, A., Teckman, J., & Willis, R. (2010). Is higher education in the UK becoming more competitive? *International Journal of Public Sector Management*, *23*(6), 578–588. https://doi.org/10.1108/09513551011069040

Altbach, P. G. (2016). *Global perspectives on higher education*. Johns Hopkins University Press.

Anderson, R. (2016). University fees in historical perspective. *History & Policy*. http://www.historyandpolicy.org/policy-papers/papers/university-fees-in-historical-perspective

Bastedo, M. N., & Bowman, N. A. (2011). College rankings as an interorganizational dependency: Establishing the foundation for strategic and institutional accounts. *Research in Higher Education*, *52*(1), 3–23.

Bodycott, P. (2009). Choosing a higher education study abroad destination: What mainland Chinese parents and students rate as important. *Journal of Research in International Education*, *8*(3), 349–373.

Bowman, N. A., & Bastedo, M. N. (2009). Getting on the front page: Organizational reputation, status signals, and the impact of U.S. News and World Report on student decisions. *Research in Higher Education*, *50*(5), 415–436. https://doi.org/10.1086/649437

British Council. (n.d.). *Introduction to the UK higher education system*.

Broadbent, J. (2010). The UK research assessment exercise: Performance measurement and resource allocation. *Australian Accounting Review*, *20*(1), 14–23. https://doi.org/10.1111/j.1835-2561.2010.00076.x

Brown, R. (2013). Mutuality meets the market: Analysing changes in the control of quality assurance in United Kingdom higher education 1992-2012. *Higher Education Quarterly*, *67*(4), 420–437. https://doi.org/10.1111/hequ.12028

Cantwell, B. (2015). Are international students cash cows? Examining the relationship between new international undergraduate enrollments and institutional revenue at public colleges and universities in the US. *Journal of International Students*, *5*(4), 512–525. https://doi.org/10.32674/jis.v5i4.412

Cantwell, B., & Taylor, B. J. (2015). Rise of the science and engineering postdoctorate and the restructuring of academic research. *Journal of Higher Education*, *86*(5), 667–696. https://doi.org/10.1080/00221546.2015.11777379

Capano, G., Pritoni, A., & Vicentini, G. (2020). Do policy instruments matter? Governments' choice of policy mix and higher education performance in Western Europe. *Journal of Public Policy*, *40*(3), 375–401. https://doi.org/10.1017/S0143814X19000047

Chankseliani, M. (2018). Four rationales of HE internationalization: Perspectives of U.K. universities on attracting students from former Soviet countries. *Journal of Studies in International Education*, *22*(1), 53–70.

Chowdhury, G., Koya, K., & Philipson, P. (2016). Measuring the impact of research: Lessons from the UK's Research Excellence Framework 2014. *PLoS ONE*, *11*(6), 1–16. https://doi.org/10.1371/journal.pone.0156978

de Wit, H., & Altbach, P. G. (2021). Internationalization in higher education: Global trends and recommendations for its future. *Policy Reviews in Higher Education*, *5*(1), 28–46. https://doi.org/10.1080/23322969.2020.1820898

Dougherty, K. J., Jones, S. M., Lahr, H., Natow, R. S., Pheatt, L., & Reddy, V. (2014). Performance funding for higher education: Forms, origins, impacts, and futures. *The Annals of the American Academy of Political and Social Sciences*, *655*(September), 163–184. https://doi.org/10.1177/0002716214541042

Enders, J., de Boer, H., & Weyer, E. (2013). Regulatory autonomy and performance: The reform of higher education re-visited. *Higher Education*, *65*(1), 5–23.

Fang, W., & Wang, S. (2014). Chinese students' choice of transnational higher education in a globalized higher education market: A case study of W University. *Journal of Studies in International Education*, *18*(5), 475–494.

Filippakou, O., Salter, B., & Tapper, T. (2012). The changing structure of British higher education: How diverse is it? *Tertiary Education and Management*, *18*(4), 321–333. https://doi.org/10.1080/13583883.2012.704064

Fowles, J. (2014). Funding and focus: Resource dependence in public higher education. *Research in Higher Education*, *55*(3), 272–287.

Furlong, J. (2011). Universities and the discipline of education: Understanding the impact of the United Kingdom's Research Assessment Exercise. *Power and Education*, *3*(1), 18–30. https://doi.org/10.2304/power.2011.3.1.18

Hillman, N. W., Hicklin Fryar, A., & Crespín-Trujillo, V. (2018). Evaluating the impact of performance funding in Ohio and Tennessee. *American Educational Research Journal*, *55*(1), 144–170. https://doi.org/10.3102/0002831217732951

Jaquette, O. (2019). Do public universities replace state appropriations with master's students? *Review of Higher Education, 42*(3), 1101–1144. https://doi.org/10.1353/rhe.2019.0031

Kaikkonen, D. (2016). Shifting from enrollment- to performance-based funding in higher education: What can we learn form Washington's experience? *Education Finance and Policy, 11*(4), 482–498.

Kelchen, R., & Stedrak, L. J. (2016). Does performance-based funding affect colleges' financial priorities? *Journal of Education Finance, 41*(3), 302–321. https://doi.org/10.1353/jef.2016.0006

Kholmuminov, S., Kholmuminov, S., & Wright, R. E. (2019). Resource dependence theory analysis of higher education institutions in Uzbekistan. *Higher Education, 77*(1), 59–79. https://doi.org/10.1007/s10734-018-0261-2

Marginson, S. (2018). Global trends in higher education financing: The United Kingdom. *International Journal of Educational Development, 58*, 26–36.

Martin, B. R. (2011). The Research Excellence Framework and the "impact agenda": Are we creating a Frankenstein monster? *Research Evaluation, 20*(3), 247–254. https://doi.org/10.3152/095820211X13118583635693

McClure, K. R., & Titus, M. A. (2018). Spending up the ranks? The relationship between striving for prestige and administrative expenditures at U.S. public research universities. *Journal of Higher Education, 89*(6), 961–987.

Meredith, M. (2004). Why do universities compete in the ratings game? An empirical analysis of the effects of the U.S. News and World Report college rankings. *Research in Higher Education, 45*(5), 443–461.

Monks, J., & Ehrenberg, R. G. (1999). The impact of US News and World report college rankings on admissions outcomes and pricing policies at selective private institutions. In *NBER Working Paper Series*.

Nisar, M. A. (2015). Higher education governance and performance based funding as an ecology of games. *Higher Education, 69*(2), 289–302. https://doi.org/10.1007/s10734-014-9775-4

OECD. (2019). *Education at a glance 2019: United Kingdom*. https://doi.org/10.1787/f8d7880d-en

Ortagus, J. C., & Yang, L. (2018). An examination of the influence of decreases in state appropriations on online enrollment at public universities. *Research in Higher Education, 59*(7), 847–865. https://doi.org/10.1007/s11162-017-9490-y

Ovseiko, P. v., Oancea, A., & Buchan, A. M. (2012). Assessing research impact in academic clinical medicine: A study using Research Excellence Framework pilot impact indicators. *BMC Health Services Research*, *12*(1). https://doi.org/10.1186/1472-6963-12-478

Pfeffer, J., & Salancik, G. R. (1978). *The external control of organizations: A resource dependence perspective*. Harper & Row.

Radice, H. (2013). How We Got Here: UK Higher Education under Neoliberalism. *ACME: An International Journal for Critical Geographies*, *12*(2), 407–418.

Scott, W. R., & Davis, G. F. (2007). *Organizations and organizing: Rational, Natural, and open system perspectives*. Pearson.

Serna, G. R., & Weiler, S. C. (2016). *Higher education, fiscal administration, and budgeting: An applied approach*. Rowman & Littlefield.

Shin, J. C. (2010). Impacts of performance-based accountability on institutional performance in the U.S. *Higher Education*, *60*(1), 47–68.

Slaughter, S., & Leslie, L. L. (1997). *Academic capitalism: Politics, policies, and the enreprenurial university*. Johns Hopkins University Press.

Taylor, J. (2011). The assessment of research quality in UK universities: Peer review or metrics? *British Journal of Management*, *22*(2), 202–217. https://doi.org/10.1111/j.1467-8551.2010.00722.x

Terämä, E., Smallman, M., Lock, S. J., Johnson, C., & Austwick, M. Z. (2016). Beyond academia: Interrogating research impact in the research excellence framework. *PLoS ONE*, *11*(12), 1–19. https://doi.org/10.1371/journal.pone.0168533

Tight, M. (2011). How many universities are there in the United Kingdom? How many should there be? *Higher Education*, *62*(5), 649–663. https://doi.org/10.1007/S10734-01

Trevorrow, P., & Volmer, D. A. (2012). Dispelling the myths surrounding the Research Excellence Framework. *Rapid Communications in Mass Spectrometry*, *26*(4), 399–402. https://doi.org/10.1002/rcm.6133

Tymms, P., & Higgins, S. (2018). Judging research papers for research excellence. *Studies in Higher Education*, *43*(9), 1548–1560. https://doi.org/10.1080/03075079.2016.1266609

UK government. (n.d.). *Education system in the UK*. Retrieved February 10, 2022, from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/219167/v01-2012ukes.pdf

UK, U. (2016). *University funding explained*. https://www.universitiesuk.ac.uk/policy-and-analysis/reports/Documents/2016/university-funding-explained.pdf

Universities UK. (2022, February 10). *Higher education in facts and figures: 2021*.

Walker, P. (2014). International student policies in UK higher education from colonialism to the coalition: Developments and consequences. *Journal of Studies in International Education*, *18*(4), 325–344. https://doi.org/10.1177/1028315312467355

Wilkins, S., & Huisman, J. (2012). UK business school rankings over the last 30 years (1980-2010): Trends and explanations. *Higher Education*, *63*(3), 367–382. https://doi.org/10.1007/S10734-01

Williams, G., & Filippakou, O. (2010). Higher education and UK elite formation in the twentieth century. *Higher Education*, *59*(1), 1–20.

Wooldridge, J. M. (2019). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning.

Yeung, R., Gigliotti, P., & Nguyen-Hoang, P. (2019). The impact of U.S. News college rankings on the compensation of college and university presidents. *Research in Higher Education*, *60*(1), 1–17.

Zacharewicz, T., Lepori, B., Reale, E., & Jonkers, K. (2019). Performance-based research funding in EU Member States - A comparative assessment. *Science and Public Policy*, *46*(1), 105–115. https://doi.org/10.1093/scipol/scy041

Ziskin, M. B., Rabourn, K. E., & Hossler, D. (2018). Performance-based funding of higher education: Analyses of policy discourse across four case studies. *Journal for Critical Education Policy Studies*, *16*(2), 164–210.

APPENDIX A: LIST OF INSTITUTIONS INCLUED

Anglia Ruskin University

Aston University

University of Bath

Bath Spa University

University of Bedfordshire

Birkbeck College

University of Birmingham

Birmingham City University

Bishop Grosseteste University

University of Bolton

Bournemouth University

University of Bradford

University of Brighton

University of Bristol

Brunel University London

Buckinghamshire New University

University of Cambridge

Canterbury Christ Church University

University of Central Lancashire

University of Chester

University of Chichester

City University London

Coventry University

Cranfield University

University of Cumbria

De Montfort University

University of Derby

University of Durham

University of East Anglia

University of East London

Edge Hill University

University of Essex

University of Exeter

Falmouth University

University of Gloucestershire

Goldsmiths' College

University of Greenwich

Harper Adams University

University of Hertfordshire

University of Huddersfield

University of Hull

Imperial College London

Keele University

University of Kent

King's College London

Kingston University

Lancaster University

University of Leeds

Leeds Beckett University

Leeds Trinity University

University of Leicester

University of Lincoln

University of Liverpool

Liverpool Hope University

Liverpool John Moores University

University College London

London School of Economics and Political Science

London Metropolitan University

London South Bank University

Loughborough University

University of Manchester

Manchester Metropolitan University

Middlesex University

Newcastle University

Newman University

University of Northampton

University of Northumbria at Newcastle

University of Nottingham

Nottingham Trent University

Open University

University of Oxford

Oxford Brookes University

University of Plymouth

University of Portsmouth

Queen Mary University of London

University of Reading

Roehampton University

Royal Holloway, University of London

St. Mary's University, Twickenham

University of Salford

University of Sheffield

Sheffield Hallam University

University of Southampton

Southampton Solent University

Staffordshire University

University of Sunderland

University of Surrey

University of Sussex

Teesside University

University of Warwick

University of the West of England, Bristol

University of West London

University of Westminster

University of Winchester

University of Wolverhampton

University of Worcester

University of York

York St. John University

PAPER 3: PERFORMANCE-BASED FUNDING AND ACADEMIC FIELD-LEVEL EXPENDITURES AT RUSSELL GROUP UNIVERSITIES

Introduction

The United Kingdom (UK) is home to one of the world's largest higher education performance-based funding schemes, today called the Research Excellence Framework (REF) and previously called the Research Assessment Exercise (RAE). Taking place approximately every seven years, the REF system determines research funding allocations to UK institutions until the next REF exercise (Chowdhury et al., 2016). The results of each REF exercise determine how over £2 billion of research money will be allocated to UK universities (Universities UK, 2022).

In this paper, I studied the relationship between REF 2014 results by academic field[2] and subsequent university expenditures in those academic fields at Russell Group universities. The Russell Group is a consortium of 24 UK universities, and these institutions are widely regarded as the most prestigious universities in the UK. The Russell Group has significant agenda-setting power within the UK higher education sector, in large part because it counts among its members the most well-known UK universities. Because of their reputation, Russell Group institutions are also particularly competitive globally, aggressively competing internationally in the quest for prestige and the benefits associated with it—revenue, rankings, top faculty and students, and so on. To distinguish themselves from their peers, Russell Group institutions must work to bolster themselves in as many academic fields as possible. As such, these institutions are an ideal grouping to study the relationship between REF 2014 results and expenditures by academic field. If it is the case that Russell Group universities "double down" on academic fields that perform

[2] I use the term "academic field" to refer to a division of a university committed to the study of a particular topical area. This term is synonymous with departments in the U.S. context or faculties in the U.K. context.

well in performance-based funding exercises (i.e., the REF 2014), the result would be increased expenditures in those fields in the years that follow. On the other hand, it may be the case that Russell Group universities attempt to be globally competitive in a variety of academic fields. If so, Russell Group universities might direct resources towards academic fields with lower performance in the REF 2014 to improve those fields' research profile before the next REF.

Research Questions

Three research questions guided this study:

1. What is the relationship between REF 2014 results and subsequent total expenditures in select academic fields at Russell Group universities?
2. What is the relationship between REF 2014 results and subsequent staffing expenditures in select academic fields at Russell Group universities?
3. In what ways do the relationships discussed in questions 1 and 2 vary based on academic subject area (natural sciences, social sciences, or humanities) and institutional ranking at Russell Group institutions?

I hypothesize that Russell Group universities will increase both their staffing and overall expenditures in academic fields with stronger performance in the REF 2014 and decrease their expenditures in academic fields with weaker performance in the REF 2014, particularly in academic fields with a high percent of research rated "4." These effects are not likely to be homogenous across institutions. I expect that the highest-ranked Russell Group universities will have no relationship between REF 2014 performance and expenditures, regardless of whether that performance is "better" or "worse." Because these institutions generally perform well across a wide array of academic disciplines, I predict that highly ranked Russell Group universities will invest consistently across academic fields without much regard to performance in the REF 2014.

I predict that lower-ranked Russell Group institutions will behave differently. Lower-ranked Russell Group universities may be able to compete with the top-ranked Russell Group universities in some academic fields, but they likely lack the resources necessary to complete broadly across many academic disciplines. I anticipate finding that lower-ranked Russell Group universities prioritize academic fields with stronger performance in the REF 2014 at the expense of academic fields with lower performance. I also expect that the field in which an academic discipline resides (natural sciences, social sciences, or humanities) will influence the relationship between REF 2014 results and subsequent expenditures. Academic fields in the natural sciences tend to have higher expenditures at Russell Group universities than those in the social sciences and humanities, so I expect that it is within the natural sciences that the largest changes in expenditure patterns will appear.

Literature Review

History and Structure of UK Higher Education

The UK features one of the world's oldest higher education systems. The University of Oxford, the UK's first university, was established in 1096, followed by the University of Cambridge approximately 100 years later (Council, n.d.). Following the establishment of the Universities of Oxford and Cambridge, it was Scotland that next took the lead in the development of the UK's higher education system. Three of Scotland four ancient universities—the Universities of St. Andrews, Aberdeen, and Glasgow—began operation in the 1400s, followed by the fourth ancient university, Edinburgh, in the late 1500s (Council, n.d.). Until the 1800s, these six universities comprised the UK's higher education sector. All six catered heavily, if not exclusively, to elites; all emphasized a humanities-based curriculum largely absent of the study of science or technology, Oxford and Cambridge in particular (Filippakou et al., 2012).

Beginning in the early 1800s and continuing almost until the present day, the UK's higher education system has grown considerably, marked by three major periods of expansion. The early 1800s saw the creation via royal charter of multiple new universities, marking the first wave of expansion in the UK's higher education system. Most of these new universities emerged in cities across northern England, urban centers increasingly in need of scientific and technological talent for the Industrial Revolution. Colloquially known as the "red brick" universities, institutions founded in emerging urban centers during this period include the Universities of Birmingham, Bristol, Leeds, Manchester, Liverpool, and Sheffield, among others (Council, n.d.). The second major period of expansion came shortly after the Second World War. An expanding population coupled with an increasingly knowledge-based economy in the UK compelled the government to establish new universities and grant university status to some existing colleges in the 1950s and 1960s (Radice, 2013). Universities created during this period include the Universities of Aston, Bath, Bradford, Brunel, Loughborough, Hull, Leicester, Essex, Kent, Warwick, York, and Salford (Council, n.d.). The third and final major period of expansion came in the 1990s. In 1992, the government of Prime Minster John Major abolished the distinction between universities and polytechnic institutes, granting university status to the latter (Boliver, 2013). Most of these polytechnics-to-universities had been established as technical colleges in the years after the Second World War but had never been granted status as universities. Former polytechnics that gained university status in the 1990s include

With each successive expansion of the UK's higher education system has come an increasing measure of stratification. It is largely the case that universities formed in previous waves of UK higher education expansion are more prestigious, more likely to be highly ranked in national and international ranking systems, and more selective in their admissions processes

(Boliver, 2013; Filippakou et al., 2012). Oxford, Cambridge, and the four Scottish ancient universities along with some of the redbrick universities are the UK's most prestigious universities, with the bulk of the redbrick universities falling somewhere in the middle and the former polytechnics at the bottom of the system. Many of the universities created during the first two major periods of expansion are today part of a consortium of universities called the Russell Group. Twenty-four of the UK's most prestigious universities comprise the Russell Group. The Russell Group is a relatively new amalgamation of universities, first established in 1994 but not incorporated until 2007 (Universities, 2020). While the ages of the institutions comprising the Russell Group vary considerably, most universities in the Russell Group (see Appendix A) are hundreds of years old and are among the UK's most prestigious higher education institutions; of the 32 UK universities ranked in the top 200 globally, all but one is a member of the Russell Group (Hemsley-Brown, 2015; Universities, 2020). Collectively, Russell Group universities exert considerable influence over higher education and the UK economy. Russell Group universities produce over 2/3 of the UK's world-leading university research (rated "4" in the REF), award most doctoral degrees conferred in the UK, and are comprised of 1/3 non-UK students, quite a high proportion (Universities, 2020).

Performance-Based Funding in UK Higher Education

Performance-based funding, a system wherein funding is tied to the attainment of specified goals or by achievement on specified measures, first came to higher education in the United States but has since proliferated throughout much of the world (Kaikkonen, 2016; Wichmann-Hansen & Herrmann, 2017; Ziskin et al., 2018). The introduction of performance-based funding in the UK in the 1980s was driven by the emphasis on New Public Management put in place by the Thatcher Government (Adcroft et al., 2010; Shin, 2010). The Thatcher

Government, determined to introduce new accountability mechanisms to the public sector, established government-run academic review units, created a state regulator for higher education, and reviewed quality assurance regimens in the higher education sector (Brown, 2013; Martin, 2011). The largest change that the Thatcher Government's New Public Management brought to the higher education sector was the establishment of a performance-based funding exercise for higher education, called the Research Assessment Exercise (RAE) (Marginson, 2018). In the years since, the RAE exercise has been slightly modified and re-named, producing the present-day Research Excellence Framework (REF).

The REF represents the primary form of performance-based funding in UK higher education today. Held approximately every seven years, the REF process requires participating higher education institutions to submit examples of scholarship for peer review (Chowdhury et al., 2016; Trevorrow & Volmer, 2012). As currently structured, universities submit research published by their academics, and a panel of peer review experts then ranks each submission on a scale from 1 to 4. Research ranked "1" is considered to be "recognized nationally," "2" represents "recognized internationally," "3" represents "internationally excellent," and "4" represents "world leading" (Tymms & Higgins, 2018). Only results ranked "3" or "4" are eligible for funding allocations, meaning that universities have a strong financial incentive to submit research that will be ranked a "3" or a "4" and no financial incentive to submit research that will be ranked a "1" or a "2" (Chowdhury et al., 2016). The four UK higher education funding councils, one each for England, Scotland, Wales, and Northern Ireland, distribute approximately £1.6 billion per year in performance-based funding using 2014 REF results (Chowdhury et al., 2016).

While performance-based funding constitutes a major part of the funding for UK higher education, it has not been without its detractors. Research on the effectiveness of performance-based funding has found mixed results (Gándara & Rutherford, 2018; Kelchen & Stedrak, 2016; Pisár & Šipikal, 2017), and this trend holds in the UK. In the UK, most of the critiques of the REF revolve around cost and complexity. Critics claim that the REF is far too complex (Martin, 2011), includes review panels that lack the full range of expertise necessary to properly evaluate quality in various academic disciplines (Taylor, 2011), and undermines academic freedom (Karran & Mallinson, 2019). Concerns have also been raised about the ability of universities to "game" the REF system by conforming to narrow patterns of research "excellence" as defined by the REF exercise (Abramo et al., 2011) as well as the degree to which the REF reinforces neoliberal conceptualizations of "excellence" (Ziskin et al., 2018). While more limited, a smaller number of researchers have pointed to exercises like the REF as a potential source of job stress and dissatisfaction for academics, potentially undermining the ability of UK universities to attract and retain top academic talent in the process (Shin & Jung, 2014). Of note is the dearth of research examining the effectiveness of the REF system. While there are plenty of examples of studies that challenge the methodology or possible implications of the REF system (Abramo et al., 2011; Ziskin et al., 2018), I found almost no published research empirically testing the relationship between REF results and university behavior. This is a major gap in the scholarly literature.

Competition and Stratification in the UK's Higher Education System

Like the higher education systems of many other countries, the UK's higher education sector has become increasingly stratified, a trend exemplified by the Russell Group. UK universities actively compete against one another in pursuit of funding, global rankings, students,

and faculty (Altbach, 2016; Banal-Estañol et al., 2013; Cantwell & Taylor, 2013; Furukawa et al., 2013). Perhaps among no group of institutions is this more apparent than the Russell Group. As the most prestigious universities in the United Kingdom, Russell Group institutions have become the primary universities through which the UK competes in the global higher education system. The increasing globalization of higher education has led to transnational research becoming the norm, English firmly emerging as the lingua franca of academic life, top students and faculty increasingly crossing borders, and transnational ranking systems comparing universities to each other across national boundaries (Altbach, 2016; de Wit & Altbach, 2021; Furukawa et al., 2013; Iannelli & Huang, 2014). This process has both produced and been produced by a neoliberal academic system wherein both governments and universities prioritize economic competitiveness, accountability, internationalization, and academic excellence of their higher education systems (de Wit & Altbach, 2021; Raaper, 2017). Because the Russell Group is composed of the most prestigious and highest-ranked universities with the greatest global name recognition and prestige, the Russell Group has become the primary consortium of universities through which the UK engages with the highly competitive global higher education system (Raffe & Croxford, 2015).

University expenditures offer a lens through which to understand the impact of and response to competition and stratification in Russell Group universities. The most prestigious global universities overwhelmingly prioritizing research over teaching and those lower in the prestige hierarchy emphasizing teaching (Cantwell & Taylor, 2015; de Wit & Altbach, 2021; Deem & Lucas, 2007). In the UK, the most prestigious group of universities most aligned with this emphasis on research are the Russell Group universities. This focus on research performance suggests that any relationship between REF 2014 results (a performance-based funding exercise

focused solely on research output) and expenditures in individual academic fields may show up more strongly at Russell Group universities relative to other universities in the UK. Any relationship between REF 2014 performance and expenditures, staffing or otherwise, should be most prominent at Russell Group universities because it is these institutions that compete most aggressively internationally, a competition largely governed by the ability of universities to produce world-class research (Sidhu, 2009). Russell Group universities have a considerable incentive vis-à-vis their pursuit of global status and reputation to bolster their research profiles in as many academic fields as possible, a process that requires money and staffing to achieve. The REF 2014, therefore, not only provides a way for Russell Group universities to increase their financial allocations, but it also offers them a way to demonstrate the international recognition of their research and to use funding allocations to bolster research in strategic areas of interest. This combination of incentives offers the possibility that Russell Group universities may not simply increase expenditures in academic fields of strength and reduce them in weaker academic fields, but rather to make intentional decisions about which academic fields to bolster through increased expenditures and which not to. If it is the case that the REF 2014 provides Russell Group universities with a uniquely attractive opportunity to both amplify their prestige and increase their revenues, Russell Group universities may be inclined to shift subsequent expenditure patterns in response to REF 2014 results. They might invest in new facilities or capital-intensive research ventures, driving total expenditures. They might recruit additional faculty or staff to fulfill various tasks. Alternatively, they might employ some combination of both, but regardless of the specific pattern of expenditure, it is unlikely that research performance can be dramatically increased without some increase in field-level expenditures.

Methods

In this section, I describe the panel models, variables, and analytical plan that I employed to answer my research questions. I utilized university- and academic-level data from all 24 Russell Group universities, international ranking data, and a fixed effects panel estimation strategy (Jaquette, 2019; Wooldridge, 2019) to provide a descriptive account of the relationship between REF 2014 results and subsequent academic field-level expenditures at Russell Group universities.

Panel Models and Variables

I utilized a fixed effects panel encompassing years ending 2016 through 2020. This panel covers the five years immediately after the REF 2014 exercise, continuing to the most recent year in which complete HESA data are available. To examine the relationship between REF 2014 results and subsequent total expenditures at Russell Group universities, I utilized the percentage of an academic area's research rated highly enough for funding as my independent variables (i.e., percent of research rated "3" or "4" in the REF 2014) and subsequent total expenditures in each academic field as my dependent variable. I repeated the same process for staffing expenditures.

In addition to corresponding with the time period immediately following the release of REF 2014 results, this panel structure exploits a change in the way that the UK's Higher Education Statistical Agency (HESA)[3] reports data about university expenditures. Prior to the 2015-2016 academic year, HESA reported data only at the level of the institution, providing information about income and expenditures for each university but not disaggregated to the level

[3] HESA is similar to the Integrated Postsecondary Education Data System (IPEDS) in the United States. It contains data about higher education providers, students, staff, outcomes, and income and expenditures, among other elements.

of individual academic fields. Beginning in 2015-2016, HESA began supplementing institution-level data with data about academic fields. This change in data availability allows for the study of the relationship between REF 2014 results and expenditures not just at the level of universities, but within specific academic fields at those universities. I consider this to be a major advance over previous research on performance-based funding. While universities have an aggregate response to performance-based funding incentives, universities, and particularly research universities most impacted by research performance-based funding, are large, complex organizations. While each institution may have an average response to performance-based funding, this response might be heterogenous within academic fields, units, departments, or disciplines. By using a panel directly following the announcement of the REF 2014 results and exploiting a change in data availability that coincided with the REF 2014, I explored what, if any, relationship REF 2014 results have with academic field expenditure levels at Russell Group universities in a way that could not be done with data only at the institution level.

To answer my research questions, I estimated the following academic field-level fixed effects panel model with standard errors clustered at the university level using ordinary least squares (OLS) regression for total expenditures:

$$TotalExpenditures_{it} = \beta_0 + \beta_1 REFScorePercent4_{i,2014} + \beta_2 REFScorePercent3_{i,2014} + \boldsymbol{X}_{it}\Omega + a_i + u_{it}$$

I estimated the following academic field-level fixed effects panel model with standard errors clustered at the university level using OLS for staffing expenditures:

$$StaffExpenditures_{it} = \beta_0 + \beta_1 REFScorePercent4_{i,2014} + \beta_2 REFScorePercent3_{i,2014} + \boldsymbol{X}_{it}\Omega + a_i + u_{it}$$

Where *Expenditures* represents logged overall expenditures and logged staffing expenditures, respectively, in academic field *i* in time period *t, REFScorePercent4* and *REFScorePerent3* represent the percent of research rated "4" and percent of research rated "3" for academic field *i* in the REF 2014, $\boldsymbol{X}_{it}\Omega$ is a matrix of time-varying covariates, a_i is the time-invariant portion of the error term which will be estimated via a fixed effect for each academic field, and u_{it} is the time-varying portion of the error term.

It is important to note that I am not attempting to establish a causal argument. I do not contend that REF 2014 results cause changes in expenditure patterns at academic fields within Russell Group universities. Rather, I utilize panel data methods to provide a descriptive analysis of the ways in which REF 2014 results are associated with subsequent expenditure patterns by academic field at the most prestigious group of UK universities. The use of a fixed effect gets me much closer to a causal argument than a random effect model or pooled ordinary least squares (OLS) model would. By controlling for all time-invariant aspects of the academic fields themselves, my fixed effects model leaves only the time-variant unobservable characteristics in the inestimable error term (Wooldridge, 2019). Nonetheless, I have not plausibly controlled for all time-variant covariates and thus cannot claim that my findings are causal. I am studying associations between expenditure patterns and REF 2014 results, not developing casual arguments.

Data Sources

The data for this study come primarily from the REF 2014 and from the UK's Higher Education Statistical Agency (HESA). Information regarding REF 2014 results are published online; information about academic field-level expenditures as well as total university enrollment

(which was used as a covariate) are available through HESA. I supplemented REF 2014 and HESA data with *Times Higher Education* university rankings.

As I constructed my data set, I first began by identifying the 24 universities that compose the Russell Group (see Appendix A). Next, I had to address an issue emerging from the fact that the REF 2014 and HESA are two separate data sources without a common organization administering both. Because I examined the relationship between REF 2014 results and expenditure by academic field, I needed to ensure that the academic fields for which I had data from the REF 2014 matched the same academic fields as listed in HESA. Unfortunately, the academic field data available in HESA and the academic fields[4] included in the REF 2014 exercise do not match 1:1. To ensure that the units of assessment from the REF 2014 align with academic fields as reported in HESA, I decided to only utilize the following nine academic fields for my study: biosciences, physics, and mathematics to represent the natural sciences; sociology, economics/econometrics, and education to represent the social sciences; and English language and literature, philosophy, and history to represent the humanities (listed in Appendix B). By utilizing these nine academic fields, I accomplish three objectives. First, I ensure that the units of analysis are comparable between my independent and my dependent variables. Second, I ensure that I have coverage of various academic subject areas, allowing me to examine any heterogenous effects that might emerge across academic subject areas. Finally, because I have multiple academic fields included from each academic cluster (natural science, social science, and humanities), an institution opting not to be assessed in one of these nine units of assessment or an institution not having any presence in a particular academic field does not cause an

[4] The REF 2014 refers to academic fields as "units of assessment." Examples of the 36 units of assessment in the 2014 REF include Clinical Medicine, Biological Sciences, Chemistry, Physics, Mathematical Sciences, Sociology, and Area Studies. For the sake of clarity, I use the term "academic fields" throughout this manuscript as units of assessment are synonymous with academic fields.

unmanageable problem for my study. Econometrically, the resulting unbalanced nature of the panel does not pose a significant problem for estimation in OLS (Wooldridge, 2019). While I could have selected other academic fields that matched across data sources, I chose the nine listed over other options because these academic fields are broadly represented at Russell Group universities. While not every Russell Group university features all nine academic fields, most do; those that do not are typically "missing" just one academic field. Selecting less-common academic fields would have introduced the possibility of multiple fields missing from multiple institutions, which would have caused an estimation problem in OLS (Wooldridge, 2019).

After determining the universities and academic fields that I would use for the study, I assembled my dataset. The first data source that I used comes from the REF 2014 exercise—the percentage of a unit of assessment's[5] research ranked "4" or "3." Each time the REF exercise is conducted, participating universities submit a dossier of sample research from various academic fields to be evaluated as part of the exercise. Peer review panels then read the submitted works for each unit of assessment, providing a score from 1-4 to each paper or research sample submitted. Only research ranked "3" or "4" is eligible for funding. The four UK higher education funding bodies (Research England, the Scottish Funding Council, the Higher Education Funding Council for Wales, and the Department for the Economy, Northern Ireland) then use these results to allocate performance-based funding money to universities. The REF 2014 publishes the percentage of each academic field's research ranked "3" and the percentage ranked "4," which I used in my dataset. To determine expenditures in each academic field, I turned to HESA. Using HESA data, I identified the expenditure amount in each academic field at each Russell Group university for each year of my panel.

[5] Akin to academic fields.

I used several covariates for the analysis of expenditure patterns. Because my independent variable focuses on the expenditures that universities make in select academic fields, I included several covariates that may explain why universities choose to spend more in some academic fields and less in others. One such variable is total student enrollment. It seems reasonable to believe that universities allocate additional financial resources to their departments when enrollment rises and reduce expenditures when enrollment falls, independently of REF 2014 results. Unfortunately, data on student enrollment within academic fields at each university are not available. To provide a proxy for enrollment by academic field, I instead used total student enrollment at each university. While this is less ideal than having data on exact numbers of students enrolled in courses or degree programs offered through various academic fields at each institution, it enables me to control for overall changes in enrollment patterns at Russell Group universities. I completed my panel by including a few additional covariates. The second covariate that I included is research council income per academic field. Universities might view academic fields that are highly successful at securing competitive external funding as the "superstars," worthy of increased resource allocations. Alternatively, universities might decide that academic fields with success in securing external funding do not need as much internal funding and may choose to allocate resources elsewhere. Because I suspect that expenditure patterns vary based upon university ranking (Abramo et al., 2011; Cowan & Rossello, 2018; Gonzales, 2013), I included the *Times Higher Education* (THE) institutional ranking in each period. The final covariate that I included is a categorical variable for academic subject area—natural science, social science, or humanities. While this would ordinarily be absorbed by a departmental-level fixed effect, I chose to provide regression coefficients on academic subject area because preliminary analysis revealed significant disparities in both total and staffing

expenditures across academic fields in different subject areas. Academic subject areas in the natural sciences had consistently higher expenditures than those in the social sciences and natural sciences. This led me to suspect that there may be differences across academic subject areas, and I did not want this variation subsumed by the field-level fixed effect. To avoid the academic subject area being subsumed into an academic field-level fixed effect, I utilized the Correia (2016) multi-way fixed effects estimator. A traditional fixed effect estimator with an academic field-level fixed effect would control for the academic subject area (because it does not vary over time), but the estimated regression coefficient would be suppressed in a regression output. The Correia (2016) multi-way fixed effects estimator grants the researcher the ability to display regression coefficients for selected fixed effects, rather than having these coefficients automatically suppressed in the regression output. Because I suspected that academic subject area might be related to expenditure patterns, I did not want the fixed effects estimator I selected to control for academic subject area but not display the estimated coefficient on each category of the variable.

Results

I begin my results section by providing descriptive statistics regarding REF 2014 results and expenditure patterns at the academic fields in my sample across all panel years. I then provide the results from my fixed effects models, first for all academic fields and then disaggregated by academic subject area and disaggregated by *Times Higher Education* university ranking.

Descriptive Statistics

Table 1 contains means, standard deviations, maximum values, and minimum values for the dependent and independent variables. My independent variables of interest are the percent of

each department's research rated "3" and the percent of each academic field's research rated "4." The average academic field had 31.5% of its research rated "4" and 44.9% of its research rated "3." My dependent variables of interest were total expenditures and staffing expenditures. Across all panel years, the average academic field in my sample had total expenditures of £8.2 million and staffing expenditures of £6.3 million when adjusted for inflation. Mean expenditures per academic field rose modestly across all panel years from approximately £7.8 million in 2015-2016 to £8.4 million in 2019-2020 (see Figure 1). Staffing expenditures see a similar increase, rising from just under £6 million to almost £7 million (see Figure 2). For total institutional enrollment, I found that the 24 Russell Group universities have a mean enrollment of 27,533 students when averaged over all panel years. All 24 Russell Group institutions were ranked in the top 250 universities globally by *Times Higher Education* in each year of my panel; the average *Times Higher Education* global university ranking across all panel years was 97.

Table 1

Descriptive Statistics, All Panel Years

	% Research rated "4"	% Research rated "3"	Total enrollment	Total Expenditure (£000)	Total Staffing Expenditure (£000)	Ranking
Mean	31.4%	44.9%	27,533	£8,191.13	£6,306.54	97
Standard Deviation	15.7%	16.9%	6,713	£7,588.91	£5,450.56	60
Minimum Value	0%	0%	10,440	£0	£0	1
Maximum Value	79%	73%	41,180	£50,619	£44,318	201

Figure 1

Average Total Expenditures per Academic Field, All Panel Years

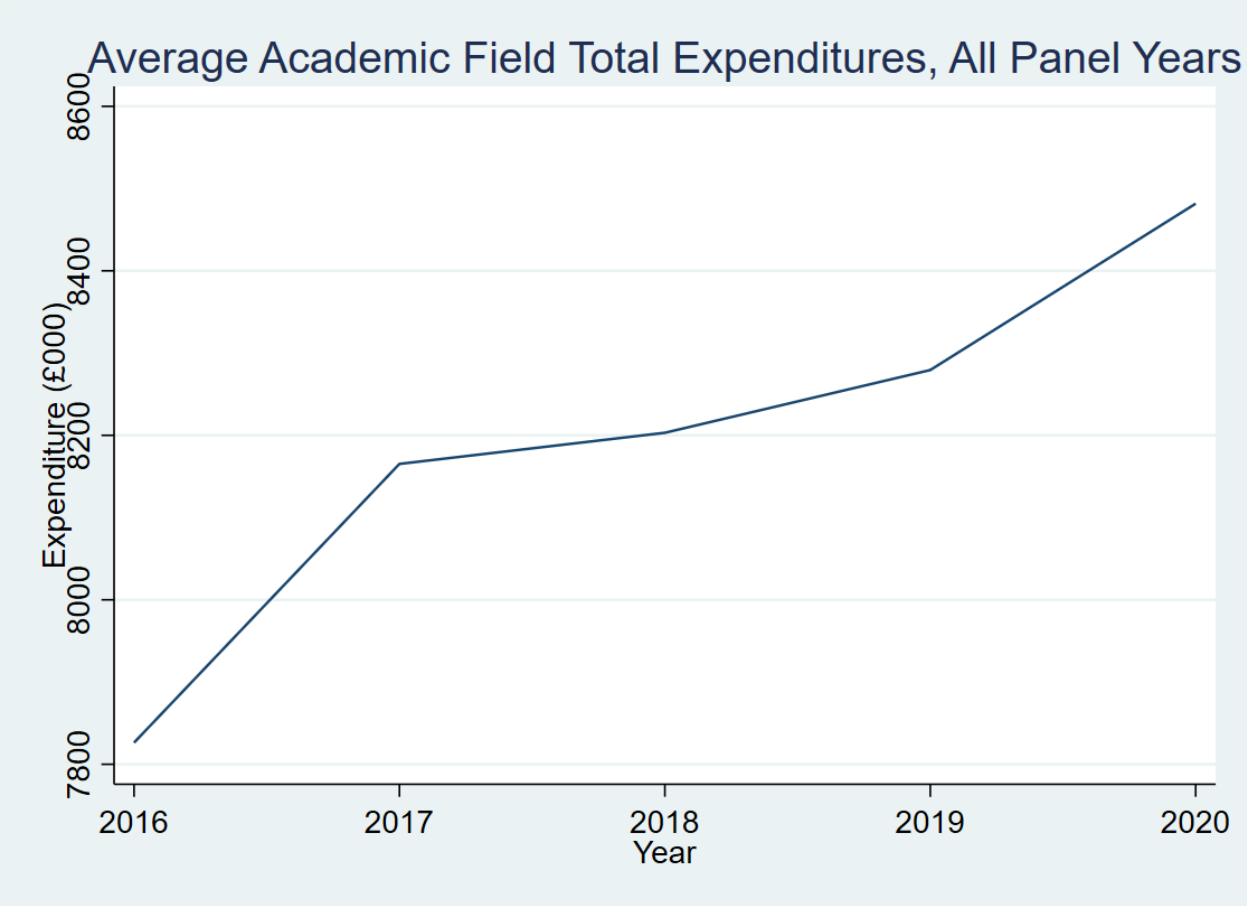
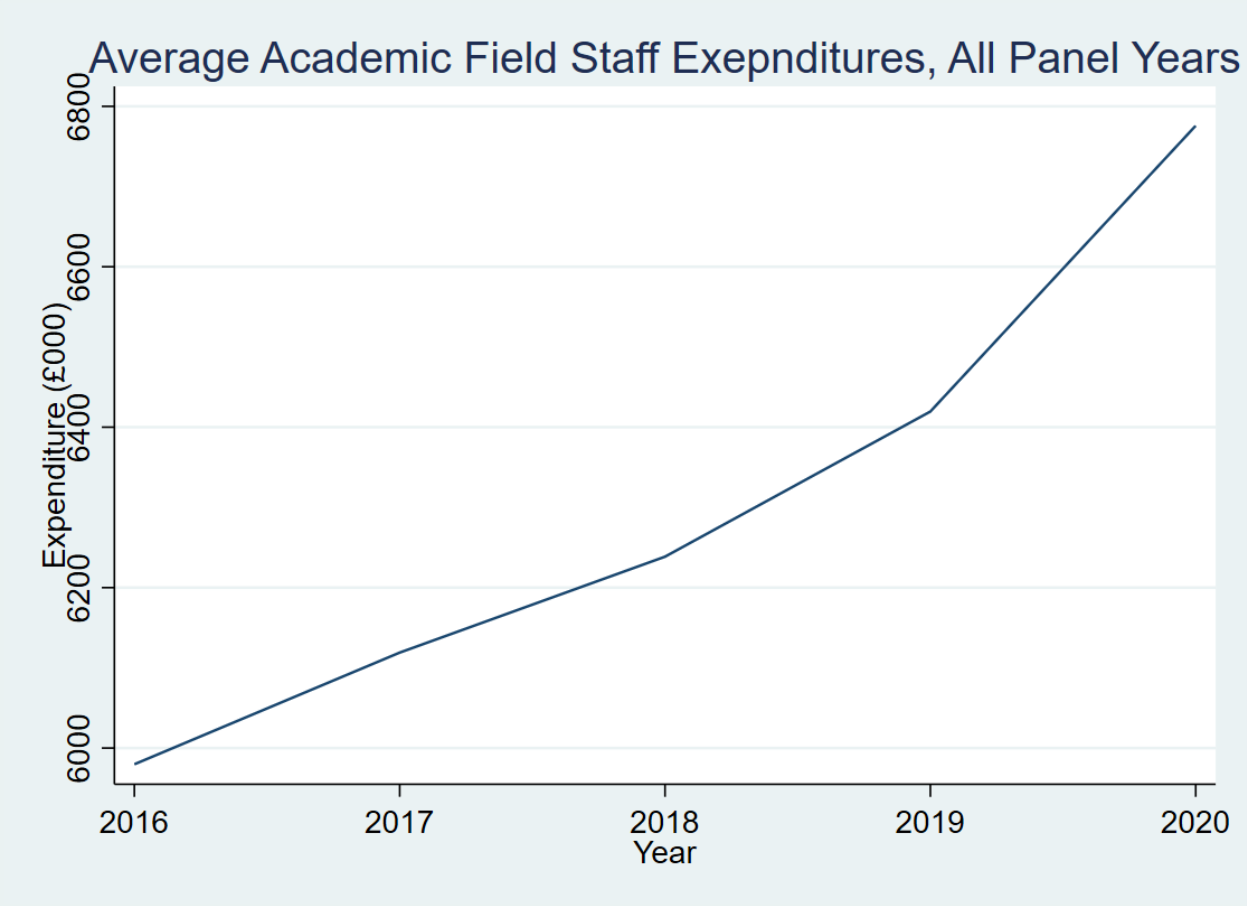


Figure 2

Average Staff Expenditures per Academic Field, All Panel Years



Fixed Effects Panel Model for All Academic Fields

Table 2 contains the fixed effects panel results for total expenditures and staffing expenditures across all panel years. I tested several covariates that prior research suggested might be related to department-level expenditures; these variables were academic subject area, total enrollment, departmental research income, and institutional ranking. My analysis revealed that institutional ranking and departmental research income were insignificant predictors of departmental expenditures, so I omitted these variables from my models. Because there are marginal effects to increasing or decreasing the percent of an academic field's research rated "3" or "4" in the 2014 REF, I included quadratic terms for these variables. Analysis of scatterplots

and regression models under different specifications suggested that the inclusion of quadratic terms was necessary.

Column 1 shows the results of regressing logged total expenditures per academic field onto REF 2014 results. These results demonstrate that the percentage of an academic field's research rated "3" or "4" in the 2014 REF has a statistically significant relationship with logged total expenditures, holding enrollment constant. I find that an academic field tends to see a decrease in subsequent total expenditures in response to an increasing percentage of research rated "4" up until a turnaround point of 27% of research rated "4." After an academic field has 27% or more of its research rated "4," its subsequent expenditures begin to rise. I found the opposite pattern with the percent of research rated "3." Academic fields see a positive relationship between the percent of research rated "3" and total expenditures, but only up to a point. After an academic field reaches 56% of its research rated "3," subsequent total expenditures begin to decline.

Because academic fields attempting to improve the quality of their research likely need additional staffing to do so, I next examined the relationship between REF 2014 results and staffing expenditures. By using staffing expenditures as a proxy for staffing levels, I can determine the ways in which REF 2014 results influence Russell Group universities to augment their staffing patterns. Staffing expenditure patterns show similar relationships to overall expenditure patterns, a result that is sensible given that much of each academic field's expenditures are spent on staffing. Academic fields see a negative relationship between staffing expenditures and the percent of research rated "4" in the 2014 REF up until a turnaround point of 26% of research rated "4." Once an academic field exceeds 26% of research rated "4," its subsequent staffing expenditures begin to rise. Academic fields see a positive relationship

between the percent of research rated "3" and staffing expenditures until the turnaround point of 57% is reached. Academic fields with 57% or more of research rated "3" in the 2014 REF then begin to experience a decrease in staffing expenditures. Taken together, these results suggest that whether an academic field sees a subsequent increase or decrease in total or staffing expenditures in response to REF 2014 results depends upon the percent of research scored "4" and the percent scored "3."

Table 2

Fixed Effects Panel Results, Total and Staffing Expenditures

VARIABLES	(1) Logged total expenditures (logged)	(2) Logged staffing expenditures (logged)
% rated "4"	-0.430**	-0.631*
	(0.144)	(0.229)
% rated "3"	1.335**	1.808**
	(0.367)	(0.586)
% rated "4" (squared)	0.008**	0.012**
	(0.003)	(0.004)
% rated "3" (squared)	-0.012***	-0.016**
	(0.003)	(0.005)
SS over NS	-2.237***	-2.028***
	(0.107)	(0.170)
HUM over NS	-2.216***	-2.247***
	(0.245)	(0.391)
Total university enrollment (logged)	0.589*	1.231**
	(0.232)	(0.370)
Constant	-27.272*	-45.205*
	(10.673)	(17.023)
Observations	977	977
R-squared	0.984	0.978

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Fixed Effects Panel Models by Academic Area

Table 3 shows fixed effects panel results for total expenditures by academic subject area. Column 1 displays the results of regressing logged total academic field expenditures onto the percent of research rated "4", percent rated "3," and logged total enrollment for academic fields in the natural sciences. Academic fields in the natural sciences experience a positive relationship between the percent of research rated "4" and total expenditures until that academic field exceeds 38% of research rated "4." Above this threshold, the relationship between the percent of research rated "4" and total expenditure in natural science academic fields becomes negative. I found no statistically significant relationship between the percent of research rated "3" and total expenditures for academic fields in the natural sciences. Columns 2 and 3 present the same model specifications for social science and humanities subject areas, respectively. In contrast to the natural sciences, academic fields in the social sciences with less than 30% of research rated "4" have a negative relationship between the percent of research rated "4" and total expenditures. Above 30% of research rated "4," the relationship becomes positive, with more research rated "4" correlating with higher subsequent expenditures. Academic fields in the social sciences see expenditures increase in response to a higher percentage of research rated "3," but only until the turnaround point of 55% of research rated "3." Once an academic field in the social sciences reaches 55% of research rated "3," an increasing percentage of research rated "3" is associated with lower total expenditures. I found no statistically significant relationship between the percent of research rated "4" and subsequent total expenditures for academic fields in the humanities, but they do see increases in total expenditures in response to a higher percentage of research rated "3." This relationship, which is positive when an academic field has a lower percent of its research rated "3," becomes negative when the percent of research rated "3" exceeds 53%.

Table 4 displays results for staffing expenditures disaggregated by academic subject area. When disaggregated by academic subject area, staffing expenditures follow somewhat different patterns than total expenditures do. In the natural sciences, I found no statistically significant relationships between the percentage of research rated “4” or “3” and staffing expenditures. In the social sciences, academic fields experience decreases in staffing expenditures in response to a higher percentage of research rated “4” up until the point at which 29% of an academic field’s research is rated “4.” After exceeding this turnaround point, there becomes a positive relationship between percent of research rated “4” and staffing expenditures. In contrast, social science academic fields initially have a negative relationship between the percent of research rated “3” and staffing expenditures, with this relationship becoming positive once an academic field reaches 53% of its research rated “3.” Academic fields in the humanities experience the same patterns as those in the social sciences with respect to staffing expenditures. An initially negative relationship between the percent of research rated “4” and staffing expenditures moderates and then becomes positive once 25% of research is rated “4”; for research rated “3,” an initially positive relationship becomes negative once 56% of research is rated “3.”

Table 3

Total Expenditure Fixed Effects Panel Results for Natural Sciences, Social Sciences, and Humanities

VARIABLES	(1) Logged total expenditures, natural sciences	(2) Logged total expenditures, social sciences	(3) Logged total expenditures, humanities
% rated "4"	0.151***	-1.573***	-0.156
	(0.030)	(0.052)	(0.111)
% rated "3"	0.162	0.774***	0.639*
	(0.124)	(0.022)	(0.259)
% rated "4" (squared)	-0.002**	0.026***	0.003
	(0.001)	(0.001)	(0.002)
% rated "3" (squared)	-0.002	-0.007***	-0.006**
	(0.001)	(0.000)	(0.002)
Total enrollment (logged)	0.359	0.730	0.710**
	(0.244)	(0.359)	(0.212)
Constant	-0.668	0.880	-14.275
	(5.573)	(3.723)	(8.427)
Observations	345	307	325
R-squared	0.979	0.967	0.986

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 4

Staff Expenditure Fixed Effects Panel Results for Natural Sciences, Social Sciences, and Humanities

VARIABLES	(1) Logged staff expenditures, natural sciences	(2) Logged staff expenditures, social sciences	(3) Logged staff expenditures, humanities
% rated "4"	-0.035	-1.573***	-0.494*
	(0.051)	(0.062)	(0.186)
% rated "3"	0.416	0.745***	1.447**
	(0.211)	(0.027)	(0.436)
% rated "4" (squared)	0.001	0.027***	0.010*
	(0.001)	(0.001)	(0.003)
% rated "3" (squared)	-0.004*	-0.007***	-0.013**
	(0.002)	(0.000)	(0.004)
Total enrollment (logged)	1.129*	1.277**	1.302**
	(0.416)	(0.434)	(0.356)
Constant	-13.108	-5.036	-39.775*
	(9.475)	(4.505)	(14.155)
Observations	345	307	325
R-squared	0.972	0.965	0.975

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Fixed Effects Panel Model by Institutional Ranking

While *Times Higher Education* global university ranking was not a significant predictor in the models provided in Table 2, this does not exclude the possibility that different institutions respond to REF 2014 results in different ways based upon their institutional ranking. Table 5 provides the results of a fixed effects model for total expenditures in which the sample was split into two approximately equal halves: those academic fields located in Russell Group universities ranked within the top 100 globally, and those academic fields located in Russell Group universities ranked within the top 101-250 globally. Table 6 uses the same modeling specifications as Table 5 for staffing expenditures. Tables 5 and 6 demonstrate that Russell Group universities ranked within and outside of the top 100 globally differ in their expenditure patterns in response to REF 2014 results. Russell Group universities ranked within the top 100 globally see a negative relationship between the percent of an academic field's research rated "4" until a turnaround point of 32% for both total expenditures and staff expenditures. Once an academic field at a Russell Group university ranked within the top 100 globally exceeds 32% of its research rated "4," its total expenditures and staffing expenditures begin to increase. These same academic fields experience the opposite effect for the percent of research rated "3." This relationship begins positive, with both total and staffing expenditures increasing as the percent of research rated "3" increases. When the percent of research rated "3" exceeds 62% for total expenditures and 61% for staffing expenditures, however, further increases in the percent of research rated "3" is associated with decreases in both total and staffing expenditures. Academic fields in lower-ranked Russell Group universities experience almost the exact opposite patterns as those ranked in the top 100 globally. Unlike their higher-ranked peers, academic fields in Russell Group universities ranked 101-250 globally have an initially positive relationship

between the percent of research rated “4” and subsequent expenditures. Once the percent of research rated “4” exceeds 26% or 27% for total expenditures and staffing expenditures, respectively, additional research rated “4” is associated with reductions in expenditures. Academic fields in these lower-ranked Russell Group universities face total and staffing expenditure reductions in response to an increasing percent of research rated “3.” This relationship, however, becomes positive once the percent of an academic field’s research rated “3” exceeds 57% for total expenditures and 56% for staffing expenditures. My results demonstrate that Russell Group universities ranked within and outside of the top 100 globally respond in opposite ways to REF 2014 results in their constituent academic fields.

Table 5

Total Expenditure Fixed Effects Panel Results for Top 100 Global Universities vs. 101-250 Global Universities

VARIABLES	(1) Logged total expenditures, top 100 ranked	(2) Logged total expenditures, 101-250 ranked
% rated "4"	-4.472***	1.053***
	(0.155)	(0.048)
% rated "3"	6.457***	-2.384***
	(0.289)	(0.204)
% rated "4" (squared)	0.070***	-0.020***
	(0.002)	(0.001)
% rated "3" (squared)	-0.052***	0.021***
	(0.002)	(0.002)
Total enrollment (logged)	0.967*	0.441
	(0.348)	(0.296)
Constant	-127.711***	59.720***
	(2.564)	(8.219)
Observations	490	487
R-squared	0.986	0.979

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Table 6

Staff Expenditure Fixed Effects Panel Results for Top 100 Global Universities vs. 101-250 Global Universities

VARIABLES	(1) Logged staff expenditures, top 100 ranked	(2) Logged staff expenditures, 101-250 ranked
% rated "4"	-3.271***	0.819***
	(0.072)	(0.092)
% rated "3"	4.512***	-1.801***
	(0.134)	(0.391)
% rated "4" (squared)	0.051***	-0.015***
	(0.001)	(0.002)
% rated "3" (squared)	-0.037***	0.016***
	(0.001)	(0.003)
Total enrollment (logged)	1.947***	0.839
	(0.161)	(0.566)
Constant	-98.510***	41.326*
	(1.187)	(15.713)
Observations	490	487
R-squared	0.983	0.974

Robust standard errors in parentheses
*** p<0.001, ** p<0.01, * p<0.05

Discussion

In this paper, I sought to understand the relationship between REF 2014 results and subsequent expenditure patterns at Russell Group universities as a way of understanding how the UK's most prestigious group of universities responds to performance-based funding results in the face of global competitive pressures. I found heterogenous effects depending upon the specific academic fields and universities included. This suggests that when it comes to total expenditure and staffing expenditure patterns, Russell Group universities are engaged in an array of strategies

to optimize the use of limited funds. These decisions seem to be based upon academic subject area and institutional positionality within the global ranking structure.

Across all Russell Group universities, I found that academic fields with a low percentage of research rated "4" see decreases in both total and staffing expenditures in response to their 2014 REF results, but this relationship becomes positive quite quickly. Once an academic field achieves just over 25% of its research rated "4," subsequent expenditures begin to rise. The percent of research rated "3" follows the opposite pattern, beginning positive and then becoming negative once the percent of an academic field's research rated "3" exceeds 56-57%. My findings suggest that Russell Group universities may be prioritizing academic departments with very strong performance (i.e., a high percentage of research rated "4"), de-prioritizing other departments in the process. It appears that Russell Group universities view increasing the percentage of an academic field's research rated "4" as a beneficial goal worthy of additional financial support. If this is the case, it aligns with prior research demonstrating that universities are engaged in a competitive pursuit to develop top academic departments in a select few fields (Barrett et al., 2011; de Wit & Altbach, 2021). Improving performance across a wide array of academic fields may limit the ability for any one academic field to become truly exceptional, but my results suggest that Russell Group universities have at least some preference for developing a few academic fields of global strength.

The relationships between REF 2014 results and expenditures by academic subject area reveal complicated patterns that speak to the diverse roles that different academic fields and subject areas play at Russell Group universities. Academic fields in the natural sciences feature the highest expenditures both overall and on staffing compared to the social sciences and humanities. I found that in the natural sciences, an initially positive relationship between the

percent of research rated “4” and subsequent total expenditures becomes negative, but the percentage of research rated “3” has no relationship with total expenditures. Neither the percent rated “4” nor percent rated “3” has any relationship with staffing expenditures. I reach two possible conclusions from this finding. First, it appears that when they provide additional resources to natural science departments, Russell Group universities do so primarily in non-staffing expenditures. It might be that they invest more heavily in capital equipment such as laboratories, buildings, or expensive research materials or in more complex, costly research endeavors that may even span international boundaries, but increasing staffing does not appear to be a response to either strong or poor REF 2014 performance. Second, very strong performance from academic fields in the natural sciences in the REF 2014, as expressed by a high percentage of research rated “4,” is associated with a reallocation of resources towards other purposes. Perhaps because of the high cost of competing successfully in the natural sciences, Russell Group universities do not seem to show a propensity for increasing the percent of a natural science academic field’s research rated “4” above a certain threshold. If an academic field in the natural sciences has already achieved upwards of a third of its research rated “4,” it may simply be the case that further increasing the percent of research rated “4” is deemed too costly and not worth the value-add to the university. Such an approach would then free up additional financial resources for re-allocation towards other goals, a hypothesis that aligns well with my findings for academic fields in the social sciences and humanities.

My analysis reveals that academic fields in the social sciences and humanities have a very different relationship between expenditures and REF 2014 results than academic fields in the natural sciences, underscoring the different roles that these academic subject areas play in Russell Group universities. Unlike the natural sciences, where there appears to be a turnaround

point at which the pursuit of additional research rated “4” is no longer deemed worthy of the expenditure, there does not seem to be a clear upper limit for academic fields in the social sciences and humanities. In these latter two areas, academic fields with a low percentage of research rated “4” see subsequent declines in both total and staffing expenditures. Only after a moderate amount of their research is rated a “4” do academic fields in these areas start to see subsequent expenditures rise, and they rise without any clear upper limit. The percent of research rated “3” also has a significant relationship with both types of expenditures for academic fields in the social sciences and humanities. Academic fields with relatively little research rated “3” see increases in expenditures, but this relationship moderates and becomes negative once the percent of research rated “3” reaches somewhere in the 50% range. This suggests that unlike in the natural sciences, Russell Group universities view a high percentage of research rated “3” as less valuable than the pursuit of a high percentage of research rated “4” for academic fields in the social sciences and humanities. Two explanations for this seem plausible. The first possible cause of this relationship is related to cost. Academic fields in the natural sciences tend to have higher expenditures than those in the social sciences and humanities, a reflection of the capital-intensive nature, both human and otherwise, of research in the natural sciences. For Russell Group universities striving to pursue high REF scores in as many academic fields as possible, investment in the social sciences and humanities might offer a more cost-effective solution than further development of academic fields in the natural sciences. If the same financial investment can generate greater improvements in research capacity or quality in academic fields within the social sciences or humanities versus the natural sciences, a Russell Group institution seeking to maximize the value-add of each pound allocated might see investment in the social sciences and humanities as a particularly attractive proposition. The second reason that Russell Group

universities might opt to invest more heavily in high-performing academic fields in the social sciences and the humanities relates to prestige and status-seeking behavior. Russell Group universities are not immune from pressures to graduate so-called "employable" students, a term that often means graduates in the natural sciences (Durazzi, 2019). What these universities might be striving for, then, is not only to be excellent in the natural sciences, but to achieve at a high level in the social sciences and the humanities as well, the older academic core of UK universities. If Russell Group institutions believe that development of high-caliber academic fields in the social sciences and humanities is critical to maintaining status as a global research university, they may opt to invest significant resources in these areas.

Perhaps the most dramatic differences in relationships between REF 2014 performance and expenditures was between Russell Group universities ranked within the top 100 globally according to *Times Higher Education* and those ranked between 101 and 250 globally. At top 100 Russell Group universities, an initially negative relationship between the percent of an academic field's research rated "4" and subsequent total and staffing expenditures moderates and becomes positive once an academic field reaches just over 30% of research rated "4." In contrast, academic fields in lower-ranked Russell Group universities see a positive relationship between the percent of research rated "4" and subsequent expenditures become negative once an academic field has approximately 25% of its research rated "4." This result suggests that Russell Group universities within and outside of the top 100 globally use REF 2014 results to inform subsequent expenditures in their constituent academic fields in very different ways. Russell Group universities ranked in the top 100, with their strong ranking and commensurate reputation, seem to be willing to invest in academic fields with a high percentage of research already rated "4." Russell Groups ranked lower, however, appear to spread their financial resources more

evenly, likely in an effort to bolster the performance of a broad array of academic fields. Russell Group universities ranked 101-250 globally seem to view academic fields with strong performance in the REF 2014 as already sufficiently successful. Rather than invest even more financial resources in these strong performers, Russell Group universities ranked outside of the top 100 allocate additional funds to academic fields with somewhat weaker performance. My findings for the percent of research rated "3" support these conclusions. At Russell Group universities ranked in the top 100, a high percentage of research rated "3" correlates with a reduction in expenditures; at lower-ranked institutions, it correlates with higher expenditures. Academic fields with a high percentage of research rated "3" appear to be prioritized for further improvement at Russell Group universities ranked 101-250 but not at top 100 Russell Group universities, a result that provides further evidence that Russell Group universities use their financial resources in different ways depending upon their ranking. Institutions already at the top of the global hierarchy provide further investment in academic fields of strength in an attempt to bolster them to be among the top few in the world. Russell Group institutions that are ranked slightly lower engage in striving behavior (Gonzales, 2013; Zerquera, 2019), trying to make as many of their academic fields as competitive as possible by providing investment in academic fields with slightly lower performance in the REF 2014.

Brought together, my results provide strong evidence that while Russell Group universities are all well-resourced, highly ranked, and globally prestigious, they still respond to performance-based funding activities like the REF 2014 in different ways. How they respond depends upon the specific strategic circumstances within which they find themselves. The first clear pattern that I found was a difference in the treatment of academic fields in the natural sciences versus those in the social sciences and humanities. Whereas Russell Group universities

seem inclined to bolster already strong academic fields in the social sciences and humanities, they are less willing to do so for those in the natural sciences. I suspect that this is due to the higher cost of further development of their natural science academic fields, a cost that many universities deem not to be "worth it." I also found that institutional ranking influences how Russell Group universities behave. The top-ranked Russell Groups demonstrate much more willingness to allocate additional financial resources to their strongest departments than Russell Group universities ranked lower. Russell Group universities ranked within the top 100 likely already have achieved considerable success in the REF 2014 across a wide array of academic fields, and this might incentivize them to provide further investment in areas of strength with a goal of making these academic fields among the top globally. Russell Group universities ranked slightly lower, on the other hand, seek to bolster research quality across a wider array of academic fields, a trend that I interpret as a form of striving behavior on the part of these lower-ranked Russell Group institutions.

Limitations

This study contains several limitations. The first limitation relates to the sample itself. This study only explored expenditure patterns at Russell Group universities. While this is an appropriate sample to select given my interest in understanding how the UK's most prestigious universities respond to REF 2014 results, the findings in this paper cannot be generalized to the UK higher education sector at large. It is likely that different types of universities within the UK's higher education sector respond to REF 2014 results in different ways, and I encourage further research in this area. The second limitation relates to the lack of causality in my argument. A fixed effects panel absorbs much of the unobserved variables by controlling for time-invariant aspects of departments themselves. In doing so, a fixed effects model represents a

significant advance on a random effects model with respect to controlling for endogenous covariates (Wooldridge, 2019). Nevertheless, because I have not controlled for every possible time-variant variable, I cannot plausibly claim that my argument is causal. I encourage researchers to pursue casual research on this topic where possible as a complement to descriptive studies such as mine, though I also acknowledge the difficulty of finding suitable natural experiments from which to conduct causal studies.

Conclusion

This study examined the relationship between REF 2014 results and subsequent expenditures, both in total and on staffing, in academic fields at Russell Group universities. I found complicated patterns. Across all institutions, a low percentage of an academic field's research rated "4" was associated with a decrease in subsequent total expenditures and staffing expenditures, a relationship that moderates and becomes positive once an academic field has approximately a quarter of its research rated "4." A low percent of research rated "3" was associated with an increase in subsequent total expenditures and staffing expenditures, but this relationship too reaches a point at which it changes and becomes negative. These relationships were heterogeneous by both academic subject area and institutional ranking. While academic fields in the natural sciences saw no relationship between REF 2014 scores and subsequent expenditures, academic fields in the social sciences and humanities did. Well-funded academic fields in the natural sciences seem to be little influenced by REF 2014 results, as least insofar as their subsequent expenditures are concerned. Academic fields in the social sciences and humanities, however, appear to have their budgets influenced by REF 2014 results. Stronger performance in the REF 2014 generally was associated with increases in subsequent expenditures, both overall and on staffing, in academic fields in the social sciences and

humanities. Most striking was how dramatically Russell Group universities ranked in the top 100 globally differed in their behavior from universities ranked 101-250. Academic fields in Russell Group universities ranked within the top 100 globally saw, on average, an increase in expenditures in response to stronger performance in the 2014 REF, but academic fields at lower-ranked Russell Group universities experienced the opposite effect. These findings suggest that Russell Group universities are engaged in specific, strategic approaches to resource allocation. The fact that universities ranked in the top 100 globally differ in their behavior from universities ranked lower suggests that universities ranked in the top 100, likely already strong in a wide array of academic fields, utilize strong REF 2014 performance to further bolster areas in which they are already strong. Universities ranked outside the top 100, however, seem to be engaging in striving behavior. My results suggest that Russell Group universities ranked outside the top 100 globally are seeking to increase their performance across the board, in doing so attempting to match the performance of the Russell Group universities ranked above them.

While much has been written about the REF 2014 exercise, little empirical work exploring the relationship between REF 2014 results and the behavior of UK universities has been published. This paper contributes to filling this gap in the literature by using a descriptive approach to examine the relationship between REF 2014 results and subsequent expenditures in a select group of academic fields at Russell Group universities. Beyond the context of the REF 2014, my research engages with a broader research agenda among scholars whose work explores the relationship between universities and their external environments. Beginning with the assumption that universities are embedded within and engage with their environments, my research studies the way in which one external policy, the 2014 REF, relates to university performance and institutional behavior (Scott & Davis, 2007). I found that it is difficult to

generalize, even across a group of institutions as similar as the Russell Group. My research underscores how different institutions engage with the external policy and resource environment in distinctive ways based upon their circumstances and positionality. With another REF exercise approaching, it is my hope that this research contributes to our understanding of how the UK's REF system influences, or does not influence, different types of universities to behave in particular ways.

REFERENCES

Abramo, G., Cicero, T., & D'Angelo, C. A. (2011). The dangers of performance-based research funding in non-competitive higher education systems. *Scientometrics*, *87*(3), 641–654. https://doi.org/10.1007/s11192-011-0355-4

Adcroft, A., Teckman, J., & Willis, R. (2010). Is higher education in the UK becoming more competitive? *International Journal of Public Sector Management*, *23*(6), 578–588. https://doi.org/10.1108/09513551011069040

Altbach, P. G. (2016). *Global perspectives on higher education*. Johns Hopkins University Press.

Banal-Estañol, A., Macho-Stadler, I., & Pérez-Castrillo, D. (2013). Research output from university-industry collaborative projects. *Economic Development Quarterly*, *27*(1), 71–81. https://doi.org/10.1177/0891242412472535

Barrett, A. M., Crossley, M., & Dachi, H. A. (2011). International collaboration and research capacity building: Learning from the EdQual experience. *Comparative Education*, *47*(1), 25–43. https://doi.org/10.1080/03050068.2011.541674

Boliver, V. (2013). How fair is access to more prestigious UK universities? *British Journal of Sociology*, *64*(2), 344–364. https://doi.org/10.1111/1468-4446.12021

Brown, R. (2013). Mutuality meets the market: Analysing changes in the control of quality assurance in United Kingdom higher education 1992-2012. *Higher Education Quarterly*, *67*(4), 420–437. https://doi.org/10.1111/hequ.12028

Cantwell, B., & Taylor, B. J. (2013). Global status, intra-institutional stratification and organizational segmentation: A time-dynamic tobit analysis of ARWU position among U.S. universities. *Minerva*, *51*(2), 195–223. https://doi.org/10.1007/s11024-013-9228-8

Cantwell, B., & Taylor, B. J. (2015). Rise of the science and engineering postdoctorate and the restructuring of academic research. *Journal of Higher Education*, *86*(5), 667–696. https://doi.org/10.1080/00221546.2015.11777379

Chowdhury, G., Koya, K., & Philipson, P. (2016). Measuring the impact of research: Lessons from the UK's Research Excellence Framework 2014. *PLoS ONE*, *11*(6), 1–16. https://doi.org/10.1371/journal.pone.0156978

Correia, S. (2016). *A feasible estimator for linear models with multi-way fixed effects*.

Council, B. (n.d.). *Introduction to the UK higher education system*. Retrieved February 10, 2022, from https://www.britishcouncil.in/sites/default/files/higher_education_system_of_uk.pdf

Cowan, R., & Rossello, G. (2018). Emergent structures in faculty hiring networks, and the effects of mobility on academic performance. *Scientometrics*, *117*(1), 527–562. https://doi.org/10.1007/s11192-018-2858-8

de Wit, H., & Altbach, P. G. (2021). Internationalization in higher education: Global trends and recommendations for its future. *Policy Reviews in Higher Education*, *5*(1), 28–46. https://doi.org/10.1080/23322969.2020.1820898

Deem, R., & Lucas, L. (2007). Research and teaching cultures in two contrasting UK policy contexts: Academic life in education departments in five English and Scottish universities. *Higher Education, 54*, 115–133.

Durazzi, N. (2019). The political economy of high skills: higher education in knowledge-based labour markets. *Journal of European Public Policy*, *26*(12), 1799–1817. https://doi.org/10.1080/13501763.2018.1551415

Filippakou, O., Salter, B., & Tapper, T. (2012). Higher education as a system: The English experience. *Higher Education Quarterly*, *66*(1), 106–122.

Furukawa, T., Shirakawa, N., & Okuwada, K. (2013). An empirical study of graduate student mobility underpinning research universities. *Higher Education*, *66*(1), 17–37.

Gándara, D., & Rutherford, A. (2018). Mitigating unintended impacts? The effects of premiums for underserved populations in performance-funding policies for higher education. *Research in Higher Education*, *59*(6), 681–703. https://doi.org/10.1007/s11162-017-9483-x

Gonzales, L. D. (2013). Faculty sensemaking and mission creep: Interrogating institutionalized ways of knowing and doing legitimacy. *Review of Higher Education*, *36*(2), 179–209.

Hemsley-Brown, J. (2015). Getting into a Russell Group university: High scores and private schooling. *British Educational Research Journal*, *41*(3), 398–422. https://doi.org/10.1002/berj.3152

Iannelli, C., & Huang, J. (2014). Trends in participation and attainment of Chinese students in UK higher education. *Studies in Higher Education, 39*(5), 805–822. https://doi.org/10.1080/03075079.2012.754863

Jaquette, O. (2019). Do public universities replace state appropriations with master's students? *Review of Higher Education*, *42*(3), 1101–1144. https://doi.org/10.1353/rhe.2019.0031

Kaikkonen, D. (2016). Shifting from enrollment- to performance-based funding in higher education: What can we learn form Washington's experience? *Education Finance and Policy*, *11*(4), 482–498.

Karran, T., & Mallinson, L. (2019). Academic freedom and world-class universities: A virtuous circle? *Higher Education Policy*, *32*(3), 397–417. https://doi.org/10.1057/s41307-018-0087-7

Kelchen, R., & Stedrak, L. J. (2016). Does performance-based funding affect colleges' financial priorities? *Journal of Education Finance*, *41*(3), 302–321. https://doi.org/10.1353/jef.2016.0006

Marginson, S. (2018). Glboal trends in higher education financing: The United Kingdom. *International Journal of Educational Development*, *58*, 26–36.

Martin, B. R. (2011). The Research Excellence Framework and the "impact agenda": Are we creating a Frankenstein monster? *Research Evaluation*, *20*(3), 247–254. https://doi.org/10.3152/095820211X13118583635693

Pisár, P., & Šipikal, M. (2017). Negative effects of performance based funding of universities: The case of Slovakia. *NISPAcee Journal of Public Administration and Policy*, *10*(2), 171–189. https://doi.org/10.1515/nispa-2017-0017

Raaper, R. (2017). Tracing assessment policy discourses in neoliberalised higher education settings. *Journal of Education Policy*, *32*(3), 322–339. https://doi.org/10.1080/02680939.2016.1257160

Radice, H. (2013). How We Got Here: UK Higher Education under Neoliberalism. *ACME: An International Journal for Critical Geographies*, *12*(2), 407–418.

Raffe, D., & Croxford, L. (2015). How stable is the stratification of higher education in England and Scotland? *British Journal of Sociology of Education*, *36*(2), 313–335. https://doi.org/10.1080/01425692.2013.820127

Scott, W. R., & Davis, G. F. (2007). *Organizations and organizing: Rational, Natural, and open system perspectives*. Pearson.

Shin, J. C. (2010). Impacts of performance-based accountability on institutional performance in the U.S. *Higher Education*, *60*(1), 47–68.

Shin, J. C., & Jung, J. (2014). Academics job satisfaction and job stress across countries in the changing academic environments. *Higher Education*, *67*(5), 603–620.

Sidhu, R. (2009). The "Brand Name" Research University Goes Global. *Higher Education*, *57*(2), 125–140. https://doi.org/10.1007/sl0734-008-9136-2

Taylor, J. (2011). The assessment of research quality in UK universities: Peer review or metrics? *British Journal of Management*, *22*(2), 202–217. https://doi.org/10.1111/j.1467-8551.2010.00722.x

Trevorrow, P., & Volmer, D. A. (2012). Dispelling the myths surrounding the Research Excellence Framework. *Rapid Communications in Mass Spectrometry*, *26*(4), 399–402. https://doi.org/10.1002/rcm.6133

Tymms, P., & Higgins, S. (2018). Judging research papers for research excellence. *Studies in Higher Education*, *43*(9), 1548–1560. https://doi.org/10.1080/03075079.2016.1266609

Universities, R. G. of. (2020). *About the Russell Group*.

Universities UK. (2022, February 10). *Higher education in facts and figures: 2021*.

Wichmann-Hansen, G., & Herrmann, K. J. (2017). Does external funding push doctoral supervisors to be more directive? A large-scale Danish study. *Higher Education*, *74*(2), 357–376. https://doi.org/10.1007/s10734-016-0052-6

Wooldridge, J. M. (2019). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning.

Zerquera, D. D. (2019). The problem with the prestige pursuit: The effects of striving on access for Black and Latino Students at urban-serving research universities. *The Review of Higher Education*, *42*(5), 393–424. https://doi.org/10.1353/rhe.2019.0057

Ziskin, M. B., Rabourn, K. E., & Hossler, D. (2018). Performance-based funding of higher education: Analyses of policy discourse across four case studies. *Journal for Critical Education Policy Studies*, *16*(2), 164–210.

APPENDIX A: LIST OF RUSSELL GROUP UNIVERSITIES

University of Birmingham

University of Bristol

University of Cambridge

Cardiff University

Durham University

University of Edinburgh

University of Exeter

University of Glasgow

Imperial College London

King's College London

University of Leeds

University of Liverpool

London School of Economics and Political Science

University of Manchester

Newcastle University

University of Nottingham

University of Oxford

Queen Mary University of London

Queen's University Belfast

University of Sheffield

University of Southampton

University College London

University of Warwick

University of York

APPENDIX B: LIST OF ACADEMIC FIELDS INCLUDED

Biosciences (natural sciences)

Physics (natural sciences)

Mathematics (natural sciences)

Economics and econometrics (social sciences)

Education (social sciences)

Sociology (social sciences)

English language and literature (humanities)

Philosophy (humanities)

History (humanities)

DISSERTATION CONCLUSION

This dissertation utilized performance-based funding to interrogate the ways in which universities interact with and respond to changes in their external environments. The first article of my dissertation uses the UK, Germany, and France as case studies to understand the performance-based funding policy formation process in western Europe. While an emphasis on transnational forces and on policy diffusion framework offers a compelling explanation for why performance-based funding emerged and rapidly proliferated as a policy solution, it does not adequately explain the reasons why common concerns led to the emergence of disparate policies. I augment policy diffusion with institutional logics, arguing that conditions unique to each country played a critical role in informing the design of performance-based funding policies for higher education. In adding institutional logics to policy diffusion, scholars have a theoretical framework through which to make sense not only of the broader concerns shared by European countries which contributed to the emergence of performance-based funding systems for higher education, but also the particularities of each individual country.

The second article of my dissertation studied one possible source of policy failure of the UK's performance-based funding system. Using resource dependence theory as a framework, this paper tested the hypothesis that English universities replace lost performance-based funding money with undergraduate student enrollment. I found little evidence that this is true, instead finding that increased performance-based funding revenues are associated either with increased enrollment or no change in enrollment. Furthermore, when enrollment changes in response to performance-based funding allocations, it is usually due to an increase in UK-domiciled students. I did not see situations in which English universities seemed to be enrolling more EU-domiciled or international students to offset lost revenue. I also found no evidence that English universities

were strategically shifting their undergraduate student body demographics by increasing the percentage of the student body coming from the EU or overseas and decreasing the percentage of the student body coming from the UK. This result suggests to me that English universities are utilizing currently available resources, performance-based funding, to enhance their ability to obtain resources from another revenue stream, tuition, in the future.

The final paper of my dissertation used the Russell Group as a sample to understand the relationship between REF 2014 results and subsequent expenditures by academic field. I found heterogenous effects. Across all Russell Group universities, higher performance in the REF 2014 exercise was generally associated with higher expenditures in subsequent years. These effects did not hold consistently across academic subject areas or across Russell Group universities with different *Times Higher Education* global rankings. Academic fields in the natural sciences saw no relationship between REF 2014 results and subsequent expenditures, but those in the social sciences and humanities saw expenditures rise in response to very strong performance in the REF 2014. Of note were my findings when I split the sample according to *Times Higher Education* global ranking. I observed that Russell Group universities ranked within the top 100 globally seem to increase expenditures in academic fields of strength. Russell Group universities ranked outside the top 100, on the other hand, spread their financial resources more evenly, reducing the expenditures of their top-performing academic fields in favor of those with more modest performance. I argue that these findings underscore the ways in which an individual institution's position influences its behavior. Faced with the same exercise, the REF 2014, universities all situated within one prestigious grouping of higher education institutions, the Russell Group, can respond to funding incentives in quite disparate ways based upon characteristics such as the academic subject area or global ranking.

Before a discussion of the broader implications and connections to the scholarly literature, a methodological note is worth making. Both empirical studies in my dissertation make use of fixed effects panels with robust standard errors. The second article incorporates a university-level fixed effect, and the third article includes an academic field-level fixed effect. My use of institutional and academic field-level fixed effects in the second and third articles, respectively, are commonly used in higher education policy studies like mine (Gándara & Rutherford, 2018; Jaquette, 2019; Ortagus & Yang, 2018). The use of institution-level fixed effects may have unintended consequences, however, and as such I urge higher education as a field to consider when and whether their use is appropriate. Institution-level fixed effect estimators operate by utilizing a variable transformation to remove the unobserved, time-invariant effect prior to estimation (Wooldridge, 2019). This offers an attractive advantage in that it permits the researcher to control for a considerable proportion of unobserved variables, namely, those characteristics of individual institutions that are time-invariant (assuming the use of an institution-level fixed effect) (Wooldridge, 2019). The potential problem comes from the way in which an institution-level fixed effect estimator functions mathematically. The fixed effect estimator controls for these time-invariant characteristics by time-demeaning explanatory variables, using each university's pooled mean and differencing out results in each panel year (Wooldridge, 2019). This can be potentially problematic in situations where there are large "spikes" in an explanatory variable in one or more institutions over one or more years. If there are large "spikes" in an explanatory variable being used as part of an institution-level fixed effect, the fixed effect estimator itself may be a source of bias over pooled OLS. The importance of noting this is not to say that institution-level fixed effects should not be used; there are often compelling theoretical reasons to utilize them, and my dissertation makes extensive use of them.

It is instead to argue that higher education policy researchers would be well-advised to consider if their individual research questions and data are conducive to the use of institutional-level fixed effects. In my dissertation, the removal of the fixed effects does little to affect the overall findings, underscoring their practical appropriateness in this circumstance in addition to theoretical justification. This may not always be the case.

The results of my dissertation research point to two major conclusions that tie to larger discussions in the scholarly literature. First, I found that while European countries faced a consistent set of concerns about the accountability, performance, and global status of their higher education systems, conditions unique to each country make it difficult to generalize about the policy formation processes that ensued in response to these concerns. Local conditions played a key role in the ultimate design of performance-based funding policies in each country, underscoring that policymakers do not simply copy policies in place elsewhere but instead tailor them to their specific context. The difficulty in generalizing about the policy formation process for performance-based funding extends to the outcomes of these policies as well. While there are trends in how universities respond to performance-based funding policies, my research suggests that different universities can respond to the same performance-based funding policy in considerably different ways. This suggests that universities are engaged in strategic behavior, seeking to engage with performance-based funding systems in the way that optimizes their own goals and interests. Because these goals and interests differ across institutions, so too do their actions.

One of the major findings from my dissertation is the degree to which it is challenging to speak meaningfully about a singular policy adoption process. Many studies of international higher education policy discuss the proliferation of educational policies as one broad process,

with policy adoption moving from locale to locale in a relatively linear fashion (Grisorio & Prota, 2020). The first study of my dissertation underscores the potential dangers of speaking too broadly about educational policies and their origins. Transnational pressures provided an impetus for reform in European higher education systems, and policy makers adopted performance-based funding as one of the policy solutions to these pressures. With that said, the specific conditions pertinent to each individual country also played a critical role in informing the policy design process. While it is potentially useful to speak about the proliferation of educational policies from one state or country to another as a way of understanding how policy makers identify policy solutions to problems they face, my dissertation research underscores that caution is needed. Broader processes and pressures matter, but these factors seldom subsume the importance of local context in understanding the design and adoption of policies.

The second and third articles of my dissertation draw attention to the fact that institutional responses to educational policies in the organizational environment vary considerably, even among universities that are in the same country (i.e., England) or the same institutional grouping (i.e., the Russell Group). For example, the third article of my dissertation found that on balance, there exists a positive relationship between REF 2014 results and academic field expenditures in the years following the 2014 REF. This result, however, masked heterogeneity among Russell Group institutions. I found that Russell Group institutions seem to treat academic subject areas differently from one another. I also discovered that Russell Group institutions ranked in the top 100 differ in their behavior from Russell Group institutions ranked lower. The fact that expenditure patterns vary by academic subject area suggests that Russell Group universities view different academic fields in different ways. It might be that Russell Group universities view academic fields in the natural sciences, with their higher overall

expenditures compared to social sciences and natural sciences, as sources of extra revenue that they can reallocate towards strengthening academic fields in other areas. It may also be the case that Russell Group universities ranked outside the top 100 are pursuing status and prestige, and their strategy to do this is to spend more revenue in areas of relative weakness in hopes of strengthening them before the next REF exercise. This contrasts with Russell Group universities ranked within the top 100. These universities are among the most prestigious in the world, and they already have globally competitive strength in most of their academic fields. Knowing that they can complete from a position of such strength might give these institutions the ability to focus financial resources on their top performing academic fields, enabling those fields to rise even further in global reputation and status. The real gains in prestige for those academic fields prioritized to receive additional money at top 100 Russell Group universities are probably marginal; but given that many of these universities have little room to go up in rankings, an improvement from, say, number 8 in the world to number 6 in the world could bring with it a significant prestige boost for the institution. This underscores the fact that the behavior of any individual university in response to a policy change in its external environment is likely a complicated combination of factors unique to that institution. While similar universities often seem to behave in similar ways, there can still be heterogenous effects even within these groupings. My dissertation research emphasizes how important it is to avoid grouping institutions together and assuming that because they share key characteristics, they will behave in much the same way when presented with the same policies from their external environments.

My dissertation research contributes to the scholarly literature in multiple ways, first by underscoring the degree to which performance-based funding for higher education is associated with a plurality of organizational responses. Extensive higher education policy research has

found that different universities respond to similar policies in different ways (Gándara & Rutherford, 2018; Kelchen & Stedrak, 2016; Ortagus & Yang, 2018). My second dissertation article, studying the association between enrollment and RAE/REF performance, demonstrated that different universities approach enrollment of different types of students in different ways. The third article of my dissertation finds that Russell Group universities allocate funding differently depending upon the institution's ranking in *Times Higher Education*. These results underscore the difficulty of speaking about higher education institutions as a monolith. Universities each have distinctive circumstances facing them, and this dissertation emphasizes that responses to performance-based funding vary based upon individual universities' circumstances.

My dissertation also contributes to the literature by situating performance-based funding within a broader field of scholarship that positions colleges and universities as embedded within and responsive to their external environments. This view of organizations originally came from sociology and has become a major topic of study within the field of higher education (Altbach, 2016; Barringer et al., 2019; DiMaggio & Powell, 1983; Orphan et al., 2021; Scott & Davis, 2007). For example, Barringer et al. (2019) and Bastedo (2008), both studying university trustees, found that university trustees/ connections external connections played an important role in connecting their universities to their environments and can influence how university trustees vote on initiatives put before them. As another example, Capano et al. (2020) studied how governments in Europe have adopted similar policy instruments for higher education, underscoring the interconnections between higher education and government. Research exploring the connections between universities and their external environments have found that universities have complex relationships with their external environments (Bastedo, 2008, 2009;

Jaquette, 2019). These relationships can, and often do, vary based upon the specific institution in question, with different universities responding to similar policies or external pressures in different ways (Jaquette, 2019; Kelchen, 2016). My dissertation research adds to a growing body of scholarship exploring the relationship between university behavior and performance-based funding. It makes an important addition, however, by studying this phenomenon in Europe. While much has been written about performance-based funding for higher education in Europe (Adam, 2020; Chowdhury et al., 2016; Dohmen, 2016; Koya & Chowdhury, 2017; Rebora & Turri, 2013), I found no articles that empirically studied the relationship between RAE/REF funding and university behavior. This dissertation adds to the higher education scholarship taking a sociological approach to the study of colleges and universities, contributing additional study into the ways in which these relationships happen in Europe and the UK.

REFERENCES

Adam, E. (2020). 'Governments base performance-based funding on global rankings indicators': A global trend in higher education finance or a global rankings literature fiction? A comparative analysis of four performance-based funding programs. *International Journal of Educational Development, 76*. https://doi.org/10.1016/j.ijedudev.2020.102197

Altbach, P. G. (2016). *Global perspectives on higher education*. Johns Hopkins University Press.

Barringer, S. N., Taylor, B. J., & Slaughter, S. (2019). Trustees in turbulent times: External affiliations and stratification among U.S. research rniversities, 1975–2015. *Journal of Higher Education, 90*(6), 884–914.

Bastedo, M. N. (2008). Convergent institutional logics in public higher education: State policymaking and governing board activism. *Review of Higher Education, 32*(2), 209–234. https://doi.org/10.1353/rhe.0.0045

Bastedo, M. N. (2009). Conflicts, commitments, and cliques in the university: Moral seduction as a threat to trustee independence. *American Educational Research Journal, 46*(2), 354–386.

Capano, G., Pritoni, A., & Vicentini, G. (2020). Do policy instruments matter? Governments' choice of policy mix and higher education performance in Western Europe. *Journal of Public Policy, 40*(3), 375–401. https://doi.org/10.1017/S0143814X19000047

Chowdhury, G., Koya, K., & Philipson, P. (2016). Measuring the impact of research: Lessons from the UK's Research Excellence Framework 2014. *PLoS ONE, 11*(6), 1–16. https://doi.org/10.1371/journal.pone.0156978

DiMaggio, P. J., & Powell, W. W. (1983). The iron cage revisited: Institutional isomorphism and collective rationality in organizational fields. *American Sociological Review, 48*(2), 147–160.

Dohmen, D. (2016). Performance-based funding of universities in Germany – an empirical analysis. *Investigaciones de Economía de La Educación Volume 11, 11*, 111–132. https://ideas.repec.org/h/aec/ieed11/11-05.html

Gándara, D., & Rutherford, A. (2018). Mitigating unintended impacts? The effects of premiums for underserved populations in performance-funding policies for higher education. *Research in Higher Education, 59*(6), 681–703. https://doi.org/10.1007/s11162-017-9483-x

Grisorio, M. J., & Prota, F. (2020). Italy's national research assessment: some unpleasant effects. *Studies in Higher Education, 45*(4), 736–754. https://doi.org/10.1080/03075079.2019.1693989

Jaquette, O. (2019). Do public universities replace state appropriations with master's students? *Review of Higher Education, 42*(3), 1101–1144. https://doi.org/10.1353/rhe.2019.0031

Kelchen, R. (2016). An analysis of student fees: The roles of states and institutions. *Review of Higher Education, 39*(4), 597–619. https://doi.org/10.1353/rhe.2016.0027

Kelchen, R., & Stedrak, L. J. (2016). Does performance-based funding affect colleges' financial priorities? *Journal of Education Finance, 41*(3), 302–321. https://doi.org/10.1353/jef.2016.0006

Koya, K., & Chowdhury, G. (2017). Metric-based vs peer-reviewed evaluation of a research output: Lesson learnt from UK's national Research Assessment Exercise. *PLoS ONE*, *12*(7), 1–19. https://doi.org/10.1371/journal.pone.0179722

Orphan, C. M., Laderman, S., & Gildersleeve, R. E. (2021). Advocates or honest information brokers? Examining the higher education public policy agenda-setting processes of intermediary organizations. *The Review of Higher Education, 44*(3), 325–355. https://doi.org/10.1353/rhe.2021.0002

Ortagus, J. C., & Yang, L. (2018). An examination of the influence of decreases in state appropriations on online enrollment at public universities. *Research in Higher Education, 59*(7), 847–865. https://doi.org/10.1007/s11162-017-9490-y

Rebora, G., & Turri, M. (2013). The UK and Italian research assessment exercises face to face. *Research Policy*, *42*(9), 1657–1666. https://doi.org/10.1016/j.respol.2013.06.009

Scott, W. R., & Davis, G. F. (2007). *Organizations and organizing: Rational, Natural, and open system perspectives*. Pearson.

Wooldridge, J. M. (2019). *Introductory econometrics: A modern approach* (7th ed.). Cengage Learning.