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Context Matters: Conceptualizing Research Funding Policies through the Lens of the Varieties of Academic Capitalism Approach

Introduction

The globalization of the knowledge economy and of the knowledge society has pushed welfare states to increase their contribution to scientific knowledge and most have placed higher education at the core of their advances in research and innovation. This sector performs nearly 30% of the US$ 1.7 trillion invested globally and every year in research and development (UIS-UNESCO, 2020). In addition to the total amounts invested, which vary significantly between countries (OECD, 2021), studies on academic research production shall focus on research funding policies (RFP) as they stipulate to whom sums are allocated, according to which allocation modes and in the pursuit of which objectives, in the geographic and temporal contexts that prevail at the time of policy formulation (Borrás & Edquist, 2019).

To conceptually highlight these multiple interactions inherent to RFP, this chapter presents and discusses the relevance of an emerging theoretical framework – the variety of academic capitalism (VoAC) approach – in explaining how countries' political-economic structures may influence RFP. After having described two intersecting competitive dynamics through the lenses of academic capitalism and following a presentation of the theoretical foundations for the VoAC approach, this chapter, based upon an integrative literature review, will explore how policy mixes, coordination and outcomes are structured in the liberal, conservative, and social-democratic welfare regimes.

Economic and symbolic competitive dynamics

The global academic field is confronted with multiple competitive dynamics. The first dynamic stems from the knowledge economy and puts pressure on higher education systems (HES) to be economically profitable. The increase in tuition fees, financialization of student debt, recruitment of fee-paying international students, international campuses, and the marketization of academic research are some of the consequences of a global competitive landscape revolving around the accumulation of material capital (Schulze-Cleven & Olson, 2017). Slaughter and Leslie (1999) and Slaughter and Rhoades (2004) developed the first iteration of a theory they named "academic capitalism," which conceptualizes how the economic field merged with the academic field in multiple countries, partly because of RFP fostering public-private circuits of knowledge and embedding profit-oriented activities into publicly funded research. *Economic* academic capitalism has thus strengthened the interdependence relationship between HES and business actors and is propelled by a global competition for economic profits.

Scholars noted an equally transformative phenomenon strengthening and widening the deeply rooted tradition of competition for prestige based on discoveries and publications. Building upon Bourdieu's (1988) definition of capital, Münch (2014) developed a different iteration of academic capitalism to conceptualize the global competition for the accumulation of scientific capital and the symbolic power it grants to academics, institutions, and governments. While he agrees with Slaughter and Rhoades (2004) that the economic thought has seized the academic field, his theory – that we name *symbolic* academic capitalism – considers that authority in the academic field is based upon the symbolic power generated from the accumulation of scientific capital that is recognised by other actors. In symbolic academic capitalism, higher education institutions are conceived as entrepreneurial organisations that own the means of production and act strategically to maximise the symbolic profits from research.

The mediation of political-economic structures

To nuance our understanding, we argue that global dynamics of academic capitalism will produce different outcomes in different contexts. When the diversity of contexts is virtually innumerable, comparatists might rely upon Weber's (1968) ideal types, which are abstract analytical tools with a high degree of logical integration synthesizing the core features of local contexts. Like political sociology, political economy employs ideal types to compare how the interrelationships between power structures and resource distribution condition organizations' behaviour (Caporaso & Levine, 1992). For instance, Esping-Andersen (1999) defines welfare regimes as specific configurations involving the state, the market, and households, through which welfare is produced. The liberal regimes emerged in the 19th century English political economy, are found in Anglo-Saxon countries, and characterized by a faith in markets, individual responsibility, free competition, and a residual role for the State. The conservative regimes emerged in continental Europe in the mid-19th century. In these regimes, the civil service enjoys privileged treatment and the social protections offered to citizens are based on their profession and family situation, thus preserving differences in class and status. The social-democratic regimes emerged in the 1930s when social democratic parties shifted from "class parties" to "citizens' parties" and promoted social welfare, regardless of family status or employment.

Although ideal types are "logical utopias", it is worth noting that Esping-Andersen's (1999) welfare regime types have empirical resonance in comparative higher education since they depict how countries respond to policy trade-offs (such as participation rates, taxation, and public funding). For instance, performing a correspondence analysis between welfare regimes and HES in 16 OECD countries, Pechar and Andres (2011) found that welfare regimes could be distinguished based on the public-private funding ratio for HES. Focusing on academic research governance models, Benner (2011) noted Anglo-Saxon (liberal), Continental European (conservative) and Nordic (social-democratic) countries varied in terms of academic self-organizations, policy discourses and support structures. Bégin-Caouette et al. (2016) performed a correspondence analysis revealing that, although both regimes were responsive to market forces, social-democratic regimes could be distinguished from liberal regimes on a "academic centrality" dimension that included variables such as higher education R&D expenditures (HERD) and R&D in the form of general university funds (GUF).

Those studies highlight contextual features that could mediate the impact of global academic capitalism and support a closer look into the variety of academic capitalism (VoAC). The VoAC approach is an adaptation of Hall and Soskice's (2004) varieties of capitalism approach, which was developed to examine institutional arrangements conditioning societies' adjustment paths in the face of a globalized economic system. The approach was developed to explain firms' behaviours in different contexts. Based on a comparison of five parameters – industrial relations, training and education, corporate governance, inter-firm relations, and relations with employees – in multiple countries, the authors conceptualized two ideal types: the liberal market economy and the coordinated market economy. In this approach, a comparative advantage refers to the institutional structure allowing organizations in one country to perform an activity more efficiently than others.

If Graf (2009) applied the approach to the study of internationalisation in German and British universities, Olson and Slaughter (2014) were the first to compare how academic capitalism manifests itself in coordinated and liberal market economies. Kauppinen and Kaidesoja (2014) noted, however, that this bimodal categorization did not capture the particularities of the Nordic countries. While preserving the title of the approach, Schulze-Cleven and Olson (2017) opted for a categorization based on Esping-Andersen's typology. They found that academic capitalism had encouraged the financialization of the HES in liberal regimes, channelled funding to leading institutions in conservative regimes and quality assurance and performance indicators in the social-democratic variety.

While previous studies have suggested that welfare regimes were related to public-private ratios of funding for HES (Pechar & Andres, 2011), HERD and GUF (Bégin-Caouette et al., 2016) and research governance (Benner, 2011), that the varieties of capitalism influenced R&D investments (Kim 2013) and internationalization strategies (Graf, 2009), and that the VoAC could explain variations in governments' strategies to support world-class universities (Olson & Slaughter, 2014) and HES' liberalization (Schulze-Cleven & Olson, 2017), no study has applied the VoAC approach to systematically compare countries' RFP.

Research questions and methodological approach

The objective of this chapter is to compare RFP in three welfare regimes. To meet the objective, we conducted an integrative literature review of 75 scholarly documents and 15 OECD reports. An integrative review analyses both empirical and theoretical bodies of literature to provide a holistic understanding of a phenomenon (Whittemore & Knafl, 2005). The integrative review supports a wide range of inquiry, including non-experimental research, and typically serves to answer four questions: what is known about the phenomenon, what is the quality of what is known, what remains unknown and what the future steps for research might be. Following the prescribed steps of Toronto and Remington (2020), we formulated the three following research questions:

1. Do the competitive dynamics of academic capitalism lead to different funding policy mixes in the three welfare regimes?
2. How is policy coordination carried out in the three welfare regimes?
3. To what extent does countries' political-economic structure influence policy outcomes in the global academic capitalism?

Variables of interest were conceptualized as follows: comparative political economists pay attention to policymaking as they construe an important manifestation of public actors' strategic interaction with other sectors (Hall & Soskice, 2004). Our definition of policy *mixes* was supplemented by Borrás and Edquist's (2019) work, building upon the reconceptualization proposed by Flanagan et al. (2011). We define RFP mixes as the combination of policy instruments designed by public organizations to address the problems identified in the research system. For Borrás and Edquist, mixes include instruments whose effects can be complementary, synergetic, or contrasting, and depend on the socio-historic and political-economic context for which they are designed. Coordination is a core concept (Thelen & Kume, 2006) defined in the VoAC approach as the strategic interactions between actors in a context of diverging interests and political settlements. Although the VoAC approach is more concerned with processes than outcomes, it acknowledges that different contexts provide different comparative advantages to organizations (Bégin-Caouette, 2019). Outcomes are considered through the lenses of the specific rationales and goals set by policymakers (Flanagan et al., 2011). This chapter will focus on the reported outcomes of RFP on scientific capital accumulation, whether the goal for it is to be converted into economic profitability or symbolic power.

In an integrative literature review, the problem formulation stage includes the sampling frame. In this case, we focused on 18 OECD countries: Austria, Australia, Belgium, Canada, Denmark, Finland, France, Germany, Italy, Portugal, the Netherlands, New Zealand, Norway, Spain, Sweden, Switzerland, the United Kingdom and the United States. For the literature search, we used the variables listed above to extract from multiple databases all the books, book chapters, journal articles, and research reports (1) on one or more of the 18 countries, (2) written in French or in English, (3) and published between 2010 and 2021. We have read the abstracts of the 134 found documents and selected 75 based on their relevance and equity between varieties. We supplemented this analysis with 15 OECD reports providing specific data on R&D and funding mechanisms. For the data analysis stage, the 90 sources were placed in a double entry table in which countries were rows and variables (policy mix, coordination, and outcomes) were columns. Each author for this chapter performed a content analysis on this matrix and produced a synthesis about the VoAC in each regime. Statements were confronted and led to the common-agreed findings presented below. Although attempted to meet standards in terms of clarity, rigor, and replication, this study does not have the ambition of a systematic meta-analysis and should rather be considered as a first attempt to apply the VoAC approach to the study of RFP.

Policy mixes

As shown in Table 1, policy mixes can be characterized by expenditures (OECD, 2021), allocation mechanisms (Reale, 2017) and policy instruments (Borrás & Edquist, 2019). 13 OECD indicators were reported for the 18 countries in Appendix 1 and careful readers will note that there are important intra-category variations (represented by standard deviations), sometimes even larger than inter-category variations, especially in the conservative regime's category.
< Table 1 should go here>

R&D expenditures

As shown in Appendix 1, gross domestic expenditures on research and development (GERD) as a percentage of the GDP (Line 1) is the highest in social-democratic regimes ($\bar{x}$ = 2.83[1]), followed by the conservative ($\bar{x}$ = 2.32) and the liberal ($\bar{x}$ = 1.92) regimes. HES' centrality within R&D ecosystems also varies: the proportion of GERD performed by HES systems (Line 5) being, on average, the highest in the social-democratic regimes ($\bar{x}$ =29.28), followed by the liberal ($\bar{x}$ = 26.86) and conservative ($\bar{x}$ = 24.91). We conclude that the social-democratic regimes present a context of high public investments in research, and funding concentration into universities (Michavila & Martinez, 2018; Pranevičienė et al., 2017). On the contrary, some countries of conservative regime concentrate cutting-edge scientific development in research institutes outside of universities, which is visible in the proportion of higher education researchers per thousand labour force (Appendix 1, Line 9). Reale (2017) noted that public research organisations, which are more frequent in conservative regimes, receive a substantial allocation of research funding. In Germany, universities compete with the Helmholtz Centres, institutes of the Max-Planck Society and Fraunhofer institutes, which publish a higher proportion of papers (Powell & Dusdal, 2017). In France, the CNRS is the second most important research institution in the world and is ahead of leading US universities in terms of scientific publications (Musselin, 2017). However, since academic capitalism is based on universities' scientific capital, the logic of accumulation has encouraged RFP that (re)integrate the scientific and academic fields so that the latter could appropriate capital accumulated by the former. As a reminder, a field is a setting covering one area of social life and populated by agents and positions (Bourdieu, 1988). The scientific field includes all the agents (including public research organisations) concerned with the pursuit of science, while the academic field includes agents contributing to the social functions of academia. The two fields can be more or less integrated depending on the political-economic structure. Joint initiatives, such as the International Max Planck Research Schools (IMPRS) or mergers between institutes and universities (Powell & Dusdal, 2017), such as merger of universities, *grandes écoles*, university institutes of technology and CNRS and CEA laboratories to create University of Paris-Saclay (France), constitute examples of RFP contributing to fields' integration.

Expenditures also serves as a proxy to discern interactions between R&D sectors. The proportion of HERD financed by the business sector (Line 7) is high in both conservative ($\bar{x}$ = 7.25) and liberal regimes ($\bar{x}$ = 5.49). Correspondingly, RFP in liberal countries tend to enhance HES' market sensitivity by including business actors on granting agencies' governing councils (Sá et al., 2013), and by developing tax incentives to encourage privately funded academic research (Lester & Warda, 2014). Most OECD countries have different forms of R&D tax credits, but Canada and the UK rank among the top third of the OECD (2020), and the US remain well above the OECD (2020) average. In the liberal regimes, support for curiosity-driven research has declined in relative terms, and RFP include instruments supporting the commodification of research, namely through the protection of intellectual property and direct support for university-industry collaborations (Link, 2019). Conservative regimes are characterized by networked coordination with the cooperation between enterprises, universities, and research institutions (Christensen & Serrano Velarde, 2019). In those regimes, economic-focused RFP have relied upon HES' strengths to support technology transfer, such as industrial postdoctoral fellowships in Belgium (Herstad et al., 2010) or generous tax credit in Belgium, France, and the Netherlands (Vennekens et al., 2019). In social-democratic regimes, collaborations between the economic and academic fields also take the form of academic training, including the creating of industrial PhDs. These regimes have also implemented generous tax credit to trigger R&D in companies, but unlike in the liberal regimes, Bégin-Caouette et al.

[1] $\bar{x}$ = mean.

(2017) suggested that networking was based upon equalitarian relationships between industrial and academic partners, the latter receiving public funding to participate in technology transfer initiatives rather than being encouraged to compensate for a lack of public funding with a private one.

Allocation mechanisms

Although governments in the liberal regimes have, on average, larger budget allocations for R&D (GBARD) in purchasing power parity (Line 11), the proportion of funding allocated through non-oriented research programmes or GUF (Line 13) is the lowest ($\bar{x}$ = 27.78). As reported by Reale (2017), the United Kingdom and the United States allocate more than 50% of total GBARD in the form of project funding, while institutional funding accounts for more than 70% in Austria, Denmark, France, Italy, Spain, and Switzerland. Block funding is a core feature of RFP in the conservative and social-democratic regimes (Reale, 2017). Since the early 2000s, reforms have however included a performance-based institutional funding (PIBIF) in block funding, such as in the Netherlands where the formula considers PhD defences, and in Austria, and Germany, where indicators also include external research funding (Hicks, 2012). In Norway, 60% of the funding was allocated as block funding, 25% based on education outcomes and 15% on research performance (Frølich et al., 2010). The Norwegian model inspired the 2006 Danish model (Hicks, 2012). Although block funding is smaller in the liberal regimes, Australia, New Zealand, and the UK rely on performance-based research evaluation frameworks (Auranen & Nieminen, 2010; Hicks, 2012) that include institutions' publication, citations, research income, and since the mid-2000s indicators related to the economic impacts of academic research in research evaluation frameworks (Chubb & Read, 2018). The UK 2014 Research Excellence Framework, for instance, includes 20% weighting for the demonstration of research's impacts outside the academia (Luukkonen & Thomas, 2013).

Policy instruments

Following the channelled competition inherent to conservative regimes (Scholten et al., 2021) where the State sets criteria that only a handful of units can meet, thus creating a "consecration effect" (Münch, 2014, p.80), additional institutional funding has been complemented by excellence instruments. In countries where research universities are prominent (such as in Germany, the Netherlands, and Switzerland), RFP built excellence upon universities' existing strengths, while in other countries (such as Austria, Belgium, France, and Portugal), excellence was built upon collaboration between leading universities and other organizations. In Switzerland, the National Centres of Competence and the National Research Programmes increased host institutions' block funding (Öquist & Benner, 2012). In France, the IDEX/LabEX aimed at promoting research excellence by funding multidisciplinary projects presented by Research and Advanced Education Centres (PRES) and well-established university-institutes research groups (Musselin, 2017). Portugal created centres of excellence as publicly funded laboratories located on university campuses, but almost entirely independent from universities (OECD, 2014).

Excellence funding is not unique to conservative regimes. RFP in social-democratic countries include two types of centres of excellence, those based on the accumulation of scientific capital and those based on the accumulation of economic capital (Langfeldt et al., 2015). In Denmark, 48 centres of excellence were funded since 1993; in Finland 33 centres of excellence since 1995; in Norway 21 centres since 2003; and in Sweden 40 Linnaeus Environments since 2006, but one could also characterize the Swedish Strategic Research Areas, which are both strategic and excellence funding. The centres of excellence for innovation are part of RFP policy mixes

intending to, not only to provide industries with innovation support, but also strengthen the evolutionary dynamics of the whole economic system (Herstad et al., 2010).

Table 1.
Expenditures, allocation modes and policy instruments

Regimes	Expenditures	Allocation mechanisms	Policy instruments
Liberal	Market sensitivity.	Competitive project funding. PBIF in AUS, NZ and GBR.	Grant concentration and external actors on grant committees (CAN, USA). Evaluation frameworks including impact-related factors (AUS, GBR).
Conservative	Academic and scientific fields integration.	Institutional funding. PBIF in AUT, BEL, DEU, ESP, ITA, NLD	Block funding and excellence instruments. Regional collaboration (clusters).
Social-democratic	Academic centrality.	Balance between institutional funding (PBIF component) and project funding.	Block funding, competitive grants, and two types of excellence instruments (research vs. innovation).

While excellence funding is rarer in liberal regimes, it should be noted that competitive grants have increased in size and that success rates have decreased, thus contributing to funding concentration (Bloch & Sørensen, 2015; Polster, 2018). In Canada, 10% of researchers in the social sciences accumulate 80% of available funds, and 10% in the health sciences accumulate 50% of the funds (Larivière et al., 2010). Like the concentration prompted by PBIF in Australia or the UK, the concentration of research grants seems to favour institutional and individual actors who appear the most likely to win the global symbolic race. RFP in liberal regimes also include indicators related to the economic impacts of academic research. In Canada and the US, funding agencies have developed research programmes for which researchers or institutions must demonstrate that there is a societal or economic demand for the project (Sá et al., 2013). In Canada, 45% of the funds granted by the Natural Sciences and Engineering Research Council are linked to federal priorities, and knowledge transfer to non-academic partners (Veletanlić & Sá, 2020). These RFP seem to support individual and institutional actors who are the most likely to convert scientific capital into economic capital and generate wealth.

Policy coordination

As shown in Table 2, policy coordination includes the strategic interactions between policy actors and the coordination approaches supporting policy implementation.

Actors' coordination

In liberal regimes, policy actors' coordination is achieved through a quasi-market competition between highly autonomous actors (Cummings & Finkelstein, 2011). In the EU Autonomy Scorecard, the UK is the only European country achieving a perfect score in terms of organisational, financial, staffing, and academic autonomy, meaning universities can select and dismiss the executive head, keep surpluses, and borrow money, decide on recruitment and salary,

select students, introduce programs, and design content (Pruvot & Estermann, 2017). A competitive dynamic between autonomous institutions would explain research performance as universities diversify revenue sources and the most competitive of them attract grants and talents (Lacroix & Maheu, 2015). The literature, however, suggests that RFP supporting competition could have accentuated vertical differentiation between institutions. A limited number of universities seem to have strengthened their position in academia through aggressive managerial strategies aimed at recruiting top scientists, increasing endowments and ultimately, converting the capital accumulated by other actors (Adams & Gurney, 2010).

In conservative regimes, coordination requires relational contracts between actors, yet this coordination is likely to accentuate existing hierarchies (Hall & Soskice, 2004). Instead of letting all players compete for grants, public authorities have channelled competition between institutions into excellence initiatives, which have increased the vertical differentiation between institutions, consolidating the symbolic authority of a limited number of universities that are the largest, oldest, and most active in natural and health sciences (Cantwell & Marginson, 2018). Flagship universities monopolize a significant part of public funding and ensure coordination by acting as a regulator setting standards for other institutions. Their graduates become professors in other universities and that their members are more strongly represented on the evaluation committees (Klemenčič, 2016). Since the 1980s, actors' coordination has also manifested itself through the imposition of accountability instruments, although the conceptualization and operationalization of these instruments vary according to the context (Capano, chapter in this *Handbook*).

Actors' coordination in social-democratic regimes has been characterized as collaborative (Woiceshyn & Eriksson, 2014), horizontal, and conducted in a context of trust. Academics have been instrumental in building the welfare state and, in the knowledge society, have justified their authority in the public sphere by their seemingly disinterested function (Bégin-Caouette, 2019). Citizens' trust towards HES is also fuelled by the egalitarian context of these regimes. Lastly, the centrality of the academic field has been reaffirmed by mergers between academic institutions, and, in Denmark and Finland, between PRO and universities (Askling, 2012). In Denmark, in 2007, 12 universities and 13 institutes were merged into 5 universities and 3 institutes. In Sweden, most of the R&D occurs in the top research universities (Brundenius et al., 2011). In Norway, however, institutes still compete with universities on the same grants and perform 25% of the country's R&D.

Policy coordination

When it comes to policy coordination, one can distinguish between integrated and fragmented approaches. In liberal regimes, New Zealand and the UK seem to follow an integrated approach (Dawson et al., 2009). In the US, although Congress plays a critical role in providing funding and conducting oversight activities (EPTA, 2014), multiple federal and state agencies, as well as public, semi-public, private for-profit or not-for-profit organizations fund research and impose their own set of rules (Link, 2019). The OECD (2017) noted similar policy fragmentation in Australia, where government investments in R&D are spread across 15 portfolios, multiple local and national agencies, and a diversity of research programmes. Against this backdrop, Industry Innovation and Science Australia was created in 2016 to increase coordination and guide policy development. In Canada, academic research is at the crossroad of two jurisdictions as provinces have exclusive power over education and the federal government is the main funder for research (Bégin-Caouette et al., 2020). Barriers to coordination stem from a lack of clarity in the

delimitation of the responsibilities of government agencies, and the absence of a tradition of federal-provincial consultations (Weinrib & Jones, 2015). In addition, various research agencies have emerged on the fringes of the three traditional research councils (Tamtik & Sà, 2020). In this decentralized and fragmented system, coordination occurs horizontally through trans-regional policy networks (Tamtik, 2018).

In conservative regimes, integration is influenced by the level of centralisation in the system, and the number state-level actors involved: Austria, Italy, and Portugal following a fragmented approach, while France, Germany, Spain, and Switzerland follow an integrated approach. Belgium is difficult to characterize since its research ecosystem is fragmented into language communities, yet both Wallonia and Flanders follow integrated approaches (Hottenrott & Thorwarth, 2011; Powell & Dusdal, 2017). Germany is also a federal system, but the central government has greater influence on RFP coordination through the intervention of the Federal Ministry of Education and Research, and the Expertenkommission für Forschung und Innovation (EFI), which, following a network-based model, increased partnerships between federal, provincial, and societal stakeholders (Christensen & Serrano Velarde, 2019). The 16 Länder have local RFP (Onestini, 2016) and co-fund the German Science Foundation, a self-governing agency that sits at the core of the German ecosystem. Spain, Switzerland, and France have fewer state-level agencies intervening on research matters and all count one institutional stronghold for RFP implementation (Langfeldt & Borlaug, 2016; Musselin, 2017; OECD, 2019). On the contrary, in Italy, academic research falls under the purview of multiple ministries and agencies, including the Ministry of University and Research mostly funding basic research, the Ministry for Economic Development that funds innovation, but also acts as a coordinating agent, and the Agency for the Evaluation of University System and Research, that evaluates institutions (Donina et al., 2015). In Portugal, the OECD (2019) indicates that the fragmented approach is the corollary of suboptimal horizontal coordination, resource dispersion and disconnection between national goals and institutions' strategies.

Lastly, coordination in social-democratic regimes follows an integrated approach characterized by consensus (Campbell & Pederson, 2010) and reliance on experts. Information feeds through networks and potent technocrats, bargaining is achieved through formal corporatist meetings, and decisions are made through consensus. The government often makes its rulings based on feedback from the social sciences, and this relationship between science and policymaking extends to the public service sector, which has institutionalized scientific expertise and its processes. RFP are developed in collaboration with universities and implemented by arm-length organisations, such as the Swedish National Authority for Higher Education or, in the case of Finland and Norway, the main research councils (Bégin-Caouette, 2019).

Table 2.
Policy coordination and policy actors' coordination

Regimes	Policy actors' coordination	Policy coordination
Liberal	Competition between autonomous institutions. Hierarchies.	Integrated approach in NZ and the UK. Fragmented in AUS, CAN and the US.
Conservative	Relational contracts between actors. Hierarchies.	Integrated approach in FRA, DEU, SPA and CHE. Fragmented approach in AUT, BEL, ITA and POR.

Social-democratic	Trust-based horizontal coordination between actors. Mergers.	Integrated approach in DNK, FIN, NOR and SWE. Consensus, experts, and arm-length organisations.

Policy Outcomes

Outputs refer to the immediate results of a policy and outcomes refer to the deeper changes it is intended to yield. If most RFP attempt to enhance research production, Table 3 describes how the desired outcomes depend upon each global competitive dynamic's measure of success: symbolic power (Münch, 2014) or economic profitability (Slaughter & Rhoades, 2004). In other words, RFP can encourage research that will lead to indexed publications, citations, academic prizes, and universities' position in rankings (Altbach, 2012) and/or that will lead to university patents, spin-off businesses and businesses' growth (Lissoni & Montobbio, 2015).

Symbolic power

While policy mixes in all regimes have contributed to funding concentration, the outcomes of such RFPs are nuanced (for a thorough discussion on the impact of grant sizes, please refer to Bloch, Kladakis & Soren, in this *Handbook*). Van den Besselaar and Sandström (2017) pointed out that the Australian framework had a positive outcome on publications' impact. In the UK, Pinar and Unlu (2019) found that the Research Excellence Framework had accentuated the vertical hierarchy between institutions, since those with higher external research income performed better. In the US and Canada, an increasing number of actors compete for a limited number of larger grants. Bloch and Sørensen (2015) found that, in the US, smaller grants from the NIH or the NSF had a stronger impact on researchers' publications than larger grants. RFP's outcome assessment should, however, consider that academic capitalism is concomitant with the linguistic hegemony of English (Altbach, 2012). Cultural hegemony of Anglo-Saxon countries is also manifest in the massive recruitment of international graduate students and top researchers (Avveduto, 2010). This context contributes to the competitive advantage of liberal regimes, which remain the most visible in the global symbolic competition (OECD, 2017).

Larger grants and lower acceptance rates are also notable in social-democratic regimes (Wendt et al, 2015), such as in Denmark where acceptance rates fell from 65% in 2001 to 16% in 2009. Like in liberal regimes, Bloch et al. (chapter in this *Handbook*) found that, in social-democratic regimes, smaller grants produced more articles (per dollar) than larger excellence instruments. Compared to their Continental European counterparts, Nordic countries, however, avoid an excessive accumulation of resources (Langfeldt et al. 2015), and this balance could contribute to research excellence (Öquist & Benner, 2015). Comparatively large block funding also ensures stable revenue sources for institutions that, in the absence of tuition fees, have little alternative for maintaining their infrastructure (Auranen & Nieminen, 2010). The PBIF may also improve quality due to the promotion of publication in top-tier journals (Eriksson, 2013), partly thanks to a signalling effect (Bégin-Caouette et al., 2017). Any analysis of RFP outcomes in social-democratic regimes should, however, consider the positive influence of large expenditures in R&D (Michavila & Martinez, 2018) and, in agreement with egalitarian values, an improved access to a quality postgraduate education (Bégin-Caouette, 2019).

In conservative regimes, RFP tended to prioritize academic research, compare institutions' publications and citations, and provide additional funding. Belgian researchers' publications and citations have increased significantly, largely because of the well-funded research universities (Powell & Dusdal, 2017). In Spain, the Sexenio research assessment data has also improved publications and citations (Hicks, 2012), and, in Italy, PBIF increased publications in all universities, but even more in the most prestigious institutions (Cattaneo et al., 2016). The literature, however, presents important contradictions regarding the outcomes of excellence instruments. The OECD (2014) suggested that they support high-risk research and increase universities' international visibility. The German Excellence Initiative has increased publications, inter-institutional cooperation and, because of its doctoral school component, the level of research training. The success of the Swiss centres of excellence also partly stems from the improved level of doctoral education and an enhanced level of international recruitment. However, since few units succeed in obtaining excellence grants and because larger grants require complex proposals (Falavigna & Manello, 2014), their efficiency is questioned. Jonkers and Zacharewicz (2016) note that excellence initiatives work best in countries with a greater balance between institutional and project funding, such as the Netherlands, Germany, Austria, and Switzerland. Institutional autonomy is also a crucial factor to consider since it is highly variable in conservative regimes, and it could mediate the impact of various funding instruments. In the Netherlands, Scholten et al. (2021) suggest that the positive influence of excellence funding stems from the autonomy and flexibility it grants to the research unit vis-à-vis the department and central administration. For Michavila and Martinez (2018), the combination of lower funding and lower autonomy could explain why Italy, Portugal and Spain publish fewer papers per faculty than the Netherlands and Switzerland.

Economic profitability

Institutional autonomy might also explain RFP's success in increasing universities' economic profitably in conservative regimes. For Lissoni and Montobbio (2015), the Dutch universities outperform their French and Italian counterparts in terms of producing patents, as they can more easily network with local firms and manage more effectively intellectual property matters and patent portfolios. Hottenrott and Thorwarth (2011) found that, in Germany, an increase in funding from industry is linked to a decrease in publication and citations. Many countries of conservative regimes, however, have a separate sector for applied research and teaching, and it could be that this sector responds more easily to economically oriented RFP than traditional universities, especially since performance funding and excellence initiatives have highlighted the prioritizing of internationally recognized academic research.

In liberal regimes, the OECD (2020) suggests that tax credit increases private R&D investments into academic research, but that the effects are larger in countries with higher tax rates, and that effects are smaller than directly funding university-enterprise collaborations (Becker, 2014). In the UK, Sussex et al. (2016) found that there was a statistically significant complementary relationship between RFP for academic research in the biomedical field and private pharmaceutical R&D expenditures. Tax incentives, direct funding, legal provisions, and access to capital ventures all support universities' contribution to the global economy (Loise & Stevens, 2010). With 68% of the world university-owned patents (Veugelers, 2014), the US is a special case in terms of patents, but the UK and Canada are also countries with high shares of patents owned by universities (OECD, 2009). If Leydesdorff and Meyer (2010) suggest that RFP dedicating more resources to traditional research metrics undermine university owned patent creation, Sterzi (2013) found a

correlation between patent quality and scientific productivity, and Banal-Estañol and colleagues (2015) observed a curvilinear relationship between researchers' collaborations with businesses and publication rates. In sum, in liberal regimes, there are complex interactions between RFP aimed at increasing universities' prestige and RFP aimed at increasing their economic utility.

Social-democratic regimes are characterized by small, innovative, and open economies to which the academic field contributes significantly (Woiceshyn & Eriksson, 2014). Innovation policies support collaboration between sectors rather than R&D outside academia, thus strengthening scientific capital accumulation and inducing arms-length R&D contract (Herstad et al., 2010). Falavigna and Manello (2014) however found that, when researchers spent time in conducting non-publishable research, they had less time to spend on projects with a greater impact on the scientific community. In Sweden, Öquist & Benner (2015) found that sectorial research agencies supported research perceived as economically relevant, and that it had impeded ground-breaking discoveries. For the authors, there would also be limited interaction between research units focusing on basic research and those focusing on innovation. The centrality of the academic field appears as a pillar of social-democratic regimes' competitive advantage, though it is possible the multiplication of contradictory demands put on HES limit their capacity to respond effectively.

Table 3.
Symbolic power and economic profitability

Regimes	Symbolic power	Economic profitability
Liberal	Limited impacts of PBIF. Negative impact of grant concentration on publications. Cultural-linguistic advantage.	Positive impact of tax incentives, direct funding, legal provisions, and access to capital ventures. Complex interactions between RFP aimed at increasing universities' prestige and economic profitability.
Conservative	Positive outcomes of prioritizing academic research and comparing institutions. A positive outcome of excellence funding as it increases universities' autonomy and postgraduate education.	Positive outcome of universities' autonomy and regional networks. Limited response of traditional universities to economically focused RFP.
Social-democratic	Positive outcome of high expenditures, accessible postgraduate education, and balance between instruments. Negative outcome of grant concentration.	Positive outcome of collaboration between sectors, but limited knowledge development and absorptive capacity on the industry side.

Concluding remarks

Relying on an integrative review of 75 scholarly documents and 15 OECD reports, this chapter compared RFP in 18 countries and examined if there were differences in funding policy mixes, how policy coordination was carried out and to what extent the VoAC influenced policy outcomes.

Regarding policy mixes and coordination, our findings suggest that, in liberal regimes, scientific capital accumulation is based upon the following institutional arrangement: competition, market sensitivity and commodification. Competition is the main coordination mechanism and is accompanied by policy mixes including a large share of project funding granted by arm-length publicly funded research funding agencies after a peer-reviewed evaluation of research proposals. The conservative category presents important intra-category differences, but the literature suggests that RFP policy mixes are built upon the integration of the academic and scientific fields, a competition between institutions channelled by public authorities and relational contracts between

actors. PBIF would have supported scientific capital accumulation, and excellence funding contributed to institutions' autonomy and the quality of doctoral education. In social-democratic regimes, accumulation of scientific capital is partly supported by the following institutional arrangements: policy mixes based upon high expenditures, balance between instruments and the centrality of the academic field; as well as consensus-based policy coordination.

Policy outcomes are analysed with regards to the global competitive dynamics. In the *symbolic global competition*, the academic field's success stem from its capacity to accumulate scientific capital endogenously (social-democratic regimes), or convert the capital accumulated by the strongest fields in societies, whether it is the scientific field (conservative regimes) or the economic field (liberal regimes). The review however suggests that, in the three types, funding concentration is less efficient to increase publications and citations than spreading out smaller grants. We however pose that excellence instruments produce different outcomes depending on countries' balance between institutional and project funding, institutions' autonomy, and doctoral education; all of which can be influenced by the political-economic structure.

In all three regimes, policy outcomes in the *economic global race* are based upon the level of collaboration or integration between the academic and economic fields. Some differences however appear between the liberal regime and the two others when policy mixes and coordination are considered. In liberal regimes, tax incentives, legal provisions, direct subsidies, access to capital ventures, the establishment of priority areas, and the inclusion of industry representatives on grant evaluation committees have integrated both fields and supported universities' contribution to economic growth. In the conservative and social-democratic regimes, following Europe's Impact Agenda, RFP seem to rely on HES' innovative potential for industries, and to promote intra-national linkages in the form of clusters. If those regimes follow relational- and networked-based coordination, the proportion of HERD financed by industry is higher in the conservative regimes, which corroborates equalitarian relationships between academic and economic fields, the former receiving public funding to participate in technology transfer initiatives rather than being encouraged to compensate a lack of public funding with a private one.

This integrative review's objective was also to identify what remains unknown. Our analysis was based on a country-based conceptualization of political-economic structures, yet future studies should include two other levels. While we acknowledged the cultural and linguistic influence of liberal regimes, future studies should analyze countries' RFP in the context of the European Higher Education Area and the European Research Area, or in the context of the Canada-United States-Mexico Agreement (CUSMA). The internationalisation of research contributes to scientific capital accumulation in the three regimes, but it remains unknown how the VoAC could mediate its effects, nor if it diminishes differences between welfare regimes. Our analysis also revealed that the integrated or fragmented character of policy coordination depended less on regimes than by the number state-level actors involved in the policy implementation process and by the nature of the political system. Future studies could explore the subnational level since the VoAC may vary between jurisdictions within the same federal country (Carnoy et al., 2018). In Canada, for instance, Fisher et al. (2009) have explained how provinces' political-economic structures (liberal in Ontario and social-democratic in Quebec) influenced research and development policymaking. Regarding policy outcomes, despite the diversity of indicators, our analysis was limited to publications and citations for symbolic competition and faced difficulties in identifying the most appropriate indicators in the economic competition, which undermined our ability to draw

unambiguous conclusions. Future studies could include indicators related to the research's social impacts, or equity, diversity, and inclusion.

This chapter finally presents significant limitations – to which future research could respond – including reforms occurring during the period we covered (2010 and 2021), which would have affected policy mixes. Under common global trends (such as managerialism), countries across regimes might have moved in a similar direction (Marini & Reale, 2016) or, within each regime and variety, in different directions (Öquist & Benner, 2015). An important limitation also stems from the typology itself. There was noticeable intra-category heterogeneity, and future research could examine if a framework allowing for the combination of different types may have accounted for what is observed empirically more adequately than a static approach (see Walker & Wong, 2005). Moreover, in order to maintain categories' adequacy, we limited our analysis to the 18 North American and Western European countries initially studied by Esping-Andersen (1999) and later analysed by Pechar and Andres (2011) and Bégin-Caouette et al. (2016); doing so, we omitted 20 other OECD countries and China, which does not fit the welfare regime typology (Ringen & Ngok, 2013) but produces the largest proportion of the world's scientific publications (World Bank, 2018). Future research should broaden the conceptualization to include a greater diversity of jurisdiction.

As Hayhoe (2007) posed, "ideal types are made to be broken" (p. 196), but until future research extends, nuances, or even breaks this model, we argue that the VoAC approach remains complementary to other public policy approaches, as it proposes theoretically sound ideal types to conceptualise dynamic interactions between global competitive landscapes, RFP and the deeper political-economic fabric of societies as they influence (albeit indirectly) policy choices and actors' behaviours.

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