



Reimagining Health as a ‘Flow on Effect’ of Biomedical Innovation: Research Policy as a Site of State Activism

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Accepted: 13 November 2021 / Published online: 18 January 2022
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Abstract As health care systems have been recast as innovation assets, commercial aims are increasingly prominent within states’ health and medical research policies. Despite this, the reformulation of notions of social and of scientific value and of long-standing relations between science and the state that is occurring in research policies remains comparatively unexamined. Addressing this lacuna, this article investigates the articulation of ‘actually existing neoliberalism’ in research policy by examining a major Australian research policy and funding instrument, the Medical Research Future Fund (MRFF). We identify the MRFF and allied initiatives as a site of state activism: reallocating resources from primary and preventive health care to commercially-oriented biomedical research; privileging commercial objectives in research and casting health as a “flow on effect”; reorganising the publicly funded production of health and medical knowledge; and arrogating for political actors a newly prominent role in research grant assessment and funding allocation. We conclude that rather than the state’s assumption of a more activist role in medical research and innovation straightforwardly serving a ‘public good’, it is a driver

"When we work with scale, a sense of national purpose and the eye of an investment banker, science can achieve our national potential" (Winslade 2014: 4).

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of neoliberalisation that erodes commitments to redistributive justice in health care and significantly reconfigures science-state relations in research policy.

Keywords Research policy · Health policy · Health bioeconomy · Biomedical innovation · Neoliberalism · Politics · Australia

Introduction

In the face of the COVID-19 pandemic, in Australia as internationally, appeals for greater hospital and health care capacity have been coupled with those for increased state support for medical goods and equipment manufacturing and for biomedical research. Underpinning these latter has been an explicit promise—investment in medical research and manufacturing will not only support the COVID-19 health response, including in the critical arena of vaccine development and production, but also drive industrial development in the recovery phase (MTPConnect 2020) and even lead to a manufacturing ‘renaissance’ (Hondros 2020). The entwined pursuit of health and economic goals in policy responses to COVID-19 is consonant with that of recent state-backed initiatives designed to stimulate biomedical innovation (Gardner et al. 2017; Hogarth 2015; Mitra 2016).

Contemporary state efforts to promote a ‘medical bioeconomy’ seemingly recast the (often-imagined) ‘social contract for science’ (Guston and Keniston 1994), alongside the traditional goals of health policy. This contract notionally commits the state to funding basic research, autonomously managed by scientists accountable to their peers, with the understanding that this will ultimately deliver health, wealth and military advantage (Guston and Keniston 1994). By contrast, governments are increasingly seeking to coordinate speculative innovation activities, including through state-backed megafunds (Fernandez et al. 2012; Sunder Rajan 2017); publicly funded medical researchers are asked to account not only to the principles of scientific ‘excellence’ but also to the anticipated needs of industry; and health policy is reoriented with the aim of achieving both health and commercial outcomes, assuming a “complementary alignment” between these objectives (Gardner and Webster 2017: 17). In short, initiatives designed to foster biomedical innovation are a site at which conceptions of epistemic value, health policy objectives, and relations between science, the state and markets are being profoundly reconfigured.

In public policy internationally, state-sponsored biomedical innovation is posited as the “solution” to the “two problems of *health* and *wealth*” (Shaw and Greenhalgh 2008: 2512). Government agencies and elected representatives argue that faced with ageing populations, the growing incidence of chronic disease, higher expectations from patients, and the escalating costs of new drugs, existing health care spending by the state is “unsustainable” (OBR 2017; SSAB 2009). Despite the pharmaceutical industry’s own set of overlapping crises as it struggles to bring new drugs to market (Sunder Rajan 2017), this problem framing positions state-supported biomedical innovation as key to ensuring the future availability of effective drugs and treatments, reducing the costs to society from

ill health, and hence to the very viability of publicly funded health care. At the same time, biomedical innovation is touted as the means to a high-value, knowledge-intensive export sector (Ley 2015).

Positing state-stimulated biomedical innovation as the *cure* for the alleged *problems* in health—and boosting state funding to promote the commercialisation of biomedical research even as funds are withdrawn from health care itself (Gardner et al. 2017)—is consonant with the project of "reorienting the state away from welfare provision and towards supporting industry" (Hogarth 2015: 257). Similarly, the recasting of health and medical research as innovation science is consistent with the commercialisation and privatisation of technoscientific knowledge making that is a key feature of neoliberalism (Lave et al. 2010; Mirowski 2011; Tyfield 2012). But whereas there is a considerable literature on the implications of neoliberalism for medicine and for health care (Davis and Abraham 2013; Hogarth 2015; Schrecker and Bambra 2015), and for the conduct of biomedical research (Cooper 2008; Mirowski 2011), the articulation of neoliberal logics and the reconfiguring of notions of scientific and social value in states' health and medical *research policies* remains comparatively unexamined (but see Shaw and Greenhalgh 2008). Here, we respond to the call to examine the national dynamics shaping contemporary biomedicine (Good 1995), focusing on the understudied site of research policy.

A central interest of Science and Technology Studies (STS) is the situated articulation of models of scientific practice. In this study we draw together STS literature with that on 'actually existing neoliberalism' (Brenner and Theodore 2002; see also Cahill 2010; Cahill 2014; Peck et al. 2017; Ryan 2015), which takes a similar approach to understanding neoliberalism as a 'mobile technology' (Ong 2007) that is always (re)constituted in site-specific forms. Allied work in this context has provided compelling depictions of the diverse manifestation of neoliberalism and its interface with research and science policy. Kean Birch (2019), for example, suggests that:

a diverse and varied array of processes (e.g. privatization, marketization, comodification), forces (e.g. state, capital), agents (e.g. business, international policy-makers, NGOs), discourses (e.g. new public management, competitiveness), and institutions (e.g. law, education, market) are implicated in neoliberalization, meaning that in every case neoliberalism has to be thought of as particular, as plural, as hybrid, or as variegated (p. 22).

In this paper we build on this work, exploring infrastructures of research funding and research support as a particularly significant site for the state-orchestrated neoliberalisation of science and research policy. We focus on a recently inaugurated Australian research policy and funding instrument, the Medical Research Future Fund (MRFF), as a site at which epistemic norms, science management regimes and health policy objectives have been actively—if unevenly—reconstructed. Notwithstanding its largely successful presentation as a 'nation building' program, we find that the MRFF and allied initiatives recast notions of value in science and in public policy in a manner concordant with neoliberal logics:

commercial objectives are privileged and health is envisaged as a “flow on effect” (CSIRO Undated), even as political actors assume a newly prominent role as arbiters of both commercial relevance and research merit. Rather than the state’s assumption of a more activist role in promoting medical research and innovation straightforwardly serving a ‘public purpose’, we conclude that work to repurpose medical research as innovation science and to valorise commercial objectives and political responsiveness in health research policy is a site of neoliberalisation—plural and variegated. In the MRFF’s design, long-standing commitments to redistributive justice in health care are eroded and notions of scientific value are reconfigured to emphasise not only commercial but also political logics.

Conceptual Framework

Research policy is an important, under-examined site at which neoliberal modes of governing are articulated and principles of economic rationality extended to the operations of science and medicine. It is also a site at which new forms of state subsidy, commercial engagement and coordination are readily observed. Recognising this as emblematic of the paradoxes inherent in policies and programs ostensibly guided by neoliberal theory, in this paper we employ the conceptualisation of actually existing neoliberalism to aid our investigation.

The Pluralities and Inconsistencies of Neoliberalism

As political theory, and even as a political project, neoliberalism is heterogeneous (Birch 2015) and often internally contradictory (Peck et al. 2017). Its core proposition is that, as an omniscient processor of information, ‘the market’ is the best arbiter of value, allocator of resources, and mechanism for achieving social order. In the public statements of proponents, and in popular conceptions of neoliberalism, commitments to ‘free markets’ and to a ‘small state’ feature prominently (Ryan 2015). Arguments and logics derived from such commitments have been used by governments to justify programs of marketisation, privatisation, and deregulation (in practice often re-regulation; Cahill 2014), and the privatisation or scaling back of public services and welfare programs, with far-reaching consequences for health (Schrecker and Bambra 2015). Nevertheless, a core feature of neoliberalism is its emphasis on state activism to create and sustain markets (Mirowski 2011). Even as the deficiency of state reason has been central to arguments for dismantling programs associated with the welfare state, its proponents recognise that neoliberalism “must itself be *constructed through* a state” (Tyfield 2012: 155, emphasis in original) necessitating “the retasking of the state to protect and/or create markets and competition” (Birch 2015: 572).

Some scholars caution against assuming a strong and consistent correlation “between the normative prescriptions of neoliberal theory, and neoliberalism in practice” (Cahill 2010: 305; see also Cahill 2014). Neil Brenner and Nik Theodore, for example, emphasise “the manifold disjunctures that have accompanied the

worldwide imposition of neoliberalism—between ideology and practice; doctrine and reality; vision and consequence” (Brenner and Theodore 2002: 353). To investigate specific programs of neoliberal transformation better, while concomitantly highlighting and problematising the discrepancies that exist between neoliberal theory and its “evolving, unevenly developed and site-specific form(s)” (Peck et al. 2017: 6), a growing body of work employs the conceptualisation of ‘actually existing neoliberalism’. Just as STS has insisted on a pragmatist and materialist reading of science, the actually existing neoliberalism literature points toward a similar kind of reading of neoliberalism.

‘Actually Existing Neoliberalism’

Certain departures between prominent strands of neoliberal theory and the features of neoliberal restructuring projects have been widely observed. Recent critical scholarship has highlighted the ways in which neoliberalism was never simply a *laissez faire* project; rather, its promoters sought to create institutions that protect markets and private capital against democratic interventions (Slobodian 2018; Saksena 2021). Instead of the retreat of the state, late-modern, capitalist states’ expenditure as a proportion of GDP has grown in recent decades (Cahill 2010)—albeit with a reallocation of their resources (Ryan 2015). And despite certain forms of regulation deemed unfavourable to business interests being dismantled, state activism across a range of market-creating projects has led to swathes of new regulation. Indeed, in stark contrast to visions of a small state and free markets, a “dramatic intensification of coercive disciplinary forms of state intervention in order to impose market rule” has occurred (Brenner and Theodore 2002: 352). Finally, actually existing neoliberalism is characterised by policies that enable regressive wealth redistribution and which preserve and bolster the privileges of economic elites—policies that have no basis in neoliberal theory (Harvey 2007).

In addition to these widely observed divergences between neoliberal theories of *minimising* the state and the material features of neoliberal policy and restructuring projects, such projects also exhibit idiosyncratic features. Even projects that are oriented by seemingly similar neoliberal logics are always already shaped, and their effects mediated, by unique features of their socio-political environment and by the legacies of institutions that they aim to replace (Brenner and Theodore 2002: 349; see also Harvey 2007; Peck et al. 2017). We extend this insight by observing that, as we outline in the following section, research policy is a particularly apposite site for observing the contradictions evident in the neoliberalisation of science, where it is not only practices and projects that are locally (re)produced, but also the very understanding of what neoliberal commitments mean. In the United States, for example, a dedication to free market principles ostensibly restricts state funding for commercially relevant science; in Australia the same claimed dedication underpins demands for publicly funded researchers to work more closely with industry (Miller 2017). It is not only the material work of neoliberal restructuring projects that is always already *embedded* (Brenner and Theodore 2002) but also meaning making associated with economic theory and discourse.

Notwithstanding both shared and idiosyncratic discrepancies between the various normative prescriptions of neoliberal theory and the material features of neoliberal restructuring projects, the terminology of actually existing neoliberalism calls attention to the broad correspondence that exists between them (Ryan 2015). This correspondence may be greatest at the level of micro-economic policy—in recent decades policies that support deregulation, marketisation and privatisation have proliferated (Cahill 2010, 2014). The discourse of neoliberalism that is so frequently used in the framing and justification of such policies has also had generative and constitutive effects, including by naturalising and normalising market-constrained views of value as “commonsense understandings” (Peck et al. 2017)—not least inside state agencies such as Treasuries (Pusey 1991). In this way, despite their plurality and discordances, neoliberal restructuring projects show shared material and discursive features: they are programmatically connected.

Actually Existing Neoliberalism in Research Policy

The state activism that we observe at the site of research policy is emblematic of actually existing neoliberalism. Some critics of the usefulness of neoliberalism as a theoretical concept suggest that the recent expansion of state-backed sovereign investment funds (Weiss 2012) and other forms of state entrepreneurialism show that popular conceptions of the neoliberal state are essentially a fiction (Mazzucato 2014). However, more recent work has problematised assumptions that a return to state-led investment in innovation erodes processes of neoliberalisation, or even evinces their repair.

Reflecting critically on the proliferation of Green Keynesian proposals that followed the Global Financial Crisis, Jesse Goldstein and David Tyfield (2018: 90) call attention to how fifty years of neoliberalism has transformed the state and question notions that “(greater) state direction of innovation will serve a just and democratic public interest, almost by definition”. Similarly, we observe that state activism to assetize (Birch 2017) publicly funded health and medical knowledge production and to subsidise research commercialisation activities—as we investigate here—is entirely in keeping with the market-creating, pro-corporate agendas of actually existing neoliberalism. That is, the MRFF is itself a vehicle for neoliberalisation, while conceptions of the ‘public good’ embodied in it are in many respects hostile to social democratic values (on the amenability of this concept to neoliberal logics more broadly, see Saksena 2021). Further, we show that recognising this state activism is essential to understand the complexity of the epistemic transformation produced by the MRFF.

Our contribution to the literature is conceptual and empirical. Empirically, we offer a detailed investigation of the articulation of neoliberal logics and the transformation of regimes of science management and notions of value in contemporary research policy. Conceptually, we bring to actually existing neoliberalism STS’s co-productionist sensibility (Jasanoff 2004). The idiom of co-production emphasises the co-constitution of science and social order. Relatedly, rather than see what counts as a market principle or a public good in research policy as pre-existing its own

enactment, we explore how notions of commercial, social, epistemic and national value(s) were themselves constructed and contested in the events and discourses that we investigate. In this way, our study asks not only “how the external political–economic forces of neoliberalism are transforming technoscience” (see Lave et al. 2010: 659), but also how technoscience—or in this instance, medical research—is a locus at which political-economic forces and alignments are also tested and reconstituted. Put differently, we show that relations between science, the state, markets and citizens are renegotiated as research policy is developed, with the (often contradictory) logics and values that underpin such relations very much at stake. We emphasise that medical research is a site not only of constitutive co-production, from which an ever more commercially-oriented biomedicine is emerging, but also one at which far broader interactional struggles take place.

Importantly, we identify research policy as a site and a mechanism by which notions of epistemic value are recast by the activist state. Traditionally, much of science’s epistemic authority has derived from its claims to neutrality and objectivity—its “Mertonian vision of disinterest”—supported by social distancing that enables it to “stand apart from the contaminating touch of politics” (Jasanoff 2005: 288), and to some extent also industry. Neoliberalism repudiates Polanyi understandings of science “as a self-justified ‘republic’ of rational-empirical argument productive of public knowledge” (Tyfield 2012: 156; see also Mirowski 2011). David Tyfield observes that:

... the ‘marketplace of ideas’ transforms the scientific enterprise such that the very criteria by which scientists themselves evaluate science are a domesticated version of the criterion of private economic gain (Tyfield 2012: 56).

Here, we extend this analysis by illuminating the state’s role. In the research policy that we investigate, it is not a spontaneously emerging ‘marketplace of ideas’ that transforms the production of health and medical knowledge and the criteria by which scientific merit is judged, but the focused work and efforts of political actors. In turn, this bears on the nature of the epistemic changes that we observe. We highlight not only the (mediated) commercialisation of science in contemporary research policy, but also its politicisation. Rather than science being “produced in direct response to corporate requirements” (cf. Lave et al., 2010: 668), we observe its responsiveness to political actors’ own apprehensions of commercial relevance; rather than “markets” acting as the “optimal epistemic, not just allocative, mechanism” (Tyfield 2012: 155), we show politicians assuming both roles.

Materials and Methods

Our research focuses on the years 2014–2017, the period in which the MRFF was announced and its architecture established amidst heated policy debate. Our analysis includes formal policy and legislative documents, and a range of grey literature. We review the 2014–15 Federal Government Budget papers in which the initiative and the cuts to health spending that would support it were proposed. We undertake a close examination of the legislation introduced in 2015 to create the MRFF, and the

parliamentary and public debates associated with it. We consider the statements to parliament, media releases and public commentary of key Ministers and other parliamentarians, early reports of the MRFF advisory board, and bureaucrats' advice to parliamentary inquiries. Finally, we review the introduction by the Federal Government in 2015 and 2016 of allied initiatives, and the release in 2017 by Australia's national science agency of an MTP 'Roadmap', to complement the MRFF's stimulation of biomedical innovation. Throughout this period, we survey a broad range of material produced by key stakeholders—medical researchers, the national science agency, the MTP industry, doctors and their professional associations, and health policy analysts. This material includes media releases and public commentary, institutional reports, submissions to parliamentary inquiries, journal articles, advocacy videos, and website content produced in support or criticism of the initiative. Evaluating this broad documentary base supports our analysis of various enactments of scientific and social value in health care and in research policy, the transformations of science-state relations affected by the MRFF, and the accommodations and frictions that these encountered.

“The Biggest Medical Research Endowment Fund in the World”

The MRFF is envisaged to be a publicly funded, \$20 billion (all figures in Australian dollars) perpetual endowment fund whose annual interest earnings will be disbursed to support not only “medical research” but also, and particularly, “medical innovation” (Medical Research Future Fund Act 2015, (Cth)). First announced in the Federal Government's 2014-15 Budget, as at 31 March 2020, the MRFF is valued at \$17.075 billion, of which \$16.788 billion has been contributed as capital from government using ‘savings’ from the health budget (Australian Government undated). Once fully funded the MRFF is envisaged to provide \$1 billion annually for R&D, effectively doubling Australia's public funding for medical research.

The 2014-15 Budget proposed a raft of cuts from which the MRFF would be funded. These included cuts to: health infrastructure; public hospitals funding; preventive health programs including Indigenous health, mental health, obesity, alcohol and smoking; dental care; and eye health (Treasury 2014, for a summary, see Russell 2014: 96). Internationally, it has been observed that government-backed initiatives designed to accelerate the translation of biomedical research into clinical and commercial applications attract funding that, at least hypothetically, could otherwise be spent on present day health care (Gardner et al. 2017). In the case of the MRFF, the reallocation of funding away from health care and towards speculative, commercially-oriented research is a design feature. The government also proposed a new \$7 co-payment for patient visits to general practitioners (GPs), which was intended both as a major funding stream for the MRFF and as a “price signal” to discourage patients from seeking allegedly unnecessary GP services (House of Representatives 2014: 7358).

An appearance of political disorder and policy chaos surrounded the MRFF's announcement. The initiative was hastily developed and came as a surprise to the

government's most senior science and medical advisors (Senate Community Affairs Legislation Committee 2014). Under questioning, bureaucrats acknowledged that they had begun working on the policy only some weeks prior to its public announcement (Senate Community Affairs Legislation Committee 2014). The Shadow Minister for Health argued that the MRFF had been created at short notice as an electorally pleasing centrepiece for a Budget whose very significant cuts to social spending, including in health, were otherwise deeply unpopular (House of Representatives 2015b).

Noting the concerns of senior researchers, one commentator dismissed the MRFF as possessing "no strategy, no coherence, no acknowledgment of possible perverse consequences; just a compromise solution to a short-term political problem" (Hare 2014: 18). Somewhat differently, we observe that there *was* coherence in the logics underpinning the MRFF: its architecture was clearly informed not only by international precedents but also by the selective extension of market logics to the health care system and to research policy. An array of sometimes contradictory justifications was made by government for the initiative. But the declared aim of providing funding to stimulate the growth of Australia's MTP sector remained more or less consistent, as did the problem framing that the MRFF responded to: state spending on health care was "unsustainable" (Dutton 2014) and commercialisation rates from publicly funded health and medical research were unacceptably low (Ley 2015). State intervention to facilitate biomedical innovation was heralded as the solution to both problems.

Reimagining Value

As debates surrounding the MRFF played out, competing notions of scientific and social value in health research and health policy were constructed and contested. At the heart of questions surrounding the purpose of the initiative, how it should be funded, and the mechanisms and metrics for grant assessment, were tensions associated both with the attempted imposition of market meanings on health care systems and on publicly funded research, and with the fundamental challenge to scientific autonomy embodied by the new role for political actors in grant assessment.

Commercialising and Medicalising Health Research

The MRFF promotes the commercialisation, privatisation and medicalisation of new health knowledge, while valorising a narrow spectrum of research as relevant to innovation (see Clarke et al. 2003; Williams et al. 2011). Underscoring its function as a promissory construct and a political vehicle, few details were initially available regarding the kinds of research that the initiative would fund. Nonetheless, public servants suggested that the fund would primarily support technologically sophisticated, commercially-relevant biomedical research (Senate Community Affairs Legislation Committee 2014), while Ministers emphasised that all MRFF grants must demonstrate a "strong business case" (Cormann 2015: 2; Ley 2016).

Allied initiatives announced soon after the MRFF focused even more pointedly on efforts to expand Australia's MTP sector. After his successful challenge for the Prime Ministership, Malcolm Turnbull's government announced that \$250 million from the MRFF—its first major funding grant—would establish a new, for-profit, public-private \$500 million Biomedical Translation Fund (Ley 2015). The Federal Government also created five new 'industry growth centres', including one which became known as 'MTPConnect' (MTPConnect 2016). The 'Sector Competitiveness Plan' released by MTPConnect (2016) and the related 'Roadmap' for the MTP sector released by the national science agency, the Commonwealth Scientific and Industrial Research Organisation (CSIRO, CSIRO Futures 2017), offered a vision for health care that was capital-intensive, high-tech and highly medicalised. Both documents foregrounded the pursuit of commercial and industry development objectives, and the key role to be played by the MRFF and BTF in realising them.

Despite state-stimulated biomedical innovation nominally pursuing both health and wealth, in these initiatives commercial objectives eclipsed those of health. The CSIRO acknowledged its strategic plan's focus on commercial objectives but reassured the reader that "implicit to this Roadmap" was the expectation that "the ultimate beneficiary of new MTP solutions is the patient" (CSIRO Futures 2017: 4). In an online statement the national science agency suggested that "Australians will benefit from better and more cost-effective health products and services as a flow on effect from a thriving domestic MTP industry" (CSIRO Undated, unpagged). Put crudely, in a variation of the old promise associated with neoliberal economics, it was hoped that health outcomes would trickle down.

Inherent in the promise that "a thriving domestic MTP industry" would produce positive health outcomes is a series of assumptions: that generous new financial backing for the sector would result in its commercial success; that this would result in the release of new drugs or therapies; that these would be "better and more cost-effective"; and that they would be available to and benefit the Australian public that had forgone present-day health care to subsidise their development. Each assumption is contestable. Even if these initiatives do result in a "thriving" industry it may fail to deliver new health and medical products. As Kean Birch (2017: 460) observes, value in the bioeconomy is most commonly associated with processes of "financialization, capitalization, and assetization" rather than commodification—the development of saleable products such as pharmaceuticals is infrequent (see also Sunder Rajan 2017).

An Uncertain Economic Return

Perhaps surprisingly, given the avowedly commercial objectives that orient the MRFF, analysis by consulting group Deloitte Access Economics forecasts modest returns from the initiative. Deloitte calculated that the net value of benefits gained from the MRFF investment in terms of both health outcomes (including savings on state expenditure on health care) and commercial returns to industry would be \$14.2 billion, accruing over the 10 years between 2052-53 and 2062-63 (Deloitte 2014: ii). However, even this prediction fails to account for the repercussions of cutting

primary and preventive health budgets to fund the MRFF's establishment—which analysts stressed would ultimately increase health system costs and undermine health outcomes, as we discuss in the next section.

It is possible that despite the MRFF being championed as a means to obtain greater value from public health spending, and this value being understood in primarily commercial terms, the cuts to health care spending on which the MRFF budget relies may result in ultimately higher health care costs for the state. Put differently, the MRFF may prove another instance of the reallocation of the state's resources in service of a market-creating, pro-corporate agenda, which erodes egalitarian commitments while not actually reducing state spending (Cahill 2014; Schrecker and Bambra 2015), perhaps not even resulting in new health and medical commodities.

MRFF Funding—Reconfiguring the Social Value of Health Spending

In his 2014–15 Budget night speech, the Treasurer positioned the MRFF as the proper beneficiary of budget cuts, asserting that “Australians are always prepared to make a reasonable contribution if they know their money is not wasted” (Hockey 2014, unpagged). The implication of both the Treasurer's comments and the MRFF's design was that money was being “wasted” in providing primary and preventive care to patients, and that greater value could be gained from its reallocation to speculative biomedical research and commercialisation activities. Just as logics of commercialisation have reshaped notions of social value in publicly funded research (Cooper 2008; Mirowski 2011), by selectively embedding market logics in the architecture of health and medical research policy, the MRFF effectively recast notions of social value in health spending by the state. Rather than social value being understood in terms of health or equity outcomes achieved within the broader populace, it was increasingly tied to the hoped-for expansion of the MTP sector and to the private accumulation of capital from publicly funded research (see also Gardner et al. 2017).

Exemplifying the selective application of market logics that is a hallmark of actually existing neoliberalism, Coalition Ministers called for budget cuts and the greater application of principles of economic rationality to the health care system as the solution to its alleged non-economic viability (cf. Moreira 2013), even as they proudly assumed a more expansive role in funding and coordinating commercialisation activities designed to foster the MTP sector's growth. The Health Minister argued that individual patients needed to take greater responsibility for their own health care costs, asserting that the Federal Government's electoral mandate was to “fix the Budget and strengthen the economy” (Dutton 2014, unpagged). At the same time, and illustrating how the meaning of market logics and free market commitments is always locally reconstituted, offering what was effectively a generous new subsidy for the MTP sector—made possible by cuts to health care spending—was presented as consonant with government's pro-market agenda given its primary objective was “strengthen[ing] the economy”.

Illustrating the friction that neoliberal restructuring projects encounter as they interact with existing institutional arrangements and the alternate value judgments that they embody (cf. Brenner and Theodore 2002), health economists, ethicists and doctors argued that cutting health spending to pay for medical research was short-sighted, unfair and economically counter-productive. While positive about the MRFF in principle, the Australian Medical Association (AMA) President warned that: “tak[ing] money from sick people today to pay for medical research sometime in the next 20 years” was “illogical and unfair” (Owler 2014: 5). Similar objections were made by health policy analysts who stressed that increased investment in primary care and preventive health programs would deliver both greater budget savings and more equitable health outcomes than greater spending on research (Hunter et al. 2015; Russell 2014).

The AMA and health policy analysts also challenged the problem framing on which the cuts to health spending were predicated. The AMA insisted that health spending as a proportion of the budget was stable, or even falling (Owler 2014), while others argued that it was not health costs that were the problem, but Australia’s comparatively low taxes (Richardson 2014). In contrast to government, they appealed not only to economic but also to egalitarian logics that framed the social value of health spending as measurable by equitable access to health care and to the benefits of public spending. Their objections helped to prevent the imposition of the GP co-payment, and to forestall some of the proposed health cuts; they were not sufficient to prevent the MRFF’s budget being made reliant on savings in health spending.

MRFF Disbursements—Reconfiguring the Epistemic Value of Research

Just as the MRFF’s funding model recast the social value of health spending, its grant making procedures reconfigured notions of scientific value while significantly altering science-state relations. Whereas all NHMRC grants and fellowships are allocated subsequent to “rigorous independent peer review” (NHMRC 2016: 38), this is not the case for the MRFF. The Health Minister “must take into account” the Priorities developed by the MRFF advisory board in formulating proposals for grant disbursement (*Medical Research Future Fund Bill 2015* (Cth), s. 15A 2(a)). Funding principles subsequently developed by government also state that peer review will inform grant allocation (Department of Health 2017). Nonetheless, funding decisions are ultimately made by the Health Minister.

The MRFF prioritises top-down, priority-driven research, and accords political actors a central role in ensuring that grant allocation demonstrates a “strong business case”, ostensibly to ensure that research “not just do more of the same, but demonstrate greater value and returns to the Australian people” (Cormann 2015: 2). In this way, the MRFF architecture is responsive to a long-standing criticism (e.g. see CSIRO Futures 2017) that publicly funded Australian research delivers an insufficient commercial return due to low rates of uptake by industry. To rectify this supposed problem, the MRFF foregrounds commercial relevance—as apprehended

by political actors—in new notions of scientific value, while enabling politicians to directly oversee health and medical research grant making.

The MRFF's reformulation of science-state relations and the epistemic norms by which research should be judged attracted criticism from senior figures in the research sector (Dunlevy 2015). The former CEO of the NHMRC argued forcefully for NHMRC to administer the MRFF funding, and to retain "excellence in peer review" as the basis for funding decisions (Anderson 2015). He cautioned that "the risk for the government and the community is that the inevitable lobbying by vested interests and special pleading will dilute the value of the funds", observing that "vested interests are already circling like sharks" (Anderson 2015, unpagged). In legislative debates, critics warned that the absence of peer review-based assessment left the MRFF vulnerable to a scenario where only "powerful voices" or those "that manage to get the ear of government" obtain access to the fund (House of Representatives 2015a: 8245, 8246). Conversely, there were also concerns that the absence of accountability in grant allocation could lead to the MRFF's use for political purposes; the Shadow Health Minister accused the Federal Government of creating a twenty-billion dollar "government slush fund" (Dunlevy 2015).

Appealing to Notions of National Value

As political debate surrounding the MRFF threatened to limit the willingness of the Federal Labor and Greens parties to support the Coalition Government's initiative, research sector advocates responded by enacting their own, more expansive notions of social value to be delivered by the scheme. In proponents' vision, state-backed expansion of the MTP sector was the "solution" not only to the "two problems of *health* and *wealth*" but also to long-standing questions surrounding Australia's post-colonial identity and place in the world.

Many analysts argue that to maintain prosperity, Australia must reduce its reliance on low-value added exports such as coal, gas and iron ore, and develop more high-value, knowledge-intensive industries. This is not only an economic argument but one that for certain audiences is overlain not only by the imperative of climate change, but also with national symbolism. In the 1960s Donald Horne famously wrote that: "Australia is a lucky country. It is run mainly by second-rate people who share its luck" (Horne 1964: 239). In making this criticism Horne argued that Australia had achieved wealth through the ready exploitation of natural resources and that it remained a parochial nation fettered by its colonial past. Decades later, Australia's reliance on mining and the prospect that its 'luck' may run out is the focus of recurring political debate. Supporting Australia's transition from 'lucky country' to 'clever country' is understood by the research sector and its champions as vital to securing both future prosperity and national pride.

The hope for MTP-enabled economic diversification and renewal was central to the storylines employed by the MRFF's champions in advocating for the initiative in certain settings. In public-facing forums, proponents largely appealed to a hope for *health*. The public message communicated by Australia's major medical research institutions was dramatic: "without medical research, hope for ourselves

and our loved ones will disappear” (AAMRI 2015). However, the hope for *wealth* and for techno-industrial transformation made possible by MTP was often dominant at events and in communications materials targeted at parliamentarians, journalists, policy-makers and other research sector stakeholders.

In an opinion piece based on his address to the National Press Club, the CSIRO chairman and chair of a government-commissioned review of the nation’s health and medical research system argued that the MRFF would help Australia to control its economic destiny:

In Australia, we occasionally refer to ourselves as the ‘clever country’. With respect, we are kidding ourselves... Our mineral and energy wealth should continue for centuries but the timing of cyclical highs in terms of volume demand and pricing will never be within our control. But the rewards that come from investing in our minds, in our abilities, in our potential are much more within our control. And an important part of that is our investment in health and medical research (McKeon 2014, unpagged).

The President of the Association of Australian Medical Research Institutes put the case for the MRFF in forging a “smarter economy” in similar, if blunter, terms:

This is a way for us to be a smart nation for generations to come... We can only dig minerals out of the earth for so long. We need to build a smarter economy, and medical research helps us do that while also improving the lives and livelihoods of all Australians (AAMRI 2014, unpagged).

The imaginary in these statements is clear—biomedical innovation supports a ‘sunrise’ industry that promises health and wealth, and a new era of national pride as a ‘clever country’. Implicit is a forced choice and a policy prescription: either Australia relies in perpetuity on an extractivist political economy that sells our national potential short, or it grasps the opportunity for national renewal offered by biomedical innovation, necessitating unhesitating support for the MRFF. This spurious binary performed critical political work, enlisting as champions for the initiative critics of Australia’s reliance on fossil fuel exports—despite many of them being long-standing defenders of progressive health policy. Indeed, the potential for a techno-industrial transformation that could hasten the nation’s shift away from reliance on climate change-driving coal and gas exports was cited by the Australian Greens as key to their support for the MRFF, despite their criticism of the health funding cuts on which it relied (House of Representatives 2015a) and more generally their resistance to neoliberal approaches to health and to political interference in research grant making.

We have elsewhere traced in greater detail the difficulties Australian technoscience proponents experience in enrolling political audiences in knowledge economy imaginaries—especially, but not exclusively, Coalition politicians (Miller 2017).¹ Here, the Abbott-Turnbull government had its own reasons for supporting

¹ It is notable that recent work on the cultural economy of science has tended to focus primarily on political and policy contexts where the neoliberalisation of science and research funding infrastructures is infused with notions of national competitiveness and a kind of implicit scientific and techno-nationalism (see, for example, Sunder Rajan 2006). Typically consolidated through institutions of state-making, what

the MRFF, while a vision of national transformation through biomedical innovation served to expand and bolster perceptions of the initiative's social value among other political actors. It functioned to shift the temporal locus of value assessment away from patients who forgo primary or preventive health care in the present day, to focus on future gains to the nation—including (somehow) future transition from mining commodity dependence. In so doing, this vision performed effective coordination work (Pollock and Williams 2010), helping to enrol support for the MRFF and subdue criticism of its regressive features among progressive political actors. Its efficacy in this role illuminates the situated reconstitution of notions of public good in research policy and the multi-faceted nature of the political-economic forces transforming technoscience (Lave et al. 2010), but also how the visions that animate (or at least justify) research policy can themselves prompt political-economic realignments.

Discussion

State research policies are important and yet under-examined sites for the articulation and implementation of neoliberal modes of governing. Inasmuch as earlier modes of governing selectively took up the implied values of science (Jasanoff 2004), neoliberal modes have sought to respond to and re-articulate these values in the context of the uncomfortable epistemic challenge to science posed by the 'marketplace of ideas'. This has, in turn, precipitated the creation of a raft of intermediary organisations and agencies designed to optimise the outcomes of publicly funded research—increasingly envisaged in commercial and market terms—whilst remaking established research support infrastructures as knowledge 'brokers' (Kearnes and Wienroth 2011). In this sense, the Australian MRFF, an initiative designed with "the eye of an investment banker" (Winslade 2014: 4) embodies the core logics of the neoliberalisation of public research funding and research policy more generally.

The MRFF represents a model of research support where public funding is reallocated, and health and medical knowledge production is reconfigured. The very research policy architecture erodes long-standing commitments to redistributive justice in health care. State activism is central to the transformations that we observe. We stress that the MRFF privileges research with commercial potential *as apprehended* by political actors: it affects not only a new commercialisation but also the politicisation of publicly funded health and medical research. The MRFF renders grant making vulnerable not only to political whim, but to notions

Footnote 1 (continued)

Jasanoff and Kim (2009) characterise as "*national* sociotechnical imaginaries" (p. 120, emphasis added) are commonly buttressed by an innately nationalistic logic that is explicitly technopositive: the fortunes of the nation are held to be dependent on its capacity to mobilise the forces of science and innovation. By contrast, dominant economic imaginaries among Australian political audiences centre the importance of commodity exports, particularly from the mining sector. Political audiences have often reacted sceptically to the rhetorics of the 'knowledge' or 'innovation' economy—despite such rhetorics' strong appeal to the research sector and to certain progressive politicians.

of value shaped by antipathy to the central tenets of the social democratic state. Rather than a return to state-led investment in innovation heralding the erosion of neoliberalism (Weiss 2012; Mazzucato 2014), instead we see the selective sedimentation of neoliberal logics in the critical field of health.

Health as a “Flow on Effect”

Balancing the state’s health objectives (equitable access to safe and effective medicines) and industry policy objectives (maintaining a viable domestic MTP sector) has long been regarded as a challenge with which policymakers struggle (Morgan et al. 2008). However, recent work observes that state efforts to promote biomedical innovation assume a “complementary alignment between practices that serve the public health of the community on the one hand, and private commercial interests of industry on the other hand” (Gardner and Webster 2017: 17). That is, innovation policy casts its objective as “combining values associated with the public (population health) good *and* the private market” (Gardner and Webster 2017: 5, emphasis in original). In our study, as the state itself assumes a coordinating role in the profit-seeking ‘medical industrial complex’ (cf. Clarke et al. 2003), we show an even more profound reformulation of notions of public good and of the state’s own objectives in relation to health.

In our investigation, the growth of a domestic MTP sector is *itself* constituted as a public good—a desirable objective for health and medical research policy, and a legitimate beneficiary of funding ‘saved’ from primary and preventive health care. That is, public good in health and medical policy is no longer only, primarily, or even necessarily associated with population health outcomes. Previous research has found the normalisation of commercialisation imperatives among biomedical researchers amid an “implicit assumption” that this is “the primary way to get useful discoveries to patients” (Holloway and Herder 2019: 270). What we see is the transformation of notions of public good to the extent that getting “useful discoveries to patients” is not a necessary aim for publicly funded research and translation activities. It is not necessary for initiatives that receive public funding such as the for-profit Biomedical Translation Fund, the state-sponsored “industry-led” MTPConnect, or even the national science agency’s MTP sector ‘Roadmap’ to establish or be accountable to the pursuit of *health* objectives. Improved health outcomes are desirable, but assumed to be an inevitable “flow on effect” of the MTP sector’s commercial success (CSIRO Undated, unpagged).

In contrast to scholars (see Mittra 2016) who argue that the contemporary bioeconomy has enabled new, more ethical innovation within which multiple forms of value and multiple expressions of values are supported, including those associated with patients’ well-being, nation building and the realisation of commercial profits, our own analysis points to health objectives being to some extent subsumed by commercial objectives.

The Politicisation of Research Policy

Compared with earlier work—which has observed “the ‘marketplace of ideas’ transform[ing] the scientific enterprise” (Tyfield 2012: 156) and reconfiguring the production of technoscientific knowledge, and foregrounding commercial considerations in appraisal of science’s value (Mirowski 2011)—the creation of initiatives such as the MRFF suggest that a central site and mechanism for this transformation is state research policy. Our case study does not illustrate a straightforward process of commercialisation, where the judgment of scientific value is shaped by and responsive to corporate requirements and private capital (see Lave et al. 2010). Instead, in a design feature whose significance is difficult to overstate, MRFF grant making is directed by the Australian Federal Health Minister and Cabinet.

In providing for direct Ministerial involvement in grant allocation, the MRFF significantly reconfigures normative prescriptions for science-state relations. In Australia as elsewhere, processes of research priority setting and coordination have long been regarded as a delicate balance between the competing demands of protecting scientific autonomy and excellence, on the one hand, and ensuring appropriate forms of sociopolitical accountability, on the other, in both research policy making and scientific practice (Kearnes and Wienroth 2011). By contrast, the MRFF insists on responsiveness of research policy to political notions of value; in its limited provision for scientific autonomy, the MRFF casts meritorious research not as disinterested and distant from politics (cf. Jasanoff 2005), but rather as thoroughly social, commercially relevant, and politically engaged.

Recognising the state’s active role in the transformation of the scientific enterprise deepens our understanding of the epistemic changes taking place, and of the plural, variegated neoliberalisation that we observe. Even as ‘excellence’ is displaced by ‘commercial relevance’ as a key criterion by which scientific merit is judged, it is not ‘the market’ that is charged by the MRFF with appraising commercial value, but rather the Health Minister and Cabinet. Whereas researchers will certainly reshape research questions, metrics and practices to better demonstrate to political audiences their commercial relevance, there is no guarantee that such research will be ultimately of interest to industry, let alone catalyse the techno-industrial transformation promised by MRFF champions. Moreover, in their oversight of research grants, political actors will necessarily be guided not only by apprehended market logics, but also, and most importantly, by political logics. That is, the MRFF is the vehicle not only for the (mediated) commercialisation of notions of scientific value, but also their *politicisation*.

Innovation policy in Australia has long been characterised by political pragmatism and opportunism (Thurbon 2012), and, in determining worthy recipients of MRFF funding, it is to be expected that Ministers will be responsive not only to their understanding of the needs and preferences of future industry but also to those of the government of the day. Political preferences are likely to be shaped by Australia’s apprehended interests in an era characterised by fractious geopolitical competition, including in the post-COVID-19 world in the MTP arena, and by calculations regarding domestic electoral need and political opportunity.

The subdued response from the scientific sector to these far-reaching changes may perhaps be explained by the prospect of an additional billion dollars annual funding for medical research. The future stability of this settlement with the research sector, especially as funding for biomedical research and innovation dwarfs public funding for all other fields of research, and MRFF funding rivals that available for health and medical research through peer-reviewed, competitive grant processes, remains an open question.

The Political Work of Visions of National Transformation

The medical research sector and its champions worked assiduously to forge broad notions of the national value to be gained from the MRFF. A vision in which biomedical innovation offers a route to health, wealth and national pride—frequently contrasted with one in which the uncertain future of the Australian economy is dependent on the continued export of mining commodities—helped to enrol the support of progressive political actors for the initiative, despite its regressive features. Exploring the generative power of patients’ expectations of biomedical innovation, Tiago Moreira and Paolo Palladino (2005: 67) describe a “‘regime of hope’... characterized by the view that new and better treatments are always about to come, being tested, ‘in the pipeline’”. Similarly, we observe the function of this imaginary in cultivating a regime of hope amongst certain political audiences, within which a thriving MTP industry that will enable economic transformation is “always about to come” or “‘in the pipeline’”.

Conclusion

Hastily developed and introduced in a moment of high political drama, the MRFF is a research policy that significantly reconfigures notions of scientific and social value in public policy, and relations between science, the state, markets and citizens. Rather than any straightforward withdrawal of the state’s resources we show instead their reallocation to ‘encasing’ (Slobodian 2018), marketising institutions. Perhaps unique among its international counterparts, the MRFF directly redistributes funding from present day health care to biomedical research and commercialisation. The MRFF serves a market-creating, pro-corporate agenda: commercial objectives are privileged in research funding, and health is envisaged as a “flow on effect” of the MTP sector’s expansion.

Earlier work has explored the market-driven transformation of health and medical knowledge production and the criteria by which scientific merit is judged; we argue for greater recognition of this transformation being affected by the activist state through research policy. Goldstein and Tyfield (2018) caution against assuming that the ‘entrepreneurial state’, having suffered decades of neoliberal conditioning, will seek to mitigate the unbridled appetites of neoliberal capital in the innovation it supports. Here, we show that far from serving social democratic aims that counter-balance those of capital, it is a more activist state that drives neoliberalisation and

erodes commitments to redistributive justice in health policy making, and displaces health outcomes as the primary objective of health and medical research. Further, in privileging research with commercial potential *as apprehended* by political actors, the MRFF both commercialises and politicises notions of scientific value, significantly reconfiguring epistemic norms in health and medical research policy. In stark contrast to authors who hail state-led investment in innovation as a challenge to, or even evidence of a reversal of, neoliberalism (e.g. Mazzucato 2014), we observe its extension in the critical arena of health and medical research policy, in plural and variegated form (Birch 2019). Our study cautions against assuming that massive fiscal stimulus, such as that offered by states internationally in the wake of COVID-19, axiomatically serves or is guided by traditional notions of public good.

Given Australia's inconsistent support for past innovation initiatives (Thurbon 2012), the extent to which an imaginary of MTP-enabled national transformation will become institutionally stabilised in this and related policy is yet to be seen. At a time of unprecedented political attention to health and medical policy, the absence of any significant discussion of the MRFF and its success or failure in the COVID-19 response is telling. Should the MRFF be eventually acknowledged to have failed to produce either the life-saving drugs or transformational economic opportunities its champions promised, it is possible that this could support a powerful critique of the neoliberalisation and politicisation of health and medical research policy the initiative has driven—at the expense of spending on healthcare itself. However, in a context in which political actors are largely hostile to the research sector, the reverse is also possible—any failures of the initiative touted as the means to redress alleged deficiencies of publicly funded researchers could be effectively sheeted home to them.²

Acknowledgements This work was supported by the Australian Research Council (ARC) through a grant to the Centre of Excellence in Convergent Bio-Nano Science and Technology (Award Number CE140100036).

Conflict of interest The authors declare that they have no conflict of interest.

References

- AAMRI. 2014. AAMRI Welcomes Government's Commitment to MRFF, 9th December, 2014. <https://aamri.org.au/news-events/aamri-news/aamri-welcomes-governments-commitment-to-mrff/>. Accessed 27 June 2021.
- AAMRI. 2015. *What's the fuss about the medical research future fund?* https://www.youtube.com/watch?v=T08_LP8e1DA. Accessed 27 June 2021.
- Anderson, Warwick. 2015. Response from Prof. Warwick Anderson, Secretary General of the International Human Frontier Science Program Organization to Questions on Notice from the Community

² There is an obvious parallel here with Foucault's observation regarding the non-falsifiability of neoliberal logic: "nothing proves that the market economy is intrinsically defective since everything attributed to it as defect and as the effect of its defectiveness should really be attributed to the state" (Foucault 2008: 116).

- Affairs Committee, August 4th 2015. <http://www.aph.gov.au/DocumentStore.ashx?id=0263b5e6-7391-4d4f-97ed-dcc461eee3ff>. Accessed 27 June 2021.
- Birch, Kean. 2015. Neoliberalism: The whys and wherefores ... and future directions. *Sociology Compass* 9(7): 571–584.
- Birch, Kean. 2017. Rethinking value in the bio-economy: Finance, assetization, and the management of value. *Science, Technology & Human Values* 42(3): 460–490.
- Birch, Kean. 2019. *Neoliberal bio-economies? The co-construction of markets and natures*. Cham: Springer.
- Brenner, Neil, and Nik Theodore. 2002. Cities and the geographies of “actually existing neoliberalism.” *Antipode* 34(3): 349–379.
- Cahill, Damien. 2010. Actually existing neoliberalism and the global economic crisis. *Labour & Industry: A Journal of the Social and Economic Relations of Work* 20(3): 298–316.
- Cahill, Damien. 2014. *The end of laissez-faire? On the durability of embedded neoliberalism*. Cheltenham: Edward Elgar.
- Clarke, Adele, Laura Mamo, Janet Fishman, Jennifer Shim, and Jennifer Fosket. 2003. Biomedicalization: Technoscientific transformations of health, illness, and U.S. biomedicine. *American Sociological Review* 68(2): 161–194.
- Cooper, Melinda. 2008. *Life as surplus: Biotechnology and capitalism in the neoliberal era*. Seattle: University of Washington Press.
- Cormann, Mathias. 2015a. *House of representatives: Medical research future fund bill 2015, medical research future fund (consequential amendments) bill 2015, supplementary explanatory memorandum*. Canberra: The Parliament of the Commonwealth of Australia.
- CSIRO. Undated. Medical technologies and pharmaceuticals roadmap. <https://www.csiro.au/en/Do-business/Futures/Reports/Health/Medical-Technologies-and-Pharmaceuticals-Roadmap>. Accessed 27 June 2021.
- CSIRO Futures. 2017. *Medical technologies and pharmaceuticals: A roadmap for unlocking future growth opportunities for Australia, April 2017*. Sydney: CSIRO.
- Davis, Courtney, and John Abraham. 2013. *Unhealthy pharmaceutical regulation: Innovation, politics and promissory science*. Hampshire: Palgrave Macmillan.
- Deloitte. 2014. *Extrapolated returns from investment in medical research future fund (MRFF). Australian Society for Medical Research, October 2014*. Kingston: Deloitte Access Economics.
- Department of Finance. Undated. *Medical research future fund*. <https://www.finance.gov.au/government/australian-government-investment-funds/medical-research-future-fund/>. Accessed 27 June 2021.
- Department of Health. 2017. *Medical research future fund—Funding principles*. <https://www.health.gov.au/sites/default/files/mrff-funding-principles.pdf>. Accessed 27 June 2021.
- Dunlevy, Sue. 2015. *Medical research future fund branded a \$20 billion ‘Government Slush Fund’, 4 June 2015*. <http://www.news.com.au/national/politics/medical-research-future-fund-branded-a-20-billion-government-slush-fund/news-story/43f27c25c1d1f041d68f52eaafc9bc86>. Accessed 27 June 2021.
- Dutton, Peter. 2014. *Media release: Strengthening medicare, 13 May 2014*. Australian Government: Canberra.
- Fernandez, Jose-Maria, Roger Stein, and Andrew Lo. 2012. Commercializing biomedical research through securitization techniques. *Nature Biotechnology* 30(10): 964–975.
- Foucault, Michel. 2008. *The birth of biopolitics*. New York: Palgrave Macmillan.
- Gardner, John, and Andrew Webster. 2017. Accelerating innovation in the creation of biovalue: The cell and gene therapy catapult. *Science, Technology & Human Values* 42(5): 925–946.
- Gardner, John, Andrew Webster, and James Mittra. 2017. The entrepreneurial state and the leveraging of life in the field of regenerative medicine. In *Bioeconomies: Life, technology, and capital in the 21st century*, eds. Vincenzo Pavone and Joanna Goven, 25–47. Basingstoke: Palgrave.
- Goldstein, Jesse, and David Tyfield. 2018. Green Keynesianism: Bringing the entrepreneurial state back in (to question)? *Science as Culture* 27(1): 74–97.
- Good, Mary-Jo Delvecchio. 1995. Cultural studies of biomedicine: An agenda for research. *Social Science and Medicine* 41(4): 461–473.
- Guston, David, and Kenneth Keniston. 1994. Introduction: The social contract for science: Chap. 1. In *The fragile contract: University science and the Federal Government*, eds. David Guston and Kenneth Keniston, 1–41. Cambridge, MA: MIT Press.
- Hare, Julie. 2014. Medical research boost ‘may not be a blessing’, 17 May. *The Australian*, p. 18.
- Harvey, David. 2007. *A brief history of neoliberalism*. Oxford: Oxford University Press.

- Hockey, Joseph. 2014. *Budget speech 2014–15*. Canberra: Australian Government.
- Hogarth, Stuart. 2015. Neoliberal technocracy: Explaining how and why the US Food and Drug Administration has championed pharmacogenomics. *Social Science & Medicine* 131: 255–262.
- Holloway, Kelly, and Matthew Herder. 2019. A responsibility to commercialize? Tracing academic researchers' engagement with the commercialization of biomedical research. *Journal of Responsible Innovation* 6(3): 263–283.
- Hondros Nathan. 2020. 'We're too dependent on Chinese manufacturing': COVID-19 commissioner wants Australian-made medical supplies. *Sydney Morning Herald* 3 April.
- Horne, Donald. 1964. *The lucky country: Australia in the sixties*. Revised. Adelaide: Penguin Books.
- House of Representatives. 2015a. *Bills: Medical Research Future Fund Bill 2015, Consideration of Senate Message Speech, Thursday, 13 August 2015*. Commonwealth of Australia: Canberra.
- House of Representatives. 2015b. *Bills: Medical Research Future Fund Bill 2015, Medical Research Future Fund (Consequential Amendments) Bill 2015, Second Reading Speech, Thursday, 4 June 2015*. 5850-5855. Commonwealth of Australia: Canberra.
- House of Representatives. 2014. *Questions without Notice: Budget Question, Wednesday, 25 June 2014*. 7358–7359. Canberra: Commonwealth of Australia.
- Hunter, David, Michael Woods, Peter Breadon, and Stephen Leeder. 2015. *Federal budget 2015: Health experts react*. <https://theconversation.com/federal-budget-2015-health-experts-react-41439>. Accessed 27 June 2021.
- Jasanoff, Sheila. 2005. *Designs on nature: Science and democracy in Europe and the United States*. Princeton, NJ: Princeton University Press.
- Jasanoff, Sheila. 2004. *States of knowledge: The co-production of science and social order*. Oxon: Routledge.
- Jasanoff, Sheila and Sang-Hyun Kim. 2009. Containing the atom: Sociotechnical imaginaries and nuclear power in the United States and South Korea. *Minerva* 47(2): 119–146.
- Kearnes, Matthew, and Matthias Wienroth. 2011. A new mandate? Research policy in a technological society. In *Research report*. Durham, NC: Durham University.
- Lave, Rebecca, Philip Mirowski, and Samuel Randalls. 2010. Introduction: STS and neoliberal science. *Social Studies of Science* 40(5): 659–675.
- Ley, Sussan. 2016. *Media release: Appointments to the Australian Medical Research Advisory Board, 4 April 2016*. Canberra: Australian Government.
- Ley, Sussan. 2015. *Media release: Turning medical research into commercial reality, 7 December 2015*. Canberra: Australian Government.
- Mazzucato, Maria. 2014. *The entrepreneurial state: Debunking public vs. private sector myths*. London: Anthem Press.
- McKeon, Simon. 2014. How to spend those extra medical research dollars. 11 June 2014. *The Drum*. *Medical Research Future Fund Act 2015* (Cth). Available from <http://www.austlii.edu.au/>
- Miller, Georgia. 2017. *Science and politics in innovation policy: The making and remaking of nanotechnology*. PhD thesis. University of New South Wales: Sydney.
- Mirowski, Philip. 2011. *Science-mart: Privatizing American science*. Cambridge, MA: Harvard University Press.
- Mitra, James. 2016. *The new health bioeconomy: R&D policy and innovation for the 21st century*. Houndsmills: Palgrave Macmillan.
- Moreira, Tiago. 2013. *The transformation of contemporary health care: The market, the laboratory, and the forum*. Abingdon: Routledge.
- Moreira, Tiago, and Paulo Palladino. 2005. Between truth and hope: On Parkinson's disease, neurotransplantation and the production of the 'self.' *History of the Human Sciences* 18(3): 55–82.
- Morgan, Steve, Meghan McMahon, and Devon Greyson. 2008. Balancing health and industrial policy objectives in the pharmaceutical sector: Lessons from Australia. *Health Policy* 87(2): 133–145.
- MTPConnect. 2016. *Medtech, Biotechnology and pharmaceutical sector competitiveness plan, December 2016*. MTPConnect: MedTech and Pharma Growth Centre: Clayton.
- MTPConnect. 2020. *MTPConnect COVID-19 impact report 2nd edition: Sector impacts, the road to recovery and future pandemic preparedness, October 2020*. MTPConnect. Clayton: MedTech and Pharma Growth Centre.
- NHMRC. 2016. *National Health and Medical Research Council Annual Report 2015–2016*. Canberra: Australian Government.
- OBR. 2017. *Fiscal sustainability report, January 2017*. London: Office of Budget Responsibility.

- Ong, Aihwa. 2007. Neoliberalism as a mobile technology. *Transactions of the Institute of British Geographers* 32(1): 3–8.
- Owler, Brian. 2014. Restore the rebate cut. *Australian Medicine* 26.19(30 September 2014): 5.
- Peck, Jamie, Neil Brenner, and Nik Theodore. 2017. Actually existing neoliberalism: Chap. 1. In *The Sage Handbook of Neoliberalism*, eds. Damien Cahill, Melinda Cooper, Martijn Konings, and David Primrose, 3–15. Los Angeles, CA: Sage.
- Pollock, Neil, and Robin Williams. 2010. The business of expectations: How promissory organizations shape technology and innovation. *Social Studies of Science* 40(4): 525–548.
- Pusey, Michael. 1991. *Economic rationalism in Canberra: A nation-building state changes its mind*. Cambridge: Cambridge University Press.
- Richardson, Jeffrey. 2014. Can we sustain health spending? *MJA* 200(1): 629–631.
- Russell, Lesley. 2014. *Analysis of 2014–15 health budget: Unfair and unhealthy*. Sydney: Menzies Centre for Health Policy.
- Ryan, Matthew. 2015. Contesting “actually existing” neoliberalism. *Journal of Australian Political Economy* 76: 79–102.
- Saksena, Nivedita. 2021. Global justice and the COVID-19 vaccine: Limitations of the public goods framework. *Global Public Health*. <https://doi.org/10.1080/17441692.2021.1906926>.
- Schrecker, Ted, and Clare Bamba. 2015. *How politics makes us sick: Neoliberal epidemics*. Basingstoke: Palgrave Macmillan.
- Senate Community Affairs Legislation Committee. 2014. *Proof Committee Hansard: Estimates (Public), Monday, 2 June 2014*. Canberra: Commonwealth of Australia.
- Shaw, Sara, and Trisha Greenhalgh. 2008. Best research—for what? Best health—for whom? A critical exploration of primary care research using discourse analysis. *Social Science & Medicine* 66(12): 2506–2519.
- Slobodian, Quinn. 2018. *Globalists*. Cambridge, MA: Harvard University Press.
- SSAB. 2009. *The unsustainable cost of health care, September 2009*. Washington, DC: Social Security Advisory Board.
- Sunder Rajan, Kaushik. 2006. *Biocapital: The Constitution of Postgenomic Life*. Durham, NC: Duke University Press.
- Sunder Rajan, Kaushik. 2017. *Pharmocracy value, politics & knowledge in global biomedicine*. Durham, NC: Duke University Press.
- Thurbon, Elizabeth. 2012. From developmentalism to neoliberalism and back again? Governing the market in Australia from the 1980s to the present: Chap. 13. In *Developmental politics in transition: The neoliberal era and beyond*, eds. Chang Kyung-Sup, Ben Fine, and Linda Weiss, 274–295. Houndsmill: Palgrave Macmillan.
- Treasury. 2014. *Budget 2014–15: Budget Paper No. 2. Part 2: Expense measures, health*. Australian Government: Canberra.
- Tyfield, David. 2012. A cultural political economy of research and innovation in an age of crisis. *Minerva* 50(2): 149–167.
- Weiss, Linda. 2012. The myth of the neoliberal state: Chap. 1. In *Developmental politics in transition: The neoliberal era and beyond*, eds. Chang Kyung-Sup, Ben Fine, and Linda Weiss, 27–42. Houndsmill: Palgrave Macmillan.
- Williams, Simon, Paul Martin, and Jonathan Gabe. 2011. The pharmaceuticalisation of society? A framework for analysis. *Sociology of Health and Illness* 33(5): 710–725.
- Winslade, Steve. 2014. The medical bioeconomy. *Australian Life Scientist* July/August: 4.

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