Journal of Economic Behavior and Organization 241 (2026) 107378

Contents lists available at ScienceDirect

Journal of Economic Behavior and Organization

journal homepage: www.elsevier.com/locate/jebo

Markets and New Industrial Policy: Systemic directionality or polycentric evolutionism?

Bryan Cheang [a,*], Mark Pennington [b]

[a] London School of Economics, STICERD, 3rd Floor, Sir Arthur Lewis Building, 32 Lincoln's Inn Fields, London WC2A 3PH, United Kingdom
[b] Department of Political Economy, King's College London, Bush House, North East Wing, 30 Aldwych, London WC2B 4BG, United Kingdom

ARTICLE INFO

Keywords:
Industrial policy
Uncertainty
Evolutionary economics
Entrepreneurial state
Complexity
Structural transformation

ABSTRACT

Proponents of "new industrial policy" claim that systemic directionality can be imparted to market economies in ways recognising the epistemic challenges of complexity and uncertainty. This paper evaluates these efforts to reformulate industrial policy on a more epistemically modest, evolutionary footing and argues that they fail. We contend that the focus on "systemic directionality" undercuts the emphasis placed on evolutionary learning and the epistemic limitations of centralised authority. Proper attention to these problems implies *neither* a laissez-faire/market fundamentalist position *nor* one that favours "systemic directionality." Rather, it points towards a largely directionless environment where market-state entanglements arise through a polycentric evolutionism at multiple different scales.

1. Introduction

A long-standing complaint against the market economy is that it lacks a unifying purpose. Ethical critics suggest that markets alienate people from one another and that this alienation can only be remedied by a common mission that requires active promotion by states. Economic critics maintain that the lack of directionality in market systems leads to short-termism and a failure to invest in longer-term innovations that hold the key to sustained economic progress. The latter perspective is reflected in the resurgence of arguments for states to lead structural transformation through industrial policy to overcome economic stagnation, socio-economic inequality, and anthropogenic climate change.

Scholars in the Hayekian-evolutionary tradition have long emphasised the complexity and non-linearity of socio-economic phenomena where actors, private and public, face multiple and interrelated uncertainties (Knight, 1921; Kirzner, 1979; Potts, 2000; Hodgson, 2019a; Dold and Lewis, 2022). This perspective has cast doubt on state-led planning, whether the comprehensive planning of old, or recent proposals for "techno-socialism" (see Lavoie, 1985/2016; Boettke and Candela, 2023; Lambert and Fegley, 2023). Nonetheless, "new industrial policy" theorists draw explicitly on evolutionary arguments, making the case for an activist state that mitigates uncertainty by pursuing systemic directionality. Juhasz et al. (2024: 238), for example, argue for an approach that steers the direction of innovation while recognising that "knowledge about the location and magnitude of market failures is widely dispersed," and that "government faces substantial uncertainty" (see also Rodrik, 2009). Similarly, Mariana Mazzucato proposes a "systemic directionality" that addresses economic stagnation, inequality and climate change while acknowledging that these problems are "wicked" and "cannot be solved in a linear way," requiring experimentation and evolutionary learning, through a "wide portfolio

* Corresponding author.
E-mail addresses: b.cheang@lse.ac.uk (B. Cheang), mark.pennington@kcl.ac.uk (M. Pennington).

https://doi.org/10.1016/j.jebo.2025.107378
Received 3 August 2025; Received in revised form 7 November 2025; Accepted 3 December 2025
Available online 10 December 2025

approach" (Mazzucato, 2021: 53, 154).

This paper argues that the new industrial policy paradigm is inconsistent with the concepts on which it draws. The apparent recognition of the need for evolutionary learning is undermined by the commitment to "systemic directionality" or a "mission-oriented" stance, which expects states to *lead* structural transformation.[1] Far from mitigating uncertainty, systemic directionality may at best shift uncertainty to another level, and at worst, stultify the required processes of social learning or reflexivity. While we highlight advantages for markets not fully incorporated by the new industrial policy paradigm, the evolutionary position we favour *does not* imply a "market fundamentalist" stance. Market exchange requires institutions, rules, and standard-setting arrangements that may include hierarchical action, some provided by or involving states. Nonetheless, given the prevalence of uncertainty, governance institutions should embrace a polycentric evolutionism that minimises directional efforts to shape the emergent outcomes arising from the interactions of diverse public *and* private actors.

The paper's contribution can be summarised as follows. First, it assesses how thoroughly the "new industrial policy" has incorporated epistemic problems and evolutionary insights into its proposals. New industrial policy proponents aim for economic governance to be "reflexive". By this, they mean that it should allow actors to learn from their successes and failures and those of others, and to foster an attitude of self-criticism and openness in the face of uncertainty. They recognise that economic development is a highly complex process that cannot be managed by markets or states alone (Hausmann and Rodrik, 2003), favouring instead a dynamic learning relationship *between* government and the private sector (Mazzucato, 2021).

In response, we show that new industrial policy faces an intractable dilemma: on one hand, the desire for experimentation to cope with uncertainty; and on the other, the privileging of bureaucratic missions to "shape markets to fulfil a purpose" (Mazzucato, 2021: 21). Although its proponents emphasise epistemic challenges (see Hausman and Rodrik, 2006; Aiginger and Rodrik, 2020), they maintain that the case for "radical change" is "overwhelming," and that "only government has the capacity to steer the transformation on the scale needed" (Mazzucato, 2021: 21). This ambition must "not only catalyze but also direct growth", thus "redesigning the direction of the economy from the ground up (Mazzucato and Rodrik, 2023: 4, 35). We contend that new industrial policy advocates cannot have it both ways. They cannot claim epistemic humility while advocating ever more ambitious structural transformations.

Second, we suggest that a properly evolutionary approach implies support *neither* for "market fundamentalism" *nor* for state-driven "systemic directionality." Rather, it points towards a meta-level process of evolutionary competition that allows for *parallel* rather than *serial* knowledge processing about uncertain institutional combinations and re-combinations between markets, states and civil society. This perspective, which we call "polycentric evolutionism", though favouring competitive markets, does not specify the precise balance between public and private resource allocation and the place for institutional hybrids. It requires a framework of general rules allowing the institutional mix to arise through a largely directionless and competitive process rather than one that pursues "systemic directionality" (see Hasnas 2024 for similar analyses). Though states cannot avoid imparting some level of direction over those they govern, political actors informed by a polycentric evolutionism will strive to maintain ample scope for *counter-directional* forces to emerge in both the private and public sectors.

The paper is structured accordingly: Section one elucicates the multiple challenges of uncertainty faced by state-directed development models as emphasised by the Hayekian-evolutionary tradition. Section two outlines the core tenets of "new industrial policy". Section three presents a critical evaluation of the new paradigm. Section four develops the case for polycentric evolutionism as an alternative to *both* market fundamentalism and the systemic directionality of mission-oriented industrial policy.

2. Hayekian evolutionism and the epistemic problems of industrial policy

The most significant arguments against industrial policy are associated with the Hayekian-evolutionary tradition. Hayek (1967) makes a critical distinction between "simple" and "complex" phenomena and the implications thereof for attempts to control or guide socio-economic systems – a distinction now incorporated in the burgeoning literature on uncertainty and evolutionary economics (see Hodgson, 2019a, chs. 7 & 8). Simple phenomena contain relatively few variables and ones that relate to each other in linear fashion, such that an observing intelligence can comprehend their connections through a predictive stimulus-response model. Complex phenomena contain many more elements and ones that interact through non-linear processes that cannot be observed synoptically by an overarching mind. While it may be possible to understand the principles allowing complex phenomena to develop patterned relationships, it is not possible to predict in detail their character. Outcomes are emergent phenomena that are greater than the sum of their parts (Harper and Lewis, 2012). Logically, they cannot be comprehended in their totality *either individually or collectively* by the relevant parts (see Page, 2010: 6–7).

In complex social phenomena, non-linearity and uncertainty arise from the creativity of human agents, with diverse responses to socio-environmental conditions reflecting the changing mental models of multiple individuals and organisations—models irreducible to those of a representative or average actor. Lachmann's analysis brings out two dimensions of this uncertainty. First, there is uncertainty about which of the different subjective mental models will prove most accurate or well-adapted in confronting an unknown, though perhaps imaginable, future. Different individuals will respond differently to the same data, and with entrepreneurial *outliers* often generating *unexpected* margins of change (Lachmann, 1943, 1956, 1986/2020).

Second, there are additional problems of uncertainty arising from *interdependencies* between subjective expectations, as actors must

[1] In this paper, we use the terms "systemic directionality", "mission-directionality", "mission-directed governance" interchangeably, which refer to the application of state capacity to lead society-wide structural transformation through industrial policy. The "entrepreneurial state" is the name given by Mariana Mazzucato to such a mission-oriented state.

make judgements about how others in the social environment will respond to their circumstances. The latter understanding has parallels with Keynes' analysis of "beauty contests" in financial markets, where investors base their own decisions on how they believe others will choose. For Lachmann, instead of converging on a stable equilibrium of representative expectations, the diverse attempts of actors with different interpretive frameworks to second-guess others will lead to a variety of shifting outcomes rather than a stable equilibrium. This applies equally to people's responses to Keynesian policy measures that seek to "stabilise" market expectations such that the latter are unlikely to succeed, except perhaps by chance.

These epistemic conditions mean that individual or corporate actors operate under radical or "Knightian" uncertainty, where they often "do not know what they do not know", where surprises abound and where they must respond reflexively to changing circumstances which cannot be grasped in their totality or predicted ex-ante on probabilistic lines (Knight, 1921). Predictive modelling can inform short-term decisions, but successful medium to longer-term forecasting requires knowledge of future-shaping factors before their emergence (Lachmann, 1986/2020).

This analysis underpins the epistemic-evolutionary case for predominantly market institutions. A market economy, based on rules of private property and contract, allows an intricate ecology of individuals and organisations to experiment locally, communicating the results of their divergent mental models indirectly to others via prices and profit-loss signals (Smith, 2003). This argument does not imply, as critics sometimes suggest, that market prices provide a decentralised "full information" surrogate that leads to "optimal" outcomes (Stiglitz, 1994). Rather, it is the more modest claim that no central price-setting board can communicate and respond to as many subjectively perceived "gaps" as can multiple agents entering and exiting transactions in response to inherently "noisy" prices and market conditions (Lavoie, 1985/2016; Thomsen, 1992). Market institutions productively use *disagreements* and the uncertain implications of divergent mental models through an evolutionary process. With decentralised ownership and open entry, more or less cost-effective actions emerge inter-subjectively with profits and losses acting as a form of reflexive feedback, guiding entrepreneurs toward contingently "better" combinations and away from "inferior" ones, even without full comprehension of the reasons behind success or failure.

Seen in this light, the epistemic failings of comprehensive planning are twofold. First, under uncertainty, the centralisation or monopolisation of decision-making authority in the hands of state actors increases the risk of system-level failure, relative to more fragmented or decentralised systems where decisions are more diverse and where the consequences of error tend to be limited to a more localised scale. Second, regimes with a single/social owner of property cannot produce and be aware of an equivalent range of comparisons or counterfactuals and learn the results of these possibilities through profit-loss signals. As Lavoie (1985/2016: 160) explains:

> "Where capital ownership is common, all decision-makers are part of a joint project and thus cannot contend with one another in this manner. In such a case there can be no struggle between decision-makers in their willingness to risk 'their' capital in various uncertain avenues but rather 'societies' capital has to be consciously allocated in the 'better' ways. Lacking profit and loss signals these 'better' ways would simply be unknown."

The argument is not that markets better facilitate adaptation to "given" data, but that outside decentralised ownership and the rivalrous, parallel testing of ideas, much of the relevant data *would not even come into being*. It is the mutations generated by multiple acts of dispersed entrepreneurship that supply the gene pool of ideas on which evolutionary competition then operates.

Hayekian-inspired theorists also apply these arguments to non-comprehensive and piecemeal policies such as Keynesian stabilisation measures and industrial policies that favour specific firms, industries, or sectors (Lavoie, 1985/2016; Powell, 2005; Karlson et al., 2021; Cheang, 2022). Two interrelated claims underpin these critiques. First, states are ill-equipped to identify and manage unintended consequences. The failures of comprehensive planning reflect the cognitive inability of hierarchical public agencies to anticipate how subordinate actors will respond to centralised edicts. States are not unitary actors; decisions by one branch of government often generate *unexpected* responses from others. Industrial policy faces similar challenges, with central agencies unable to anticipate responses from subordinate public bodies and a complex ecology of private organisations acting independently, in concert, or with other public sector agencies. As Wagner (2016) explains, public policy is a "shell game" where politicians speak as if they are "in charge" of "the system," but where no one exercises the relevant control. Politicians can *affect* the environment but not *control* the strategic responses of other actors.

In the case of negative unintended consequences, these may include crowding-out where public funding replaces rather than adds to private investment, the failures of "white elephant" projects, and the spread of rent-seeking behaviour not only in sectors targeted to benefit from public subsidy, investment, or protection, but from parties in other sectors demanding equivalent treatment or new forms of intervention and support (Lerner, 2009; Wennberg and Sandstrom, 2022; Cheang, 2023; Henrekson et al., 2024).

Importantly, unintended consequences are not always negative. Industrial policy may generate positive spillovers for the wider economy, such as the Apollo Project and DARPA's investments in the internet. The Hayekian-evolutionary argument is not that such successes are impossible, but that they remain, at best, unintended by-products of fortuitous events. Thus, the internet in its current form was never envisioned by the US government, which initially invested only in technologies with limited military uses. Key components like TCP/IP were initially designed for academic research, and the later commercialisation of these technologies through companies like Cisco and the creation of the World Wide Web by Tim Berners-Lee was not the result of government "steering" but arose from Schumpeterian entrepreneurship, which is largely impervious to top-down guidance (Mingardi, 2015; Henrekson et al., 2022). While federal defence spending contributed to these innovations, their eventual transformation into the commercial internet was an unintended consequence (Yerger, 2024). Significantly, a wide range of modern technologies today – and the longer history of technological progress – reflect disparate accidents whose *final combinatorial effects* could not have been foreseen (Jewkes, 1969; Landes, 1994; Aldrich et al., 2008; Koppl et al., 2023).

The difficulty of exercising synoptic control is further compounded by the challenge of evaluating ex-post, the net benefits and costs of specific policies. Even if positive outcomes follow their implementation, it is difficult for policymakers to *causally attribute* these successes to their actions. This problem is not due to the lack of empirical tools such as statistical cost-benefit techniques (see Juhasz et al., 2024: 228–232 for existing evaluations). Rather, the problem is that industrial policy practitioners do not possess the counterfactual knowledge needed for comparative evaluation. Outside a rivalrous process where they must bid for funds against those who understand the situation differently, they do not know the "opportunity cost of another industry's potential use of the resources" (Powell, 2005: 308). This problem is rooted in the *singular* nature of state action, where capital is appropriated from a multiplicity of private actors and where *only one* industrial policy is implemented in a jurisdiction, closing the evolutionary space for alternative investment paths to be pursued and for decision-makers to observe the outcomes of parallel paths (DeCanio, 2021; Holcombe, 2024). This recognition does not preclude government action, such as the provision of basic public goods or institutional rules that facilitate exchange, but it does imply that states should limit themselves to predominantly umpiring functions rather than becoming active players in the economic game.

3. Uncertainty, evolution and the new industrial policy

Contemporary industrial policy advocates believe the challenges raised by the Hayekian-evolutionary tradition do not fatally affect the case for greater governmental "steering". First, because markets themselves have epistemic weaknesses. Second, necessary interventions and reforms can incorporate piecemeal experimentalism and evolutionary learning into public governance.

The first of these propositions draws on Keynesian concerns that in conditions of Knightian/radical uncertainty market actors require a level of background confidence to act entrepreneurially, which may necessitate a "somewhat comprehensive socialization of investment" (Keynes, 1936, ch. 24). The mutations or innovations driving economic evolution may not come into being when entrepreneurs are paralysed by uncertainty over the compatibility of their investment plans with those of other actors. Even thinkers such as Hayek recognise that spontaneous orders such as the common law may become locked in evolutionary dead ends that may only be unlocked by centralised legislation (Hayek, 1982) - and similar structural lock-ins can block economic dynamism. Moreover, if the hierarchical directionality of corporate firms has some coordinative advantages over decentralised spot contracts (Coase, 1992), there is no principled reason on evolutionary grounds to assume that states might not have some coordinative advantages over private organisations in at least some domains (Nelson and Winter, 1985; Hodgson, 2019a).

These premises feed into contemporary proposals for an "entrepreneurial state" advanced by theorists such as Mazzucato, who argue that entrepreneurs are subject to "animal spirits," where the psychological fear of the unknown can lead them to stick with what they know, acting like timid "pussycats" rather than brave adventurers willing to engage in potentially transformative investments (Mazzucato, 2013: introduction). States must act as "meta-entrepreneurs," enabling private business activity by coordinating around a guiding star or focal point, marshalling social actors so they "all work symbiotically for a common goal" (Mazzucato, 2021: 205). Such activism mitigates uncertainty by providing the "systemic directionality"—or what Keynes called the "directive intelligence"—that the market lacks. Just as Polaris (the North Star) provides a crucial guidepost for navigators, so the entrepreneurial state must provide confidence-inspiring leadership in a sea of economic uncertainty.

Crucially, this systemic directionality does not imply a "one size fits all" approach. Governments can pursue several interrelated missions that preserve pluralism. Mazzucato's (2021) account, for example, outlines three different missions: a green new deal to address climate change, innovating for accessible public health, and narrowing the digital divide – and governments inspired by her approach, such as the current Labour administration in the UK, have also spoken of missions in the plural (Pannell, 2024). Moreover, within any given mission, governments can further sustain pluralism by pursuing a "wide portfolio approach," which, instead of picking winners, allows for an evolutionary process where "policies and strategies are viewed as provisional at the outset, to be continuously monitored and revised in light of outcomes" (Aiginger and Rodrik, 2020: 192).

A related, though distinct argument is that even the minimal provision of public goods and general rules that market liberals favour cannot be done in a purely neutral or directionless way. While provision of public infrastructure is often thought of as a "horizontal" intervention generally applicable to all, even such a seemingly neutral policy requires discretion. Bureaucrats will, for example, need to exercise judgement over where new railway lines will be built, and thus which specific communities stand to gain the most from proximity to them. Thus, "the idea that the government can disengage from specific policies and focus on providing broad-based support to all activities in a sector-neutral way is an illusion" (Hausmann and Rodrik, 2006: 24). The state is "doomed to choose." The question is not *whether* governments must intervene, but *how* they should, given that non-neutral discretionary intervention is unavoidable (Hausmann and Rodrik, 2006; Coyle, 2024).

If industrial policy, so understood, is inevitable, its proponents insist that while they cannot eradicate uncertainty, interventions can be designed to facilitate reflexivity and evolutionary learning in the face of such uncertainty. Contemporary social problems are acknowledged to be "wicked", complex, and resistant to simple solutions, thus requiring widespread experimentation (Mazzucato, 2021: 154). There is also recognition that successful breakthroughs and "existing patterns of specialization" are often "the consequence of historical accidents and serendipitous choices by entrepreneurs" (Hausmann and Rodrik, 2003: 616).

The turn to evolutionary concepts here is evident in the emphasis placed on discovery and adaptation. For contemporary industrial policy advocates, "picking winners" by arbitrarily distributing subsidies is questionable because "winners often come out of random evolutionary processes that are impossible to predict" (Bianchi and Labory, 2006: 25). They acknowledge that "details of the actual dynamics (of economic innovation) depend a good deal on the details of corporate strategies—and chance", which policymakers cannot easily plan for (Cimoli et al., 2020: 115). This evolutionary standpoint also rejects neoclassical constructions which assume that the relevant knowledge of economically optimal moves is pre-given either to market agents or to policymakers charged with correcting

"market failures," or that informational problems are reducible to the search costs associated with finding information which is nonetheless known to be available—much as one might search for a book on a library shelf. On this view, to act effectively, a nation must experiment across multiple possible lines of specialisation to generate or produce knowledge about the relevant opportunity costs which are not pre-given or searchable. Thus, "there is great social value to discovering that cut flowers, soccer balls, or computer software can be produced at low cost, because this knowledge can orient the investments of other entrepreneurs" (Hausmann and Rodrik, 2003: 605). More explicitly, Mazzucato argues that a theory of innovation "needs to be nested in a theory of learning, experimentation and adaptation to uncertainty" (2021: 178).

This stress on experimentation and adaptive learning is also reflected in proposals for industrial policy design. Apparently, industrial policy must be reframed "as a process, without a preconceived list of sectors and policy instruments" (Rodrik, 2009: 18). Such an "evolutionary perspective on policy must consider adaptation," whereby "which policy is best in which environment will emerge from experimentation and trial and error" (Mazzucato, 2016: 147). This necessitates a government infrastructure that is nimble, agile, and dynamically evolving in response to changes in the wider environment (Kattel et al., 2022).

A key implication of this evolutionary framing is the avoidance of an excessively top-down approach. Traditional industrial policy has picked winners and sought to "correct once and for all market failures" (Bianchi and Labory, 2006: 24), using a fixed set of incentives such as subsidies, targeted protectionism, and public investment, with governmental agents adopting an "arm's length" relationship vis-à-vis the private sector in a manner insufficiently attentive to the potential for government failures. By contrast, contemporary industrial policy theorists embrace the need for the private and public sectors to play *complementary* roles, where governmental actors can learn from private entrepreneurs as well as provide the confidence-inspiring systemic directionality the latter are thought to need.

This reflexive approach means that policy instruments and objectives are less predetermined. Rather than having a singular focus on manufacturing, for example, contemporary industrial policy is ostensibly also concerned about services, and even non-economic goals such as addressing the climate emergency (Altenburg and Rodrik, 2017). It moves beyond an emphasis on targeted subsidies to incorporate a broader range of "customised public services". Importantly, it envisions an ongoing series of dynamic and collaborative relationships with private firms to obtain their voluntary buy-in and elicit valuable information (Juhasz et al., 2024: 235–237).

Relatedly, industrial policy defenders highlight the importance of reforms to the internal and external environment of bureaucracies. In the former instance, "what matters more in a complex and uncertain situation is the rationality of the decision procedure (determined largely by the organizational structure) rather than the substantive rationality of individual decisions" (Chang, 1996: 34). This focus on internal reforms has inspired scholars to identify the practices instrumental to the apparent success of East Asian industrial policy—such as reducing information asymmetries within public organisations, soliciting information from private firms, and carefully evaluating government assistance to ensure incentive alignment between principals and agents (Chang 1996: 35–37). The concept of "conditionality" is also stressed. Structuring conditionalities in exchange for public support is necessary to ensure that private actors do not capture it for their objectives but are incentivised to meet public objectives (Mazzucato and Rodrik, 2023). This focus on organisational structures is further reflected in the demand to instil "agile stability," where the reflexivity and adaptability of the bureaucracy determine how effective they are in creating public value (Kattel et al., 2022).

With respect to the external environment, reflexivity requires that public bodies are configured in a *decentralised or networked manner*. Ricardo Hausmann and Dani Rodrik express this best when they describe the need for "more network-like arrangements that may deliver what is required without any single node of the network being fully aware of all the things that are going on at any point in time" (2006: 35). Similarly, Mazzucato (2016: 146–147) invokes the concept of the "developmental network state," arguing that *decentralised* networks of public agencies will be in a position to intervene more effectively by learning from the experiences of multiple private and public actors while providing the directional intelligence that "neoliberal governance" lacks.

4. The epistemic dilemma of new industrial policy: uncertainty, mission-oriented governance and the networked state

The foregoing arguments have been deployed by numerous scholars to challenge the perceived dominance of "market fundamentalism." It will be our contention, however, that these arguments are based on deeply incompatible claims. The suggestion that contemporary challenges require structural transformations that can only be secured through the directional intelligence of public agencies stands opposed to the stated need for epistemic humility, reflexivity, and a more networked model of policy formulation. In this section, we argue that a consistent commitment to reflexivity and evolutionary learning counts *against* efforts by governments to provide directional intelligence. In the subsequent section, we contend that while striving for pure directional neutrality is chimerical, far from expecting a convergence around a "public purpose", an evolutionary approach implies that governments should *promote challenges* to whatever implicit or explicit directionality is embedded in the status quo. The latter does not imply "market fundamentalism" but points towards an environment of "polycentric evolutionism."

4.1. Mission-oriented government, uncertainty and reflexivity

Whether it comes in older or newer garb, common to *all* industrial policy theorising is the need for "structural transformations", such as the movement of economies up the value-chain to secure productivity leaps, the creation of totally new comparative advantages, or a change in the direction of innovation (Monga and Lin, 2019; Oqubay, 2020; Juhasz et al., 2024). These structural transformations are thought to be impeded by market failures reflecting uncertainties that lead to an underproduction of necessary entrepreneurial investments (Hausmann and Rodrik, 2006; Stiglitz, 2017, 2019; Wade, 2019; Mazzucato and Rodrik, 2023).

The problem with this theoretical construction, however, stems from its treatment of uncertainty. In Keynesian vein, uncertainty is

understood to reflect the atomisation of market agents and their incapacity to anticipate how others will act without the provision of some central guiding star (Mazzucato, 2013: introduction). As Mazzucato puts it:

> "This view, of business not as tigers and lions, but as pussycats means that the State is not only important for the usual Keynesian countercyclical reasons stepping in when demand and investment is too low – but also at any time in the business cycle to play the role of real tigers. Nowhere is this truer than in the world of innovation – where uncertainty is so high." (2013: introduction)

Yet, this characterisation fails to realise that uncertainty does not stem primarily from atomised decision-making but from the fact that the *subjective mental models of agents differ and will continue to so differ*. All economic agents must "filter" seemingly "objective" events through their own mental models (Lachmann, 1943). This ideational heterogeneity therefore reflects the power of subjective agency and entrepreneurial imagination and is not an inhibitor of that agency and imagination.

As such, attempts to provide greater "certainty" or "direction" through the specification of a mission can only shift the uncertainty elsewhere. Market actors, as well as multiple agents in the public sector, may disagree with the chosen direction of travel, believing that other missions should be pursued instead. In the face of such disagreement, there will be uncertainty over how the actors in question will respond strategically to the relevant measures and how these responses might compare to those generated from alternative mission commitments. While there is always a possibility that the provision of a guiding star might coordinate people on what turns out to be a beneficial path, there is a concomitant possibility that the provision of a mistaken directionality might lead people off a collective cliff. The literature on "Big Players", for example, suggests that far from reducing uncertainty and increasing private confidence, mission-directed action by public agencies may increase uncertainty because in addition to judging the likely actions of other private actors, entrepreneurs must also second-guess what public agencies will do (Koppl, 2002). They must, for example, anticipate whether governments will abandon certain mission commitments that appear to be "failing" or come to a view about the likely consequences of governments sticking doggedly like Mazzucato's "tigers" to a mission they believe might be misguided.

It is precisely the relative lack of systemic directionality in "free markets" that counts in their favour *because* of uncertainty over what the direction of travel should be and where the source of failure may lie. The elementary point here is that the opportunity costs of unchosen missions are subjective, and that replacing the pluralistic pursuit of individual ends with one where "all work symbiotically for a common goal" (Mazzucato, 2021: 205) does not increase certainty over outcomes. Thus, having documented the positive effects of various industrial policies, new industrial policy scholars themselves acknowledge that "a lingering question with much of the current work is its limited ability to speak to economy-wide counterfactuals" (Juhasz et al., 2024: 231). In our view, however, this ex-post knowledge problem is not merely a "lingering question" but the *central* problem afflicting industrial planners, and why a sensitivity to radical uncertainty and complexity warrants a rejection of centralised mission commitments in favour of bottom-up experimentation within an evolutionary paradigm (Morçöl, 2012; Colander and Kupers, 2016). The case for "free markets" so understood is not that externalities or coordination failures are absent, but that they allow for rival ideas about how to address these problems to be tried out simultaneously. A liberal market regime institutionalises a form of reflexivity akin to conditions of scientific experimentalism by allowing for the *parallel processing of multiple trials and projects* rather than a process of serial experimentation where only one trial is conducted at any given time (Polanyi, 1951; DeCanio, 2014).

Now, new industrial policy theorists insist that they do not seek to close down such ideational heterogeneity, speaking of *plural* missions. The implicit assumption is, however, that the missions in question are not mutually incompatible or contradictory, for if they were, this would count against the suggestion that governments must provide systemic directionality to counter the allegedly paralysing uncertainty arising from the conflicting missions and expectations of decentralised market actors. Yet there is little reason to believe that "faster economic growth" missions are *necessarily* compatible with "sustainability" or "national security," or that these missions are compatible with "reducing inequalities." The complementarities and incompatibilities between these various missions will depend on complex responses to the policies introduced, reflecting the subjective interpretations and strategies of countless socio-economic agents – responses that cannot be anticipated synoptically in advance of their emergence.

The previous point underscores the fundamental dilemma for the new industrial policy paradigm, which claims to incorporate evolutionary learning but privileges state structures as the primary sites for this to occur (see Cimoli et al., 2020). Theorists such as Mariana Mazzucato and Dani Rodrik insist that in pursuing systemic directionality, states must show determination in the face of resistance to the missions they pursue while simultaneously demonstrating reflexivity. A reflexive stance, however, requires a willingness to *abandon* parts of a mission in the face of entrepreneurial or political challenge from those with divergent goals and expectations, or none. Yet, to the extent that these challenges are allowed, the ideal of mission-directionality will be compromised because it reintroduces the very problem that the entrepreneurial state claims to solve: namely, paralysing *uncertainty arising from the lack of a mission commitment*.

Note, the above problem also raises questions about the compatibility of systemic directionality with competitive democratic procedures. If rival political parties can offer alternative visions or overturn those of incumbent governments, this generates uncertainty about the longevity of any given set of investments. The thrust of Mazzucato's argument rests on her claim that "the current state of the typical instruments used by governments, such as taxation, fiscal policy and monetary policy, is *rudderless*. There is *no systemic directionality* towards de-financialization or sustainability" (2021a: 24, emphasis ours). Yet, to provide the relevant directionality would require circumscribing the scope for challenge by granting authority to agencies effectively insulated from political and market pressure (Cheang, 2024). As noted above, this would itself generate a form of systemic uncertainty over the possibility that the direction picked by the relevant Big Player agencies might be mistaken.

The foregoing tension exists both with respect to allowances for the mission (the end) being chosen and over the means used to achieve it – or what Mazzucato refers to as a "wide portfolio approach" within a state-chosen "direction" (Mazzucato, 2021: 53). Allowing too much competition or disagreement over means may undermine systemic directionality as might allowing the existence of

multiple but potentially contradictory mission commitments or ends. Moreover, allowing experimentation with means may also lead those concerned to reflect on the value of the very ends to which they have been directed. As Delmotte and Dold (2022) have shown, ends themselves are often *revised* in the process of experimentation with rival means, to the point where the uncertainty that "systemic directionality" is supposed to lessen simply re-emerges elsewhere.

4.2. Reflexivity and the networked state

The points raised thus far reveal serious inconsistencies between the twin goals of systemic directionality and the incorporation of ideational pluralism or heterogeneity. Similar tensions surface in the suggestion that industrial policy can be implemented through a networked and decentralised state allowing for reflexivity. From an evolutionary standpoint, there is no incoherence in suggesting that public policies should be conducted in a fragmented, decentralised manner that permits local experimentation across multiple jurisdictions and fosters "open architecture" and "self-organisation" (Hausmann and Rodrik, 2006). Even socialism, if conducted on a more localised and modest scale, may be compatible with a wider liberal order of market experimentalism (Hodgson, 2019b). The question we raise, however, is whether these proposals for a networked and decentralised state allow for anything resembling what might credibly be referred to as industrial policy. There are several issues to consider.

First, if a decentralised or networked industrial policy is favoured, then this seems to be premised on an attempt to replicate the parallel experimentation and knowledge processing facilitated by market competition - but *without* the conditions of open entry and the generation of profit-loss signals that characterise liberal market structures. To the extent that, for example, an innovation bureaucracy occupies a singular or monopolistic position from which to implement policy X for adoption within a given jurisdiction, the social system will be restricted to *serial* experimentation. If it is to benefit from *parallel* learning, where multiple organisational experiments, whether in production, grant giving or talent spotting, are conducted simultaneously, this implies conditions of open entry that mimic those where competitive enterprises, such as venture capital funds, learn from the successes and failures of their rivals. It is the relative dispersal of decision-making authority in open markets that lowers the costs of adaptation to new circumstances through a process of competitive entry and exit, allowing failed adaptations to be shut down relatively speedily. Under radical uncertainty, markets cannot eliminate the possibility of systemic failure, but their dispersal of authority may reduce this likelihood *relative* to regimes lacking conditions of openness.

Second, to the extent that the characteristics of networked market structures are replicated, this would seem to have the same destabilising effects on the commitment to "mission-directionality" explicated previously. If policymaking authority is parcelled out to separate jurisdictions that enjoy meaningful independence from others, then their mutual interactions will likely produce emergent effects that no single industrial policymaking entity could anticipate. Such a directionless industrial policy would not seem to be one worthy of the name. Recall that the very definition of industrial policy entails the "transformation of the structure of economic activity in pursuit of some public goal" and to get actors to "act in ways that are consistent with the intended direction of structural change" (Juhasz et al., 2024: 216), also called "systemic directionality". To the extent that pluralistic governance structures are introduced, centrifugal forces that pull away from the centre will be fostered. Understandably, Mazzucato expresses frustration at what she sees as the "rudderless" model of neoliberal governance (Mazzucato, 2021: 24). Uncoincidentally, former European Central Bank chief Mario Draghi recently unveiled plans for a "new industrial strategy", which criticises existing industrial policies for *insufficient* central coordination, and calls for further alignment on a supranational, EU-wide level (European Commission, 2024).

Mazzucato explicitly condemns existing policymaking for being too modest, limited to passively "fixing" market failures (2021: 31–35). She recommends an *ambitious* industrial policy, which is antithetical to any claim to recognise the value of decentralised experimentation. After all, "the more ambitious the goals of industrial policy are, the less government knows about the techniques available to solve them" (Aiginger and Rodrik, 2020: 202). Insofar as she values decentralisation, Mazzucato appears to favour a "branch-plant" model where the entrepreneurial state *directs* the network from a "super-nodal" point – a model that promises to attain "agile stability". Yet, for any such agency to "steer" network development in this manner would seem to vitiate the merits of "open architecture and decentralisation." It grants a "gods eye view" to the central agency when in a genuinely open and fluid network structure, *no agency* may be able to anticipate where the actions of a network's constituent elements will or should lead. In other words, the advocacy of states *leading* the direction of structural change stands in opposition to the evolutionary paradigm it appeals to, where adaptations are contingent on random events and constantly changing environments. Put simply, there is no "systemic directionality" in evolution, so an approach seeking to institutionalise such directionality is incompatible with a properly evolutionary stance.

Third and relatedly, taking seriously the evolutionary paradigm means questioning "structural" industrial policy narratives premised on the belief that the "networked" character of many socio-economic problems requires that changes to the relevant "structures" are *collectively led or shaped* by big players. These usually involve states acting in strategic alliances with central banks and large corporate actors to overcome collective action and coordination problems. This "branch plant" model fails to appreciate the role of micro-level adaptations across complex resource bundles, which give rise to *endogenous* processes of structural change. The metaphor of an economic "structure" obscures what is, in fact, an *unstructured*, yet *contingently coordinated* network of heterogeneous factor inputs which can be recombined in complex and disparate ways. Accordingly, the capital structure is a complex web of production inputs including non-physical human capital and various intangible ideas, expectations and techniques arising from subjective entrepreneurial judgements (Lachmann, 1956; Lewin, 1999, Lewin, 2014; Lewin and Baetjer, 2015). Importantly, it is the exercise of *active imagination* by these entrepreneurs that communicates micro-level shifts in the relevant structure towards changing consumption and investment patterns through the price system, and which can trigger endogenous structural change across partial, but overlapping perspectives (see Stein and Storr, 2024).

Pointing out that such change is riddled with coordination problems does nothing to explain how centralised "steering" will

improve the outcomes of a bottom-up, competitive and largely directionless evolution. Crucially, the knowledge required to overcome collective action problems is not given to any single actor. Instead, it may emerge as entrepreneurs build various networks of contingently connected agents, which then form the environment necessary to generate knowledge of complementary investment possibilities and build the confidence required to launch new plans. This knowledge is extremely difficult to transfer and is not subject to "free riding", precisely because much of it is derived from non-priced activities, such as creating network relations with suppliers, logistics operators, consumers, and other entrepreneurs in complementary markets, as well as building various forms of social or cultural capital (Mathews, 2006). Although actors may learn from their competitors by imitating their successes, the capacity to *apply* the relevant knowledge effectively is gained through experience and, at least initially, is only available to those working in specific cultural or organisational networks. Since much of the knowledge is tacit and routine-specific, the knowledge relevant to processes of structural transformation is rarely, if ever, a collective good in the neoclassical sense of the term (see Polanyi, 1966). Instead of requiring sudden leaps from one set of routines to another, "structural change" can occur almost imperceptibly from many incremental shifts within rival or competing networks. Importantly, this argument does not preclude public agencies from participating in these networks. However, it does suggest that such agencies are not uniquely positioned to guide or, still less, "steer" the networks concerned.

Finally, the entrepreneurial state theory is based on an asymmetric analysis of private and public actors. Following Karl Polanyi, it is suggested that a "free market" does not exist because markets are always embedded in rules, norms and institutions that enable them to function effectively (Chang, 1996; Mazzucato, 2016). Mazzucato, for example, writes that "markets are not the outcomes of individual decision-making but of how each value-creating actor is governed - including the government itself" (2021: 20). Market actors are not "free" contractors but are always '"embedded' in rules, norms and contracts affecting organizational behaviour, interactions and institutional designs" (Mazzucato, 2021: 20).

New industrial policy advocates are surely right to reject a neoclassical "institution-free" conception of markets or what Oliver Williamson (1975) describes as an "in the beginning there were markets" standpoint. In our view, they are similarly correct in the judgement that market agents are not atomised competitors, but ones governed by cultural routines. Nonetheless, they fail to recognise that this emphasis on embeddedness cuts in *both* directions and does not give priority to governmental actors in shaping the institutional environment. While market agents are embedded in a framework of rules often originating from a non-market arena, it is simultaneously the case that government agents are embedded in a network of rules and technologies that often originate from a non-government arena. We might describe entrepreneurs, state officials, and civil society associations as being *mutually embedded* and *irreducibly entangled* in ways that make it difficult to cleanly demarcate from whence any directionality or shaping derives (Wagner, 2016). *All* agents are embedded in complex evolutionary conditions where the "blind are leading the blind". This is why the evidence on the effectiveness or otherwise of industrial policy is so equivocal, and why for every apparent success story for "systemic directionality" there are multiple examples of failure. In this sense, there is no more likelihood that any specific industrial policy is likely to succeed in shaping institutions in what turns out to be a beneficial direction than there is to suppose that any given entrepreneurial venture in business will generate profits**.** New industrial policy, however, which starts with an apparent emphasis on complexity and embeddedness, somehow grants a superior capacity to public agencies to "steer" institutional rules and entanglements in a favourable direction.

5. Rules, directionality and polycentric evolutionism

If the emphasis on "systemic directionality" is in tension with an evolutionary political economy, then what kind of governance might be more compatible with such a political economy?

In our view, rejecting new industrial policy does not imply endorsing a market fundamentalist position. Though broadly liberal market institutions address many of the epistemic challenges arising from complexity, advocates of industrial policy are right to emphasise that even a minimal government stance focused on general rules and dispute resolution cannot be conducted in a purely neutral manner. Similarly, we concur with Hausmann and Rodrik (2006) that public goods/infrastructural provision cannot be purely neutral and is likely to favour some groups or sectors over others.

Nonetheless, the mere fact that some directionality is unavoidable and that a purely general approach to policymaking is impossible does not imply that the scope for this should be enlarged. That there is indeterminacy in demarcating what counts as a "general" or a "particular" rule does not render it impossible to observe when states take on a qualitatively different role from that of an umpire. This would certainly be the case if states were to embrace Mazzucato's suggestion that governments should change "the relationship between public and private sectors, and between them and civil society, *so they all work symbiotically for a common goal*" (Mazzucato, 2021: 205, emphasis ours). What new industrial policy theorists appear to be suggesting is that because states are "doomed to choose", they should lean into this very fact.

In our view, however, the opposite conclusion follows. Far from leaning into directionality, it is precisely because of the risks associated with its institutionalisation that states should *lean against* it. If the concern for reflexivity and evolutionary learning is taken seriously, it is counterproductive to expect state officials to expand the scope of their decision-making to require even more discretion, and for them to *lead* the course of structural transformation. One may event grant that in today's landscape of heavily entangled political economies where it is hard to discern any clear boundary between the public and the private, that states will inevitably exceed the minimalist framework of public goods provision and dispute resolution favoured by classical liberals such as Hayek - yet still appeal to an evolutionary regulative ideal where the relevant government actions are structured *against* directionality.

Specifically, an approach fostering what Hausmann and Rodrik (2006) refer to as "open architecture and self-governance" would strive to inject islands of *counter-directionality* at multiple levels to challenge any implicit or explicit biases within the status quo. This

implies a "polycentric evolutionism," which recognises that precisely because institutional rules are never neutral that no such practices should be immune from competitive challenge, and no agency should exercise a monopoly of rule experimentation. Such analysis points to a form of public governance that facilitates, or at least does not strive to block, competitive challenges to incumbent centres of power (Aligica et al., 2019). A world of polycentric evolutionism is one where rules and governance structures are pluralistic, and while there may be asymmetries of power between these structures, no attempt is made to enforce a monopoly over all others.

Consider in this light the implications of this perspective for money and banking. All contemporary states supply currency, and central bank decisions to expand or contract the money supply may influence inflation in ways favouring certain sectors through Cantillon effects. Strong network effects also make it likely that only one or a small basket of currencies would prevail if money were privately supplied. Nonetheless, if governments lean into their role in supplying currency by attempting to instil confidence through the suppression or outlawing of private alternatives, they may increase the risk of systemic crisis should their chosen monetary policies prove mistaken. By contrast, a government informed by a polycentric evolutionism would not use being "doomed to choose" to prevent others from choosing differently. It would *lean against* its inevitable directional bias by embracing competition as a source of reflexivity. Given the huge incumbency bias of government-backed currencies, this would not be a neutral or "directionless" stance, but *relative* to the alternative, it may increase the possibility for better-adapted directions to emerge (Paniagua, 2018).

A similar argument applies to infrastructural provision and other public goods with potential network effects. State provision of these goods might favour certain sectors or regions. In the UK, for example, recent governments have touted infrastructural investments to improve northern city connections, fostering agglomeration economies and a "Northern Powerhouse" to boost productivity and reduce regional inequalities. A government leaning into this exercise of systemic directionality might take advantage of its hierarchical position in governance networks, using national land use planning rules to consciously hinder alternative private or public projects in the Midlands or South. By contrast, if it were informed by a polycentric evolutionism, it would recognise that while "doomed to choose," it should strive to afford the greatest possible latitude for alternative infrastructural/locational ideas to be tried and tested by rival decision centres in the private sector and local government.

Insofar as governments engage in policies exceeding conventional public goods functions, a primary implication of our argument is that these should also be conducted in a mode cutting against the directionality that comes with the unique powers governments possess. Rather than the branch plant model of the "developmental network state" favoured by Mazzucato, where subordinate or local agencies are "steered" from a central nodal point, it would favour a "subsidiarity model" where private entrepreneurs, local governments and public sector agencies have extensive autonomy. This would not preclude the emergence of higher-level networks or agencies that attempt to guide or steer development at a particular jurisdictional scale. It would, however, require that the networks in question form through a dynamic where the level of centralisation is arrived at by a fractured or decentralised process where lower-level units have the freedom to "contract up" to create the superior unit and retain the right to "contract-down" by seceding from the superior entity (Ostrom and Parks, 1999; Ostrom V., 1999). Since the appropriate market-state entanglements are context dependent and will shift with technological and cultural-social innovations, this fracturing of authority would mean that, though governmental units are "doomed to choose", they can make these choices within a heterogeneous setting rather than monopolising attempts to change socio-economic rules. In other words, governments can, even if not resorting to a market fundamentalist approach, "plan for competition rather than plan against it" (Hayek, 1944). Planning for competition in this sense means governments acting *against* the inevitability of their own directional biases.

Finally, where a central government agency retains a monopolistic nodal position, it might pursue organisational procedures which have a greater potential to destabilise whatever directional biases exist in the status quo. In the context of scientific advice, for example, instead of trying to present a unified picture of scientific opinion, it might consider multiple perspectives on, for example, public health challenges and provide a forum for contestation so that decision-makers can be aware of this pluralism before any decision is made (Koppl, 2021). Similarly, in debates over the balance between climate change adaptation and mitigation or the costs of renewable versus non-renewable energy, it would solicit proponents from multiple standpoints while also requiring transparency over funding sources and possible conflicts of interest. One of the primary reasons to be wary of mission-oriented industrial policies is that they seem more likely to crush pluralism. To be coherent, a mission-oriented government must place society on something approaching a permanent war footing that prevents "too many" alternative visions from seeing the light of day. While this suppression might be necessary in emergencies, it is precisely the closing down of ideational pluralism in such contexts that means they should be the exception, not the rule.

It might be objected that this approach is excessively vague in refusing to draw clear-cut boundaries for the sphere of competitive markets relative to public policy and state structures. In our view, however, this vagueness is an unavoidable aspect of embracing an evolutionary political economy. Most contemporary political economies are complex entanglements of private, civil and public action and while open markets based on a high level of contracting discretion for private agents have important epistemic advantages which we have articulated here, an evolutionary approach cannot deny that some institutional hybrids between private and public as well as hierarchical forms of public governance may be well adapted in certain socio-economic niches.

This raises interesting questions about the role of a truly decentralised and directionless public sector and its entanglements with private markets. The reliance on compulsory taxation means that even decentralised public sector networks and their collaboration with private actors may not be as open to entrepreneurial challenge as may equivalent private structures lacking these powers. Nonetheless, the possibility that certain collective action or coordination problems may not be addressed adequately without the existence of tax-financed public bodies cannot be denied. It remains unclear, however, what actions might be taken and at what jurisdictional level to facilitate evolutionary learning over where the relevant boundaries may lie. We cannot explore further here the advantages and disadvantages of different possibilities for injecting this counter-directional competition into existing private-public entanglements. Rather, this paper explicates why all such entanglements should remain open to challenge rather than being

subject to processes that resist competition in the name of "mission commitment" or "systemic directionality". Put differently, new industrial policy scholars curtsy to Darwin but bow to Descartes.

6. Conclusion

This paper has considered the implications for the new industrial policy literature of an evolutionary political economy sensitive to the epistemic challenges of complexity and uncertainty. While it can never dispense with public discretion, a policy framework informed by evolutionary principles should not prioritise "systemic directionality". Unless they are willing to abandon the idea that states should be privileged in leading structural transformations, new industrial policy proponents need to recognise they are working against the implications of the evolutionary perspective they have appealed to. One cannot direct an evolutionary process from within. One cannot claim to wander, but be determined to steer. Evolution is *unstructured*, and any attempt to impose direction upon it is conceptually flawed.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgement

We thank the anonymous reviewers and the editor for their constructive comments and suggested improvements to our argument.

Data availability

No data was used for the research described in the article.

References

Aiginger, K., Rodrik, D., 2020. Rebirth of industrial policy and an agenda for the twenty-first century. J. Ind., Competition Trade 20, 189–207. https://doi.org/10.1007/s10842-019-00322-3.
Aldrich, H.E., Hodgson, G.M., Hull, D.L., Knudsen, T., Mokyr, J., Vanberg, V.J., 2008. In defence of generalised Darwinism. J. Evol. Econ. 18 (5), 577–596. https://doi.org/10.1007/s00191-008-0110-z.
Aligica, P., Boettke, P., Tarko, V., 2019. Public Governance and the Classical-Liberal Perspective: Political Economy Foundations. Oxford University Press, New York.
Altenburg, T., Rodrik, D., 2017. Green industrial policy: accelerating structural change towards wealthy green economies. In: UN Environment. Green Industrial Policy - Concept, Policies, Country Experiences. UN Environment, pp. 1–21.
Bianchi, P., Labory, S., 2006. From "old" industrial policy to "new" industrial development policies. In: Bianchi, P., Labory, S. (Eds.), International Handbook on Industrial Policy. Edward Elgar, Cheltenham, UK, pp. 3–27.
Boettke, P., Candela, R., 2023. On the feasibility of technosocialism. J. Econ. Behav. Organ. 205, 44–54. https://doi.org/10.1016/j.jebo.2022.10.046.
Chang, H.-J., 1996. The Political Economy of Industrial Policy. Palgrave Macmillan, London.
Cheang, B., 2022. What can industrial policy do? Evidence from Singapore. Rev. Austr. Econ. https://doi.org/10.1007/s11138-022-00589-6.
Cheang, B., 2023. Subsidy entrepreneurship and a culture of rent-seeking in Singapore's developmental state. Stud. Int. Comparat. Dev. 60, 111–141. https://doi.org/10.1007/s12116-023-09413-z.
Cheang, B., 2024. Why mission-directed governance risks authoritarianism: lessons from East Asia. J. Inst. Econ. 20. https://doi.org/10.1017/S1744137424000316.
Cimoli, M., Dosi, G., Yu, X., 2020. Industrial policies, patterns of learning, and development: an evolutionary perspective. In: Oqubay, A., Cramer, C., Chang, H.-J., Kozul-Wright, R. (Eds.), The Oxford Handbook of Industrial Policy. Oxford University Press, New York, pp. 93–124.
Coase, R., 1992. The institutional structure of production. Am. Econ. Rev. 4, 713–719. https://www.jstor.org/stable/2117340.
Colander, D., Kupers, R., 2016. Complexity and the Art of Public policy: Solving Society's Problems from the Bottom up. Princeton University Press, Princeton.
Coyle, D., 2024. State and markets: not whether but how. In: Henrekson, M., Sandstrom, C., Stenkula, M. (Eds.), Moonshots and the New Industrial Policy: Questioning the Mission Economy. Springer, Cham, pp. 31–41.
DeCanio, S., 2014. Democracy, the market, and the logic of social choice. Am. J. Pol. Sci. 58 (3), 637–652. https://doi.org/10.1111/ajps.12072.
DeCanio, S., 2021. Efficiency, legitimacy and the administrative state. Soc. Philos. Policy 38 (1), 198–219. https://doi.org/10.1017/S0265052521000285.
Delmotte, C., Dold, M., 2022. Dynamic preferences and the behavioural case against sin taxes. Constitut. Polit. Econ. 33, 80–99. https://doi.org/10.1007/s10602-021-09328-8.
Dold, M., Lewis, P., 2022. F.A. Hayek on the political economy of endogenous preferences: an historical overview and contemporary assessment. J. Econ. Behav. Organ. 196, 104–119. https://doi.org/10.1016/j.jebo.2022.01.019.
European Commission, 2024. The future of European competitiveness – a competitiveness strategy for Europe. https://commission.europa.eu/document/97e481fd-2dc3-412d-be4c-f152a8232961_en.
Hayek, F.A., 1944. The Road to Serfdom. Routledge, London.
Hayek, F.A., 1967. The theory of complex phenomena. In: Hayek, F.A. (Ed.), Studies in Philosophy, Politics and Economics. Routledge, London.
Hayek, F.A., 1982. Law, Legislation and Liberty. Routledge, London.
Harper, D., Lewis, P., 2012. New perspectives on emergence in economics. J. Econ. Behav. Organ. 82 (2–3), 329–337. https://doi.org/10.1016/j.jebo.2012.02.004.
Hasnas, J., 2024. Common Law Liberalism. Oxford University Press, New York.
Hausmann, R., Rodrik, D., 2003. Economic development as self-discovery. J. Dev. Econ. 72 (2), 603–633. https://doi.org/10.1016/s0304-3878(03)00124-x.
Hausmann, R., Rodrik, D., 2006. Doomed to Choose: Industrial Policy as Predicament. Kennedy School of Government. https://drodrik.scholar.harvard.edu/publications/doomed-choose-industrial-policy-predicament.
Henrekson, M., Kärnä, A., Sanandaji, T., 2022. Schumpeterian entrepreneurship: coveted by policymakers but impervious to top-down policymaking. J. Evol. Econ. 32 (3), 867–890. https://doi.org/10.1007/s00191-022-00761-y.
Henrekson, M., Sandström, C., Stenkula, M., 2024. Moonshots and the New Industrial policy: Questioning the Mission Economy. Springer, Cham.
Hodgson, G.M., 2019a. Evolutionary economics: Its nature and Future. Cambridge University Press, Cambridge.
Hodgson, G.M., 2019b. Is socialism feasible? Towards an Alternative Future. Edward Elgar, Cheltenham, UK.

Holcombe, R., 2024. Engineering is not entrepreneurship. In: Henrekson, M., Sandstrom, C., Stenkula, M. (Eds.), Moonshots and the New Industrial Policy: Questioning the Mission Economy. Springer, Cham, pp. 43–60.
Jewkes, J., Sawers, D., Stillerman, R., 1969. Sources of Invention. Macmillan, London.
Juhasz, R., Lane, N., Rodrik, D., 2024. The new economics of industrial policy. Annu Rev. Econom. 16, 213–242. https://doi.org/10.1146/annurev-economics-081023-024638.
Karlson, N., Sandström, C., Wennberg, K., 2021. Bureaucrats or markets in innovation policy? – a critique of the entrepreneurial state. Rev. Austr. Econ. 34, 81–95. https://doi.org/10.1007/s11138-020-00508-7.
Kattel, R., Drechsler, W., Karo, E., 2022. How to Make an Entrepreneurial State: Why Innovation Needs Bureaucracy. Yale University Press, New Haven, CT.
Keynes, J.M., 1936. The General Theory of Employment, Interest and Money. Macmillan, London.
Kirzner, I.M., 1979. Perception, Opportunity, and Profit: Studies in the Theory of Entrepreneurship. University of Chicago Press, Chicago.
Knight, F.H., 1921. Risk, Uncertainty and Profit. Houghton Mifflin, Boston and New York.
Koppl, R., 2002. Big Players and the Theory of Economic Expectations. Palgrave Macmillan, London.
Koppl, R., 2021. Public health and expert failure. Public Choice 195, 101–124. https://doi.org/10.1007/s11127-021-00928-4.
Koppl, R., Gatti, R.C., Devereaux, A., Fath, B.D., Herriott, J., Hordijk, W., Kauffman, S., Ulanowicz, R.E., Valverde, S., 2023. Explaining Technology. Cambridge University Press, Cambridge.
Lachmann, L., 1943. The role of expectations in economics as a social science. Economica 10 (37), 12. https://doi.org/10.2307/2549651.
Lachmann, L., 1956. Capital and its Structure. G. Bell & Sons, London.
Lachmann, L., 1986/2020. The Market as an Economic Process. Mercatus Center, Arlington VA.
Lambert, K.J., Fegley, T., 2023. Economic calculation in light of advances in big data and artificial intelligence. J. Econ. Behav. Organ. 206, 243–250. https://doi.org/10.1016/j.jebo.2022.12.009.
Landes, D.S., 1994. What room for accident in history? Explaining big changes by small events. Econ. Hist. Rev. 47 (4), 637. https://doi.org/10.2307/2597710.
Lerner, J., 2009. Boulevard of Broken Dreams: Why Public Efforts to Boost Entrepreneurship and Venture Capital Have Failed - and What to Do About it. Princeton University Press, Princeton.
Lavoie, D., 1985/2016. National Economic Planning: What is Left?. Mercatus Center, Arlington VA.
Lewin, P., 1999. Capital in Disequilibrium: The Role of Capital in a Changing World. Routledge, London.
Lewin, P., 2014. Hayek and Lachmann. In: Garrison, R., Barry, N. (Ed.), The Elgar Companion to Hayekian Economics. Edward Elgar Publishing, Cheltenham, UK, pp. 165–194.
Lewin, P., Baetjer, H., 2015. The capital-using economy. In: Boettke, P., Coyne, C. (Eds.), Oxford Handbook of Austrian Economics. Oxford University Press, New York, pp. 145–163.
Mathews, J., 2006. Strategising, Disequilibrium and Profit. Stanford University Press, Redwood City, CA.
Mazzucato, M., 2013. The Entrepreneurial State: Debunking Public vs. Private Sector Myths. Anthem Press, London.
Mazzucato, M., 2016. From market fixing to market-creating: a new framework for innovation policy. Ind. Innov. 23 (2), 140–156. https://doi.org/10.1080/13662716.2016.1146124.
Mazzucato, M., 2021. Mission Economy: A Moonshot Guide to Changing Capitalism. Penguin Books, London.
Mazzucato, M., Rodrik, D., 2023. Industrial Policy with Conditionalities: A Taxonomy and Sample Cases. UCL Institute for Innovation and Public Purpose. https://discovery.ucl.ac.uk/id/eprint/10196231/1/Mazzucato_industrial_policy_with_conditionalities_a_taxonomy_and_sample_cases.pdf.
Mingardi, A., 2015. A critique of Mazzucato's entrepreneurial State. Cato J. 35 (3), 603–625.
Monga, C., Lin, J.Y-F, 2019. The Oxford Handbook of Structural Transformation. Oxford University Press, New York.
Morçöl, G., 2012. A Complexity Theory for Public Policy. Routledge, London.
Nelson, R., Winter, S., 1985. An Evolutionary Theory of Economic Change. Harvard University Press, Harvard MA.
Oqubay, A., 2020. The theory and practice of industrial policy. In: Chang, H.J., Oqubay, A., Cramer, C.J., Kozul-Wright, R. (Eds.), The Oxford Handbook of Industrial Policy. Oxford University Press, New York.
Ostrom, E., Parks, R., 1999. Neither Gargantua nor the land of Lilliputs: conjectures on mixed systems of metropolitan organisation. In: McGinnis, M. (Ed.), Polycentricity and Local Public Economies: Readings from the Workshop in Political Theory and Policy Analysis. University of Michigan Press, Ann Arbor.
Ostrom, V., 1999. Polycentricity (Part 1). In: McGinnis, M. (Ed.), Polycentricity and Local Public Economies: Readings from the Workshop in Political Theory and Policy Analysis. University of Michigan Press, Ann Arbor.
Page, S.E., 2010. Diversity and Complexity. Princeton University Press, Princeton.
Paniagua, P., 2018. Money and the emergence of knowledge in society. Rev. Soc. Econ. 76 (1), 95–118. https://doi.org/10.1080/00346764.2017.1423511.
Pannell, J., 2024. Mission-driven government: What has Labour committed to? March 5 Institute for Government. https://www.instituteforgovernment.org.uk/explainer/mission-driven-government-labour.
Polanyi, M., 1951. The Logic of Liberty. University of Chicago Press, Chicago.
Polanyi, M., 1966. The Tacit Dimension. University of Chicago Press, Chicago.
Potts, J., 2000. The New Evolutionary Microeconomics: Complexity, Competence and Adaptive Behaviour. Edward Elgar Publishing, Cheltenham, UK.
Powell, B., 2005. State development planning: did it create an East Asian miracle? Rev. Austr. Econ. 18 (3–4), 305–323. https://doi.org/10.1007/s11138-005-4015-x.
Rodrik, D., 2009. Industrial policy: don't ask why, ask how. Middle East. Dev. J. 1 (1), 1–29. https://doi.org/10.1142/S1793812009000024.
Smith, V.L., 2003. Constructivist and ecological rationality in economics. Am. Econ. Rev. 93 (3), 465–508. https://doi.org/10.1257/000282803322156954.
Stein, S., Storr, V., 2024. Understanding Ludwig Lachmann's Economics. Cambridge University Press, Cambridge.
Stiglitz, J., 1994. Whither socialism? MIT Press, Cambridge MA.
Stiglitz, J., 2017. Industrial policy, learning and development. In: Page, J., Tarp, F. (Eds.), The Practice of Industrial Policy: Government-Business Coordination in Africa and East Asia. Oxford University Press, New York, pp. 23–39.
Stiglitz, J., 2019. Structural transformation, deep downturns, and government policy. In: Monga, C., Lin, J.Y-F. (Eds.), Oxford Handbook of Structural Transformation. Oxford University Press, New York, pp. 35–44.
Thomsen, E.F., 1992. Prices and Knowledge. Routledge, London.
Wade, R., 2019. Catch-up and constraints in the twentieth and twenty-first centuries. In: Oqubay, A., Ohno, K. (Eds.), How Nations Learn: Technological Learning, Industrial Policy, and Catch-Up. Oxford University Press, New York, pp. 15–37.
Wagner, R., 2016. Politics as a Peculiar Business: Insights from a Theory of Entangled Political Economy. Edward Elgar Publishing, Cheltenham, UK.
Wennberg, K., Sandström, C., 2022. Questioning the Entrepreneurial State: Status-Quo, Pitfalls, and the Need for Credible Innovation Policy. Springer, Cham.
Williamson, O.E., 1975. Markets and Hierarchies: Analysis and Antitrust Implications. Free Press, New York.
Yerger Jr., R., 2024. Analyzing the effectiveness of state-guided innovation. In: Henrekson, M., Sandstrom, C., Stenkula, M. (Eds.), Moonshots and the New Industrial Policy: Questioning the Mission Economy. Springer, Cham, pp. 95–108.