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**Innovation as a Political Process of Development: Are Neo-Schumpeterians Value Neutral?**

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**Abstract:** Technological innovation has been one of the fastest growing areas of economics scholarship and one where history and philosophy have played important roles. Since the reconstruction of Joseph Schumpeter’s view of innovation as a driver of capitalist development and the subsequent formation of the national innovation systems (NIS) theory in the early 1990s that can be described as neo-Schumpeterian, there has been a continuous attempt to explain innovation in social-scientific terms. However, much of this has positioned innovation as a value-neutral process. We argue that such value-neutrality requires closer analysis because the neo-Schumpeterian thinkers do appear to acknowledge that capitalism itself is an uneven, dynamic process. The relationship between the vital dynamism of such analysis of technological change and the context of its description of power relations and value deserves further attention. Under what conditions can systemic interactions between institutions and actors function as universal frameworks? Can the theory of innovation be abstracted from its social and political bases? This paper aims to redefine innovation as a predominately political process that is both historical and contextual, and thus draw out its implications for economics and development politics. The paper suggests some preliminary steps toward a more critical approach to innovation scholarship as part of a wider, heated ongoing debate about economics’ own relevance and contestation about its methods.

**Keywords:** Values, innovation, Joseph Schumpeter, evolutionary economics, political economy of development
1. Introduction

Since the reconstruction of Joseph Schumpeter’s view of innovation as a driver of capitalist development (Schumpeter, 1983) and the subsequent formation of the national innovation systems (NIS) theory in the early 1990s (Lundvall, 1992; Nelson, 1993; Freeman, 1995; Freeman and Soete, 1997; Edquist and Johnson, 1997; Edquist, 1997) – that can be aptly described as neo-Schumpeterian – there has been a continuous attempt to analyse innovation in diverse socio-economic contexts. However, as we will argue, much of this attempt has positioned the generation of new scientific knowledge and novel products as value-neutral processes, abstracting from ethical norms and moral and political values.

In this paper we emphasize that such value-neutrality requires closer analysis because the neo-Schumpeterian thinkers do appear to acknowledge that capitalism itself is an uneven, dynamic process of historical development. Precisely because of this acknowledgement, the relationship between the vital dynamism of such technological change and the context of its power relations and values deserves further attention. The paper suggests some preliminary steps toward a more critical approach to innovation scholarship as part of a wider, heated ongoing debate about economics’ own relevance and contestation about its methods.

It is worth recognizing that institutional scholarship on the economy and firms has always had sub-traditions that clearly situate agent action and social norms. Clearly, as Commons (1924) and later Penrose (1952) have pointed out from different vantage points, institutional evolution
involves a type of ‘artificial’ selection. The latter very much depends on power relationships between different human actors in economy and society (Kurz, 2018).

This implies that human action (individual and collective) and innovation in particular are intentional, guided not only by epistemic norms of ethics and fairness (e.g. coherence, simplicity, truth, etc.) and economic values and interests (e.g. use/exchange values, utility, materialism, cost/profit, etc.) but also by moral and political values and interests (e.g. freedom, equality, happiness, justice, etc.). Indeed, the importance of the latter set of values is recognised by an increasing number of scholars (e.g. Morgan 2015; Caldas et al 2006; Tsakalotos 2005; Davis 2003; Gigerenzer and Selten, 2001). Economics has always had traditions that well acknowledge that pure innovative and/or calculative behaviour is closely tied to values other than epistemic norms and economic values, and that neither markets nor innovation systems evolve spontaneously as value-free or neutral mechanisms. Rather they are embedded in value-bound social, political and cultural relations of power. This means that their evolution is driven by both value and power conflicts which move societies and institutions towards particular normative and political directions, including liberalism and neo-liberalism. It is clear the neo-Schumpeterian ‘School’ also reflects this awareness, and therefore several promising lines of enquiry about the gaps emerge. In this paper we consider two specific questions: under what conditions are systemic interactions between institutions and actors rendered potentially more universal? Can theories of technological innovation indeed be abstracted from their moral and political bases?

The remainder of this paper is structured as follows. Section 2 analyses value-neutral versus value-bound innovation. Section 3 critically places technological innovation as a social process that is driven by values and politics. Section 4 explains how value propositions about
innovation might be revealed. Section 5 redefines innovation in terms of history and context to provide more institutional embedding in development history. Section 6 concludes by summarising the argument of innovation as a social and political process, and its implications for economic development and revitalising innovation economics’ own relevance.

2. Value-Neutral versus Value-Bound Innovation

Some innovation scholars, apparently influenced by liberal and neo-liberal thinkers, including Hayek (1960) and Friedman (1962), have argued for a market fundamentalism in science and technology. Their arguments have been implicitly founded upon values of negative freedom (i.e. freedom from) and equality before the law (Berlin, 1969; Papaioannou, 2012). For them, public funding for scientific research and innovation projects ought to be withdrawn because the liberal state as such ought to remain neutral towards particular conceptions of the technological good, therefore also the economic and social goods. By contrast, some other innovation scholars, including Freeman (1982, 1987, 1995) and Perez (2002), have argued for state intervention explicitly founded upon values of positive freedom (i.e. freedom to) and substantive equality. In their view, cessation of public support to scientific research and innovation would have disastrous long-term consequences for both economic growth and social welfare in most countries because it is highly unlikely that free markets would compensate for the collapse of the state funding (see also Mazzucato 2014, Perez 2002 and Block and Keller 2011). Similarly, those focused on innovation systems view the state’s intervention as hinging on the complexity of market organization as well as how society shapes the contours of a public science (e.g. Mazzoleni and Nelson 2007, Nelson 1989).

While some earlier writings do claim a space on inequality and public policy (e.g. Nelson, 1977), the tenor is still quite optimistic about public research institutes and the prospects of
public policy redesign. As such, these studies are still quite distant from overt attention to inequality and access to essential goods and services, offering quite traditional roles for states and markets, while mounting some modest challenges to the conventional neo-Schumpeterian paradigm in other ways. Yet, this is in sharp contrast to scholars from or writings from developing country contexts, whose analytical enquiry is situated on the conditions under which technological learning and innovation has an emancipatory effect, with inequality and development at their core. In this article, we term these the “Fragmented Systems” institutionalists because they question the cohesion and the direction of systemic and structural change. In these debates, a strong counter has emerged questioning whether the myth of value-neutral innovation serves mainly to meeting the needs of rich winners in globalised markets. The institutional compass of these studies is not unique (after all, see Nelson, 1977), but they emphasize far more the challenge for the state to manage the institutional variety and coordinate the economy to these more, equitable ends (e.g. Srinivas 2012, 2018).

Firms are not necessarily the only agents. New models of innovative “pro-poor” products and services have emerged from the analysis of deliberate and value-bound efforts of human actors, firms, and political states to innovate, sometimes in conditions of scarcity with few of the supply-driven attributes or prerequisites laid out by neo-Schumpeterians focused on industrialised economies, and sometimes with counter-intuitive assumptions about systems and evolution (e.g. Arocena and Sutz 2003; Srinivas and Sutz 2008). Determinedly, these and other studies point toward many markets and complex regulatory choices and value-propositions for the state, the politics of technology transfer, and both structural as well as cognitive contexts for innovation (Srinivas 2012). The state in developing countries is required to handle many markets (the “market menagerie”, Srinivas 2012) with difficult political attendant questions of technological advance (Ibid.). Notably, scarcity-induced innovations and the typologies of innovation classes that follow are neither necessarily low-cost, nor rudimentary in scientific or engineering terms (Srinivas and Sutz 2008). Therefore, they push away also from traditional late industrial models and ‘catch-up’ frameworks which may be quite optimistic about the autonomy of the state and that hinge arguments on the supply capabilities of firms (Ibid.). In this sense, development-friendly and Schumpeter-friendly scholarship reflect scepticism not only about states and markets, but also about ‘value-free’ analyses in policy design.
Of course ‘innovation systems’ were also developed as a framework precisely to capture these multiple institutional and organisational configurations in society and to flag the ecosystems of learning in which innovation comes about. Differences in propositions and emphasis are therefore notable: the “Fragmented Systems” take especially seriously power, divergent evolutionary attributes and open-ended outcomes, and learning across a wide range of organisations and institutions, versus traditional neo-Schumpeterian scholars whom we term more “Cohesive Systems” optimists. The latter make different assumptions regarding the power of the state and the values of powerful agents, steering policy design in development politics, and the use of variation, selection, and retention, can seem vague and a-politicised, with the firms and routines rarely corresponding to actual development realities of power asymmetries and value conflicts (see the critique of suggested attention on ‘real firms’ that Penrose 1952 offers). Certainty, Cohesive System optimists differ in the way they approach the selection process, either focusing on selection occurring inside the firm (Dosi 1982, Bottazzi and Pindo 2013), or at the wider institutional context of markets (Saviotti and Metcalfe 1991)\(^1\)

While there are common frameworks of evolution and open-endedness shared by both groups, innovation problems may therefore need to be analysed more critically with particular political and moral values in mind e.g. innovation as a means to reduce unjust poverty and inequality. This implies taking account of the complex system of social and political relations at macro-level which has received partial attention already by neo-Schumpeterian thinkers (e.g. Freeman and Soete 1997; Lundvall 1992; Edquist 1997), who stressed that not only the market mechanism and firms (micro level) but also the state and politics (macro level) play key roles in innovation systems. As Freeman and Soete (1997: 14) state:

> The market mechanism can be useful technique for allocating resources in certain rather specific circumstances, but it has its limitations, so that the definition and implementation of social priorities for science and technology cannot be left simply to the free play of market forces …The political system is inevitably involved…

Yet, we could argue that this does not extend far enough into the “Fragmented Systems” camp on inequality and innovation. The challenge to liberalism and neo-liberalism is muted in the

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\(^1\) This point was made apparent to us by one of this journal’s reviewers. We would like to thank him/her for the contribution.
“Cohesive Systems” camp arguably because the focus on institutional change that has swept economics and political economy has alluded to value-propositions but left these themes underdeveloped and unchallenged about the power that coheres or fragments the system, or muddies its boundaries. Frameworks after all are explanations situated in some conditions: the proposition that the cognitive and social modes of engagement with the world shape our responses to it is hardly a surprise and is shared both by those writing about deep inequality and fragmented systems as well as those more focused on cohesive, functioning systems. Influential North (1989) asserts that institutions are the ‘rules of the game’ which has translated in many pieces of scholarship as relatively value-free structures and norms within which people economically participate. Yet North clearly acknowledges the complex relationship between growth and the institutional structures that humans create and their ‘mental models’ to react to the world in conditions of uncertainty. Seen in this way, institutional change’s connection to economic growth in the neoclassical, transactions cost world, is quite closely in line with the world of uncertainty of the neo-Schumpeterians and the heterodoxy that pervades evolutionary economics at large. Uncertainty provides the pivotal explanation in both approaches to situate for example, the innovator/entrepreneur’s approach to specific economic or technological problems.

Yet, if uncertainty and the ways in which people respond (especially innovators) are so important, then the Fragmented Systems institutionalists would point out that uncertainty as a concept must do far more work than the selective attention to costs or to problem-choice. Srinivas and Sutz (2008), for example, provide a heuristic that attempts to situate innovators in developing country contexts as creatures who are both cognitively located in uncertainty having to establish such mental models, and eventual routines as organizational creatures (similar to North’s agent, to the neo-Schumpeterian entrepreneur, or the Austrian homo-
economicus). But they are also structurally located, as innovators within a world of knowledge and technological innovations that are politically and economically uneven, channelled by states, geopolitics, and the policy priorities of specific places and historical periods. Therefore, during the import substitution industrialization phase, this innovator would have likely faced little uncertainty about (high) import tariffs for needed equipment, but deep uncertainty on other fronts, from pricing to monopoly strategy (especially as a private firm in a world of nationalized firms).

The cognitive dimension of innovation is fundamentally rooted in the socialization of problem-framing and -solving in what has been termed ‘conditions of scarcity’ which creates an ambience of considerable uncertainty in which agents innovate (Srinivas and Sutz, 2008.) As such, no cognitive explanation of institutional change is sufficient without a corresponding structural aspect of the problem. Simply put, developing countries are both developing in relative terms, but they are also developing within their own domestic institutional context. Development is not a function of relative catch-up alone but of deep domestic political change and social aspiration. While the two aspects of development are of course tied (e.g. import substitution industrialization is both a domestic political decision as well as an international trade and geopolitical position), juxtaposing industrialization as a relational and traded process within which innovation emerges, creates the institutional explanation more robustly as a political economy question within an environment for action in which the state is the dominant organization and institution instead of solely focused on the individual agent. The state however may be unable to coordinate the fragmented and unconnected systems into a cohesive one and specific types of policy arenas such as social policy or urbanisation policies might offer new opportunities (Arocena and Sutz 2003; Albuquerque 2007; Srinivas 2012, 2018). In
such a view, the evolutionary emphasis notably switches from supply alone as many cohesive systems scholars do, but also evolutionary aspects of demand (Srinivas 2018).

The systemic aspects of the economy can thus draw on cognitive and structural features for their essential scaffolding. In the health industry we find that cognitive and structural explanations can distinguish developmental processes e.g. how a Cuban innovator and policy-maker can jointly and successfully focus on Hib vaccine development versus the challenge of the ‘life-style’ medications from industrialised countries that have catered to export opportunities while detracting attention and policy focus from essential medicines. Yet, seen separately in cognitive or structural terms alone, we are unlikely to see the co-evolving mechanisms through which value priorities shape policies and incentives and/or lead individuals to certain problems. Thus, recognizing the systemic relatedness of cognitive and structural institutions and organizations, then provides an evolutionary explanation for changes in agent action over time, but equally technological learning of firms or evolution of national capabilities over time.

3. Innovation as a Political Process: Responding to Uncertainty

The irony is that the Cohesive Systems neo-Schumpeterians, mostly writing about industrialised economies or offering what Arocena and Sutz (2000) term ‘ex-post systems analysis’, have well recognized uncertainty and its potential. While both neoclassical and neo-Schumpeterian frameworks hinge on uncertainty and wisely use it to frame economic change, it is the neo-Schumpeterians who wield the importance of uncertainty to its fullest extent, revealing its ties to dynamic economic growth. Uncertainty and the response of firms to uncertainty sets apart able from inept entrepreneurs, but equally situates the bounds of problem-
framing and the development of active routines for learning. Uncertainty therefore provides the backdrop for learning through adaptation, and as such, creates the underlying basis for VSR i.e. variation, selection, retention. Indeed, as Geels and Schot (2016: 8) explain, there is ‘…initial variety, divergence and uncertainty [that] gradually gives way to convergence, stabilisation and … selection…’. But it might be insisted that this ‘convergence or stabilisation’ process is neither spontaneous nor automatic as neo-Schumpeterians seem to mistakenly believe. In addition, the selection of a dominant technology or other innovative product does not necessarily coincide with the development of a shared cognitive model or paradigm that remains in place until a new one get spontaneously selected. Rather, there are always competing cognitive models and some of them are in line with hegemonic moral and political narratives, succeeding to influence innovation policy and practice.

This is the point made repeatedly by what we term Fragmented Systems evolutionary scholars. What is clearly less developed however is who precisely shapes this context for uncertainty and how innovators respond to it. First, there are the usual attendant problems between ‘policy’ and ‘politics’ where policy is often well represented in neo-Schumpeterian analysis but not politics, often overlooking the importance of political feasibility of policy (e.g. R&D investment, innovation systems building, infrastructure, etc.), and concentrating only on technocratic evidence for specific policy measures and schemes. But such measures and schemes usually don’t get implemented unless they are in line with government’s existing political programme. Second, ‘innovators’ are not a given class of society, neither well-defined by religion, race, or even easily self-identified. An innovator is not born, arguably he/she is made by his/her society in a given historical period and within certain types of moral and political values within institutional change. The utility of the cognitive and structural interplay is that why innovators act the way they do can be complemented by why some emerge as
innovators, and then in turn why some problems are framed the way they are or accordingly solved. Least of all, as they argue, are innovators necessarily separate from ‘users’, nor should innovators be confused with R&D firms.

The above are not merely separate economic categorizations, they are social and political ones: a low-income innovator devising an entirely new way to store solar power is fundamentally a different actor from the R&D team of a large multinational firm studying the same problem. Similarly, in African pharmaceutical production, the context of inequality and values becomes routinely visible not only in the policy choices and occasional accountability frameworks for government, but also in the specific policy instruments for production as well as access to medicine (Mackintosh et al. 2016). As Vallas, Kleinman and Biscotti (2011: 74) stresses:

Industrial policy decisions are not value-free technocratic matters. To the contrary, whether ad hoc or systematically developed, these policies are premised on specific values and have broad social implications. Economic growth is not an adequate measure of the success of any policy.

It well could be argued of course that probing the neo-Schumpeterian context for values in the health industry is surely misleading because healthcare itself is so fraught with the human condition and the difficult ethical and moral dilemmas that patients, providers, and companies must face.

Indeed, Srinivas (2012, 2018) argues that it is precisely because of the character of the health industry and its co-evolutionary institutional triad of production, consumption, and delivery, that we can more rigorously distinguish its industrial policy from other industries such as
garments or automotive where value choices may be less stark in policy-making (but do exist). The health industry is not a simple equation of costs and benefits. What is technologically feasible is contingent on power relations, social choices, morality and politics; what is value-laden in turn is at least in part driven by the realm of what we perceive to be available or potentially so in terms of new technologies. Whether or not deaths or high morbidity due to malaria are morally and politically acceptable is driven by whether malaria vaccines are available, whether their solutions sit on shelves but have not been commercialized or otherwise deployed, whether bed nets or other preventative measures are available and affordable, or indeed whether malaria deaths are so routine and widespread that the issue remains invisible in plain sight exerting little political pressure for change. In fact, innovation as such raises new moral and political claims (Papaioannou, 2018), technological advance’s development impact is always contingent (Srinivas, 2012). For example, the production of new anti-malarial vaccine or the development of an innovative drug for childhood diseases immediately raises a new claim about their diffusion to global society and especially to those who need them most in developing countries. To put it another way, values and politics co-evolve with technical change and innovation (Papaioannou, 2011). In essence, this is co-evolution of normative and descriptive elements of the historical process of development of societies. Clear separation of these elements is impossible, given that one influences another.

With these observations in mind, we analyse two particular institutional, epistemological aspects of neo-Schumpeterian approaches to values. These are their emphasis on a) the systemic elements and b) the evolutionary features of the economy. When we signal that a policy priority should be reducing inequality or increasing access to medicines, or to low-income consumers, the values are broadly signified. Nevertheless, in political terms, this is too wide a value proposition because neither are the explicit steps clarified to these ends, nor is
there a way to separate the element of innovation at the heart of the proposition. For example, we may be able to reduce inequality with no details whatsoever, showing broad value positioning but the specific process argument absent. Second, an attempt to reduce inequality, even if laid out in detailed terms, may contain no reference to innovation as such.

4. How might value propositions about innovation be revealed?

We could tentatively push these gaps further. Neo-Schumpeterians – all of whom are fundamentally interested in innovation – must therefore have some way of connecting their arguments about innovation with a value claim of some sort. To the degree that such a claim is made explicit, we would argue for a value proposition existing; in its absence, we would state that the specific sub-group of neo-Schumpeterians is value-neutral (at least from textual analysis and interpretation).

It should be clear therefore, that the more we can differentiate amongst Cohesive Systems scholars and with their differences with Fragmented Systems evolutionary scholars, the more fine-grained the analysis can be about the types of value claims or their absence. For instance, some value chain analysts (Pietrobelli and Rabellotti, 2007; Kaplinsky and Farooki, 2010) have increasingly moved their research out of the domain from general value chain upgrading to an interest in how innovation in global value chains affects issues such as poverty at the “end” of the chain, and “below the radar” (Kaplinsky et al 2009). Another instance of global value chains research with an overt value proposition, is the interest between upgrading and innovation in a specific sector (say, shoe manufacture) and the impact of multiple protagonists on labour conditions (say, shoe factory sweatshops) (e.g. O’Rourke 2003).
Of course, in general terms scientific enquiry has been termed ‘value-free’ because it is not expected to mimic advocacy but rather develop along the lines of several principles. These include sound scientific reasoning, design, methods, and data collection efforts that rather than assume a proposition, tests its relevance (Tsakalotos, 2005). Consequently, labour impacts of shoe-manufacture (although an author may hope to improve labour conditions) would be studied by stating that the research enquiry takes the following general form “Under what conditions does innovation in heel structure of shoe design improve the health of workers?” and may assume that the glue used in the construction of shoe heels which are often toxic in large doses, could be phased out through some type of technological innovation and improved design. The scientific phrasing of the question implies that there may or may not be a way to improve labour conditions, but if there were, we would be able to identify them and reproduce the results closely. As such therefore, the neo-Schumpeterian researcher would have an implicit value proposition (better health of workers are a good thing) but the structure of the study itself is ‘pure research’.

Nevertheless, the researchers’ value proposition could be made more explicit by analysing the types of studies undertaken over time. Thus we see value chains research (or some researchers within this group) as always having had labour exploitation concerns at the centre of systematic research, while for others, upgrading *per se* ceases to be of interest for its own sake, and its specific relationship to a value (labour well-being, better environmental impact) becomes more overt. In this sense, of the evolution of value propositions themselves, we may have a more robust basis for differentiation among systems scholarship in evolutionary economics. Admittedly, this is not as clear in all classes of neo-Schumpeterian and evolutionary analyses.
For example, the study of the social life of wasps may always have been premised on the need to study cooperative behaviour because of the desirability of such behaviour in humans. Yet, many studies of this type remain with the proposition being implicit and hidden both at the level of the individual researcher and the level of sub-groups of studies over time. E.O. Wilson the ant biologist might be an example of someone who is fundamentally interested in the social behaviour of ants because of the benefits to ant society, but the bridge to his own value proposition that such social, cooperative behaviour is highly desirable in humans as well, has become more explicit over time and in the phraseology of his later studies (Oster and Wilson 1978, Wilson 2012).

We are interested in the analysis of evolutionary economists (and neo-Schumpeterians among them) who are inspired by such sociobiological assumptions and methods. Table 1 below attempts an early-stage classification of the differences among neo-Schumpeterian thinkers and their value propositions. At its simplest, the table offers a tentative classification of sub-groups of Cohesive and Fragmented Systems evolutionary scholars, especially with their attention to diverse actors and politics. It is hoped that further research can build on this table. Clearly, what brings together these neo-Schumpeterian scholars is their interest in systemic and evolutionary features of the economy. Both features, if in fact intertwined, would require some attention to how and why policy and politics change, especially why technological advances seem to make life more not less, complicated for access to medicines issues. Some scholars in GVC traditions do study poverty, however market mediated ‘upgrading’ through trade-induced

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2 Note that although not included here, non-Schumpeterian scholarship of development economists such as Albert Hirschman or Arthur Lewis, would likely also fall among Fragmented Systems scholarship and focus on inequality and public reform (Srinivas 2018). The table does not include other development political economists who had evolutionary elements to their work on technological change but were not Schumpeterians as such, including Alice Amsden or Sanjaya Lall.
effects is the primary concern, although some other institutional mechanisms of coordination are discussed. Similarly, the table could also engage with complexity theories as ways to organise power or evolution as strands (see Robert and Yoguel 2016).

Also, meso-level concerns in coordination, change, and information differences become the ‘binding glue’ for systems that connect fragmentary systems scholars with some cohesive systems socio-biologists and complexity scholars. (Amsden 1989, Lall 1992, also interested in the same issues mediated by the state).

Table 1: Neo-Schumpeterians and a graded matrix of evolutionary scholarship and value propositions

<table>
<thead>
<tr>
<th>Scholarship Category</th>
<th>Scholarship Example</th>
<th>Value Visibility</th>
<th>Innovation Protagonists</th>
<th>Clarifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Value Chains 1 (GVCs1) (e.g. Stephanie Barrientos, Gibbon and Ponte, Dara O’Rourke, etc.)</td>
<td>Skills; social protections and bonded labour; governance</td>
<td>High (for those working on labour issues in upgrading)</td>
<td>States, firms, workers, Standards and Trade</td>
<td>Least likely to self-identify as evolutionary scholars or neo-Schumpeterians</td>
</tr>
<tr>
<td>Global Value Chains 2 (GVC2) (e.g. Raphael Kaplinsky; Roberta Rabellotti; Carlo Pietrobelli, etc.)</td>
<td>Inequality and GVCs</td>
<td>Low (Becoming higher overall as more GVCs analysis steers toward innovation dynamics or addressing inequality in development processes)</td>
<td>Firms and their ecosystems, Standards and Trade</td>
<td>More likely to self-identify as evolutionary scholars or neo-Schumpeterians</td>
</tr>
<tr>
<td>Innovation Systems 1 (National)</td>
<td>NIS, social cohesion, user-</td>
<td>Moderate (Increasingly high in Globalics)</td>
<td>Innovation Systems, firms</td>
<td>Traditional neo-Shumpeterians</td>
</tr>
<tr>
<td>Innovation Systems</td>
<td>producer linkages, community of scholars. The early work of Freeman, Lundvall and Johnson on NIS was self-consciously embedded in the labour and social policies of W. and N. Europe.</td>
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</tr>
<tr>
<td>Innovation Systems 2</td>
<td>‘history-friendly’ methods; technological paradigms; growth dynamics of firms and industries (Richard Nelson may be the exception).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-biologists</td>
<td>‘Agents’, individuals, firms, free markets, IPRs. Some equations of power exist in terms of information asymmetries (Differences exist between generalized and universal Darwinism scholars)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPRU first generation (e.g. Chris Freeman, Carlota Perez, etc.)</td>
<td>Long-waves of technical change; structural transformation (High States, firms)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inequality, Innovation, and Development (e.g. Judith Sutz,)</td>
<td>Innovation and inequality; poverty and innovation; (High States, firms, non-profit organizations, non-state)</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Fragmented Systems Evolutionary Scholars

Neo-Schumpeterians: emphasizing complexity and spontaneity often using Hayekian terms of socio-biological evolution.
When VSR is invoked, scholars may bring in selection at different scales and units; some within firms, others within markets, or via policy or public administration processes. Protagonists differ in each case. For example, multiple case studies of the difficult political challenge for politicians and bureaucrats reveal the ugly fact that innovation in pharmaceuticals and biotechnologies does not necessarily reveal uneven redistributive priorities and key intermediaries (such as industry associations, international donors or NGOs) who shape the delivery and consumption dimensions (Shadlen 2009; Srinivas 2012, 2015; Mackintosh et al. 2016). If stores of well-supplied pharmacies and clinics are enjoined to deliver at affordable prices, than the global justice questions would not be quite so stark (see Papaioannou, 2011).

Thus, the real challenge is how best and if necessary for scholars to articulate each time the moral and political values by which the ordering of industrial priorities might occur. In innovation scholarship, this tension is splitting communities of scholarship loosely joined as ‘neo-Schumpeterian’ into camps more or less markedly focused on developing economies and especially on politics. ‘Bottom of the Pyramid’ (BoP) approaches for example, although clearly directed at an inclusive agenda (and as such a value-laden one), do so primarily through traditional instruments of finance and economic policy, and with relatively low regard to political tensions of redistribution. Srinivas (2018) argues that BoP approaches should be
differentiated from other ‘pro-poor’ innovation scholarship based on their assumptions about what drives demand. In fact, it might be said that if indeed a sustainable redistributive politics were possible, the ‘Bottom’ would have filtered upward to other areas and the ‘Pyramid’ would look less like one. When the Grameen Bank meets the BoP debate, the articulated values are to remove exploitation by middle men and to focus attention on design principles and credit terms amenable to affordable products, processes, and entrepreneurial ambitions.

The neo-Schumpeterian promise is the attention directed to the evolutionary dynamics of the business cycle that Schumpeter himself stressed. Yet, the momentum required for public benefit to be articulated in a political system may rest with many different stakeholders. In most developing country democracies, the politicians and bureaucrats play critical roles. If their interests and value judgements, certainly their political rhetoric does not join ‘innovation’ with ‘inclusion’ in a simple way, they will articulate the goals without the means. For instance, several countries have spoken out for affordable medicines, but only some of them have taken this battle into and beyond the Doha Round and its intellectual property priorities (Papaioannou, 2016). These countries include Brazil and South Africa. Similarly, Srinivas (2012, 2016) argues that Indian policy design for the health industry was a victim of its own industrial success over time, making health policy imperatives more difficult to foreground when private firms were successful. Yet domestic interventions are not always globally rewarded. While Brazil introduced regulations for the grant of compulsory licenses but was accused by the United States (US) and other developed nations of TRIPS violations, South Africa implemented TRIPS-compatible measures but these were challenged by multi-national companies (Correa and Matthews, 2011). Similarly, few countries have successfully juggled production of medicines with the political momentum to keep their costs low and the consumption/delivery dimensions in check (e.g. Japan, see Srinivas 2012). Similarly, Cuba
may have gone the farthest and longest in sustaining its institutional triad with clearly articulated values, but it has hardly done so by democratic means (Thorsteinsdóttir et al. 2004). India has perhaps gone the farthest in production measures as ‘Supplier to the World’ but hardly as a success story on its wider health redistributive agenda (Srinivas 2012, 2016.) and what many see as cooption of the state by the private sector (e.g. Madhavi 2006).

Seen in theoretical terms alone, the neo-Schumpeterian state is not pushed to the wall, neither to defend legitimate, corrupt or other political leaders, nor to explain its industrial investments (except by the traditional voting process we presume) or to suffer by retrenchment from one sector to another. In this respect, pre-2016 Brazil, swinging from political Right to Left, military rules to democracy, was able to build out a social policy mandate which has trumped other organizational and political priorities. Precisely because of the current corruption charges of the Rousseff government, a value analysis opportunity presents itself to understand what the new Left agenda can or should be for inclusive social policies. Because the corruption charges include deeply entrenched industrial and innovation stakeholders in the oil and gas sectors with industry and financial procedures (procurement, bidding, oversight, etc.), it would be impossible administratively and economically to separate the impact of public reform on industry from potential redistributive ambitions: energy for the poor, utilities reform, and spatial distribution. Of course, political economists who were not Schumpeterian in their methods well recognized the challenge of value-laden processes, and these were bundled usually under ‘reform’. Hirschman (1970) famously described the grey areas between exit, voice, and loyalty and the stickiness of public reform. He was not concerned with technological innovation per se, but recognized well the political legitimacy challenge for state actors to renegotiate their existing relationships with citizens and businesses alike.
5. Redefining Innovation in Terms of History and Context: the Myth of Universality

Thus, rather than treating existing and emerging patterns of technological innovation as socio-biological and value-neutral, we might re-define them as both historical and contextual patterns which embody moral and political values (Tsakalotos, 2005). This reveals both the political nature of innovation for development and debunks the myth of universal values and institutions. The reason being that even if we assume that people have the same more or less rational capacities and cognitive faculties in common, people exercise them differently in different historical times and circumstances. As has been argued elsewhere (Srinivas, 2012: 1), development as such ‘…is a menagerie that houses many institutional varieties – especially of states and markets’. More specifically, markets take different forms in different historical and political contexts. In some countries markets are absent and in some others they are underdeveloped.

Consequently, we should avoid using evolutionary theory to ignore history. Markets are not spontaneously created institutions which fail or succeed to deliver innovation-led growth and economic prosperity. Rather they are historically created through a complex process that involves social struggles, technological advance and the state. Indeed, as has been pointed out elsewhere (ibid: 2):

   Even when dysfunctional or outright malevolent, and despite its limitations and contradictions, the state (and its governments) is inevitably the most important planning institution in these economies.
The same also holds true for industrialised capitalist countries. An increasing number of economists and political scientists (Perez, 2002; Block and Keller, 2011; Vallas, et al, 2011; Lundvall, 2013; Mazzucato, 2014) now agree, the state has been the main driver of radical innovations with long-term effects for advanced economies and societies. Through industrial strategy and the formalisation of normative directions for national, regional and sectoral innovation systems, the state has been actively promoting technological change. According to Mazzucato (2013: 196):

…the mission-oriented investments … make up about 75 per cent of public sector investments in innovation in many advanced economies … Such missions, from putting ‘a man to the moon’ to developing the Internet (which was done through DARPA …) are driven not by the dynamics of the private/social ‘wedge’ but by direct objectives of government in question. Indeed, almost all general purpose technologies were fundamentally state funded’.

Since the 1980s, the moral and political justification of government objectives has been in terms of values of individual freedom and equality before the law, excluding egalitarian values of social justice. This normative framework is reflected in the introduction of a new IPRs regime that allowed new actors such as publicly funded universities and research laboratories to patent products of their research and transfer their patents to private firms in the form of exclusive licenses (Coriat, 2015). The Bayh-Dole Act of 1980 and the Orphan Drug Act of 1983 constitute major government interventions towards articulating such values into a legal framework for science, technology and innovation (Ibid)
Yet, such governments of the 1980s, including the Reagan administrations, seem to drive radical innovations despite their risky nature. The normative justification for this is often security of the neo-liberal state and its values of individual freedom and equality before the law (Block, 2011). The extension of such values to developing countries through the so-called ‘Washington Consensus’ and ‘Structural Adjustment Programmes’ has failed to deliver across a range of regions, including Latin America, Sub-Saharan Africa and Eastern Europe (Papaioannou, 2014), resulting in inequality that now poses a fundamental challenge to sustainable prosperity in the 21st century (Ince, 2014; Piketty, 2013). This top-down science and technology (S&T) based innovation despite its claims, in practice has been a value-laden arena and a major contributing factor to the growing divide between rich and poor (Chataway et al, 2014). Evidence suggests that how S&T based innovation is framed is a serious barrier to its usefulness in resolving major problems of social justice. ‘Mission-mode’ need not imply exclusively state-led, centralization or even hierarchy as vaccine history demonstrates (Wilson et al. 2007). Yet, often top-down innovation has been hierarchical in tackling major global challenges such as health, agriculture and energy, excluding important segments of the population, failing to address inequality and the potential for long-term socio-economic prosperity.

In response to supposedly value-neutral, yet hierarchical and exclusive, innovation that has been directed towards meeting the needs of rich winners in globalised markets, new models of innovative “pro-poor” products and services have emerged. These more inclusive models of innovation have not been spontaneous by-products of globalised markets but deliberate and value-bound efforts of civil societies and political states to innovate. While considerable attention in economics is given to scarcity of physical resources, much development use comes
from ‘scarcity-induced innovations’ in conditions of institutional, socio-economic, physical resources, and cognitive scarcity (Srinivas and Sutz, 2008: 132-133):

…scarcity-induced innovations (SII) emerge from at least four important characteristics. 

*Cognitive:* a) the canonical set of solutions can be relatively obscure and even absent from the mental landscape of the innovator, b) the innovator, even being aware of such set, is unable to use it and faces the need to address the problem differently.

*Institutional or physical:* lack of supporting organisations, laws, and technical instruments. *Socio-economic:* a) when problems affecting developing societies have not been tackled at all b) existence of policy biases or c) solutions available are unaffordable, and new searching avenues need to be pursued … *SII do not “scale up”*. Individual capabilities do not translate into appreciable transmissible means of knowledge. SII are, more often than not “encapsulated” innovations. They can be “locally strong” yet remain isolated.

These four characteristics of SII cannot be easily understood by those neo-Schumpeterian thinkers who conceive innovation in socio-biological and value-neutral terms. As has been already implied, in developmental contexts, mechanisms of variation, selection and retention (VSR) can and must be made more explicit because assumptions about firms and routines in economic theory rarely exist in the manner that such thinkers assume. Instead, there are pressing innovation problems which need to be addressed with particular political and moral values in mind e.g. reduction of unjust poverty and inequality through policies and plans designed to promote V.S,or R.
6. Conclusion

Neo-Schumpeterian thinkers are far from constituting a unified school of thought in innovation nor toward research about social priorities. This paper has shown that some of them tend to adopt seemingly value-neutral approaches, working within socio-biological frameworks of technological change and evolution, and tending to abstract from historical processes of moral and political value formation that have influenced the normative direction of innovation systems in developed and developing contexts. By contrast, others appear to embed history and values explicitly in their analysis of technological innovation, arguing for politics of industrial organisation and the state to be factors of generation of novel products and processes. For the latter neo-Schumpeterian thinkers, the direction of innovation or ‘systems’ is predominantly normative and political. By contrast, for the former neo-Schumpeterian thinkers the evolution of new technologies is a mostly blind and non-teleological natural process of development. In conclusion, it might be said that independently of approach, neo-Schumpeterians need to better explain emerging models of innovation. These models go beyond the classical notion of innovation as an evolutionary process based on individual entrepreneurship.

Certainly, it would be difficult, almost impossible, to separate clearly normative and descriptive elements of innovation. This is because both such elements are embedded in the historical process of evolution of human societies. What is clear is that technical solutions to innovation problems are morally and politically laden and not value-neutral. Also, it would be too quick to write off neo-Schumpeterian analysis as a large umbrella under which value-focused economics analysis is impossible or of one type. Neo-Schumpeterians offer a critical counter to a value-free proposition by neoclassical economics by at least recognizing the uneven
dynamism of the economy, and the importance of values and politics in the contexts of uncertainty and open-ended economic outcomes. The normative agenda for orthodox economics and its positivist ambitions in policy-design often argued for an implicit value offered by industry or innovation or of pro-market principles. This is a wide, long-standing debate not least of which for developing countries has included a charged political agenda on public sector dismantling from the Washington Consensus days. The assumed, narrow, behavioural standing of *homo economicus* in neoclassical economics leaves other economics approaches to values somewhat implicit and subdued, but nevertheless perhaps an improvement (see also Tsakalatos 2005). In part the advantage of the emphasis on uncertainty and open-endedness forces the marriage of political economy of late industrial development with overt evolutionary perspectives (Srinivas 2012). Furthermore, the sector-specific insistence from evolutionary and institutional scholars that industry dynamics matter, means that from health to gender, from ethics to markets, the clarifications of economic theory and policy become more visible (see also Culyer 1989; Hodgson 2000; Keita 1997). Agent-based modelling based on stricter sociobiological assumptions about evolution, offer the least clarification of values and sit between the Cohesive and Fragmented Systems scholars that the paper has used as a preliminary typology. Yet, ironically, the sociobiologists perhaps offer the greatest insights of the open-ended, systemic, and evolving economy. Their stripped-down models which build to greater complexity allow us some vantage points about whether we are essentially different as societies from those of wasps or bonobos, and whether we really wish to be or not.

If economics is to claim relevance and not succumb to *ad hoc* theory and methods convolutions simply to reinvent its orthodoxy, the discipline could usefully analyse the substantial body of existing innovation scholarship and its several strands laid out here. From the perspective of attempting a disciplinary self-reflection of history and philosophy, innovation scholarship for
evolutionary economics scholars can offer a powerful means to debate values and ethics as a substratum of its political economy foundations. To this end, the paper has offered some preliminary conceptual and methods discussion to study development and its further hypotheses and methods.

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