Change in and changing economics

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There is nothing more constant than change.

Heraclitus (535 BC)

The crisis consists precisely in the fact that the old world is dying and the new cannot be born. In this interregnum a great variety of morbid symptoms appear.

Gramsci (1971 [1930]): 276)

1 Change in economics: The issue of method

Change in economics has likely always been a subject of discussion in economics and political economy. That discussion may have languished in the first post-World War II decades when neoclassicism was ascendent and dominated economics, but the emergence of game theory, more recently behavioral economics, and a variety of other new fields and approaches in economics since the 1980s has re-invigorated interest in the subject so that now there are many views on it. Yet systematic investigation of what change in economics involves has advanced little. Change is clearly always on-going in any discipline, but when it is said there is or is not 'change in economics' something more significant beyond this is usually intended. How, then, can this more significant sort of change be identified and explained? I begin by discussing the issue of method for analyzing change in economics.

One method employed in making such arguments involves inventorying sets of 'new' concepts and theories and comparing them to inventories of 'old' concepts and theories. There are two problems with this method. First, what may appear to be 'new' theories and concepts may simply

be ‘old’ concepts and theories that have been modified or revised. How do we identify genuinely ‘new’ concepts and theories? Second, supposing we can say what is ‘new’ in economics, when are there enough ‘new’ concepts and theories in a field to say there is change in it? Fields could have many ‘new’ concepts and theories but as a whole remain largely unchanged.

The underlying problem with the inventory method, I suggest, is that its comparison of ‘new’ and ‘old’ contents depends upon and implicitly makes use of judgments about the state of a field as a whole, but when the starting point is inventories of concepts and theories these judgments are not made explicit, and may simply presuppose the interpreter’s preferences regarding what is ‘new’ and ‘old’ in it. How, then, might we make judgments about the state of economics as a whole that provide an independent means of judging ‘new’ and ‘old’ contents?

One way of proceeding – a method historians employ – involves making arguments about the role and place of a discipline in the world. Thus, economics, or political economy as it was previously understood, clearly had a different role and place in the world in the past than economics does now. What counts as ‘new’ or ‘old’ in economics can then be explained according to how its concepts and theories reflect historical changes in institutions and social relationships, particularly as shows up in changes in the scope and nature of policy thinking. For example, Keynesian economics was ‘new’ compared to what preceded it when it became the basis on which many countries sought to manage aggregate demand and advanced fiscal and monetary policies to achieve this. Economics as a whole changed because it gave rise to new policies, and was associated with different institutions and social relationships.

However, this method does not capture how economics as a whole may undergo change in more subtle ways that do not materialize in institutions, social relationships, and policy thinking. A more fine-grained strategy I adopt, then, is to explain change in economics in terms of change in its relations to other disciplines. To the extent that this changes economics’ scope, domain of explanation, and definition. I argue, it produces ‘new’ contents and theories.

The scope of a discipline is the range of subjects it concerns, its domain is how they are addressed, and its definition, which explains its scope and domain, is its summary interpretation of that subject matter. Consider, then, the development in the immediate postwar decades of mathematical forms of explanation in economics, reflecting change in economics’ relation to quantitative sciences. This changed both the scope and domain of economics – what it could be about and how that was addressed – and led many to re-define and re-interpret economics as a mathematical social science that discovered mathematical relationships in economic life.

Non-mathematical, natural language forms of explanation in economics were then seen as ‘old’ and easily distinguished from ‘new’ forms of explanation. They failed to fall within the scope of a mathematical economics, because they could not capture the scope of economic relationships when seen mathematically, and they mis-represented economics’ domain, because did not explain the mathematical nature of those relationships. They were accordingly increasingly defined as not (quite) being economics. Thus, change in economics arose out of how its relations to other (quantitative) disciplines changed.

Thus, ontologically speaking, what a field is – its disciplinary identity – lies in what distinguishes it from other fields, and then gives it distinct epistemological (and ultimately social) responsibilities. Economics, in virtue of how it is different in its scope, domain, and definition from other social sciences, investigates dimensions of the world different from those they investigate. We cannot say, then, what kind of knowing is going on in a field and what kinds of things it claims exist independently of how this differs from other fields. Disciplines' identities, consequently, are ultimately established in a comparative manner. This then gets embedded institutionally in how a field's research agenda is materially organized, how researchers identify themselves and interpret what they are doing, how they segregate themselves from other kinds of researcher and forms of investigation, and how they see their social policy/application responsibilities.

Whether there is change in economics, then, depends on whether its relations to other disciplines have changed sufficiently as to produce a 'new' definition or interpretation of its scope and domain of investigation. But how do we capture this? Beginning with a field's scope and domain, we can examine how its differences from other fields change by tracking how the boundaries between them change. If what previously fell primarily within the scope and domain of one discipline is increasingly found in another's, then the boundaries between them have shifted and this may begin to change their respective definitions and identities. Figure 1 summarizes this overall view of change for economics.

Figure 1: Change in economics

Change in economics *is reflected in change in its* ***scope, domain, and definition*** *of explanation*

which is reflected in change in its ***relations to other disciplines***

which is reflected in change in its ***differences from other disciplines***

which is reflected in changes in its ***boundaries with other disciplines***

(which ultimately influences its ***institutional role, popular thinking about social relationships, and policy/applications responsibilities)****.*

Let us test this analysis with two recent examples of boundary change between economics and other disciplines: the economics imperialism of the Chicago School toward sociology and law and the behavioral psychology imperialism toward economics. Note, then, that in both cases, while the imperialist disciplines extended their boundaries regarding what they included in their respective scopes and domains, this did not appear to change their individual definitions. Most economists still define economics as the science of resource allocation, but now also apply this definition to some non-market processes. Behavioral psychologists still define their field in terms of how environments affect individual behavior, but now also apply this definition to market processes.

Thus, there is both 'new' and 'old' in both fields, making it paradoxically possible argue both that they have and have not changed. Whether they ultimately change as disciplines, then, depends on whether their definitions also ultimately change. To deal with this complication, I have used a core-periphery distinction to characterize economics (Davis, 2006, 2008, 2019a), re-appropriating the Lakatosian methodology (hard) core concept, and arguing that change in economics' relations to other fields occurs first on its periphery, and then possibly later in the core of economics where the field's definition is maintained.

Historically, there are cases where change in the periphery of a economics deriving from change in its boundaries also produced change in its definition and core. Nineteenth century classical political economy was succeeded by twentieth neoclassical century economics when other fields took over the 'political' and 'sociological' parts of political economy, resulting in a narrowing of the field's scope and domain, and ultimately changing its definition. Political economy can be defined as the science of growth and distribution for entire economies. Economics was subsequently defined as the science of choice for allocative processes occurring within economies.

The more recent psychology imperialism towards neoclassical economies also involves boundary change. The emergence of behavioral economics in economics' periphery potentially shifts economics' boundaries inward. If Chicago School economics imperialism might have shifted them outward by claiming choice theory explained non-market behavior, psychology imperialism not only seeks to reclaim this ground – such behavior still reflects people's environments – but also extends this environment argument to market behavior. Change in economics' boundaries on its periphery then creates incentives for redefining its core. Should one domain of 'economic' thinking focus on how environments influence choice, the core of economics might then be redefined as being concerned with the 'pure' theory of choice.

Yet an analysis of change in economics in terms of change in its boundaries has a particular weakness. It ignores what is happening in the world, and focuses almost entirely on change occurring internally within economics. That is, it ignores external forces operating upon economics that might influence how it changes internally.

To address this latter source of change, I argue that two types of external forces operate upon economics and influence change within it: (i) those affecting its research practices; and (ii) those associated with social expectations about economics and its policy/application responsibilities. When we integrate these two sets of forces into an analysis of how economics changes internally

and in its relations to other disciplines, change is then also a matter of change in economics' individual standing as a science in the world. Figure 1 is concerned with processes of change in economics internal to it as concerns its boundaries. Figure 2 complements this, and identifies two broad kinds of external forces acting upon economics.

Figure 2: Forces influencing change in economics

(1) ***Disciplinary research practices*** *in economics:*

increasing specialization in research
formal modeling as the preferred form of explanation
the 'empirical turn' in economics

(2) ***Social expectations:*** *social values regarding economics and its responsibilities:*

the importance of emancipative values
the importance of individual agency

My prediction, then, is especially because of these external forces, economics will evolve over time into a more pluralistic, less hierarchical, theoretically 'flatter' discipline with greater openness and competition between diverse kinds of approaches within economics.

To frame this prediction in terms of economics' relations to other disciplines, section 2 first discusses the four different forms of relations between disciplines, identifies 'interdisciplinarity' as the form that currently describes economics, and then investigates whether this form is stable and likely to persist. Second, I turn to the topic of boundary crossings to address how theories and contents from one discipline 'foreign' to another can nonetheless enter into it. I model boundary crossings using a recent Classical economics development of open and closed systems thinking, and argue not only can 'foreign' materials readily enter into economics but examine how they may influence it. Third, I argue that, were economics' landscape to evolve to become more diverse and pluralistic – a shift toward 'multidisciplinarity' – complexity theory best describes what this involves. A possible consequence would be that economics' imperialist ambition to theorize the unity of social science in its own image would give way to the ideal of a decentralized, 'disunified' social science landscape.

Section 3 on 'change in economics' discusses the two sets of forces in Figure 2 influencing economics. First, I discuss how three forces operating in it at the level of its research practices weaken its theoretical core. I frame their effects using a non-Darwinian, computational approach to evolutionary change. Second, I discuss what popular expectations about the role and nature of economics and evolving social values as identified in the World Values Survey can tell us about economics. My argument is that with an increasing weight given to emancipative values, people's concern with agency and social relationships will rise. Third, I briefly review how the oligarchic, hierarchical nature of current economics works against change in economics reinforcing its 'interdisciplinary' nature.

Section 4 returns to the recent Classical economics open-closed systems analysis to argue that the core of economics is incompletely closed and needs to be completed by thinking from outside it. Regarding the two sets of forces operating in and on economics, those at the level of its research practices affect the core's development, but how they distance the core from theory in general leave its closure open to theories and concepts from its periphery and other disciplines. There, social expectations affecting economics, as seen in the historical evolution of social values in the World Values Survey, offer a guide regarding how the core might evolve that jeopardize its *Homo economicus* and positivism doctrines. Thus, change in economics could come about were what acts externally upon it regarding *what* economics is about were to inform *how* its practices are put to use.

2 Forms of disciplinarity and boundary relationships between economics and other fields and within economics

a. Economics' interdisciplinarity and its instability

The four forms of disciplinary relationships distinguished by Jodi Cat (2017) are crossdisciplinarity, interdisciplinarity, multidisciplinarity, and transdisciplinarity. This typology has the advantage that it allows us to characterize disciplines and their interaction in terms of how closed or open they are to one another according to: (i) the extent to which they are significantly affected by their interaction; and (ii) the extent to which their interaction produces new interfield research that influences them.

For Cat, crossdisciplinarity is the most closed case since disciplines borrowing from one other are largely unaffected by it in their own independent development, and new interfield research disciplines drawing on both do not really develop. Interdisciplinarity is the next most closed form, since disciplines may be somewhat but not extensively affected by their borrowing from one another, and while significant interfield research between them emerges, its ties to its contributing disciplines is weak. Multidisciplinarity and transdisciplinarity are at the other end of the spectrum as the most open since in differing degrees interacting disciplines are significantly affected by their interaction and interfield research begins to rival disciplinary research.

Interdisciplinarity, then, is the case that best characterizes contemporary economics, because its borrowing can be shown to have influenced its recent development, since on its periphery there

are a variety of new approaches that owe much to other fields that have an increasingly interfield research character. To investigate, then, whether this state of affairs is stable, first consider economics' postwar borrowing in three important episodes: its adoption of mathematical forms of explanation in the immediate postwar decades, the emergence of game theory somewhat later, and the more recent adoption of experimentalism. What these three borrowing episodes could show is that economics can borrow freely from other disciplines, not significantly change what defines it, and thus that it could persist as an interdisciplinary type of field. Thus, these episodes constitute one test case for the stability of economics' current interdisciplinarity. Note, then, that what these three episodes share is that this borrowing especially draws on other disciplines' methods of explanation rather than on their concepts and theories.

In the first case, while there were also transfers of concepts and theories that transferred from quantitative sciences, what principally was transferred were quantitative methods of explanation, for example, as used to place general equilibrium theory on a more rigorous basis (Weintraub, 2002), and as also applied to refine microeconomic optimality research. It is widely perceived, then, that this borrowing strengthened the core of economics. A reason for thinking this is that a borrowing that occurs at the level of method appears to have a neutral sort of character, so that adoption of quantitative methods was instrumental to the development of existing theories. Tools and methods, that is, in themselves have essentially no substantive implications for the theories to which they are applied.

While this conception of tools and methods as purely instrumental is questionable, to the extent that tools and methods have this character, their adoption suggests economics' borrowing from other disciplines can have limited impact on its main concepts and theories. Nor, it seems, is such borrowing ultimately to have much effect on economics' core-periphery divide, since that has not much changed as a result of this borrowing. Indeed, mathematical explanation has now become fairly standard in most of economics. Thus, it could be argued that borrowing from other disciplines strengthens rather than weaken postwar economics' interdisciplinary status.

Now consider the later, more complicated case of borrowing economics engaged in several decades into the postwar period in its adoption of game theory, also from mathematics. This is also widely seen as an adoption of new methods of explanation, and so in principle was also neutral in its effects on dominant thinking in economics. Game theory's assimilation into economics may have disrupted its perfect competition conception of markets that had been standard, but one could argue that as long as game theory emphasized zero-sum behavior, competition as an ideal still characterized economics. This borrowing, then, also might show that economics can draw on other disciplines without significantly changing its main concepts and theories and its interdisciplinary character.

Finally, consider the more challenging case in the emergence of experimentalism in economics, also a borrowing of methods rather than concepts and theories from other sciences. While experiments can indeed be used in a neutral sort of way to simply develop new empirical knowledge and applications of existing theories, they also potentially create challenges to fundamental assumptions in economics, for example as seen in the early debates over whether the ultimatum game and inequity aversion show people do not always behave in a self-regarding way. Yet these debates too have still been framed by standard rationality assumptions, and non-standard

behavior, to the extent that it is admitted, is seen only as a departure from it. Thus again, economics' borrowing from other disciplines does not appear to have much changed it.

These three examples thus make a case for saying economics' borrowing from other disciplines does not really affect its character and interdisciplinary nature. Indeed, they arguably make the opposite case that this borrowing is likely to be done in an instrumental manner that conforms to economics' *status quo*. What, however, should we say about a borrowing that appears to go beyond method methods of explanation and involves substantive concepts and theories from other disciplines? In the three cases above, economics borrows what is largely compatible with its existing character and then adjusts it to this. On this model, does economics' borrowing other sciences' concepts and theories only occur in such a way as to remove substantive content inconsistent with economics' core principles?

Consider the most debated case of economics' borrowing from other disciplines, namely, from psychology. On the one hand, when we characterize behavioral psychology as relying on the principle that decision-makers' environments fundamentally influence their choices, we bring in ideas that are at best associated with economics' periphery and potentially disruptive of economics' core rationality thinking as an analysis independent of context. But as many have argued, behavioral economics has largely treated this as providing a set of choice anomalies – actually an adjustment in its method of analysis, not a call for rethinking the nature of choice.

Still, that such anomalies derive from how the environment affects choice raises a fundamental issue regarding the standard theory of choice which assumes people always make choices in the same way everywhere irrespective of context. Might then this larger issue, in effect smuggled in behind the scenes and working on a different conceptual level than that of method, potentially introduce substantive conceptual matters inconsistent with the core of economics and ultimately challenge its interdisciplinary nature?

To investigate whether this could occur, the next section develops a two-level account of disciplinary borrowing using an open and closed systems analysis to explain how a discipline's borrowing from other disciplines can successfully introduce 'foreign' contents into it. It describes a mechanism for how disciplinary boundary crossings work, whereby borrowings at the level of method are accompanied by broad conceptual ideas on a second level that 'close' the borrowing discipline's conceptual framework and can thus transform it.

b. Disciplinary boundary crossings in open and closed systems terms

Cat's typology does not address how one discipline's contents enter another's. We can assume this readily occurs in multidisciplinary and transdisciplinary interactions because disciplines are less independent and boundaries between them are weak, but in interdisciplinary (and crossdisciplinary) interactions where this is not the case boundary crossings need to be explained. This is particularly the case with broad, substantive concepts and theories since they are especially characteristic of their contributing disciplines and potentially a poor fit in the borrowing ones. On a core-periphery view of economics, this is important since core principles that define it are broad ideas.

The open and closed systems analysis I use is drawn from recent Classical economics. It treats the core of economics (in a Classical Ricardian world) as an only relatively or incompletely closed system, whose closure is completed by open system concepts and theories drawn from outside it. Applying this to current mainstream economics, I argue its core is also incompletely closed, and is also completed by drawing from open systems concepts and theories that lie outside it, whether from economics' periphery or other disciplines.

I characterize this open-closed thinking as a recent Classical economics understanding because it is drawn from Piero Sraffa's rehabilitation of Classical Ricardian theory. In 1931, in developing ideas later employed in his *Production of Commodities by Means of Commodities* (1960), Sraffa used an open-closed systems distinction from philosophy of science to argue that the system of equations determining commodity values (the Classical core) conceptualized strictly in cost of production terms could not explain the existence of an economic surplus (Sraffa (1931). He consequently reconceptualized his system of equations to include wage and profit components to show that economies generated surpluses divided between workers and capitalists, where this drew on an open system embodying the struggle over distribution (Davis, 2012, 2018).[i] Thus, a relatively closed system is closed by incorporating the effects of an open system in and upon it.

Wages and profits, of course, are not determined in the way material inputs to production process are. They reflect social struggle and a host of determining factors not reducible to the laws of natural science. Thus, the system of equations for determining commodity values in cost of production terms can only be incompletely closed. Further, since social struggle over the distributive shares of the economy's surplus lacked the systematic character of a cost of production determination of commodity values, that struggle can itself be characterized as an open system.[ii]

The same analysis, then, characterizes postwar standard general equilibrium theory, the core of mainstream economics. There, rather than a cost of production determination of commodity values, prices are determined according to preferences and resources. Yet a general equilibrium cannot be established by tallying up knowns and unknowns inherent in that system of prices, or by inspection of the equations involved themselves. To show an equilibrium is possible required the development of fixed-point theorems that came from outside the system of price equations, so a general equilibrium price system itself is only an incompletely closed system. Further, since there is considerable debate in mathematics regarding the nature and assumptions underlying fixed-point theorems, this domain functions more as an open system. In fixed point theorems, where a fixed point of a function is defined as an element in the function's domain that is mapped onto itself by that function, mathematicians employ a reasoning developed to conceptualize how sets of equations can be taken as unities. This relationship is something that can be applied to any sort of system of equations irrespective of their subject matter, and is consequently an idea external to whatever they represent.

Returning to economics' overall core-periphery organization, I thus argue that economics' core is not a contained fully closed system but rather an incompletely closed one whose closure depends on how it draws from open systems with which it interacts, whether they are from the periphery of economics or other disciplines. Economics' quantitative nature gives the primary relationships it investigates a systematic, interconnected character that makes it a kind of closed system analysis.

Yet how these relationships are ultimately conceptualized depends on a range of assumptions about the nature of economic activity that have been long debated in economics.

In this light, reconsider behavioral economics. Behavioral economics is a research area still mostly located on economics' periphery deriving from behavioral psychology. In standard postwar economics, rational choice theory aspires to be a completely closed analysis of choice, but its independence axioms on which this depends are largely stipulative, and motivated by the need to close off choice analysis from context of choice rather than from evidence context does not matter. Thus choice theory as a whole is better seen as an incompletely closed system. Behavioral economics and behavioral psychology, then, seen as an open system of analysis, provide one way of closing choice theory. Though much of their discussion proceeds on the level of methods of explanation, their rejection of the standard independence axioms and insistence that context of choice matters introduce broad conceptual issues into economics that jeopardize the autonomy of its traditional core.[iii]

Thus, while we cannot rule out that change in economics may leave its core unchanged, yet on this closed-open, two-level understanding of disciplinary border crossings, we also cannot rule out that the core principles of economics change over time, as they have in the past, at least in part as a result of economics' interaction with other disciplines. Thus, the core-periphery divide in economics might erode, and its interdisciplinary nature give way to a more multidisciplinary character. The next section outlines what economics might then look like.

c. A diverse, pluralistic, multidisciplinary economics landscape

In Cat's taxonomy, multidisciplinarity and transdisciplinarity on the open-closed spectrum are the most open forms of disciplinary interaction. Multidisciplinary interactions significantly affect the interacting disciplines, and also produce active interfield research with strong effects on the contributing fields. In transdisciplinary interaction, interacting fields may begin to lose their independent individual identities, and emergent interfield research begins to dominate, sometimes with contributing disciplines being replaced in the long run by new disciplines. For example, it can be argued that economics' emerged as a relatively new interfield domain of investigation when its eighteenth century focus on prices and incomes distanced it from narratives of just price and feudal power that acquired other disciplinary locations. However, I see no evidence that economics is likely to be replaced by new emergent disciplines to which it contributes, so transdisciplinarity is an unlikely scenario. What, then, might economics look like if it were to become a multidisciplinary discipline?

Multidisciplinary disciplines borrow more freely from other disciplines than interdisciplinary and crossdisciplinary ones. Since this characterizes the current periphery of economics, were economics as a whole to become more multidisciplinary it could lose its core-periphery divide, become more pluralistic and less hierarchical, and exhibit more open competition between different kinds of approaches within economics.[iv]

How can we explain this sort of disciplinary structure? To say a discipline is less hierarchical does not mean there are no dominant approaches in it, but if there are there is a regular rotation of them

over time. This calls for a dynamic representation of change in economics based on how relationships between different kinds of approaches changes. In Simon's (1962) basic complexity model, interaction between different processes has effects on the entire system they make up, which then feed back upon their interaction, a combination of bottom-up and top-down effects. Suppose we characterize those approaches in a discipline that are dominant at any time as those particularly associated with the discipline as a whole, and thus seen as representative of it. Then, as they evolve over time due to this interaction between different approaches, what is seen as representative of a discipline changes as well.

It could still be argued that there is 'nothing new' is this sort of process of change if what is 'new' only revises and reconfigures what it replaces. However, this view rests on an understanding of evolution more appropriate to evolutionary processes in the natural world and not those in the social world. In natural systems with evolution understood in a Darwinian way, 'new' organisms are descended from parents who are of the same type. In the human social world when we focus on the evolution of ideas, the ancestry of 'new' phenomena is quite different. New ideas can be descended in part from antecedents of the same type when a theory is redeveloped and revised, but they can also be descended from unlike antecedents when they result from creative assembly of different idea streams.

One material process driving scientific development is specialization, or the deeper concentration on particular processes within a subject of investigation. Advances in science are associated in part with how specialization generates discovery of what was previously unrecognized. Discovery is about what is 'new' in science. In a non-Darwinian conception of evolution, what is 'new' occurs when previously unrecognized, discovered phenomena are seen to be descended from unlike, unexpected antecedents. Brian Arthur's computational explanation of evolution explains the mechanics of this in terms of how different kinds of technology modules, created independently of one another for different purposes, are combined in unanticipated ways to create altogether new technologies (Arthur, 2009). Over time, as the number of new technologies increases, this increases the base upon which possible new technology modules that can be created (Davis 2019b). Thus, a social evolutionary process such as operates in science potentially generates new phenomena, concepts and theories, in an exponential manner. Science is thus biased toward what is 'new' rather than toward what only revises and reconfigures what gets replaced.

A multidisciplinary environment, then, in which change is pervasive is inherently pluralistic, less hierarchical, and possesses many competing approaches. Yet if economics is best described today as an interdisciplinary field, what might cause it to become a multidisciplinary one? The following section turns to this issue in terms of forces operating in and upon economics.

3 'Change in economics': Forces operating in and upon economics

Figure 2 distinguishes two kinds of forces influencing economics. Specialization in research, formal modelling, and the 'empirical turn' involve forces operating in economics that concern economists' research technologies and *how* economics is done. I characterize them as practices because they concern ways researchers operate within their research programs. Social expectations about economics and its policy/application responsibilities involve forces operating

upon economics that concern *what* economics is about. Of course economists also have expectations about economics as a science, but my view is they are influenced in significant degree by how society sees economics.

The argument below is that these two kinds of forces could move economics from being an interdisciplinary science to a multidisciplinary one, and reduce hierarchy in economics making it an increasingly pluralistic science. I also discuss forces in economics working counter to this at the end of this section.

a. Economics' research practices: Specialization, formal modeling, and the 'empirical turn'

Above I discussed specialization in evolutionary process terms but here I focus on it as a practice influencing the way in which research is done and how scientific knowledge develops. It is one of the most fundamental research practices in science and generally seen as å key means to extending scientific knowledge. Will new discoveries confirm or disconfirm accepted beliefs? I argue that in active, growing sciences increasing specialization weakens the command existing theories have on a science. Economics in the postwar period has indeed been an active, growing science with continually increasing numbers of people and publications, and research specialization is increasingly characteristic of economics (Davis, 2019b). Thus, we should expect the command that existing theories have, whatever their orientations and approaches, to weaken. Two properties of specialization supports this.

First, since specialization emphasizes particularity and context, its development lessens the connection of scientific activity to general theory. Specialization involves focusing on individual topics where their specificity is determined by how they are differentiated from other. In effect, its basis are its horizontal links to other similar but different phenomena, and less its vertical links to theories which motivate it. Theory then becomes secondary in importance in the design and implementation of a research investigation. Is the phenomenon being investigated truly distinct from like phenomena? Is the contextual setting in which the phenomenon is observed correctly described? Generality, a key concern of theory, becomes a background, less immediate concern.

Second, as specialization advances in a science its overall research landscapes exhibit a greater array of new results. As the volume of new results increases, theory construction then becomes more difficult as it becomes less clear how generalization encompasses this greater variety. Not only is scientific activity more removed from theory concerns, but it is less clear how it is even related to theory concerns. Theory may still flourish, but it needs to do so either at a greater remove from much on-going research or on a more limited, less general basis. The status of theory in a science then becomes less obvious, and researchers may lower the priority and time they devote to it.

Both of these properties specialization exhibits appear to apply to economics, together lessening the importance of theory in economics. This in turn diminishes the divide between core and periphery. Specialization in economics also seems connected to the other two forces I argue are operating in and upon it in much the same way.

Formal modeling is essentially a more highly specified expression of theory made possible by its mathematical method of explanation. Narrative-based theorization identifies possible causal relationships between different factors, such as the relationship between income and consumption, but formal models translate factors into variables and describe relationships between them parametrically to determine, for example, how income affects consumption. One could argue, then, that the postwar expansion of formal modeling in economics has increased the importance of theory in economics and also strengthened existing theory on the grounds that models refine theories and much of the postwar development of models is associated with existing theory. However, I argue the opposite has occurred because this change has shifted economists' priorities away from broad theorizing toward explaining particular causal relationships.

Narrative-based theorization works at a high level of generality in which causal relationships are not sharply defined. In mainstream economics, this involves such claims as incentives matter, prices determine behavior, markets work effectively, etc. Modeling causal relationships involves modifying these claims: they may hold sometimes, in some degree, in some circumstances, etc. What then matters scientifically is what specific relationships stand up to empirical testing, not what broad, general claims might motivate economists' intuitions. Indeed, because broad claims operate at a high level of generality, they cannot *per se* be said to be true or false or confirmed or disconfirmed. They essentially occupy an earlier stage of theoretical development, one that ends up giving way to the more sharply specified causal relationships that replace them.

Theory, of course, still matters in economics, but its character has changed with the rise of formal modeling. If we associate this shift as one in which applied economics has come to define most practitioners' scientific activity (Backhouse and Cherrier, 2017), what particular theoretical motivations underlie economists' research divides them less than disagreements over such things is whether a variable is correctly identified or a parameter properly estimated. What this means is that as formal modeling is adopted across economics irrespective of theoretical orientation, theory motivations divide economists less than disputes over these more concrete issues. Their implications for broad theories consequently become background concerns.

Consider, now, the 'empirical turn' in economics. Here, as in the rise of formal modeling in economics, we have a widely recognized change in the nature of recent economics research reflected in the falling share of theory research and rising share of empirical research (Hamermesh, 2013; Angrist, *et al*., 2017). While this distinction is not entirely sharp, nonetheless it is reasonably clear that empirical research in economics research has increased, and what increasingly characterizes economics as a whole is empirical research. Moreover, it seems unlikely also that this turn might be reversed in the future, since the amount of data available to economists – reflective of a 'data explosion' and exponential growth of information across science – is increasing significantly and giving additional momentum to empirical research.

Economists can still be distinguished by their different theoretical assumptions, but as with formal modeling their professional standing and credentials increasingly rest on whether their empirical research meets the standards of the profession. New theories may be claimed to develop new conceptual relationships compared to previous theories. For example, game theory produced a new understanding of competition compared to prior market theory analysis. However, whether these theories end up being counted as 'new' depends on whether there is evidence to support

them. Thus, much empirical research aims at contributing to accumulating a body of evidence, and rarely is a single empirical result or set of results seen as having 'breakthrough' status, whatever its theoretical motivation. The 'breakthrough' idea indeed might be a relic of an earlier stage of development in economics.

Specialization, formal modeling, and the empirical turn thus reinforce each other in making the core-periphery divide that characterized economics in the early decades of the postwar period less important going forward. As material practices, they involve change in the technology of economics research. Economics' nature as an interdisciplinary field largely precedes the onset of these changes. It's transition to becoming a multidisciplinary field thus reflects less change in ideas and views of what economics is about and more how research in it is institutionally organized. Consider now how social expectations regarding economics operate upon it from outside it.

b. Social expectations regarding economics

People form expectations about economics based on their belief that economic life affects their lives and well-being, and rely on their values to judge what this implies ought to be economics' scientific responsibility. Most economists of course believe values are subjective and are irrelevant to what they do. This is because they think values are only individual private values, fail to understand what social values are, and do not appreciate economics as a social science is in service of social well-being. Social values are values shared by many people, and are objective in much the same way that other facts, demographic and otherwise, about people are objective. The challenge in talking about social values and how they bear on economics then lies in how we identify them.

It is a misconception that social values highly transitory and always changing. Social values in fact have been comprehensively surveyed across 100 countries since 1981 in the World Values Survey (WVS) by a global network of social scientists (Inglehart *et al.,* 2014), and exhibit considerable stability and clear connection to people's different economic circumstances. I rely on the results of these surveys to identify the values that motivate large numbers of people, and use this to frame social expectations and about economics according to how well it explains what people care about in economic life, and thus in economics.

The Inglehart-Welzel World Cultural Map, then, uses multiple survey rounds of the WVS to show there exist two major pairs of ways in which values vary across the countries: (i) traditional values versus secular-rational values, and (ii) survival values versus self-expression values (Inglehart and Welzel, 2005). In both cases, these pairs of values are opposite to one another. Traditional values are associated with importance given to religion, family, and political authority, and secular-rational values de-emphasize these. Survival values are associated with existential insecurity and constraints on human autonomy, while societies that emphasize self-expression value tolerance, social equality, and exhibit increasing demands for participation in economic and political decision-making.

What economic basis, then, do these different sets of values possess? Economic development and the advent of post-industrial society has generally tended to move countries from both traditional and survival values toward both secular-rational and self-expression values (Inglehart and Welzel, *Ibid*., ch. 2), though this is not the case for all countries. The U.S. and most of Latin America combine traditional and self-expression values, much of western and northern Europe and Japan combine and secular-rational and self-expression values, former Soviet bloc eastern Europe combines secular-rational and survival values, and many developing countries still combine traditional and survival values.

Interestingly, however, mainstream economics does not fit the U.S. case very well, despite that its postwar development of economics has been strongly associated with U.S. economics. That is, it is not the case that U.S. economics reflects the U.S. combination of traditional and self-expression values since the former have been influentially reinterpreted in secular-rational terms through instrumental rationality explanations of the family (Becker, 1981), religion (Iannaccone, 1998), and political authority (Buchanan and Tullock, 1965). At the same time, standard rationality theory is associated with self-expression values, since subjective preferences, a form of self-expression, are the foundation of mainstream rationality theory. Thus, mainstream economics, at least as it is seen through U.S. economics, combines secular-rational and self-expression values.

We might think, then, that social expectations about economics in the U.S. might press for a restoration of traditional values. It seems highly unlikely, however, that economics will change in the future in this way since instrumental rationality is foundational to mainstream economics, and is one of the highest expressions of secular-rational values. Things are more complicated, however, regarding how economics' subjective preferences doctrine aligns up U.S. self-expression values.

The WVS disaggregates each of its main social values into subsets of underlying values, and country scores for these different subsets of values are the means by which countries' overall classifications are determined for the two major pairs of ways in which values vary across the countries. A key subset of self-expression values, then, are what are called emancipative values that drive from how people value freedom of choice and equality of opportunity, lifestyle liberty, gender equality, personal autonomy, and popular voice. Among the main WVS findings across countries regarding emancipative values are that they are seen to: (i) underlie broader processes of human empowerment, (ii) concern people's capabilities, aspirations, and desired entitlements, (iii) are associated with a commitment to democracy, (iv) favor out-group trust and cosmopolitan orientations toward others (Welzel, 2013).

When we put this in terms of countries' shift over time from survival values to self-expression values, particularly as has accompanied transitions from industrial to knowledge societies, emancipative values are associated with large increases in people's sense of individual agency or their understanding of what empowers them to do the things they choose to do – their capabilities. Increases in individual agency, then, can be seen to be the goal motivating people's higher valuations of self-expression. Figure 3 summarizes these linkages between emancipative values, human empowerment, and individual agency.

Figure 3: Emancipative values in the shift from survival to self-expression values

Emancipative values *a key subset of self-expression values emphasize:*
freedom of choice and equality of opportunity, prioritize lifestyle liberty, gender equality, personal autonomy, and popular voice

promote ***human empowerment*** *by strengthening people's capabilities, aspirations, and entitlements, democracy, out-group trust and cosmopolitan orientations toward others*

Are motivated by the goal of increasing ***individual agency***

In this light, mainstream economics' conception of self-expression values falls short of what the WVS evolution toward self-expression values involves. Most of what is in Figure 3 is inconsistent with its subjective preferences understanding of self-expression: emancipative values, human empowerment, and capabilities do not really fit anywhere in mainstream economics. Further, the mainstream is unlikely to evolve in the direction of this expanded conception of self-expression on account of as can be characterized as an internalist view of individual autonomy. Autonomy or how individuals are distinct and independent is fundamental to explaining individual agency. Yet a subjective preferences interpretation of self-expression offers no account of increasing freedoms and individual agency. People are free in that they can form their own preferences, and this fully explains the nature of individual agency. In contrast, emancipative values reflect an externalist view of individual autonomy where how institutions and social arrangements are organized influence the extent to which people can act freely and independently. On this understanding of individual autonomy, increasing human empowerment is always a goal.

Moreover, on an externalist understanding of individual autonomy, people's social relationships and social identities are important. Yet the idea that people are embedded in such relationships and social beings is contrary to the mainstream's foundational *Homo economicus* doctrine. Thus the mainstream's conception of self-expression as a value really cannot be expanded or revised to accommodate emancipative values. This puts the mainstream at odds with the historical development of self-expression values seen in the WVS, and suggests that it will not meet social expectations about its responsibilities for explaining economic life in the future. It is essentially time-bound by its past commitments and too inflexible in them to evolve with evolving social values.[v]

c. Forces reinforcing economics' interdisciplinary nature

Though there are forces operating in and on economics influencing change, there also exist forces operating on it tending to reinforce its current character. I associate these with economics' long-standing commitment to being an interdisciplinary science, linked to the belief held by many economists that economics is unique among the social sciences.

Again, an interdisciplinary science draws concepts and theories from other sciences but adapts them to its core (or 'hard core' in Lakatosian terms) assumptions and principles, thereby securing its identity as an independent science. Practitioners learn early in their careers that their field has this status, and implicitly learn where the boundaries lie regarding what ought and ought not be investigated. In economics, they may also adopt an economics-centric or economics imperialism view of other social science disciplines, in which they believe the unity of social science rests on other disciplines' adopting economics' principle commitments, in particular its emphasis on rationality (Ambrosino, Cedrini, and Davis, 2021).

One could argue that any field's ability to maintain a set of core assumptions and principles is limited in the long run, whether due to other sciences' own incursions into it or due to its own evolutionary development. Working against this in economics is its hierarchical, oligarchic social organization by which the most prestigious individuals and institutions monopolize and control career and research opportunities (Fourcade et al., 2015; Heckman and Moktan, 2020; Hoover and Svorenčík, 2020). Since these elite individuals and institutions' reputations and standing are closely associated with existing economics, they have much to lose from change in economics. Thus, as long as the field is socially and institutionally organized in this way, these forces work to preserve past assumptions and principles.

What might we expect of the future? The histories of science and economics show that over time well entrenched paradigms are replaced by new thinking, the transition from Classical to Neoclassical economics being an example. My general argument, then, is that such transitions involve disciplines, temporarily and sometimes in the long run, becoming multidisciplinary and open to many approaches, whether those approaches originate within them or in other disciplines. Above I discussed a modern Classical economics understanding of openness and the open-closed distinction to discuss boundary crossings. In the closing last section I use this analysis to say how the different forces influencing economics might combine to influence evolution and change in economics.

4 Changing economics

Sraffa came to regard the system of equations determining commodity values as only relatively closed, because distribution, a relatively open system, needed to close those equations, acted both upon it and in it. In effect, the core of a Ricardian Classical economy, its system of equations determining commodity values, was acted upon by what lay outside it on its periphery, the struggle over wages and profits. In terms of current economics core-periphery structure, if its core is only relatively closed, because what lies outside it on economics' periphery acts upon it, that core only becomes completely closed when interpreted in terms of what is added to it from outside.

Sraffa did not use the terminology of interdisciplinarity and multidisciplinarity, but the idea that interpretation of a core concern in a field depends on what is not part of it is a multidisciplinary idea. If interdisciplinarity is where individual approaches isolate themselves in a field independently of what else exists outside it, multidisciplinarity is where individual approaches are never fully independent of other approaches and are ultimately dependent on them in ways that close or complete them. This would exist whether a field had a hierarchical core-periphery structure with one or a few dominant approaches, such as economics, or a less hierarchical structure with many comparably influential approaches, such as sociology (Collins, 1994, Horowitz, 1994). In either case, multidisciplinary fields are defined by and integrated through boundary crossings between approaches.

The example I gave above to illustrate this is how a neoclassical general system of price equations cannot be shown to be in equilibrium simply by tallying up knowns and unknowns but is completed by employing mathematics fixed-point theorems that come from outside the system of equations. That is, a general equilibrium price system is also only an incompletely closed because it draws on a system of thinking that lies outside it. Note the difference between tallying up knowns and unknowns and fixed point reasoning. The tallying up idea simply inspects a set of equations, and there is no idea of a system *per se* in that set that entails any particular kind of mapping relationship connecting them as a whole.

Recall, then, the distinction between forces operating in economics and upon economics. The former – specialization, formal modeling, and the empirical turn – operate at the level of practices in economics, influence *how* economics research is done, and operates primarily within economics. The latter – social expectations operating on economics – influence *what* economics research is about, and operate primarily upon economics from outside.

In open-closed system terms, economics' practices, because they determine how economics research is done, leave open what it is about, and function as only a relatively closed system. Specialization, formal modeling, and the empirical turn, I argued above, have made explaining causal relationships central to economics, make weak commitments to particular theories, and therefore make economics more open to different theoretical approaches. That is, as only relatively closed systems, they are open to completion by different theoretical ideas.

This raises the question of where theoretical ideas come from or how economists determine what subjects they will research. When we answer this question in terms of social expectations acting on economists, there were two answers given above. The first was that broad social expectations about what economics should investigate act on economists and ultimately influence their choices. The second, in connection with the oligarchic organization of mainstream economics, was is done in elite individuals and institutions.

It is not difficult to make an argument that the second alternative will not prevail in the long run, because in the histories of science and economics over time well entrenched paradigms have always been replaced by new thinking. Yet, it is not easy to make an argument for the first alternative, because explaining social expectations is difficult. Nonetheless, the WVS offers a way to proceed on the assumption that values and beliefs on a world scale will ultimately also influence

economists. In closing, then, I describe how economics might change in the future in light of the social values especially affecting influential U.S. economics.

The WVS shows the growing importance for post-industrial, knowledge-based societies of self-expression and emancipative values and people's concern with their empowerment, capabilities, and individual agency. Their agency cannot be understood apart from an understanding of individual identity, which taken as socially embedded includes people's social identities and relationships to others. Thus, the WVS shows people are likely to see themselves as social beings, not like the isolated *Homo economicus*. On the grounds that people's concern with their identities and social relationships will likely increase in the future, I take this standard doctrine to be a likely casualty of change in economics. To the extent that people expect economics, like all sciences, to be an objective science and reliable source of knowledge about economies that affect so much in their lives, they are likely to see a transformation of its conception of the person as necessary.

The WVS represents human society in terms of social values. Thus, as a guide to how social expectations operate on economics, it tells us that people are likely to believe that values pervade economics just as elsewhere in society. This is glaringly inconsistent with economics' claim to be a positive value-free science. In ordinary life, of course, people commonly see values at work in the economy. Thus, it makes sense that the science of the economy contains values as well. The idea that economics is a 'moral science' is unfamiliar to most people, but it nonetheless captures this general belief about the value-laden nature of economic life. I consequently take the standard idea that economics is positive science free of values to also be a likely casualty of change in economics.

That the *Homo economicus* doctrine and economics' self-conception as a positive science have little future may seem improbable to many whose view of the future is framed in a backward-looking way where the past determines present. Yet there is considerable uncertainty today about whether and how economics may be changing, and perhaps that reflects that we occupy an interregnum in the history of the discipline when the old world is still dying and the new is yet to be born.

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[i] This was the understanding Sraffa later developed in his *Production of Commodities by Means of Commodities* (1960), though he did not use the systems framework there.

[ii] As Sraffa put it: "When we have defined our 'economic field', there are still outside causes which operate in it; and its effects go beyond the boundary" (D3/12/7: 161 (3-5); also quoted in Kurz and Salvadori, 2008, p. 268).

[iii] Thus, while the asymmetry between gains and losses that was the focus of Kahneman and Tversky (1979) makes one's wealth position a contextual factor, but one can equally see one's social position as a contextual factor (Davis, 2011, pp. 33-4.).

[iv] This for examples describes sociology as a discipline in which there are many competing approaches with no accepted ranking of their importance (Collins, 1994; Horowitz, 1994).

[v] Thus, one way of seeing behavioral economics as posing a significant challenge to mainstream economics is to say that it reflects an incipient awareness that environmental factors influence not only behavior but also individual autonomy. This would encourage economists to adopt an externalist view of individual autonomy where individual freedom and independence are affected by institutions and how the world is organized.