The Rise of a Mainstream in Economics

M. De Vroey and L. Pensieroso

Discussion Paper 2016-26

Institut de Recherches Économiques et Sociales
de l'Université catholique de Louvain

UCL

The Rise of a Mainstream in Economics [◊]

Michel De Vroey and Luca Pensieroso
IRES,
Université catholique de Louvain

November 2016

Abstract

Our paper contends that the existence of mainstream economics ought to be understood as a particular case of the now widespread certification phenomenon, which defines good practices on the grounds of a compliance with well-defined standards. Basing our analysis on Leijonhufvud's vision of the construction of economic theory, we document the fragmentation process which economics has undergone from the marginalist revolution to the present. Studying the evolution of five sub-branches of economics, we show how at the end of the 1970s loose standards for good research practices were replaced by narrower ones in each of them. We claim that this change and the emergence of a mainstream were two faces of the same process.

Keywords: mainstream, decision tree, neoclassical approach

JEL codes: A10, A20, B20.

[◊] michel.devroey@uclouvain.be, luca.pensieroso@uclouvain.be. We wish to thank Jean-Marie Baland, Bastien Castiaux, Allan Collard-Wexler, David de la Croix, Franck Jovanovic, François Maniquet, Fabio Mariani, Thomas Müller, Marthe Nyssens, Matthew Panhans, Jean-Phillipe Platteau, John Singleton, Bruno Van der Linden, Xavier Wauthy and Helen Windish for their helpful comments on previous versions of the paper. The usual disclaimer applies. This research is part of the ARC project 15/19-063 on "family transformations" (French speaking community of Belgium).

INTRODUCTION

The present paper is a contribution to the numerous works looking to understand the twists and turns in the development of economic theory from the marginalist revolution to the present. It aims at showing when and how a methodologically grounded mainstream emerged in economics and how it evolved over time.

A pioneering event in this line of research was the 1998 History of Political Economy conference on the topic, *From Interwar Pluralism to Postwar Neoclassicism*, which took place at Duke University (Morgan and Rutherford 1998). Most of the papers presented at this conference deplored the contemporary predominance of the neoclassical approach, conveying a feeling of nostalgia for the good old times of 'pluralism', when institutionalism evolved on a par with neoclassicism. It may be surmised that for a time this vision was widely shared among historians of economics. Yet, dissenting views were soon to arise as a few economists counter-argued that, at the very time when this conference was held, the situation was already changing. A blunt expression of this viewpoint was D. Colander's Presidential Address to the History of Economics Society 1999 Conference, entitled "The Death of Neoclassical Economics" (Colander 2000). His views were further developed in a joint 2004 paper with R. Holt and B. Rosser, "The Changing Face of Mainstream Economics" (2010). J. Davis followed suit contending that neoclassical economics was in the process of being supplanted by a conglomerate of new non-neoclassical research lines (Davis 2006, 2008). A few years later, R. Backhouse and B. Cherrier (2014) narrowed down this claim. According to them, applied economics has become the new upcoming research line.[1] In 2016, eighteen years after the *From Interwar Pluralism* HOPE Conference, they organized a new HOPE Conference, *Becoming Applied: the Transformation of Economics after 1970*, on the subject.

The present paper re-examines the themes studied by these authors – the nature and content of the neoclassical approach, pluralism, mainstream economics, and the transformation of economics over time. Its originality lies in supplying a more systematic framework of analysis by summoning three new or neglected notions – bifurcations, fragmentation and certification – at the service of our re-examination. More precisely, (a) we use the notions of methodological nodes and bifurcations, introduced by Leijonhufvud, to shed light on the development of economics; (b) we document the fragmentation process that has taken place in economics from the marginalist revolution to the present. (c) we contend that the rise of mainstream economics, which we date back to the 1970s, resulted from a process of certification whereby conditions for 'good' scientific practice were decreed.

Two objects of study lie beyond the scope of our paper. First of all, we are aware that the rise of a mainstream in economics did not occur in a social vacuum. As claimed by

[1] In their words, "Economists no longer view economic theory as standing above applied work in the (same) way as they had by the end of the 1960s." (Backhouse and Cherrier 2014 : p. 21).

Godechot, "paradigmatic changes are not only a question of truth, of evidence and of proofs but also of politics" (2011: 30). Though we might agree with Godechot, disentangling the methodological aspects is a daunting enough task in itself without trying to carry out a sociological analysis in addition. Second, in this paper, we do not engage in an empirical verification of our claims. This has been done in several recent papers.[2] Our distinct contribution is rather proposing a new framework which helps to understand the empirical results presented in these papers.

BIFURCATIONS

Leijonhufvud's decision tree metaphor

The notion of bifurcation is drawn from A. Leijonhufvud's decision-tree vision of the development of economics (Leijonhufvud 1994).[3] According to him, constructing economic theory amounts to making decisions about basic methodological nodes. They can be compared to forks or bifurcations on a road. Choosing one rather than another puts the theory on different tracks. First, there are elementary or basic choices to be made. Next, once a given branch has grown, choices become more specific, that is second-, third-level, etc. choices. The longer the sequence, the sturdier the branch, i.e. the research line. However, a successful research track may at some point lose its momentum: puzzles arise, objections are leveled, and doubts about its validity set in. Such an occurrence may result in what Leijonhufvud calls 'backtracking' – that is, returning to a previous node and taking a previously neglected bifurcation. Such a methodological decision tree is an *ex post* reconstruction undertaken by historians of economics; it can only be drawn after the dust has settled. The people engaged in the process of theoretical construction may or may not be cognizant of the methodological choices faced.

Leijonhufvud's framework plays a central role in our paper as it allows to schematize the rise and development of the neoclassical approach. We will also use it later to document the emergence of a mainstream in economics.

The neoclassical approach

In the last quarter of the XIX century, a new vision of economics saw the light of the day, the neoclassical approach. It originated in the 'marginalist revolution' driven by S. Jevons, C. Menger, and L. Walras.[4] Jevons is usually credited for having been the first to formulate its basic intuition, the substitution principle. However, in the United Kingdom, Marshall soon became its dominant figure since he created the first economics curriculum and

---

[2] Cf. Biddle and Hamermesh (2016), Card and Della Vigna (2013), Hamermersh (2013), Kelly and Bruestle (2011), and Panhans and Singleton (2016).

[3] The bifurcation notion as used here is not to be understood in its mathematical meaning.

[4] The name 'neoclassical' arose much later. According to T. Aspromourgos (1986), T. Veblen introduced it in 1900 in a *Quarterly Journal of Economics* article, entitled "Preconceptions of Economics Science", to characterize Marshallian economics. Its extension to marginalist theory in general can be traced to J. Hicks and G. Stigler, in articles dated respectively 1932 and 1941. It then gradually entered the common language.

his *Principles of Economics* became the *magna carta* for economics for decades. Therefore, we will refer to him rather than to Jevons.

The gist of the neoclassical approach is that the determination of relative prices and equilibrium quantities is built on the twin notions of marginal utility and marginal productivity. The underlying intuition is what Marshall called the 'principle of substitution': the idea that households' optimizing behavior requires them to keep substituting the quantity of any pair of goods they plan to consume up to the point where the marginal rate of substitution between the two goods (which, under suitable mathematical representation of the preferences, corresponds to ratio of their marginal utilities) and their relative price are equal. *Mutatis mutandis*, the same principle is applied to the production process.

The marginalist revolution

What the protagonists of the marginalist revolution had in common was the intention to supplant the classical approach in its Ricardian variant and to replace it with a new one which they deemed more scientific – in present-day terminology, the neoclassical approach. The contrast between the two approaches can be understood using Leijonhufvud's framework. Three basic methodological nodes are worth considering. The first relates to the representation of society. While classical economists view society as structured in social classes, which act as the basic units of analysis, neoclassical economists focus on individual choice-making. This change amounted to making economics part of methodological individualism. The second node concerns the concept of equilibrium. Here, both approaches are centered around the notion of equilibrium, in contrast to the institutionalist approach. The third node relates to the type of theory of value adopted once the equilibrium fork has been taken. Here the shift is from the labor theory of value to the subjective theory of value.

Table 1. The differences in basic methodological choices between the classical and neoclassical approaches

		Classical approach	**Neoclassical approach**
Vision of society	Class-divided	✓	
	Atomistic		✓
Equilibrium approach	No		
	Yes	✓	✓
Type of value theory	Labor	✓	
	Subjective		✓

The neoclassical approach should also be compared to the institutional approach, defended at the time by economists such as G. Schmoller in Germany, and T. Veblen and C. Ayres in the United States. The hallmark of the institutional approach is to regard the market as an institution, comprising a host of lower-rank economic institutions, intertwined with other social institutions, all likely to change over time. Collective behavior is emphasized

more than individual behavior. Table 2 summarizes the contrast between the neoclassical and institutional approaches.

Table 2. The differences in basic methodological choices between the institutional and neoclassical approaches [5]

		Institutional approach	**Neoclassical approach**
Vision of society	sociologically structured	✓	
	atomistic		✓
Equilibrium approach	no	✓	
	yes		✓
Reasoning	verbal	✓	✓
	mathematical		✓
The market as an institution	yes	✓	
	no		✓
Evolutionary perspective	yes	✓	
	no		✓

The basic methodological nodes underpinning the construction of the neoclassical approach

Beyond their commonalities, Marshall, Menger, and Walras held different views about implementing their research program. These differences can be grasped by referring to six basic methodological nodes.

(a) A vision about how the construction of economics should proceed. The choice here is between a pragmatic approach to economics aiming at addressing concrete issues and an abstract one geared towards matters of principles, with the use of artificial model economies. In the first case, theoretical propositions pertains to the real world, in the second, to the fictitious model economy. External consistency is the overarching aim of the first line, internal consistency that of the second. Marshall and Menger took the first bifurcation, Walras, the second.

(b) Mathematical versus non-mathematical reasoning. Walras (and Jevons) regarded the use of the mathematical language as compelling. Menger was fully against it. Marshall's standpoint was ambiguous. He found mathematics useful as far as testing the consistency of one's ideas was concerned, but believed that its use should be confined to the appendixes of theoretical works.

(c) State of rest versus intertemporal equilibrium concept. Equilibrium is commonly defined as a state of rest acting as a center of gravity. Central to this conception is the short-/long-period divide allowing for the existence of disequilibrium states in the short period. An alternative, less intuitive concept is intertemporal equilibrium, based on the idea of intertemporal substitution (to be found in Hicks's *Value and Capital* and further elaborated by

[5] As will be seen Menger, Marshall, and Walras held different views about the place and role of mathematics in economics. This explains our classification of the neoclassical approach in row 3.

neo-Walrasian economists). The concern here is an equilibrium path. Embracing this second equilibrium concept makes the disequilibrium notion non-necessary for dynamic analysis. Marshall and Menger adopted the first concept. As far as Walras is concerned, the matter is less clear, but following Jaffé's ([1981] 1983) and Donzelli's (2007) interpretations, it appears that in his capital formation and credit model, he unwittingly paved the way for the second concept. Therefore, we ascribe the intertemporal equilibrium concept to him.

d) Scope of the analysis. This bifurcation separates partial equilibrium (the study of isolated markets) and general equilibrium analysis (the study of the economy as a whole). Marshall opted for the first, Walras and Menger for the second.[6]

(e) Microfoundations. A microfounded theory is one in which it is stated that the study of the market economy must have individual decision-making as its starting point. All neoclassical economists agree on this principle. However, when it comes to studying the functioning of markets, Marshall found it reasonable to skip the formal derivation of market demand and supply functions from individual choices and to start directly by analyzing these functions. We call this standpoint 'implicit microfoundations'. For their part, Menger and Walras were of the view that this individual decision-making stage could not be set aside. We capture this choice by stating that they took the 'explicit microfoundations' bifurcation.

(f) Measurement. As far as the relation between theory and measurement is concerned, two bifurcations presented themselves to neoclassical economists: engaging in purely theoretical contributions or in contributions mixing theory and measurement. Marshall, Menger, and Walras all three confined themselves to ''pure theory'. Marshall was certainly the most empirically inclined of the three. He was eager to collect industrial data; yet, the latter is not tantamount to engaging in original empirical measurement work.

Table 3 summarizes Marshall's, Menger's, and Jevons's respective choices

[6] Later, this bifurcation became a trifurcation, the third fork being the study of interactions between agents at a level lower than the market.

Table 3. The differences in basic methodological choices between Marshall, Menger, and Walras

		Marshall	Menger	Walras
Vision of economics	pragmatic	✓	✓	
	principled			✓
Reasoning style	prose	✓	✓	
	mathematical	✓		✓
Equilibrium concept	state of rest	✓	✓	
	intertemporal			✓
Scope	partial equilibrium	✓	✓	
	general equilibrium			✓
Microfoundations	implicit	✓		
	explicit		✓	✓
Theory/measurement	pure theory	✓	✓	✓
	theory & measurement			

These are the six basic decisional nodes faced by the founders of the neoclassical approach more or less unwittingly. We regard other important nodes – such as the competitive structure, information, expectations, or the introduction of institutions like governments and central banks – as second-level decisions nodes.

What is striking in this taxonomic exercise is that Marshall, Menger, and Walras differed in the bifurcations they chose. We take this as meaning that, though clearly separate from the classical and institutional approaches, the early neoclassical approach was broadly delineated. None of the possible bifurcations attached to the basic methodological choices of the founding fathers of marginalism were compelling. As will be seen further, in the 1970s, this state of affairs was to recede after the occurrence of a split between a broadly- and a narrowly-delineated neoclassical approach. The difference between these two variants relates to the 'type of reasoning' and 'microfoundations' nodes. Adopting the narrow delineation makes the 'mathematical language' and 'explicit microfoundations' forks compelling.

FRAGMENTATION

The notion of fragmentation refers to the process through which, over time, economics has become more and more disparate. It has testified firstly to a split between different approaches, which were more or less rivals, the neoclassical one being the most prominent one, and, secondly, to a split within these approaches generating separate fields associated with specific objects of research, distinct scientific communities, often with their own specialized journals, and their own methodological idiosyncrasies. An implication of this evolution is that one can no longer speak of a single neoclassical *theory*, but rather of a neoclassical *approach*, composed of separate theories. The same is true for what concerns institutional economics.

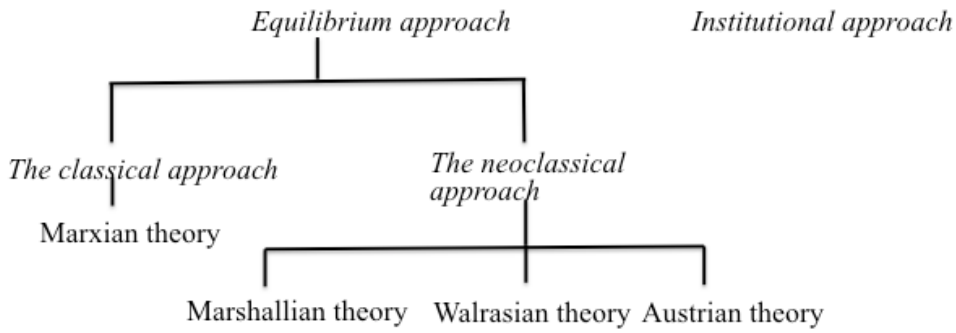
That such a fragmentation process has occurred cannot be denied. Agreeing on how to describe it is another thing. Indeed, the frontiers between sub-branches of economics are often vague and change over time. To compound the matter, some sub-disciplines experienced a split between distinct sub-streams, which were associated with specific sets of basic methodological choices. In spite of these difficulties, we find that the task must be addressed. Here is our attempt, drawn from inside knowledge (the common knowledge of the members of a scientific community) and interviews.

We divide the time span between the marginalist revolution and the present day into three periods. Period I relates to the emergence and stabilization of the neoclassical approach. It goes from the last quarter of the 19th century to the end of the 1930s. The second period starts in the early post-war period and finishes at the end of the 1970s. The third period extends from the early 1980s to the present. For each of these periods, three snapshots of the state of fragmentation are taken. The first pertains to the turn of the 20th century, the second to the end of the 1970s, and the third to the current state of affairs.

The configuration of economics from the last quarter of the 19th century to the 1930s.

During this period, fragmentation was minimal, as shown in Figure 1. Three approaches were present, the classical, the neoclassical, and the institutional approaches. Fragmentation in the neoclassical approach was merely latent, although the line separating Marshallian from Walrasian economics had already been drawn.

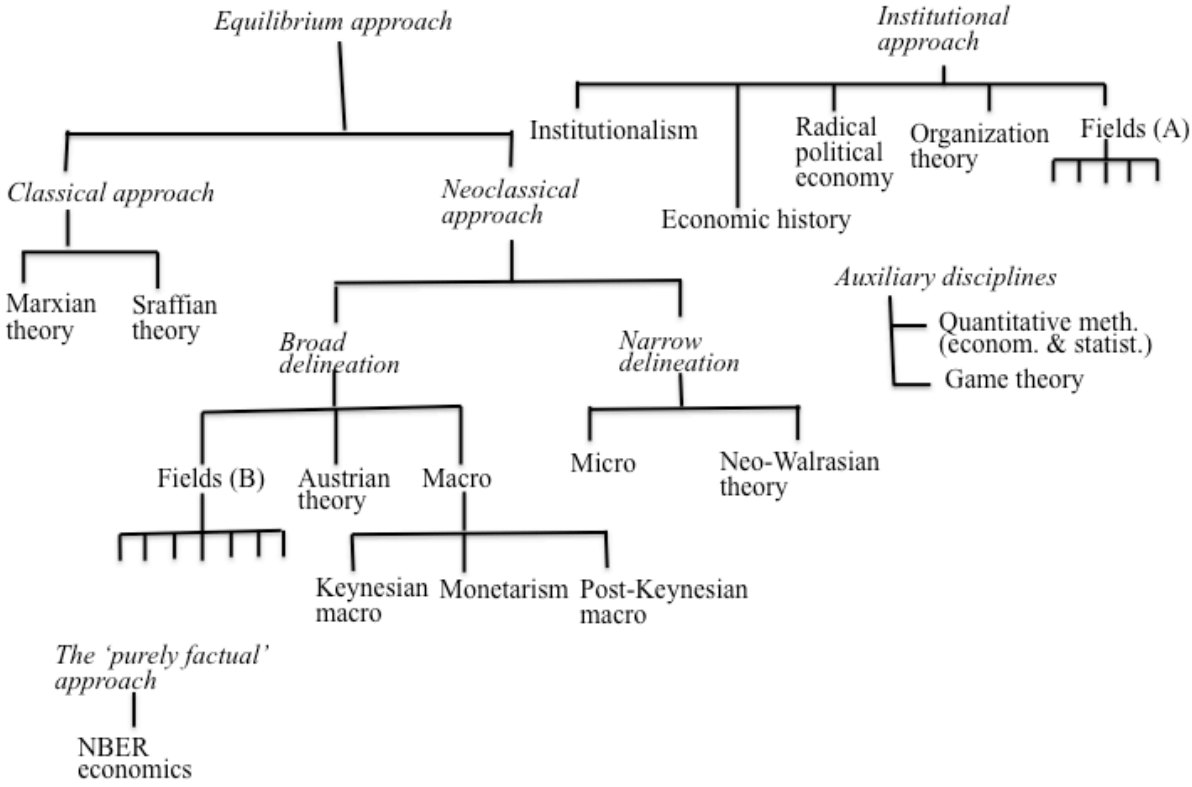
Figure 1 The configuration of economics at the turn of the 20th century



Economics at the end of the *1970s*

When comparing how economics stood at the end of the 1970s with the situation at the beginning of the 20th century, it is clear that fragmentation increased significantly, especially within the institutional and neoclassical approaches. Figure 2 gives the overall picture.

Figure 2. The fragmentation of economics at the end of the 1970s



Fragmentation within the neoclassical approach

Our taxonomy separates the following branches within the neoclassical approach: (a) microeconomics, (b) neo-Walrasian theory, (c) macroeconomics, (d) neo-Austrian theory, and (e) neoclassical fields.

(a) *Microeconomics*. As understood here, microeconomics includes everything that is usually put under this label (price theory, supply and demand theory, and decision theory) except general equilibrium analysis. By proceeding thusly, we depart from the commonly held view and return to R. Frisch's standpoint, which we find more appropriate. Frisch proposed using the 'micro' characterization to designate any "analysis by which we try to explain in some detail the behavior of a certain section of the huge economic mechanism, taking for granted that certain general parameters are given" (Frisch 1933: 172). In turn, he proposed using the term 'macro', which he was the first to introduce, apropos works concerned with the "fluctuations of the whole economic taken in its entirety" (Frisch 1933: 172). If one follows Frisch, as we do, two types of 'macro' works must be separated: general equilibrium analysis *à la* Walras and macroeconomics.

(b) *Neo-Walrasian theory*. The 1950s and 1960s were years during which neo-Walrasian theory underwent a remarkable revival under the stewardship of K. Arrow, G. Debreu, and L. McKensie, to the point of being often regarded as the most prestigious sub-discipline in microeconomics. At the end of the 1970s this was still the case.

(c) *Macroeconomics*. The existence of mass unemployment during the Great Depression led J. M. Keynes to write *The General Theory of Unemployment, Money and Interest* (1936), the fountainhead of modern macroeconomics. Keynes's book was published before the term 'neoclassical' had entered usage. However, when assessing it against the broad delineation of the neoclassical approach, there is no reason to regard it as outside its bounds. The same is true for Keynesian macroeconomics, which arose in the 1960s with the IS-LM at its core. Mention must also be made of two new theoretical streams bringing together economists who criticized Keynesian macroeconomics, whilst belonging to the neoclassical approach: monetarism and Post-Keynesian theory, the former under M. Friedman's leadership, the latter initiated by S. Weintraub and P. Davidson. Today, Post-Keynesian economists like to present themselves as heterodox or non-neoclassical. According to our typology, this is not the case with respect to the broad delineation of the neoclassical approach. While the post-Keynesian approach remained a minority stream, by contrast, monetarism, after a slow start, had gained enough strength by the end of the period to give rise to the possibility of a 'monetarist counter-revolution'.

(d) *Austrian economics*. Under F. Hayek's influence, Austrian theory underwent important changes, as attention moved from the study of equilibria as end states to that of the equilibration process with the idea of discovery coming to the forefront. Although they do not necessarily agree with all of Hayek's views, later Austrian economists, such as I. Kirzner and L. Lachman and their disciples followed suit. Austrian economists were also eager to posit themselves as different from the other branches of the neoclassical approach. For our part, we regard them as belonging to this approach in its broad delineation variant.

(e) *Neoclassical fields*. In the 1970s several specializations existed or were coming into existence. They were centered on a given object of analysis and associated with specific scientific communities and journals. When looking at their basic methodological choices, the situation is disparate. Some had long belonged to the institutional approach (although they were starting to gradually and partially move away from it). Labor economics is an example. In Figure 2, they are labeled 'A'. Others were already anchored in the neoclassical approach, such as industrial organization and international trade. In Figure 2, they are labeled 'B'.

Fragmentation within the classical approach

The change to be mentioned here is the rise of Sraffian economics spurred by P. Sraffa's 1960 book, *Production of Commodities by Means of Commodities*, promoting a revival of the classical approach, free from the strict adherence to the labor theory of value.

Fragmentation within the institutional approach

(a) Organization theory, which is associated with the names of A. Chandler and O. Williamson, is the study of mechanisms internal to the functioning of economic organizations and the coordination procedures distinct from the institutions at work in them.

(b) Another emerging stream was radical political economics, a somewhat loose gathering of economists who wanted to analyze capitalism by building on Marxian insights without adopting the labor theory of value.
(c) Economic history emerged as a specific sub-discipline.
(d) As stated, some of the emerging specialization ought to be regarded as belonging to the institutional approach.

Auxiliary disciplines

Auxiliary disciplines provide tools to help economists (and other social scientists) to frame their reasoning or to verify theoretical propositions. They are also autonomous specializations, objects of study which can be tackled for their own sake, to the effect that one speaks of 'econometric theory' or 'game theory'. The Klein-Goldberger model (1956) inaugurated structural econometric modeling, the start of a long chain of models. This move marked a radical departure in the last of the basic methodological choices listed above, pushing macroeconomics from the 'pure theory' to the 'theory & measurement' bifurcation. J. von Neumann et O. Morgenstern's invented game theory in their 1944 book, *Theory of Games and Economic Behavior*. Game theory was reshaped a few years later by J. Nash in seminal articles published in the beginning of the 1950s. These works proposed a unified mathematical apparatus for the study of interactive decision-making, be it in economics or in the other social sciences, centered on new equilibrium concepts and applicable to a host of situations of conflict and cooperation.

- The rise of the purely factual approach

  The work done at the National Bureau of Economic Research, founded in 1920 and dedicated to the creation of measurement tools and time series, must be mentioned here. A landmark book in this tradition is A. Burns and W. Mitchell's 1946 book, *Measuring Business Cycles*, the very work that prompted T. Koopmans to write his "Measurement without Theory" article. Another interesting example is M. Friedman and A. Schwartz's 1963 *Monetary History of the United States*. Their motivation was certainly theoretical and in further articles they rearranged the data collected in the book in order to make some theoretical points. Yet, in itself, their book is a mere, albeit impressive, collection of facts. [7]

Our comments on the different elements of Figure 2 completed, it is worth returning to the neoclassical approach. Earlier in the paper, we noticed that, from the start, the neoclassical approach spanned distinct research lines. In Leijonhufvud's terminology, distinct sets of basic methodological choices coexisted within it. It appears that the same internal diversity lived on in the 1970s, as displayed in Table 4.

[7] Chapter 7 dealing with the Great Depression is the exception; we regard it as a contribution to the institutionalist approach.

Table 4. Four distinct sets of basic methodological choices within the neoclassical approach in the 1970s

		Micro	**Neo-Walras. theory**	**Macro**	**Austrian theory**
Vision of economics	pragmatic	✓		✓	✓
	principled		✓		
Reasoning style	prose				✓
	mathematical	✓	✓	✓	
Equilibrium concept	state of rest	✓		✓	✓
	intertemporal		✓		
Scope	partial equilibrium	✓			
	general equilibrium		✓	✓ [8]	✓
	interactive decision-making	✓			
Microfoundations	implicit			✓	
	explicit	✓	✓		✓
Theory/measurement	pure theory		✓		✓
	theory & measurement	✓		✓	

Period III: The present-day picture

The rise of purely factual contributions to economics

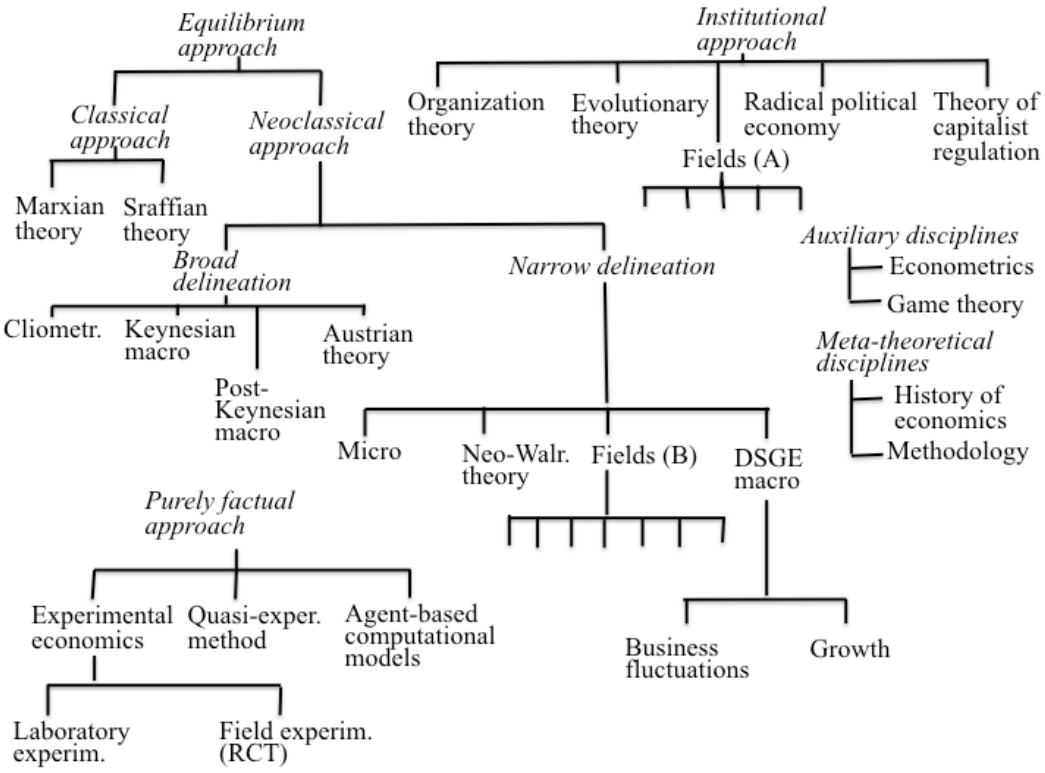
The most significant move in the last two decades has been the surge of non-theoretical research lines or, more precisely, of works that contribute to economics – i.e. the knowledge of the economy – without contributing to economic theory yet. It already existed before but what happened was a rise in the relative weight of this type of works.[9] Our remark made above about Friedman and Schwartz's *Monetary History of the United States* is valid here as well. The authors of these works are economists who pursue an economic motivation – e.g. questioning established views, such as the negative link between minimal wages and employment – stemming from a methodological dissatisfaction with the neoclassical approach. Nonetheless their specific contribution is factual evidence.

One of such research lines is experimental economics of which V. Smith is regarded as the founding figure. Behavioral economics, which originated in the works of D. Kahneman and A. Tversky, two psychologists, is a closely related research field. Both aim at accounting for human behavior differently from the *homo economicus* explanation, taking up H. Simon's intuitions and proceeding through experimentation.

[8] De Vroey (2016) argues that, during this period, macroeconomics strived at doing general equilibrium analysis without being full successful.

[9] This rise is documented in the papers quoted in Note 3.

Figure 3. The current state of fragmentation



Randomized Controlled Trials (RCT), i.e. economist-initiated field experiments, are a closely related type of research. Started at M.I.T. under the stewardship of A. Banerjee, E. Duflo, and S. Mullainathan who, in 2003, founded the Abdul Latif Jameel Poverty Action Lab (or J-PAL), this approach has been expanding considerably. Their research strategy transposes experimental methods that exist for example in medical research to the field of development. They gauge the impact of institutional measures by devising two samples, one for which the measure is applied and the other for which it is not.

Another new research line is natural or quasi-experimental economics, a domain in which O. Ashenfelter, D. Card, and A. Krueger have played a pioneering role and which has become an important sub-stream of education and labor economics. Here, researchers "exploit situations where the forces of nature or government policy have conspired to produce an environment somewhat akin to a randomized experiment" (Angrist and Krueger 2001: 73). Thereby, a division between treatment and control groups is deemed possible and causal inferences can be drawn from comparing outcomes.

Finally, a last type of work in this research line, which presents itself as an alternative to Keynesian and DSGE macroeconomics, is agent-based computational economics – "a collection of algorithms (procedures) that have been encapsulated in the methods of software entities called 'agents'" (Tesfatsion 2006: 179).

Transformation and fragmentation within the neoclassical approach

Macroeconomics witnessed the academic dethroning of IS-LM Keynesian macroeconomics by DSGE macroeconomics (DSGE standing for dynamic, stochastic general equilibrium) under R. Lucas's impetus. DSGE macroeconomics separated into two distinct research directions, both anchored to the Solow/Ramsey model, one devoted to the study of business fluctuations, the other to growth. From its onset to the present, the former evolved over three installments, new classical macroeconomics, RBC (real business cycle) modeling and (second-generation) new Keynesian modeling. Monetarism is no longer mentioned because it lost its momentum with the collapse of its central tenet, a stable velocity of money. Nonetheless, several of its insights have been absorbed into second-generation new Keynesian modeling.

One new development has been the rise of 'cliometrics' or 'new economic history', inaugurated in the 1960s by D. North and R. Fogel – a transformation of economic history whereby quantitative studies and the use of the neoclassical conceptual apparatus became important ingredients in the historical narrative.

Transformation and fragmentation within the institutional approach

R. Nelson and S. Winter's 1982 book *An Evolutionary Theory of Economic Change* gave a new impetus to evolutionary theory. The revival of economic sociology must also be mentioned. Having started much earlier with the works of E. Durkheim, and T. Parsons and N. Smelser, it underwent a revival with the rediscovery of K. Polanyi's 1944 book, *The Great Transformation*, and M. Granovetter's work. Another new stream is the French 'regulation school', initiated by M. Aglietta's 1976 book, *Régulation et crise du capitalisme*, and further developed by R. Boyer in numerous articles and books. Drawing eclectically from Marx's work, regulation theory aims at studying the transformations and crises experienced by the capitalist system using concepts such as accumulation regimes, modes of regulations, and coordination.

Transformation and fragmentation within the auxiliary disciplines

Both econometrics and game theory have evolved into thriving disciplines testifying to tremendous technical evolution.

The rise of autonomous meta-theoretical fields

The history of economic thought and epistemology have evolved into autonomous sub-communities.

Our representation of the fragmentation process that has occurred in economics is tentative and amendable. What is beyond question, however, is that a profusion of alternative research lines have seen the light of day. This conclusion is correct but may be deceptive since it gives no indication of the relative weight of the different elements in the configuration. This brings us to the subject of certification.

CERTIFICATION

Certification refers to the now widespread phenomenon of assessing the quality of the service provided in different types of activities. It acts as a screening device. While it existed before the Internet, its scope immensely increased with the rise of the latter. It has also affected the functioning of our discipline as testified to by the issuance of numerous rankings – of journals, departments, and even individual economists. Certification implies defining criteria for 'good practices'. Think of the fair trade label; it is attributed conditionally on the compliance with given standards. In economics, certification operates in the same way; it is a matter of abiding by 'good' methodological practices.[10]

Our claim is that the rise of mainstream economics – or, in other words, of a polarization between mainstream and non-mainstream economics – and certification are two sides of the same coin. Before certification, economics may well have testified to the statistical predominance of some sets of methodological choices over others, but, in our eyes, this was neither a necessary nor a sufficient condition for asserting the presence of a mainstream. This is probably why the organizers of the 1998 HOPE Conference evoked an age of pluralism, regretting its disappearance. In their words, "there was no hegemony of method" (Morgan and Rutherford 1998: 6). This state of affairs no longer prevails. Mainstream economists regard the transformation that occurred as a sign of greater scientificity – the profession has unified around better-defined methodological choices. For their part, non-mainstream economists strongly dissent with the methodological choices underpinning mainstream economics and take offense at seeing their own choices marginalized.[11]

When it comes to science, certification takes two specific aspects. Refereeing is the first one. It does not consist only in judging whether the paper submitted is an original scientific contribution. Prior to that, it serves the purpose of checking whether it complies with some basic methodological requirements. The second aspect relates to the way in which the good practice label is attributed. As far as economics is concerned, it is more complicated than in the case of fair. Its main vehicle is the classification of journals. The latter is two-tiered. To begin with, there is a binary divide between mainstream and non-mainstream journals.[12] As far as the former are concerned, there is a ranking in terms of excellence, with the 'top five' journals occupying the upper level (the *American Economic Review*, *Econometrica*, the *Journal of Political Economy*, the *Quarterly Journal of Economics*, and the *Review of Economic Studies*). The aim of non-mainstream journals is to publish papers based on other methodological choices. Usually, these journals are absent from the ranking process. The link

[10] We put quotation marks because the definition of the word "good" is a relative matter. In economics as in fair trade, the people concerned may differ with regard to the criteria which should be used. Henceforth, we will no longer put 'good' between quotation marks, yet the reader should consider that it still is.

[11] R. Weintraub (2005) vindicates the mainstream phenomenon. Morgan and Rutherford (1998) is, among many other pieces, a criticism of it.

[12] We leave aside the small group of journals publishing both mainstream and non-mainstream articles.

between ranking and certification lies in the fact that abiding by the standards for the methodological practice deemed correct is a prerequisite for papers to be published in mainstream journals.

THE RISE OF NEW METHODOLOGICAL STANDARDS: FIVE CASE STUDIES

The task pursued in this section and the next one is to use Leijonhufvud's decision tree device to identify the standards which have come to prevail, and to study how and when they emerged, and whether they changed over time. Our contention is that they emerged independently, yet more or less congruently, in different fields. We will lay out how this occurred around the turn of the 1980s in macroeconomics, industrial organization, labor economics, and development economics, and in the 1990s, in applied economics. Of course, we do not claim that standards for good practice did not exist before the 1980s. Our contention bears on a qualitative change from loose to strict standards.

Macroeconomics

Macroeconomics is a discipline that went through a scientific revolution.[13] Triggered by Lucas in the 1970s and stabilized by F. Kydland and E. Prescott in the mid-1980s, it led to the dethroning of Keynesian macroeconomics and its replacement by DSGE macroeconomics. Lucas's contribution was mainly methodological. As observed by R. Manuelli and T. Sargent in their review of Lucas's *Models of Business Cycles*, it consisted in setting up "particular sets of rules and techniques to model aggregative economic observations" (Manuelli and Sargent 1988: 523). These rules, Manuelli and Sargent pointed out, acted as standard-setters, discriminating between up-to-the-standard and sub-standard practices. Prominent among these standards were a general equilibrium perspective, dynamic analysis, the rational expectations assumption, explicit microfoundations, market clearing, stochastic shocks, and a procedure for empirical assessment. To give an example of the implications of the adoption of new standards, the notion of disequilibrium which played such a central role in Keynesian macroeconomics disappeared from the theoretical scene. Two additional traits of this new approach to macroeconomics must be mentioned. The first is the unification of the two components of macroeconomics, business cycles and growth, around a single model, the Solow/Ramsey model. The second concerns the theory/measurement methodological node. It manifests both continuity and discontinuity: continuity because DSGE macroeconomics followed Keynesian macroeconomics, both being emblematic examples of the 'theory & measurement' bifurcation; discontinuity because RBC economists replaced econometric testing with calibration. Table 5 summarizes the DSGE transformation with respect to basic methodological choices.

[13] For a more detailed analysis, see De Vroey 2016.

Table 5. Methodological transformations in business fluctuation macroeconomics

	Continuities	***Discontinuities***
Main object of analysis		From the study of short-period unemployment to that of business fluctuations
Basic methodological nodes *Vision of economics*		From a Marshallian (pragmatic) to a neo-Walrasian (principled) vision
Type of reasoning	Model building	New mathematical tools allowing dynamic analysis
Equilibrium concept		From the state of rest to the intertemporal equilibrium concept
Scope		From incomplete to full general equilibrium analysis
Microfoundations		From implicit to explicit microfoundations
Theory/measurement	Theory & measurement	A change from econometric testing to calibration first, and to Bayesian estimation later
Significant second-level methodological choices *Emphasis*		A move from demand to supply
Expectations		Rational expectations
General characterization		A move from the broad to the narrow delineation of the neoclassical approach

The account above is, however, incomplete because of a methodological change which occurred in growth theory. While P. Romer's 1986 "Increasing Returns and Long-Run Growth" and Lucas's 1988 "On the Mechanics of Economic Development" trailblazing papers belonged to the 'pure theory' fork of the 'theory/measurement' decisional node, soon, works in growth shifted towards the 'theory & measurement' fork. This shift was congruent with the set of basic methodological choices underpinning DSGE macroeconomics. However, in the present decade, a further move occurred, this time from the 'theory & measurement' towards the 'purely factual contribution' bifurcation – what makes growth theory non-neoclassical. We will show further that such a move had already taken seed in other disciplines.

Industrial organization

A transformation similar to what happened in macroeconomics took place in industrial organization. In the 1950s and 1960s, its core was the structure-conduct-performance framework. That is, the market structure in a given branch (concentration, vertical integration, product differentiation, number of firms) is supposed to determine the conduct of the firms belonging to the branch, impinging in a second stage on observable market performances. For example, it was argued that observable differences in profit rates across sectors resulted from the degree of competition. Barriers to entry (increasing returns, capital requirements, and product differentiation) were considered a central factor of collusive behavior. At the time, industrial organization had a vague theoretical underpinning, Cournot's theory of oligopoly

pricing. First and foremost, the discipline was descriptive and empirical. Most of the emphasis was on establishing correlations between market structure and performance, the second element of the triptych, behavior, receiving little attention. Techniques were rudimentary and data scarce. In the beginning, empirical work consisted in elementary statistical analysis of small cross-industry data. Market structures were evaluated subjectively. Later, large cross-section samples of industry-level data became available. Nonetheless, identifications problems abounded due to the simultaneous nature of the models used.

New style industrial organization arose at the turn of the 1980s under the combination of at least three factors. The first was the realization that the way in which issues were traditionally posited was wanting because it assumed that structural data were given rather than determined endogenously. The second was the realization that behavior needed to be placed at the center of the analysis. The third was the adoption of a new equilibrium concept geared towards tackling multi-stage games – the subgame perfect equilibrium concept proposed by R. Selten – defining the list of optimal actions to be taken by each player at the start of the game and at each intermediary step in the sequence.

Oligopoly theory had pride of place in the new paradigm. The latter also addressed research and development, the regulation of markets with two-sided platforms, the regulation of natural monopolies, contract theory, and banking theory. Moreover, the analysis zeroed in on agents' interactions within a branch, bringing the topic of asymmetric information to the forefront, as well as the problems of adverse selection, moral hazard, and verifiability that it triggered. J. Tirole's 1988 *Theory of Industrial Organization* provided a unified framework for the new industrial organization theory.

In the beginning, most papers in the new approach belonged to the 'pure theory' bifurcation. Nonetheless, the very nature of what industrial organization studies and the regulation dimension inherent to it gave the field a direct real-world relevance. A return to the 'theory & measurement' bifurcation occurred in the US at the turn of the 21st century with the rise of what T. Bresnahan referred to as the 'new empirical industrial organization' (Bresnahan 1989). It involved moving from the old cross-industry approach towards the in-depth study of isolated branches of the economy.

The transformation that took place in industrial organization is similar to what happened in macroeconomics – the rise of new, precise and compelling standards replacing loose ones. Table 6 shows how this can be interpreted in terms of the basic methodological node framework.

Table 6. Methodological transformations in industrial organization

	Continuities	***Discontinuities***
Main object of analysis	The functioning of oligopolistic markets	
Basic methodological nodes *Vision of economics*	Marshallian	
Type of reasoning		A move from soft to serious mathematical reasoning
Equilibrium concept		A move from state of rest to subgame perfect equilibrium
Scope	Partial equilibrium analysis	Also the study of interactive decisions at a level lower than the market level
Microfoundations		A move from implicit to explicit microfoundations
Theory/measurement	Theory & measurement	Either theory without measurement or theory & measurement. New techniques
General characterization		A move from the broad to the narrow delineation of the neoclassical approach

Labor economics

The field of labor economics has existed for a long time.[14] In the early years, what was important in 'labor economics' was 'labor' rather than 'economics'. This institutional bend and an accompanying mistrust of neoclassical theory lingered on until the 1970s. when new theoretical developments within the neoclassical approach, due in particular to G. Stigler and G. Backer, showed that the neoclassical conceptual apparatus proved a more powerful tool for the study of labor market phenomena than believed before. Stigler's argument that it was time to dent the perfect competition account of the working of markets by introducing 'frictions' (Stigler 1961) pioneered early search models (McCall (1970), Mortensen (1970), and Gronau (1970)). From the 1980s onwards, these models blossomed into a powerful new paradigm. As for Becker, his contributions were manifold. Human capital theory was the first one (J. Mincer was a co-inventor of the notion). It introduces an investment dimension, education, into households' decisions. As a result, topics like education and other forms of skill improvement emerged as new central topics in labor economics. Another early contribution by Becker was the theory of household production. Later, he also tackled the issues of discrimination with respect to gender and race. Both human capital and search theories started as theories without measurement, but later evolved into becoming 'theory & measurement' research lines. When adding other developments such as contract theory and efficiency wage theory, the emerging picture is that labor economics also underwent a radical shift leaving the

[14] The first text in labor economics, *The Labor Movement in America*, published in 1889, was written by R. Ely who, with J. Commons, made the University of Wisconsin's School of Economics, Political Science and History the flagship of the institutional approach to labor economics.

institutional in favor of the neoclassical approach, and for that matter the narrowly delineated variant of the latter. Table 7 summarizes this transition.

Table 7. Methodological transformations in labor economics (neoclassical sub-stream)

	Continuities	***Discontinuities***
Main object of analysis	All issues related to the labor market	
Basic methodological nodes *Vision of economics*	Marshallian	From an interdisciplinary to a mono-disciplinary approach
Type of reasoning		A move from graph-supported prose to mathematical reasoning
Equilibrium concept	State of rest equilibrium	Game-theoretical equilibrium concepts
Scope	Functioning of the labor market	Additional attention given to the study of individual behavior and interactive decision-making
Microfoundations		From implicit to explicit microfoundations
Measurement		Firstly, measurement without theory, later on, theory & measurement
New methodological nodes *Trade organization*		Invention of the search trade technology
Labor supply behavior		Introduction of the human capital dimension
General characterization		A move from the broad to the narrow delineation of the neoclassical approach

However, this 'neoclassicalization' of labor economics is only half of the picture. First, studies of labor from an institutionalist perspective remained alive and well in industrial relations departments, finding an outlet in journals like *The Industrial and Labor Relations Review*. Second and more important, the old empirical bend of labor economics evolved into quasi-experimental papers in which theory played at most a slight role. It may be conjectured that such a research line is now more important than the neoclassical one.

To conclude, the case of labor economics is interesting because in the present state of affairs it displays a peaceful coexistence of two research lines – in this paper's terminology, two sets of basic methodological choices – which have little in common except their object of analysis, i.e. labor markets issues.

Development theory

The present-day characterization of development economics is close to that of labor economics with the coexistence of two unconnected sub-streams. The field started in the 1940s in a rather scattered way with pioneering figures, such as R. Nurske, P. Rosenstein-Rodan, R. Prebisch, G. Myrdal, H. Leibenstein, H. Chenery, and A. Hirschman, each pursuing their own way of addressing the issue of underdevelopment. All these economists held the

firm conviction that neoclassical economic theory was of little help for the study of development. Their works were characterized by their discursive non-mathematical style.

From the 1970s onwards, development underwent two shifts. The first consisted in moving from the institutional to the neoclassical approach, as in labor economics. More attention began to be paid to microeconomic issues – e.g. the relationship between a principal and an agent. A landmark subject of study in this respect was share-cropping. In his seminal article "Incentives and Risk Sharing in Share-Cropping" (1974), J. Stiglitz proposed to conceptualize it as an equilibrium contract. Stiglitz's approach amounted to making development studies part of the newly created information paradigm. This made it possible for development economists of the new stripe to capitalize on the tremendous progress that had taken place in the fields of information theory and industrial organization – models of information asymmetry and strategic interactions between agents, imperfect and incomplete markets, dynamic externalities and increasing returns to scale, multiple equilibria and self-reinforcing mechanisms. As far as this first evolution is concerned, the pattern followed is close to that of the fields studied previously as Table 8 shows.

Table 9. The transformation from institutional to neoclassical development theory

	Continuities	***Discontinuities***
Main object of analysis	Development	
Basic methodological nodes *Vision of economics*		Pragmatic (Marshallian)
Type of reasoning		A move from verbal to mathematical reasoning
Equilibrium concept		A move from a non-equilibrium to an equilibrium approach mainly using Nash equilibrium
Scope		A move from structural studies to the study of individual behavior or interactive decision-making
Microfoundations		A move from a non-microfounded standpoint to explicit microfoundations
Measurement		Both 'theory & measurement' and 'purely factual contribution'
General characterization		A move from an institutional to a narrowly delineated neoclassical approach

Around the turn of the millennium, a new shift occurred, this time a move from 'theory & measurement' towards 'purely factual contribution' fork. It took two distinct ways, field-experiments, RCT, and the quasi-experimental research line. An emblematic contribution in this last respect is D. Acemoglu, S. Johnson, and J. Robinson's 2001 article on the colonial origins of comparative development. Borrowing from growth theory, the institutional approach, and political theory, it claims to have solved the reverse causation objection facing this view by using the differential mortality rates of European settlers in different colonies as an instrument variable. The paper marks an interesting step towards a

smoothing of the frontiers between the three approaches we have identified – the neoclassical, the institutional, and the non-theoretical approaches – a possible harbinger of a future new configuration.

Applied microeconomics

Up to now, we have reflected on fields defined by their object of analysis and the existence of a distinct scientific community. By contrast, works in applied microeconomics span different fields. Their common feature is to qualify for the 'purely factual contribution' appellation. The same question arises for applied microeconomics as for the other sub-disciplines mentioned above, namely whether it testifies to a transition from loose to stricter standards for research practices. This is the very claim made by J. Angrist and J-N. Pischke in reference to the quasi-experimental literature in a 2010 *Journal of Economic Perspective* article (Angrist and Pischke 2010). According to them, the main flaw of earlier applied works – for example I. Ehrlich's much discussed papers on the deterrence effect of capital punishment on crime (Ehrlich 1975, 1977) – was their lack of credible research design.

Angrist and Pischke argue that things changed around the mid-1990s. They regard Card and Krueger's 1992 papers (1992a, b) on the impact of school quality on the returns to education as a landmark for a new and more rigorous way of doing applied economics. A list of the improvements that saw the light of day runs as follows: coming to grips with the omitted variable bias, more cautious attention given to reverse causation, the renewal of already existing econometric methods such as regression discontinuity methods, and differences-in-differences-style policy analysis. But above all, what changed, they claim, is the increased attention given to research design.

> With the growing focus on research design, it's no longer enough to adopt the language of an orthodox simultaneous equations framework, labeling some variables endogenous and others exogenous, without offering strong institutional or empirical support for these identifying assumptions (Angrist and Pischke 2010: 16).

All this amounts to boosting the 'purely factual' type of work at the expense of the 'theory & measurement' one.[15] As for the explanation of its emergence, technological developments – the tremendous increase in availability of rich data sets and in computational abilities – have surely played a central role in this recent evolution. Yet, an additional rationale is worth considering – economists' (especially younger ones) frustration with respect to the too-abstract nature of high-brow neoclassical theory and its poor ability to address the economic problems of the day in a way which is helpful for policy decision. To study these issues, it is unnecessary to master all the intricacies dealt with in A. Mas-Colell, M. Whinston, and J. Green's *Microeconomic Theory* book. Neither is sophisticated econometrics needed. In

[15] Angrist and Pischke's article was the leading piece in a symposium. The other articles by Keane, Leamer, Nivo and Whinston, and Sims were highly critical, less on the point that technically 'measurement without theory' works used more rigorous research designs than on the drawbacks of having abandoned the 'theory and measurement' bifurcation. See also Deaton (2010).

some way, economists who hold this view are heirs to C. Sims, according to whom it is possible to do good work without much a priori economic theory (Sims 1980).

Wrapping up

Two lessons can be drawn from our examination. The first is that, at the turn of the 1980s, a change in standards for good research practice, typical of the certification process, endogenously and simultaneously took place in the four fields studied. It involved making mathematical modeling and explicit microfoundations compelling, that is, a move towards the narrowly delineated neoclassical approach, either from the broad to the narrow delineation type (the case of macroeconomics and industrial organization), or away from an institutionalism (the case of labor and development economics).[16] Our contention is that this transition from loose to strict standards and the rise of mainstream economics were part and parcel of each other. The second lesson is that, in the case of development and labor economics, a parallel move occurred towards purely factual contributions, to the effect that these sub-disciplines testify to a (rather peaceful) coexistence of research styles which, except for their object of analysis, have little in common.

THE EVOLVING IDENTITIES OF MAINSTREAM ECONOMICS

Our next and last task is, first, to identify the standards which came to prevail and, second, to examine whether the composition of mainstream economics underwent a change since its inception. As for the second query, our surmise is that this was the case. We locate the break (i.e. the point when a movement that arose earlier got its momentum) in the neighborhood of the millennium turn. Hence our third period of study, going from the 1980s to the present, must be split into two sub-periods, the first going from the 1980s to the millennium, the second from the latter to the present day. We start with describing the situation in the first.

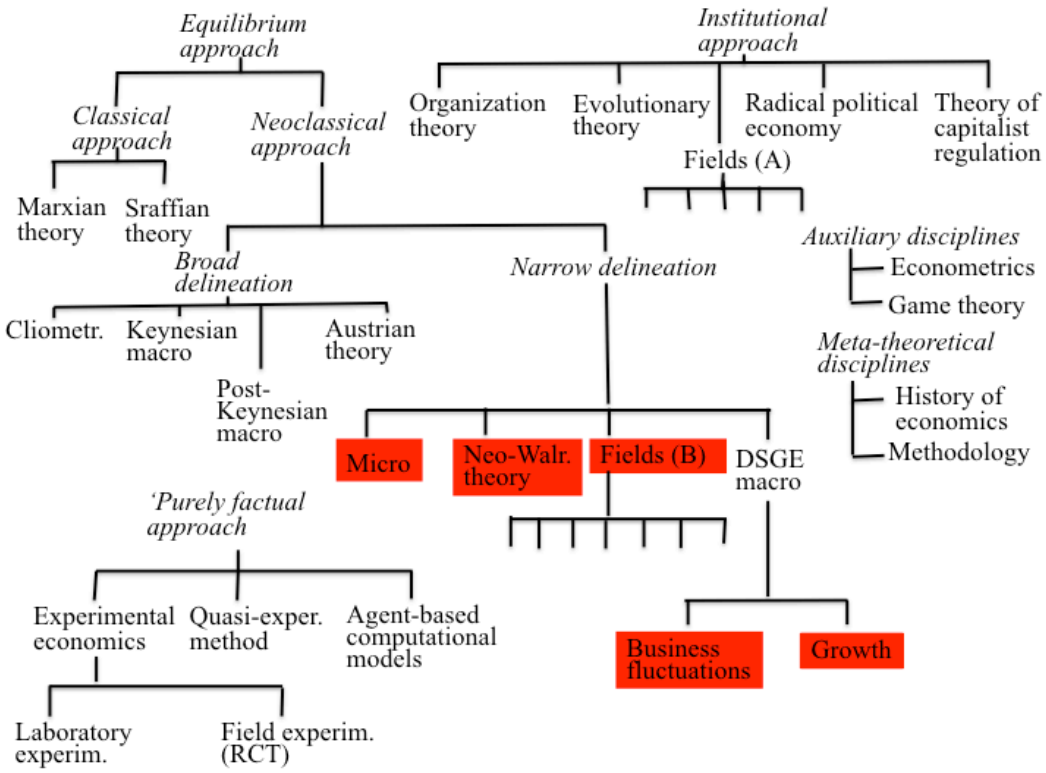
Our examination of four important sub-disciplines of economics suggests that, from the 1980s onwards, belonging to the mainstream was conditioned on the adoption of a three-pronged set of basic methodological choices within the neoclassical approach: (a) mathematical modeling, (b) explicit microfoundations, and (c) 'theory & measurement'.[17] However, this should not be the last word. While it may be surmised that an evolution similar took place in other branches (e.g. public economics or finance), there are other fields which must be regarded as contenders for the mainstream status. Their situation is different because they take the 'pure theory' fork – we are thinking of neo-Walrasian general equilibrium analysis and some sections of microeconomics such as decision theory. Therefore, the above

[16] As seen, a similar change took place in applied microeconomics, but it occurred later and outside the boundaries of the neoclassical approach.

[17] The mere presence of measurement is insufficient. Further standards, related to identification and reproducibility, have become compelling.

set of standards must be broadened with respect to the 'theory/measurement' node by including 'pure theory' as an admissible bifurcation. This standpoint taken, we may conclude that during the first sub-period the mainstream was selfsame to the narrowly delineated neoclassical approach. Figure 4, where the fields fulfilling the standards are colored in red, illustrates.

Figure 4. Mainstream fields during the first phase of mainstream economics

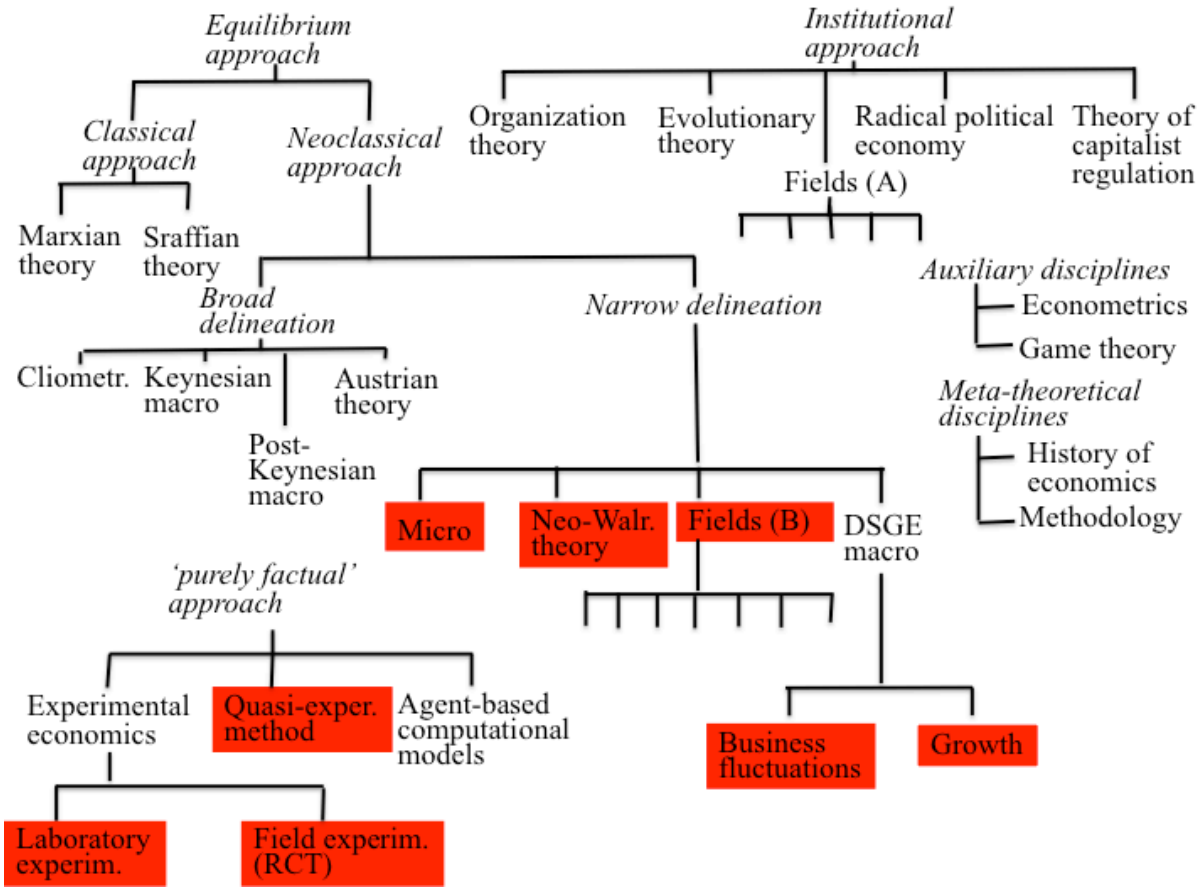


Turning to the second sub-period, it witnessed the blossoming of experimental economics, behavioral economics, and quasi-experimental economics. The empirical investigations made by Biddle and Hamermesh (2016), Hamermersh (2013), Kelly and Bruestle (2011), and Panhans and Singleton (2016) indicate that these sub-disciplines made a strong entry in top journals. Yet these new developments do not belong to the neoclassical approach as we define it. They are based on different standards related to the fulfillment of research design requirements. In as far as works based on the earlier standards have not been marginalized, the conclusion to be drawn is that mainstream economics has become two-pronged. Table 9 illustrates this new configuration in terms of standards, Figure 5 of fields.

Table 9. The evolving composition of the standards for good scientific practices

	Standards for good scientific practices
First period (from the 1980s to the 2000s)	– Mathematical modeling – Explicit microfoundations – Either 'pure theory' or 'theory & measurement'
Second period (from the 2000s to the present	– The above three standards – Alternative standard: 'purely factual' contribution with an up-to-date research design

Figure 5. The conjectured mainstream fields for the second period



CONCLUDING REMARKS

We were led to write this paper because of a desire to explain the rise of purely factual investigations which several recent papers have documented. We have argued that, to this end, two distinct threads must be brought together. The first is Leijonhufvud's insight: rivalries between different research lines follow from the fact that theoretical construction involves choosing between different bifurcations in face of basic methodological nodes. Research lines can then be regarded as specific sets of basic methodological choices. The second is that economics has become part of the general certification movement which has

come to dominate many sections of society. Piecing these two threads together has led us to contend that the rise of a mainstream in economics occurred concomitantly with the emergence of specific standards compliance allowing work to qualify as 'good' research practice. At the time of the emergence of a mainstream in economics, in the 1980s, these standards consisted of a precise set of basic methodological choices, which we call 'the narrowly delineated neoclassical approach'. Mathematical formalization and explicit microfoundations are its two *sine qua non*. Furthermore, we have argued that the passage of time has led to a change in the composition of mainstream economics. Thereby, we have returned to our initial query: explaining the drift toward purely factual studies. We regard this shift as the rise of a second, additional type of standards. Only time can tell how this duality of standards will evolve and whether new changes in the composition of the mainstream will see the light of day.

REFERENCES

Acemoglu, D. S. Johnson, and J. Robinson. 2001. " The Colonial Origins of Comparative Development: An Empirical Investigation." *American Economic Review*. **91**: 1369-1401.

Angrist, J. and A. Krueger 2001: 73). "Instrumental Variables and the Search for Identification: From Supply and Demand to Natural Experiments." *Journal of Economic Perspectives*. **15**, No. 4 : 69-85.

Angrist, J. and J-S. Pischke. 2010. "The Credibility Revolution in Empirical Economics: How Better Research Design is Taking the Con out of Econometrics." *Journal of Economic Perspectives*. **24**: 3–30.

Aspromourgos, T. 1986). "On the Origins of the Term 'Neoclassical'". *Cambridge Journal of Economics*. **10**: 265-70.

Backhouse, R. and B. Cherrier. 2016. " 'It's Computerization, Stupid!' The Spread of Computers and the Changing Roles of Theoretical and Applied Economics." *HOPE Conference, Becoming Applied*. Duke University. April 1-2, 2016.

Biddle, J. and D Hamermesh. 2016. "Theory and Measurement: Emergence, Consolidation and Erosion of a Consensus. " *HOPE Conference, Becoming Applied*.. April 1-2, 2016.

Bresnahan, T. 1989. "Empirical Studies of Industries with Market Power." *Handbook of Industrial Organization*. Volume 2. Chapter 17. Elsevier, Amsterdam: 1011-1053.

Card, D. and Della Vigna, S. 2013. "Nine Facts about Top Journals in Economics." *Journal of Economic Literature*. 2013. **51**: 144–161.

Card, D. and A. Krueger. 1992a. "Does School Quality Matter? Returns to Education and the Characteristics of Public Schools in the United States." *Journal of Political Economy*. **10**: 1–40.

Card, D. and A. Krueger. 1992b. "School Quality and Black–White Relative Earnings: A Direct Assessment*." Quarterly Journal of Economics*. **107**: 151–200.

Colander, D. 2000. "The Death of Neoclassical Economics." *Journal of the History of Economic Thought*. **22**: 127-149.

Colander, D., R. Holt and B. Rosser, Jr. 2010, "The Changing Face of Mainstream Economics." *Review of Political Economy*. **16**: 485-499.

Davis, J. B. 2006. "The Turn in Economics: Neoclassical Dominance to Mainstream Pluralism." *Journal of Institutional Economics*. **2**: 1-20.

Davis, J. B. 2008. "The Turn in Recent Economics and Return of 0rthodoxy." *Cambridge Journal of Economics*. **32**: 349–366.

De Vroey, M. 2016. *A History of Macroeconomics. From Keynes to Lucas and Beyond*. Cambridge: Cambridge University Press.

Deaton, A. 2010. "Instruments, Randomization, and Learning about Development." *Journal of Economic Literature*. **48**: 424–455

Donzelli, F. 2007. "Equilibrium and Tâtonnement in Walras's *Elements*". *History of Economic Ideas*. **15**: 83–138.

Ehrlich, I. 1975. "The Deterrent Effect of Capital Punishment: A Question of Life and Death." *American Economic Review*. **65**: 397–417.

Ehrlich, I. 1977. "Capital Punishment and Deterrence: Some Further Thoughts and Additional Evidence." *Journal of Political Economy*, **85**: 741–88.

Fourcade, M., Ollion, E. and Y. Algan. 2015; "The Superiority of Economists" *Journal of Economic Perspective*s. **2**9: 89-114.

Friedman, M. and A. Schwartz 1963. *A Monetary History of the United States, 1867-1960*. Princeton, Princeton University Press.

Godechot, O. 2011. "How did the Neoclassical Paradigm Conquer a Multi-disciplinary Research Institution"? *Revue de la Régulation*. **10**. 2e semester: 1-34.

Gronau, R. 1971. "Information and Frictional Unemployment." *American Economic Review*. **61**: 290-30.

Hamermersh, D. 2013. "Six Decades of Top Economic Publishing. Who and How"? *Journal of Economic Literature*. **51**: 162-172.

Jaffé, W. [1981] 1983. " Another Look at Léon Walras' Theory of Tâtonnement." In Walker, D. (ed.), *William Jaffé's Essays on Walras*. Cambridge, Cambridge University Press: 244-266.

Frisch, R. 1933. "Propagation Problems and Impulse Problems in Dynamic Economics" in R. Frisch and K. Koch (eds.). *Economic Essays in Honor of Gustaf Cassel*. London, George Allen and Unwin

Kelly, M. and S. Bruestle. 2011. "Trends of Subjects Published in Economic Journal 1969-2007." *Economic Inquiry*. **49**: 658-673.

Leijonhufvud, A. 1994. "Hicks, Keynes, and Marshall." In H. Hagemann and O. Hamouda (eds.). *The Legacy of Hicks*. London, Routledge: 147-162.

Lucas, R. E. Jr. 1988. "On the Mechanics of Economic Development." *Journal of Monetary Economics*. **22**: 3-42.

Manuelli, R. and T. Sargent.1988. "Models of Business Cycles. A Review Article." *Journal of Monetary Economics*. **22**: 523-542.

McCall, J. 1970. "Economics of Information and Job Search." *Quarterly Journal of Economics*. **84**: 113–126.

Morgan, M. and M. Rutherford (eds.). 1998. *From Interwar Pluralism to Postwar Neoclassicism*. Annual Supplement to Volume 30, *History of Political Economy*. Durham: Duke University Press.

Mortensen, D. 1970. "A Theory of Wage and Employment Dynamics." In E. Phelps (ed.). *Microeconomic Foundations of Employment and Inflation Theory*: 167-211.

Panhans, M. and J. Singleton. 2016. "The Empirical Economist's Toolkit: From Models to Method." *HOPE Conference, Becoming Applied*. Duke University. April 1-2, 2016.

Romer, P. 1986. "Increasing Returns and Long-run Growth." *Journal of Political Economy*. **94**: 1002-1037.

Stigler, G. 1961. "The Economics of Information." *Journal of Political Economy*. **69**: 213–225.

Stigler, G. 1962. "Information in the Labor Market." *Journal of Political Economy*. **70**: 94–105.

Stiglitz, J. 1974. "Incentives and Risk Sharing in Share-Cropping." *Review of Economic Studies*. **41**: 219-255.

Testfatsion, L. 2006. "Agent-Based Computational Modeling and Macroeconomics." In Colander, D. (ed.). *Post-Walrasian Macroeconomics. Beyond the Dynamic Stochastic General equilibrium Model*. Cambridge, Cambridge University Press: 175-201.

Tirole, J. 1988. *Theory of Industrial Organization*. Cambridge (Mass.), The MIT Press.

Weintraub, R. 2005. "Filing Formal Objections. A Polemic." http://papers.ssrn.com/sol3/papers.cfm?abstract_id=916343 (accessed October 8, 2016).

Institut de Recherches Économiques et Sociales
Université catholique de Louvain

Place Montesquieu, 3
1348 Louvain-la-Neuve, Belgique

ISSN 1379-244X D/2016/3082/26