**ARTICLE**

# Neoclassical influences in agent-based literature: A systematic review

**Emiliano Brancaccio**[1] ⓘ | **Mauro Gallegati**[2] | **Raffaele Giammetti**[2] ⓘ

[1] Department of Law, Economics, Management and Quantitative Methods, Università Degli Studi del Sannio, Via delle Puglie 82, Benevento, Italy

[2] Università Politecnica delle Marche, Piazzale Martelli, 8, Ancona, Italy (Email: mauro.gallegati@univpm.it; r.giammetti@univpm.it)

**Correspondence**
Emiliano Brancaccio, Università Degli Studi del Sannio, Via delle Puglie 82, Benevento, Italy.
Email: emiliano.brancaccio@unisannio.it

**Abstract**

Several studies highlight that the method and the object of analysis of Agent-Based models are in various respects in stark contrast to the prevailing neoclassical paradigm and therefore should be included in the traditions of alternative economic thought. In this paper, however, we show that distinctive features of the neoclassical theory can be found in most of the AB literature. Through a systematic review of most cited academic papers published in the period 1996–2019 and dedicated to Agent-Based models, we show that a "neoclassical influence" can be detected in 61% of papers, while only 39% do not have links with the mainstream neoclassical approach. We also note that after the "great recession" started in 2008 the neoclassical influences on AB literature decline to a significant extent.

**KEYWORDS**
agent-based models, alternative economic thought, complexity, computational economics, heterodox, mainstream, neoclassical approach

**JEL CLASSIFICATION**
B4, B5, C63, C8

# 1 | INTRODUCTION

In the evolution of contemporary economic analysis, the emergence and diffusion of so-called "Agent-Based" (AB) approach has represented a particularly relevant novelty. Over the last few years, several studies have highlighted the innovative aspects of the technique inherent in AB models. It was noted that these analyses not only propose a different method of investigation of economic behavior but suggest innovations in the whole object of economic science. The individual economic agent, her interactions with other agents, the emergence of aggregate behaviors and their feedback on the decisions of individuals, all these aspects are examined by AB models in ways that may have new implications for epistemology, theory, and empirical analysis (Bookstaber, 2017; Borrill & Tesfatsion, 2010; Farmer & Foley, 2009; LeBaron & Tesfatsion, 2008). In light of these innovations, a question therefore arises: can AB models be associated with alternative paradigms of economic theory or they represent only an innovation within the current mainstream approach inspired by the neoclassical paradigm? In this article, we try to answer by highlighting some contrasting elements within the literature on the subject. On the one hand, we show that numerous studies point out that the method and the object of analysis of AB models are in various respects in stark contrast to the prevailing neoclassical approach and therefore should be considered in line with alternative research paradigms. On the other hand, however, we show that the AB technique has found widespread diffusion in articles influenced by the mainstream neoclassical paradigm. In particular, through a systematic review of most cited academic papers published in the last three decades and dedicated to AB models, we measure the percentage of works in which a "neoclassical influence" can be detected and the percentage of studies that do not have links with the neoclassical theory.

Our result, as we shall see, is that a large majority of most cited papers on AB models are influenced by the prevailing neoclassical approach, while only a minority of them do not show a nexus with the dominant theory. In other words, despite several heretical features of AB lines of research, the investigation technique inherent in them has proved to be so flexible to find vast and advantageous applications within the dominant approach. We shall also see, however, that these neoclassical influences in AB studies tend to decline after the so-called "great recession" started in 2008. As we shall argue, these results seem to suggest that AB analysis is a flexible "technique" still seeking a precise place in the debate between alternative research programs in economic theory. Although the epistemological and theoretical collocation of the AB analysis reveals strong elements of contrast with the neoclassical framework in the face of several complementarities with the traditions of critical thinking, the prevailing literature on AB models is strongly influenced by the neoclassical approach.

The article is organized as follows. In section 2 we examine the studies that have explicitly placed AB models in the strand of alternative schools of economic thought. In sections 3 and 4 we define the characteristics of our systematic review of papers dedicated to AB models: methodology, data and definition of the concept of "neoclassical influence". In sections 5 and 6 we present the results of the review and comment on them. Section 7 concludes.

## 2 | AGENT-BASED MODELING AND ALTERNATIVE THEORETICAL APPROACHES: A BRIEF OVERVIEW

The 2008 "Great Recession" (IMF, 2012) has challenged the mainstream approach (Buiter, 2009; Mankiw, 2006; Romer, 2016; Solow, 2008, 2010; Stiglitz, 2011; Trichet, 2010) and has led to a surge of interest in alternative lines of research (Blanchard & Brancaccio, 2019). Notably, a growing body of literature has stemmed from the cross-fertilization of AB modeling and heterodox economics (Di Guilmi, 2017).

AB economics uses computer simulation to build models with heterogeneous agents, based on simple behavioral rules and on the interaction between these agents, where the resulting aggregate dynamics and empirical regularities are not known a priori and are not deducible from individual behavior (Gallegati & Kirman, 2012). AB models typically possess the following structure. There is a "taxonomy of agents" (e.g., consumers, households, firms, government, financial institutions, etc.; (LeBaron & Tesfatsion, 2008) which are then given a set of characteristics (e.g. endowments of commodities, income distribution, technology, etc.). The different groups of agents follow simple behavioral rules through which they interact. Their local interactions induce changes in their individual rules through adaptation as well as in the network that governs interaction. Then, some statistical regularity that cannot be inferred from individual behavior emerges from aggregation (self-emerging regularities). This bottom-up emergent behavior allows researchers to understand why certain macro-level regularities emerge and persist in decentralized market economies, despite the absence of top-down centralized coordination (Cogliano & Jiang, 2016).

We are clearly in the presence of a methodology that has more than one affinity with alternative approaches to economic thought. Not surprisingly, there have been attempts in recent years to make explicit a link between these heterodox views and the emerging AB analyses. According to Cogliano and Jiang (2016), the inherent flexibility of AB models makes them an appropriate tool for the questions raised by Classical and Post-Keynesian economists. For example, Cogliano (2013) situates the Classical-Marxian labor theory of value in an AB model. Similarly, Wright (2008, 2011a,b), develops dynamic computational models to study the emergence of Marx's law of value and its interplay with price and quantity fluctuations and macro dynamics. Further, Cogliano et al. (2016, 2019) use a computational framework to analyze the equilibrium dynamics of exploitation, class, and inequality in accumulation economies with heterogeneous labor, population growth, technical change, and bargaining. In the tradition of Classical economists, Russo (2017) proposes an AB macroeconomic model with social classes and endogenous crises in which business cycles and crises endogenously emerge as a result of the interaction between financial and real factors underlying the process of capitalist production. Yet, Gibson and Setterfield (2018) show how Keynes–Kalecki or structuralist model might benefit from AB microfoundations, without sacrificing traditional macroeconomic themes, such as aggregate demand, animal spirits, and endogenous money. Other contributions have further underlined the alternative nature of the AB analysis, highlighting its differences concerning the prevailing neoclassical approach (Caverzasi & Russo, 2018; Dilaver et al., 2018; Fagiolo & Roventini, 2012; Haldane & Turrell, 2018).

Dosi and Roventini (2017) find several similarities and complementarities between the AB approach and the alternative economic thought rooted in the schemes of the so-called "Italian School" of Classical Political Economy. According to the authors, this school was grounded on a rejection for the two fundamental pillars of mainstream neoclassical economics: maximization at the micro level and equilibrium at aggregate one (quite surprisingly, the authors state that Sraffa's scheme represents an exception and that Hahn (1982) was probably right in placing it

within a neoclassical framework; this thesis, however, has been rejected by the literature on the subject: among others, see Dumenil and Levy (1985), Garegnani (1990), Kurz and Salvadori (1995), Brancaccio (2010)). The authors note that these typical Classical features are mirrored by several building-blocks of AB models, and they argue that this is especially true for three families of AB macro models: the Schumpeter meeting Keynes (K+S) models, the Complex Adaptive Trivial System (CATS) models, and the EURACE models. Notably, the K+S framework developed in Dosi et al. (2010, 2013, 2015, 2017) models a complex system of imperfect coordination in which the Schumpeterian growth paradigm is merged with Keynesian (demand-related) and Minskian (credit cycle) insights of coordination failures and endogenous fluctuations. The CATS family of models has been developed over a long period, with publications dating back to the early 2000s (Delli Gatti et al., 2003, 2005, 2010; Russo et al., 2007). These models, highly stimulated by the Minskian financial instability theory (Minsky, 1982, 1986), focus on the role of firm heterogeneity and leverage decisions in the transmission and amplification of shocks and position the concept of emergence as an alternative to equilibrium theorizing. The EURACE model (Cincotti et al., 2010; Teglio et al., 2012) was projected to construct an AB model of the European economy. Along the same lines of the K+S and CATS models, EURACE investigates macroeconomic dynamics starting from the study of the micro interactions of heterogenous, adaptive agents.

In recent years, further contributions have resulted from an overlap between the AB modeling approaches and the Post-Keynesian Stock-Flow Consistent (SFC) models (Caverzasi & Russo, 2018; Di Guilmi, 2017). In their pioneering work, Caiani et al. (2016) note that most AB models, are not SFC and thus show an accounting inconsistency likely to affect the patterns of consumption, investment, savings, credit, and other macroeconomic variables. The authors take inspiration from the traditional SFC models (Caverzasi & Godin, 2015; Godley, 1997; Godley & Lavoie, 2007; Godley & Zezza, 2006; Nikiforos & Zezza, 2017; Passarella, 2012), to overcome these drawbacks and develop a consistent decentralized AB-SFC model. Since then, AB models framed in an SFC account structure, have been mostly used to study monetary and fiscal policy transmission (Caiani et al., 2018; Schasfoort et al., 2017), income inequality (Botta et al., 2019; Caiani et al., 2019; Cardaci & Saraceno, 2019; Russo et al., 2016; Willis, 2015), financial markets (Botta et al., 2020; Mazzocchetti et al., 2018; Riccetti et al., 2016, 2018), institutions and labor dynamics (Caiani et al., 2020; Dosi et al., 2018), climate change (Lamperti et al., 2018; Monasterolo & Raberto, 2018, 2019; Ponta et al., 2018).

The fact that AB methods are advantageous for heterodox schools of thought does not mean that AB methods are then necessarily heterodox themselves. Some papers simply highlight affinities between the AB approach and the traditions of critical thinking without claiming to place it in them. However, it is equally evident that relevant contributions in the literature explicitly position the AB approach in the context of alternative lines of research and underline its antagonism to the dominant neoclassical view. Yet these elements do not seem sufficient for a definitive collocation of the AB approach in the context of alternative schools. As we shall see, in the literature there are numerous works that in more or less explicit terms establish a precise connection between the AB models and the neoclassical paradigm. The need, therefore, arises to discern and quantify AB analyses that can be framed in the prevailing approach and those that are far from it. This will be the intent of the systematic review presented in the next sections.

# 3 | A REVIEW ON THE "NEOCLASSICAL INFLUENCE" IN AB MODELS: METHODOLOGY AND DATA

The following review aims to classify the contributions on AB models into two categories: those in which a "neoclassical influence" can be traced and those in which this "influence" is not recognized. In this section, we shortly discuss the method of data collection and describe the sample of papers included in the review. Our systematic review methodology draws on guidelines proposed by the Centre for Reviews and dissemination of the University of York (CRD, 2009), which reflects best practices in systematic reviews registered with Campbell and Cochrane Collaborations.

We made our initial selection of studies through a comprehensive search in the *Web of Science* database (on the choice of this database, see Xiao & Watson, 2017). We started the literature search by using the keywords "agent based". The outcome of this preliminary selection was 29444 articles. We then decided to delimit the search only to peer-reviewed papers published in the "Economics" *Web of Science* category. We also decided to select only papers written in English and published during the period 1996–2019. The reasoning for the choice of 1996 as a cutoff point is based on the output of our search in the *Web of Science* which returns no papers published before 1996. Our paper search stopped in August 2020. Using the above-described selection criteria, we ended up having 1043 papers. We then ranked these 1043 papers by the number of total citations and selected the first 100 papers most cited (about this criterion of selection, see: CRD, 2009; Xiao & Watson, 2017).

We then went through all these papers one by one and read the full text to determine possible "neoclassical influences" in terms of the criteria we will describe in the next paragraph. We filtered out some papers that cannot be classified as either neoclassical or alternative for the following reasons: the paper quotes the words "agent based" in the abstract or in the keywords although in the main text there are no other references to AB models; the paper discusses only technical issues, without clear reference to theoretical bases. After carefully evaluating the content of all papers in the database, we ended up having 90 papers none of which was published in the period 1996–1999[1]. Therefore, in our study, we refer to a timespan going from 2000 to 2019. The list of papers is reported in the Appendix and also marked with an asterisk (*) in the bibliography. This is the set of papers based on which we carry out the review.

The choice of delimiting the analysis to the hundred most-cited papers follows the methodology based on the guidelines of the Center for Reviews and dissemination of the University of York (CRD, 2009). These 100 most cited papers collect 6584 citations, 54% of total citations of the AB papers in the whole sample of 1043 papers. Our decision to examine only the most cited papers is not accidental: it focuses on the objective of studying the influences of the neoclassical paradigm precisely on the AB analyzes prevalent in literature. It should be noted that the surveys on the top 100 most-cited papers are increasingly used to focus the investigation on the most influential works on a specific topic (Ahmad et al., 2020), on literature belonging to different fields (Van Noorden et al., 2014), or on a specific method (Liu et al., 2013). We follow this last strand of research to analyze how and to what extent the neoclassical paradigm has influenced the landmark papers on AB modeling. An evaluation of whether and to what extent the choice to focus only on the most cited papers has an impact on the precise quantification of the papers in which there is a neoclassical influence remains open and the theme will be subject to future analysis. However, we have reason to believe that the main results reached by this work may find some confirmation even

---

[1] It should be noted that among the 1043 papers returned by our search in the *Web of Science*, only two papers were published in the period 1996-1999.

by analyzing larger samples of literature. Indeed, it is interesting to note that the selection of 100 most cited papers is in many ways representative of a much larger population of papers dedicated to AB models. If we compare the ranking of the 10 most prolific authors in the whole sample of 1043 papers with the first ten authors most present in the 100 most cited works, we read the same names. Ordered: Mauro Gallegati, Andrea Roventini, Giovanni Dosi, Shu-Heng Chen, Alberto Russo, Silvano Cincotti, Herbert Dawid, Mauro Napoletano, Marco Raberto, Andrea Teglio. The same holds, for the journals, countries/regions, research areas, and organizations: the most representative in the 1043 papers sample are also the most present in the first 100 most cited papers. Finally, we have also repeated the experiment with different samples obtained by adding further keywords to "agent based". For example, by using "agent based" AND "wage" OR "profit" OR "*employment" OR "GDP" OR "growth" OR "macro*" OR "general equilibrium", the outcome is 3225 articles, from which it is possible again to select the 100 most cited peer-reviewed papers published in English and in the "Economics" Web of Science category. As we will see in section 5, by inspecting these alternative samples we get results in line with the original experiment.

# 4 | A DEFINITION OF NEOCLASSICAL "INFLUENCE" ON AB MODELS

Once the sample of papers examined has been defined, it is necessary to clarify how we distinguish between studies on AB models in which a neoclassical influence is found and studies in which this influence is not detected.

The comparisons between the neoclassical approach and the AB models usually focus on their different analyses of human behavior, with the neoclassical models based on optimizing rationality and the AB analyses inspired by "bounded rationality" proposed by Simon and his successors (Kahneman, 2003; Simon, 1955, 1979). This difference is usually considered so irreducible as to cause an inexorable antagonism between the two approaches (Gallegati & Kirman, 2012). Yet, as we will see, despite this undoubted epistemological opposition between the two approaches, there have been attempts to consider the latter to be incorporated into the former (Hahn, 1975) and nowadays there is a large literature dedicated to AB models that are permeated by neoclassical influences.

In order to correctly define what we mean by "neoclassical influence", it is appropriate to clear the field of some misunderstandings that are often found in the attempts to define the neoclassical paradigm (on the concept of "paradigm" in economic theory, see among others: Blaug, 1976). In this regard, it is necessary to start from a canonical definition: "neoclassical" is defined as a theory for which an economic system can be fully described by the following set of exogenous variables: economic agents preferences measured in terms of utility, the endowments of scarce resources and the production sets of firms. Furthermore, all agents operate in perfect competition and therefore treat prices parametrically. Finally, all agents are rational in the sense that, given their preferences and known prices, they will choose the optimal action for them (Hahn, 1982). Under given conditions, this theory makes it possible to establish the existence of an equilibrium in which relative prices and functional income distribution are indices of the relative scarcity of the supply of resources concerning the respective demands, where supply and demand are obtained by maximizations of profit or utility under the constraint of scarce resources. Therefore, starting from exogenous elements such as the utility of economic agents and the scarcity of resources and going through constrained optimizations, this theory simultaneously determines quantity and income

on the one hand and prices and distribution on the other. This equilibrium, among other things, has the typical characteristics of optimality in the sense of Pareto.

The above definition refers to the neoclassical general equilibrium in its various versions: traditional long-term (Wicksell, 1898), temporary (Hicks, 1939), intertemporal (Arrow & Debreu, 1954), stochastic (Kydland & Prescott, 1982), and their variants. However, the same definition is also related to those analyses that do not have all the requirements of the neoclassical general equilibrium, but preserve some of its crucial starting points such as the utility of agents or the scarcity of resources, and in any case, they take this equilibrium as an ideal reference point.

A typical case is the standard neoclassical growth model, which replicates at the macroeconomic level the characteristics of the general neoclassical equilibrium, with one exception: not all the agents are rational in the sense of neoclassical theory. Firms solve a single-period optimization problem but households allocate income between present and future consumption according to a merely given propensity to save and without any reference to utility maximization (Solow, 1956). Further cases are those analyses which contemplate non-competitive markets, institutional constraints, information asymmetries, irrational behaviors and any sort of "imperfections" which inevitably determine different results from the general neoclassical equilibrium, but take the latter as an ideal point of reference also for guiding policy decisions (among the countless examples in this sense, see: Akerlof, 1976; Greenwald & Stiglitz, 1988; Stiglitz, 1987). In some cases, even, the purpose of these analyses consists precisely in measuring the distance between the actual equilibrium caused by the "imperfections" in the economic system and the ideal equilibrium that would be obtained from the original neoclassical model (see, among many others: Thaler, 2016). In essence, all these analyses suggest that reality is imperfect compared to the general neoclassical equilibrium, but the latter still represents an ideal towards which the economy would tend in the absence of imperfections or towards which it should approach thanks to policy action. Moreover, as also recognized by some of their proponents, these lines of investigation maintain an explicit link with the neoclassical general equilibrium and with its macroeconomic declinations. Suffice it to note that many of these analyses arose from the intent to accept the assumptions of the so-called new macroeconomics of neoclassical inspiration, including the hypothesis of rational expectations, but adding imperfections that lead the economy to different results (Greenwald & Stiglitz, 1987). For all these reasons, these analyses have been correctly placed within a line of research called "imperfectionist", which is considered internal to the neoclassical tradition (Eatwell et al., 2015).

We can therefore state that a neoclassical influence can be seen both in the models that replicate the general neoclassical equilibrium, and in those "imperfectionist" analyses that do not have all the requirements of the neoclassical general equilibrium but preserve some of its crucial assumptions such as a set of exogenous variables formed by the utility of agents or the scarcity of resources, and in any case, they take this equilibrium as an ideal reference point.

This definition of the neoclassical approach is rooted in the traditions of critical economic thinking (Eatwell & Milgate, 1983; Garegnani, 1990; Graziani, 2003; Pasinetti, 2000) and includes the most recent developments in the contemporary mainstream versions of the neoclassical theory (Blanchard & Fischer, 1989; Blanchard et al., 2020). Without ever denying the variety of research methods in economics (Dow, 2007), this definition of neoclassical influence can help to establish a precise dividing line capable of allowing a comparative approach with alternative research programs (Blanchard & Brancaccio, 2019; Brancaccio & Saraceno, 2017; on the comparative approach, see also Dutt, 1990, 2017).

In light of this general definition, we can explain the terms in which we will classify the AB analyses examined in this review and verify whether there is any neoclassical influence in them

or not. In this sense, we will speak about a general "Neoclassical Influence" (NI, hereafter) when we do not specify the kind of influence analyzed. Then, we will analyze two subsets of papers within the NI group. We will speak of "Neoclassical Influence type 1″ (NI1, hereafter) in those studies on AB models in which there is a reference to the general neoclassical equilibrium and the related equilibrium prices understood more or less explicitly as indices of relative scarcity of the given endowments of resources, and where this equilibrium is either actually achieved or represents an ideal reference term. Instead, we will speak of "Neoclassical Influence type 2″ (NI2, hereafter) in those works on AB models which, being characterized by partial equilibrium analyzes or for any other reason, do not directly recall a general neoclassical equilibrium and the related scarcity of resources but contain elements that clearly refer to it, such as utility maximization of at least some economic agents. We could say, in summary, that the two groups can be distinguished by examining the different sets of exogenous variables: NI1 which includes the preferences of individuals expressed in terms of utility, while NI2 also includes scarce resources and determines prices as indicators of relative scarcity. Compared to the alternative approaches, both of these neoclassical influences mark a break. With a difference between one and the other, however. Alternative theoretical approaches totally reject the determination of prices as indices of the relative scarcity of resources concerning the corresponding demands. Instead, in the critical literature, some opening to the possibility of making explicit the preferences of economic agents in terms of utility functions has been made, albeit for explanatory purposes only and rejecting the related elements of neoclassical analysis, such as maximization in terms of optimal use of scarce resources and methodological individualism (Pasinetti, 1983).

Clearly, a paper can be included simultaneously in both groups of neoclassical influence types 1 and 2. In our sample, all the partial equilibrium studies fall only into the NI2 group. On the other hand, all the papers belonging to the NI2 class are included also in the NI2 group: in other words, NI1 is a subsample of NI2. This last result is not taken for granted, since there may be models that determine prices and distribution in terms of relative scarcity but make no mention of utility functions (the canonical example is Solow, 1956).

Finally, we will define "No Neoclassical" influence (NN, hereafter) in the case of all studies on AB models that do not have any of these influences, neither in a strong nor in a weak sense. After excluding any sort of neoclassical influence, we shall not go further in the examination of this group: here we do not aim to establish to what extent these analyses can be specifically linked to alternative approaches. However, the absence of neoclassical influences and the explicit criticism of the dominant paradigm necessarily place this group of papers in the context of those lines of research characterized by an alternative theoretical view of a capitalist economy and of the mechanisms that determine prices and functional distribution of income. In particular, the AB models without neoclassical influences are compatible with the alternative traditions of economic research that determine quantities and income on the one hand and prices and distribution on the other in a radically different way compared to the neoclassical approach. Typical examples come from the tradition of critical thinking sometimes referred to as the theory of production (see, among many others: Foley et al., 2019; Kurz & Salvadori, 1995; Pasinetti, 1977 from a monetary theory of production perspective, see: Graziani, 2003). It is important to clarify that the crucial difference between the neoclassical approach and the theory of production does not regard rationality: although this last approach usually refuses methodological individualism, it can contemplate rational and even optimizing behavior, too. The fundamental difference with respect to neoclassical analyses is that in this alternative theory quantity and income, and prices and distribution result from the so-called conditions of "reproduction" of the economic system, given the technology and the power relations between social classes. More specifically, this alternative approach

does not consider the utility of agents or scarcity of resources among the set of exogenous data. Rather, it usually starts from the exogenous levels of a distributive variable, of the autonomous components of effective demand in the sense of Keynes and the composition of effectual demand in the sense of Smith, and has the peculiarity of determining prices and the other distributive variable at a stage of analysis other than that which determines quantities and income. This is a clear watershed with respect to neoclassical analyses, which start from exogenous levels of agents' preferences measured in terms of utility and/or scarce endowments of resources, and which determine quantity, income, prices, and distribution simultaneously.

As can be seen, the choice of exogenous variables represents a relevant criterion for assessing whether and to what extent an analytical model can be included in one or another research tradition (Brancaccio, 2010; Dobb, 1973; Kurz & Salvadori, 1995). Of course, looking only at exogenous variables would be insufficient and could sometimes be misleading. Just as an example, think of Blanchard's famous standard textbook model, in which the markup is an exogenous variable. At first glance, one would be led to believe that this model considers functional distribution as an exogenous variable, and then it cannot fit into the mainstream neoclassical tradition. But on closer examination, it turns out that Blanchard himself considers the exogenous markup a mere simplification, destined for more advanced stages of the analysis to be replaced by the usual neoclassical mechanisms for determining functional distribution (Blanchard et al., 2020; Brancaccio & Saraceno, 2017). For these reasons, during our investigation of the papers dedicated to AB models, we classified them by carrying out a double check: (1) in the first instance, we observed the exogenous variables of the models, to verify if they contained at least one of the groups of exogenous typical of the neoclassical theory, such as agent preferences measured by utility functions or scarce resource endowments; (2) in the second instance, we evaluated the overall logic of the models to make sure that the first classification criterion had not misled us. It is interesting to note that the first classification criterion was almost always confirmed by the second criterion.

Without ever denying the variety of research approaches in economics (Dow, 2007), this method of identifying a neoclassical influence is rooted in the traditions of critical economic thinking (Eatwell & Milgate, 1983; Garegnani, 1990; Graziani, 2003; Pasinetti, 2000) and includes the most recent developments in the contemporary mainstream versions of the neoclassical theory (Blanchard & Fischer, 1989). In our view, it can help to establish a precise line of demarcation capable of allowing a distinction between papers more or less implicitly linked to the mainstream tradition and papers that, on the other hand, maybe compatible with alternative research programs (on this demarcation see: Blanchard & Brancaccio, 2019; Dutt, 1990, 2017).

## 5 | RESULTS OF THE REVIEW

In this section, we show the results of our review of the papers dedicated to AB models and their classification based on the links with the neoclassical approach detected in them. As above mentioned, our final sample of 90 papers does not include contributions published before 2000. Thus, our attention here is focused only on the last two decades 2000–2009 and 2010–2019. The chart in Figure 1 (left) plots the cumulative frequencies for the two groups of papers: "neoclassical influence" (NI) and "no neoclassical" influence (NN). In the last observation year, the total sum of contributions for each class is shown. As already mentioned, within the NI group we also distinguish papers that show neoclassical influence type 1 (NI1) and neoclassical influence type 2 (NI2). The number of papers influenced by the neoclassical approach NI is 55, which corresponds to 61% of the whole sample. Within this group, the papers NI1 and NI2 are 17 (i.e. 19%) and 38 (i.e. 42%),
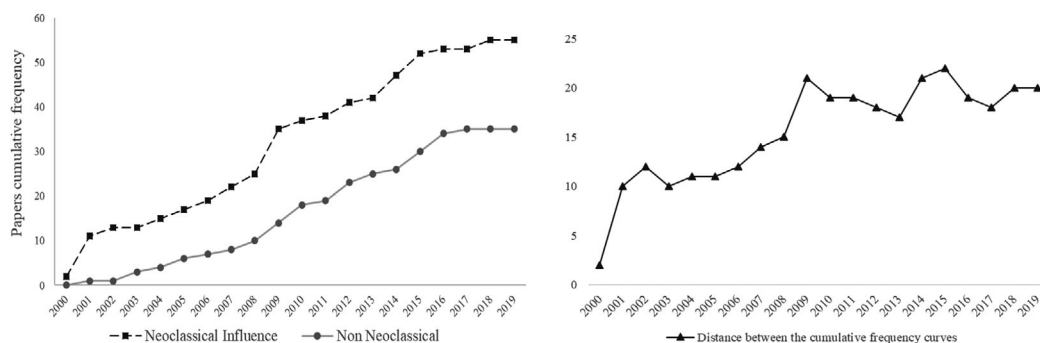
**FIGURE 1**   Papers cumulative frequency (left) and cumulative frequencies curves' distance (right)

respectively. The contributions not overtly affected by the neoclassical paradigm and thus classified in the field of "no neoclassical" influence (NN) are in a proven minority: 35 in total, i.e. 39% of the sample.

By inspecting the left panel in Figure 1, we note a clear and wide gap over the entire period of observations between the cumulative frequency curves of the NI and NN papers. However, after 2008 the NN literature booms, and the respective cumulative frequency curve rises sharply. At the same time, NI literature undergoes a sudden slowdown and the cumulated frequency curve becomes progressively flatter. As a result, starting from 2009, the gap between the two curves tends to remain constant over time[2]. The two curves seem to move in parallel until the last year of observation. The different curves behavior during the two decades is even more clear in the chart on the right side of Figure 1 which depicts the distance between the curves year by year. During the period 2000–2009, the distance increases progressively passing from two papers of difference up to the peak of 21 reached in 2009. From 2009 onwards, the distance between the two curves becomes almost constant and oscillates in a range of 4 papers of difference. Summing up the papers published in the periods 2000–2009 and 2010–2019 we find that in the first decade 35 NI and 14 NN papers have been published, while in the second decade the NI and NN papers are 20 and 21 respectively.

Figure 2 compares the evolution over time of the shares of papers and citations in the groups NI1, NI2, and NN, respectively. Looking at the entire twenty-year period 2000–2019, the prevalence of studies in which a neoclassical influence is recognized is evident: the NI group counts 61% of the papers. Over the two decades, the gap between citations is even more pronounced, with the NI group collecting 68% of citations. However, dividing the twenty years into two decades, in the last period there has been a clear decline in the share of papers in the NI group, which goes from 72% in 2000–2009 to 49% in 2010–2019. Regarding the evolution of citations over time, even in this case, we see a decline from 82% to 64% of the NI share, which however is less pronounced than the decline of NI papers. Overall, in the last year of observation, the number of citations of the papers belonging to the NN group is still far from that of the NI group, respectively 2211 and 4373. By looking at the shares of papers and citations among the three groups we find that the share of

---

[2] Between 2008 and 2009 the cumulative frequency curve of NI papers shows a sharp increase. At first glance, this may appear to be an impact of the 2008 crisis on the publication of NI papers. However, among the 10 NI papers published between 2008 and 2009, only one refers to the 2008 crisis. This is not surprising as in our study we only consider published articles. Considering that on average the economics publishing process consumes about two years (Ellison, 2002), to verify the impact of the 2008 crisis we should look at the papers published after 2009.
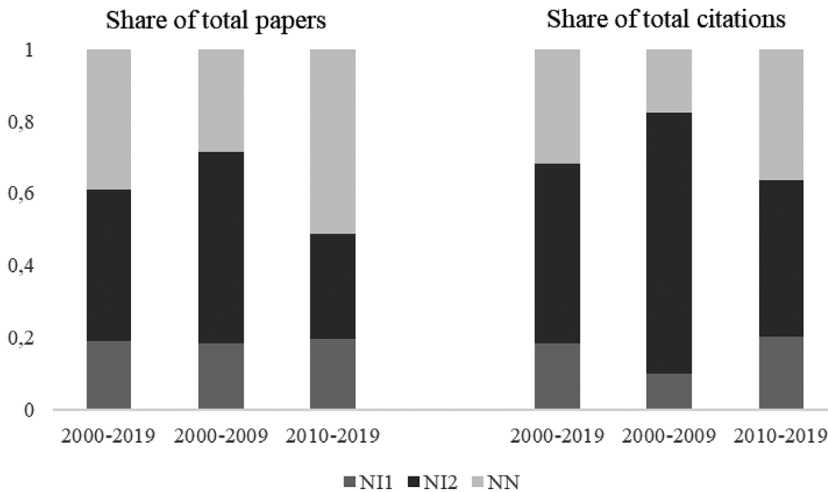
**FIGURE 2**    Share of total papers (left) and citations (right)

papers belonging to the NI1 group is almost identical during the whole period of observation and the two sub-periods considered, always just below 20%, whereas the NI2 and NN groups show a heterogeneous distribution over time. In the decade 2000–2009 the share of papers included in the NI2 class is 53% of total papers, whereas the NN group accounts for only 28%. In the decade 2010–2019 the percentages are reversed: 29% of papers included in the NI2 group versus 51% of papers in the NN group. As regards the distribution of citations between the groups, this follows a similar trend to the distribution of the number of papers, with some differences due to the rather clear link between the number of citations and years of publication. There is a clear gap between the number of citations collected by the NI2 group and the other two groups. The bars on the right side of Figure 2 show that the predominance of the NI2 is significant during the decade 2000–2009 when the share of citations towards this class of articles represents 72% of the sample. However, the dominance of the NI2 group is eroded in the decade 2010–2019, during which the share of citations towards NN papers increases significantly, passing from 17 to 36% of the total citations.

The trends described in Figure 1 and 2 suggest that the "great recession" started in 2008 (IMF, 2012) may have changed the evolution of scientific research on AB models, attenuating neoclassical influences and accentuating the links with alternative approaches. These findings may provide food for thought for the sociology of scientific knowledge, with particular regard to the relationships between socio-economic changes and the evolution of research agendas. As a further exercise, to assess the impact the economic crisis had on the AB literature, we searched the word "crisis" within our sample of papers. This search returned 18 papers, exactly 20% of the whole sample. Apart from Filatova et al. (2009) and Leijonhufvud (2009), the remaining 16 papers were published in the period 2010–2019 and represent about 40% of the papers published in this decade. This result is quite surprising and tells us that before 2010, economic crises were never mentioned in the most influential papers in the AB literature. Among the 18 papers containing the word "crisis", 7 are included in the NI group and 11 in the NN group. By analyzing one-by-one these papers, some interesting features emerge. The studies converge in arguing that AB models would be more suitable than conventional macro models in predicting crises. However, in the NI papers, AB models are mainly conceived to investigate what happens "out-of-equilibrium", during adjustment phases, and to accurately calibrate heterogeneity and the role played by the tail of the distribution

**TABLE 1** Citations and impact factor in the systematic review: Descriptive statistics

| | *Articles in the NI group* | *Articles in the NN group* |
| --- | --- | --- |
| | Citations | |
| Obs | 55 | 35 |
| Mean | 79.51 | 63.17 |
| Std. Dev. | 67.46 | 39.97 |
| Median | 56 | 39.40 |
| Min | 29 | 28 |
| Max | 374 | 195 |
| | Journal impact factor | |
| Obs | 55 | 35 |
| Mean | 3.35 | 2.21 |
| Std. Dev. | 1.94 | 1.52 |
| Median | 2.76 | 1.57 |
| Min | 0.86 | 0.29 |
| Max | 6.20 | 5.04 |

Source: Authors' calculations from a selected sample of papers taken from the Web of Science database.

(Geanakoplos, 2012). In this sense, AB models could be considered as a candidate to complement dynamic stochastic general equilibrium (DSGE) as the standard tool for macroeconomic analysis (Farmer, 2015). On the other hand, NN papers argue for the necessity to replace the reductionist approach at the heart of mainstream DSGE models (Delli Gatti et al., 2010) and to reformulate the foundations of economics starting from the AB approach (Squazzoni, 2010).

Table 1 reports some descriptive statistics across our two groups of papers and provides further information on the editorial placement of AB literature. The average number of citations is quite different across the subset of articles included in groups NI and NN, respectively 79.51 and 63.17 per each paper. We also report standard deviation, median, minimum and maximum values to yield a better picture of the distribution of citations across our two classes. At first glance, these measures show a different picture for the two groups. The standard deviation suggests that the distribution of citations among the NI papers has a higher variability, whose citations range from 26 to 374. As regards the journal impact factor, descriptive statistics provide a rather clear picture. As was widely expected, contributions belonging to the NI class tend to be published in journals with a higher impact factor. Not surprisingly, the probability of finding an AB paper published in a high impact factor journal is higher if the model includes neoclassical elements. These findings together with citation metrics tell us that in terms of research impact, at the top of AB publications we find articles characterized by a neoclassical influence.

As already mentioned in section 3, we have also repeated the experiment with different samples obtained by using alternative keywords. For example, we have also used "agent based" AND "wage" OR "profit" OR "* employment" OR "GDP" OR "growth" OR "macro *" OR "general equilibrium". The outcome was 3225 articles, from which we selected again the 100 most cited peer-reviewed papers published in English and in the "Economics" Web of Science category. By inspecting these alternative samples, we get results in line with the original experiment: the percentage of papers in which a "neoclassical influence" is found is in the majority but tends to decline in the last decade. Then, our results do not seem to be affected by sample selection.

## 6 | INSIDE THE REVIEW: AB MODELING, MAINSTREAM INFLUENCE, AND ALTERNATIVE APPROACHES

In this section, we provide a narrative summary of our review. We first describe the main features of the contributions included in the NI and NN groups. Then we draw a general picture of AB literature and discuss similitudes and differences within and across the groups.

As regards the NI group, the subset of NI1 papers is mainly composed of partial equilibrium analyses. These are studies with a rather specific research focus spanning across problems related to mobility, sustainability, asset pricing dynamics, traffic management. Most of the papers in the WNI group are published in interdisciplinary journals such as *Transportation Research*, *Ecological Economics*, *Energy Policy*. Though there are also publications in relevant economic journals such as the *Journal of Economic Behavior & Organization* (*JEBO*) and *Journal of Economic Dynamics & Control* (*JEDC*). As explained before, a common element in the studies included in the NI1 group is that they develop AB models which do not directly recall a general neoclassical equilibrium but contain elements that clearly refer to it, such as utility functions and related typical constrained optimization problems. For example, the model built by Franke and Westerhoff (2012) is framed in the small-scale AB financial market models and is designed to explain the most important stylized facts of financial markets at a daily frequency. Their virtual financial market is populated by two groups of agents, namely the fundamentalists and the chartists, who rely on simple heuristic trading strategies that involve the utility obtained from past capital gains of the two groups. BenDor et al. (2009) analyze the interactions between economic and ecological dynamic systems and their sustainability using an AB model of fishery management. Their modeling approach views fishery industries as the key agents in altering fish stocks by catching fish as a source of income. Fishers are subjected to an economic sustainability condition that is satisfied as long as the marginal revenue of each action is equal to its marginal cost, based on a typical scarce resource allocation problem. Roorda et al. (2010) present an AB microsimulation framework that explicitly represents the diversity of roles and functions that business establishments play in the freight system, how they interact through markets and how both long and short-term interactions between agents are established in the market through contracts. The authors conceptualize a model that includes all the main actors involved in the logistics and supply chains: shippers, receivers, carriers, end consumers. The latter plays a key role since they initiate the demand for commodities that flow through the commodity production system by evaluating and selecting from the potential suppliers. This evaluation is made using a random utility maximization model.

The contributions that fall within the NI2 group deal with various economic issues such as, among others, market power, the dynamics of the labor market, economic convergence, systemic risk, computational finance, climate change, agricultural economics. With respect to the NI1 group, the studies in the NI2 group are more oriented towards conventional economic issues. Indeed, the papers of this group were mainly published in strictly general economics journals such as *American Economic Review* (*AER*), *Economic Journal*, *JEBO*, *JEDC*, *Macroeconomic Dynamics*, *Journal of Evolutionary Economics*, among others. The SNI group includes models such as the one by Happe et al. (2008) where "the optimization problem produces the vector of shadow prices for scarce resources" (Happe, 2004, p. 75) and papers where the neoclassical "competitive market outcome" (Tesfatsion, 2001, p. 421) represents a normative equilibrium benchmark for the model (see among others Zhang, 2011 and Farmer et al., 2015). In some contributions, the neoclassical general equilibrium is not just a normative but even a positive reference. For example, in the AB model developed by Lengnick (2013) "competition drives the economy to a point where prices are set in

such a way that they reflect the true relative scarcity of commodities and hence lead to an efficient allocation of resources. Such an equilibrium is brought about by the interplay of agents although no individual agent even has an idea about what an equilibrium is. The equilibrium is, therefore, an emergent property of the aggregate" (Lengnick, 2013, p. 111). In the same vein, Blake LeBaron, one of the most quoted neoclassical authors of AB models, uses AB simulations to give empirical support to a typical rational expectation neoclassical equilibrium: "for multiagent simulations, the homogeneous agent world is often the appropriate benchmark". Thus, "the parameters and processes are set to allow for a simple and tractable homogeneous rational expectations equilibrium to exist" (LeBaron, 2001b, p. 234). This paper follows on from other seminal contributions (LeBaron, 2000, 2001a), in which the author explored some of the early works in the area of AB computational finance and provided a guide for researchers interested in building their own AB financial markets. According to LeBaron (2001a, p. 254) AB computational finance is a "new tool for exploring behavior in financial markets that are far from traditional notions of equilibrium" and to push "beyond the restrictions of analytic methods" (LeBaron, 2000, p. 679). However, in guiding future research, the author positively refers to standard neoclassical authors (Beltratti, 1992, 1996; Sargent, 1993) and crucial neoclassical building blocks, like the "well-behaved supply and demand functions" (LeBaron, 2001a, p. 257). The influence of the neoclassical paradigm in a normative sense is even more pronounced in LeBaron (2001b), where the author develops an AB financial market able to "replicate usual rational expectations results" (LeBaron, 2001b, p. 225), in which "agents are represented by well-defined infinite-horizon CRRA preferences with a common discount factor" (LeBaron, 2001b, p. 228) and "subject to the intertemporal budget constraint" (LeBaron, 2001b, p.229). In line with these studies, the contributions by Chen and Yeh (2001, 2002) are framed in a typical neoclassical theoretical structure and propose the AB approach as a methodology adapt to attack the boundary of what can be handled analytically in a neoclassical model with heterogeneity. In their studies on the artificial stock market, the authors often relate to the dominant approach which represents a benchmark for their models. Notably, the authors aim to demonstrate that AB models are capable of generating neoclassical market efficiency albeit most of the "interacting traders [...] do not believe in the martingale hypothesis (the efficient market hypothesis)" (Chen & Yeh, 2002, p. 237). Their tests show "that some series examined cannot reject a version of the efficient market hypothesis or a version of the rational expectations hypothesis. Thus, we illustrate, to a certain extent, how AB models are capable of replicating some well-known economic behavior empirically" (Chen & Yeh, 2002, p. 237).

Geanakoplos et al. (2012) and Gintis (2007) are among the most relevant studies for our research question. The housing market is at the core of the study by Geanakoplos et al. (2012). This contribution was published in the *AER* in the aftermath of the 2008 crisis and claimed to "bring a new kind of discipline" by introducing the AB approach in "conventional economic analysis" built on "equilibrium models with a representative agent". The innovation announced by the authors does not escape the neoclassical paradigm since agents' behavior explicitly follows the traditional neoclassical model designed by Carroll (1997). Gintis (2007) shows even more explicitly how the AB approach can be integrated into a full neoclassical environment developing an AB model of a Walrasian economy. Also in this contribution, the AB approach is not an alternative to the dominant paradigm, rather it is considered as a methodology functional to overcome some analytical limits of standard models: "Agent-based modelling is effective in solving problems involving complex nonlinear dynamics that cannot be handled through standard optimisation techniques" (Gintis, 2007, p. 1281). According to the author, "the Walrasian general equilibrium model is the centre-piece of modern economic theory, but progress in understanding its dynamical properties has been meagre" (Gintis, 2007, p. 1280). Therefore, to fill the gap Gintis (2007) builds an AB model of

a multi-sector Walrasian economy with production and exchange and in which prices are "necessarily ergodic, the long-run historical average price equalling the equilibrium price" (Gintis, 2007, p. 1282).

The group of papers included in the alternative NN class is mainly concerned with macroeconomics issues and mostly focuses on the business cycle, scaling laws and income distribution, fiscal, monetary, and structural policies. In this sense, we note a certain homogeneity with the topics covered by the studies of the SNI group. The same holds for the destination of the articles: the NN contributions were mainly published in *JEBO*, *JEDC*, *Macroeconomic Dynamics*, *Journal of Evolutionary Economics*. In this group, we find several contributions which originate from or are inspired by two families of macro AB models, namely the CATS model proposed by Delli Gatti, Gallegati, and co-authors in Ancona and Milan (Assenza et al., 2015; Caiani et al., 2016; Delli Gatti et al., 2005, 2010; Riccetti et al., 2015; Russo et al., 2007, 2016); the K+S proposed by Dosi, Fagiolo, Roventini and co-authors in Pisa (Dosi et al., 2010, 2013, 2015). Altogether the contributions of these two AB schools (on families and schools of macro AB models see Dawid & Delli Gatti, 2018) account for more than 30% of total NN papers. In some contributions, neoclassical theory and models are used to compare results and assumptions (see for example, Gualdi et al., 2015). However, in no paper of the NN group do we find a "neoclassical influence" in the sense described in section 4.

## 7 | CONCLUSIONS

According to widespread literature, the method and the object of analysis of AB models are in various respects in stark contrast to the prevailing neoclassical paradigm and therefore should be considered part of the traditions of alternative economic thought. According to this view, AB analyses reveal irreducible elements of contrast with the neoclassical conceptual framework in the face of important complementarities with the traditions of critical thinking. In this regard, it has been observed that AB analysis not only has no need to incorporate the links between production and distribution typical of the neoclassical theory of relative prices (Dosi & Roventini, 2019) but also contradicts the claim to analyze complex emerging interactions between microeconomic behavior and macro-dynamics following the canons of neoclassical methodological individualism (Zahle & Kincaid, 2020). These findings go beyond the usual critique of those macro aggregation criteria that are typical of the neoclassical mainstream approach and seem to indicate that the cases of neoclassical influence in AB analysis are like attempts to mix water with oil: destined to fail for structural reasons.

In this paper, however, we have shown that several typical elements of the neoclassical theory can be found in most of the prevailing AB literature. Our review of 100 most cited academic papers dedicated to AB models and published in the period 1990–2019 shows that in the 61% of papers a "neoclassical influence" can be detected, while only 39% do not show links with the mainstream approach. These neoclassical influences on most cited AB literature are still prevalent today but decline to a significant extent after the so-called "great recession" started in 2008.

The choice of delimiting the analysis to the hundred most-cited papers focuses on the objective of studying the influences of the neoclassical paradigm precisely on the AB analyses prevalent in literature. Based on our first checks, the main results reached by this work seem to find some confirmation even by analyzing larger samples of literature. However, a deeper evaluation of whether and to what extent our citation-based selection has an impact on the precise quantification of neoclassical influence in AB literature remains open. The theme will be subject to future analysis. In

any case, the results of our review seem to be in line with the wide range of studies that examine sociological influences on the research evaluation systems and the related development of different scientific paradigms, with particular reference to what happens in economics (among many others, see: D'Ippoliti, 2021; Fourcade et al., 2015; Hamermesh, 2013; see also: Corsi et al., 2010; Lavoie, 2015).

Considering our evidence, AB models do not seem to have a precise theoretical connotation. Rather they seem to assume the epistemological features of a pure "technique": that is, a flexible research methodology that can be useful to handle complex dynamics in whatever theoretical approach, both neoclassical and alternative (Gallegati et al., 2017).

Even if we accept the idea that the prevailing attempts to integrate AB models in the neoclassical field present irreducible contradictions, we are still far from identifying a definitive location for AB analysis. To solve this puzzle, the definition of "neoclassical influence" described above may give some help: it could be considered as a sort of "Althusserian" demarcation line that divides the paradigms of economic theory (Blanchard & Brancaccio, 2019; Brancaccio & Califano, 2018). Those who believe that AB analysis is located in a context other than the neoclassical one, will be able to adequately develop the characteristics of the models devoid of neoclassical influences and perhaps make more explicit their possible links with the alternative traditions in the theory of prices and distribution. In this direction, the still open problem of situating the AB approach on one side or the other of the demarcation line between paradigms could find a possible solution.

## APPENDIX

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| Adler et al. (2005) | A multi-agent approach to cooperative traffic management and route guidance | TRANSPORTATION RESEARCH PART B-METHODOLOGICAL | 89 | 5,56 | 4,80 | NI1 |
| Alfarano and Milakovic (2009) | Network structure and N-dependence in agent-based herding models | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 36 | 3,58 | 1,20 | NI2 |
| Antonini et al. (2006) | Discrete choice models of pedestrian walking behavior | TRANSPORTATION RESEARCH PART B-METHODOLOGICAL | 232 | 16,07 | 4,80 | NI1 |
| Assenza et al., 2015 | Emergent dynamics of a macroeconomic agent based model with capital and credit | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 45 | 8,67 | 1,20 | NN |
| Auld and Mohammadian (2012) | Activity planning processes in the Agent-based Dynamic Activity Planning and Travel Scheduling (ADAPTS) model | TRANSPORTATION RESEARCH PART A-POLICY AND PRACTICE | 41 | 5,00 | 3,99 | NN |
| Balint, T. et al. (2017) | Complexity and the Economics of Climate Change: A Survey and a Look Forward | ECOLOGICAL ECONOMICS | 31 | 9,50 | 4,48 | NN |
| BenDor et al. (2009) | Ecological and economic sustainability in fishery management: A multi-agent model for understanding competition and cooperation | ECOLOGICAL ECONOMICS | 36 | 3,17 | 4,48 | NI1 |
| Berger (2001) | Agent-based spatial models applied to agriculture: a simulation tool for technology diffusion, resource use changes and policy analysis | AGRICULTURAL ECONOMICS | 315 | 16,15 | 2,26 | NI2 |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| Berger and Troost (2014) | Agent-based Modelling of Climate Adaptation and Mitigation Options in Agriculture | JOURNAL OF AGRICULTURAL ECONOMICS | 49 | 8,00 | 2,53 | NI2 |
| Bieber et al. (2018) | Sustainable planning of the energy-water-food nexus using decision making tools | ENERGY POLICY | 33 | 17,33 | 5,04 | NI2 |
| Bower and Bunn (2001) | Experimental analysis of the efficiency of uniform-price versus discriminatory auctions in the England and Wales electricity market | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 83 | 4,25 | 1,20 | NI2 |
| Bower and Bunn (2000) | Model-based comparisons of pool and bilateral markets for electricity | ENERGY JOURNAL | 146 | 7,05 | 0,95 | NI2 |
| Brady et al. (2009) | Impacts of Decoupled Agricultural Support on Farm Structure, Biodiversity and Landscape Mosaic: Some EU Results | JOURNAL OF AGRICULTURAL ECONOMICS | 61 | 5,25 | 2,53 | NI2 |
| Caiani et al. (2016) | Agent based-stock flow consistent macroeconomics: Towards a benchmark model | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 69 | 16,40 | 1,20 | NN |
| Cats and Jenelius (2015) | Planning for the unexpected: The value of reserve capacity for public transport network robustness | TRANSPORTATION RESEARCH PART A-POLICY AND PRACTICE | 32 | 6,50 | 3,99 | NI1 |
| Chen, S. & Yeh (2001) | Evolving traders and the business school with genetic programming: A new architecture of the agent-based artificial stock market | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 122 | 6,35 | 1,20 | NI2 |
| Chen, S. & Yeh (2002) | On the emergent properties of artificial stock markets: the efficient market hypothesis and the rational expectations hypothesis | JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION | 63 | 3,37 | 1,59 | NI2 |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| Chen, S. (2012) | Varieties of agents in agent-based computational economics: A historical and an interdisciplinary perspective | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 50 | 6,22 | 1,20 | NN |
| Chen, T. et al. (2016) | Operations of a shared, autonomous, electric vehicle fleet: Implications of vehicle & charging infrastructure decisions | TRANSPORTATION RESEARCH PART A-POLICY AND PRACTICE | 85 | 23,40 | 3,99 | NN |
| Cincotti et al. (2010) | Credit Money and Macroeconomic Instability in the Agent-based Model and Simulator Eurace | ECONOMICS-THE OPEN ACCESS OPEN-ASSESSMENT E-JOURNAL | 44 | 4,73 | 1,10 | NI2 |
| Cong et al. (2014) | Managing ecosystem services for agriculture: Will landscape-scale management pay? | ECOLOGICAL ECONOMICS | 52 | 8,00 | 4,48 | NI2 |
| Dawid et al. (2014) | Economic convergence: Policy implications from a heterogeneous agent model | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 41 | 6,71 | 1,20 | NI2 |
| de Haan et al. (2009) | How much do incentives affect car purchase? Agent-based microsimulation of consumer choice of new cars-Part II: Forecasting effects of feebates based on energy-efficiency | ENERGY POLICY | 48 | 4,17 | 5,04 | NI1 |
| Delli Gatti et al. (2005) | A new approach to business fluctuations: heterogeneous interacting agents, scaling laws and financial fragility | JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION | 117 | 8,06 | 1,59 | NN |
| Delli Gatti et al. (2010) | Complex agent-based macroeconomics: a manifesto for a new paradigm | JOURNAL OF ECONOMIC INTERACTION AND COORDINATION | 40 | 4,09 | 1,57 | NN |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| De Vany and Lee (2001) | Quality signals in information cascades and the dynamics of the distribution of motion picture box office revenues | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 42 | 2,15 | 1,20 | NI2 |
| Dosi et al. (2013) | Income distribution, credit and fiscal policies in an agent-based Keynesian model | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 119 | 16,88 | 1,20 | NN |
| Dosi et al. (2015) | Fiscal and monetary policies in complex evolving economies | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 68 | 13,83 | 1,20 | NN |
| Dosi et al. (2010) | Schumpeter meeting Keynes: A policy-friendly model of endogenous growth and business cycles | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 195 | 19,45 | 1,20 | NN |
| Duffy (2001) | Learning to speculate: Experiments with artificial and real agents | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 54 | 2,80 | 1,20 | NI2 |
| Eppstein et al. (2011) | An agent-based model to study market penetration of plug-in hybrid electric vehicles | ENERGY POLICY | 166 | 17,70 | 5,04 | NN |
| Faber et al. (2010) | Exploring domestic micro-cogeneration in the Netherlands: An agent-based demand model for technology diffusion | ENERGY POLICY | 32 | 3,45 | 5,04 | NN |
| Farmer et al. (2015) | A Third Wave in the Economics of Climate Change | ENVIRONMENTAL & RESOURCE ECONOMICS | 50 | 10,50 | 2,29 | NI2 |
| Farooq et al. (2013) | Simulation based population synthesis | TRANSPORTATION RESEARCH PART B-METHODOLOGICAL | 51 | 7,00 | 4,80 | NN |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| Filatova et al. (2009) | Land Market Interactions between Heterogeneous Agents in a Heterogeneous Landscape-Tracing the Macro-Scale Effects of Individual Trade-Offs between Environmental Amenities and Disamenities | CANADIAN JOURNAL OF AGRICULTURAL ECONOMICS-REVUE CANADIENNE D AGROECONOMIE | 37 | 3,17 | 0,86 | NI2 |
| Franke (2009) | Applying the method of simulated moments to estimate a small agent-based asset pricing model | JOURNAL OF EMPIRICAL FINANCE | 37 | 3,25 | 1,57 | NN |
| Franke and Westerhoff (2012) | Structural stochastic volatility in asset pricing dynamics: Estimation and model contest | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 65 | 8,00 | 1,20 | NI1 |
| Geanakoplos et al. (2012) | Getting at Systemic Risk via an Agent-Based Model of the Housing Market | AMERICAN ECONOMIC REVIEW | 56 | 7,00 | 5,56 | NI2 |
| Gintis (2007) | The dynamics of general equilibrium | ECONOMIC JOURNAL | 51 | 4,07 | 2,76 | NI2 |
| Gualdi et al. (2015) | Tipping points in macroeconomic agent-based models | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 42 | 8,00 | 1,20 | NN |
| Happe et al. (2008) | Does structure matter? The impact of switching the agricultural policy regime on farm structures | JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION | 65 | 5,31 | 1,59 | NI2 |
| Hassani-Mahmooei and Parris (2012) | Climate change and internal migration patterns in Bangladesh: an agent-based model | ENVIRONMENT AND DEVELOPMENT ECONOMICS | 38 | 5,00 | 1,43 | NN |
| Hodgson, GM; Knudsen, T | The complex evolution of a simple traffic convention: the functions and implications of habit | JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION | 72 | 4,29 | 1,59 | NI1 |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| Hunt and Stefan (2007) | Tour-based microsimulation of urban commercial movements | TRANSPORTATION RESEARCH PART B-METHODOLOGICAL | 96 | 7,14 | 4,80 | NI2 |
| Kaufmann et al. (2009) | Simulating the diffusion of organic farming practices in two New EU Member States | ECOLOGICAL ECONOMICS | 44 | 4,08 | 4,48 | NN |
| Kirman and Vriend (2001) | Evolving market structure: An ACE model of price dispersion and loyalty | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 106 | 5,45 | 1,20 | NN |
| Klemm et al. (2005) | Globalization, polarization and cultural drift | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 54 | 3,50 | 1,20 | NN |
| Klos and Nooteboom (2001) | Agent-based computational transaction cost economics | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 45 | 2,35 | 1,20 | NI2 |
| Kohler et al. (2009) | A transitions model for sustainable mobility | ECOLOGICAL ECONOMICS | 102 | 9,25 | 4,48 | NI1 |
| Kowalska-Pyzalska et al. (2014) | Turning green: Agent-based modeling of the adoption of dynamic electricity tariffs | ENERGY POLICY | 36 | 6,14 | 5,04 | NN |
| Krupa et al. (2014) | Analysis of a consumer survey on plug-in hybrid electric vehicles | TRANSPORTATION RESEARCH PART A-POLICY AND PRACTICE | 94 | 15,71 | 3,99 | NI1 |
| LeBaron (2000) | Agent-based computational finance: Suggested readings and early research | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 222 | 10,81 | 1,20 | NI2 |

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| LeBaron (2001a) | A builder's guide to agent-based financial markets | QUANTITATIVE FINANCE | 124 | 6,40 | 1,49 | NI2 |
| LeBaron (2001b) | Evolution and time horizons in an agent-based stock market | MACROECONOMIC DYNAMICS | 80 | 4,05 | 0,98 | NI2 |
| Leijonhufvud (2009) | Out of the corridor: Keynes and the crisis | CAMBRIDGE JOURNAL OF ECONOMICS | 60 | 5,00 | 1,72 | NN |
| Lengnick (2013) | Agent-based macroeconomics: A baseline model | JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION | 43 | 5,50 | 1,59 | NI2 |
| Liedtke (2009) | Principles of micro-behavior commodity transport modeling | TRANSPORTATION RESEARCH PART E-LOGISTICS AND TRANSPORTATION REVIEW | 49 | 4,58 | 4,69 | NI2 |
| Liu and Zhou (2016) | Capacitated transit service network design with boundedly rational agents | TRANSPORTATION RESEARCH PART B-METHODOLOGICAL | 36 | 8,60 | 4,80 | NI1 |
| Lu et al. (2009) | The Naming Game in social networks: community formation and consensus engineering | JOURNAL OF ECONOMIC INTERACTION AND COORDINATION | 50 | 4,58 | 1,57 | NN |
| Marshall et al. (2015a) | Applying Dynamic Simulation Modeling Methods in Health Care Delivery Research-The SIMULATE Checklist: Report of the ISPOR Simulation Modeling Emerging Good Practices Task Force | VALUE IN HEALTH | 63 | 12,67 | 4,75 | NI1 |
| Marshall et al. (2015b) | Selecting a Dynamic Simulation Modeling Method for Health Care Delivery Research Part 2: Report of the ISPOR Dynamic Simulation Modeling Emerging Good Practices Task Force | VALUE IN HEALTH | 40 | 8,00 | 4,75 | NI1 |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| Matthews and Selman (2006) | Landscape as a focus for integrating human and environmental processes | JOURNAL OF AGRICULTURAL ECONOMICS | 95 | 6,53 | 2,53 | NN |
| Mike and Farmer (2008) | An empirical behavioral model of liquidity and volatility | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 130 | 10,31 | 1,20 | NN |
| Mueller and de Haan (2009) | How much do incentives affect car purchase? Agent-based microsimulation of consumer choice of new cars-Part I: Model structure, simulation of bounded rationality, and model validation | ENERGY POLICY | 61 | 5,33 | 5,04 | NI1 |
| Padgett et al. (2003) | Economic production as chemistry | INDUSTRIAL AND CORPORATE CHANGE | 42 | 2,33 | 1,98 | NN |
| Peeta et al. (2005) | Behavior-based analysis of freeway car-truck interactions and related mitigation strategies | TRANSPORTATION RESEARCH PART B-METHODOLOGICAL | 43 | 2,69 | 4,80 | NI1 |
| Ponta et al. (2018) | An Agent-based Stock-flow Consistent Model of the Sustainable Transition in the Energy Sector | ECOLOGICAL ECONOMICS | 29 | 12,00 | 4,48 | NI2 |
| Reis (2014) | Analysis of mode choice variables in short-distance intermodal freight transport using an agent-based model | TRANSPORTATION RESEARCH PART A-POLICY AND PRACTICE | 40 | 6,57 | 3,99 | NI1 |
| Riccetti et al. (2015) | An agent based decentralized matching macroeconomic model | JOURNAL OF ECONOMIC INTERACTION AND COORDINATION | 39 | 7,50 | 1,57 | NN |
| Roorda et al. (2010) | A conceptual framework for agent-based modelling of logistics services | TRANSPORTATION RESEARCH PART E-LOGISTICS AND TRANSPORTATION REVIEW | 100 | 9,55 | 4,69 | NI1 |

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---------|-------|--------------|-----------------|----------------------------|---------------|-------|
| Russo et al. (2007) | Industrial dynamics, fiscal policy and R&D: Evidence from a computational experiment | JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION | 42 | 3,00 | 1,59 | NN |
| Russo et al. (2016) | Increasing inequality, consumer credit and financial fragility in an agent based macroeconomic model | JOURNAL OF EVOLUTIONARY ECONOMICS | 34 | 8,40 | 1,43 | NN |
| Sander et al. (2009) | Economic Evaluation of Influenza Pandemic Mitigation Strategies in the United States Using a Stochastic Microsimulation Transmission Model | VALUE IN HEALTH | 74 | 6,33 | 4,75 | NI1 |
| Scalas et al. (2004) | Anomalous waiting times in high-frequency financial data | QUANTITATIVE FINANCE | 51 | 3,18 | 1,49 | NN |
| Schreinemachers et al. (2007) | Simulating soil fertility and poverty dynamics in Uganda: A bio-economic multi-agent systems approach | ECOLOGICAL ECONOMICS | 43 | 3,21 | 4,48 | NI2 |
| Schwoon (2006) | Simulating the adoption of fuel cell vehicles | JOURNAL OF EVOLUTIONARY ECONOMICS | 64 | 4,47 | 1,43 | NI2 |
| Sensfuß et al. (2008) | The merit-order effect: A detailed analysis of the price effect of renewable electricity generation on spot market prices in Germany | ENERGY POLICY | 374 | 30,62 | 5,04 | NI2 |
| Seppecher (2012) | Flexibility Of Wages And Macroeconomic Instability In An Agent-Based Computational Model With Endogenous Money | MACROECONOMIC DYNAMICS | 35 | 4,11 | 0,98 | NN |
| Silvia and Krause (2016) | Assessing the impact of policy interventions on the adoption of plug-in electric vehicles: An agent-based model | ENERGY POLICY | 28 | 7,40 | 5,04 | NN |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---|---|---|---|---|---|---|
| Squazzoni (2010) | The impact of agent-based models in the social sciences after 15 years of incursions | HISTORY OF ECONOMIC IDEAS | 40 | 3,91 | 0,29 | NN |
| Tang et al. (2015) | Carbon emissions trading scheme exploration in China: A multi-agent-based model | ENERGY POLICY | 69 | 14,17 | 5,04 | NI2 |
| Tesfatsion (2001) | Structure, behavior, and market power in an evolutionary labor market with adaptive search | JOURNAL OF ECONOMIC DYNAMICS & CONTROL | 53 | 2,65 | 1,20 | NI2 |
| Veit et al. (2009) | An agent-based analysis of the German electricity market with transmission capacity constraints | ENERGY POLICY | 35 | 3,17 | 5,04 | NI2 |
| Vriend (2002) | Was Hayek an ace? | SOUTHERN ECONOMIC JOURNAL | 41 | 2,26 | 0,92 | NI2 |
| Weidlich et al. (2008) | A critical survey of agent-based wholesale electricity market models | ENERGY ECONOMICS | 178 | 14,15 | 5,20 | NI2 |
| Westerhoff (2008) | The Use of Agent-Based Financial Market Models to Test the Effectiveness of Regulatory Policies | JAHRBUCHER FUR NATIONALOKONOMIE UND STATISTIK | 61 | 4,92 | 0,66 | NN |
| Zhang, J. (2004) | Residential segregation in an all-integrationist world | JOURNAL OF ECONOMIC BEHAVIOR & ORGANIZATION | 73 | 4,53 | 1,59 | NI2 |
| Zhang, J. (2003) | Growing Silicon Valley on a landscape: an agent-based approach to high-tech industrial clusters | JOURNAL OF EVOLUTIONARY ECONOMICS | 38 | 2,17 | 1,43 | NN |

(Continues)

| Authors | Title | Source Title | Total Citations | Citations Average per Year | Impact Factor | Group |
|---------|-------|--------------|-----------------|----------------------------|---------------|-------|
| Zhang, J. (2011) | Tipping and Residential Segregation: A Unified Schelling Model | JOURNAL OF REGIONAL SCIENCE | 50 | 5,60 | 2,09 | NI2 |
| Zheng et al. (2012) | A dynamic cordon pricing scheme combining the Macroscopic Fundamental Diagram and an agent-based traffic model | TRANSPORTATION RESEARCH PART A-POLICY AND PRACTICE | 78 | 9,56 | 3,99 | NI2 |

## ORCID

*Emiliano Brancaccio* https://orcid.org/0000-0001-7765-3892
*Raffaele Giammetti* https://orcid.org/0000-0003-4299-152X

## REFERENCES

Adler, J. L., Satapathy, G., Manikonda, V., Bowles, B., & Blue, V. J.* (2005). A multi-agent approach to cooperative traffic management and route guidance. *Transportation Research Part B: Methodological*, *39*(4), 297–318. https://doi.org/10.1016/j.trb.2004.03.005

Ahmad, N., Naveed, A., Ahmad, S., & Butt, I. (2020). Banking sector performance, profitability, and efficiency: A citation-based systematic literature review. *Journal of Economic Surveys*, *34*, 185–218. https://doi.org/10.1111/joes.12346

Akerlof, G. (1976). The economics of caste and of the rat race and other woeful tales. *The Quarterly Journal of Economics*, *90*(4), 599.

Alfarano, S., & Milaković, M.* (2009). Network structure and N-dependence in agent-based herding models. *Journal of Economic Dynamics and Control*, *33*(1), 78–92. https://doi.org/10.1016/j.jedc.2008.05.003

Antonini, G., Bierlaire, M., & Weber, M.* (2006). Discrete choice models of pedestrian walking behavior. *Transportation Research Part B: Methodological*, *40*(8), 667–687. https://doi.org/10.1016/j.trb.2005.09.006

Arrow, K. J., & Debreu, G. (1954). Existence of an Equilibrium for a Competitive Economy. *Econometrica*, *22*(3), 265–290. https://doi.org/10.2307/1907353

Assenza, T., Delli Gatti, D., & Grazzini, J.* (2015). Emergent dynamics of a macroeconomic agent based model with capital and credit. *Journal of Economic Dynamics and Control*, *50*, 5–28. https://doi.org/10.1016/j.jedc.2014.07.001

Auld, J., & Mohammadian, A. K.* (2012). Activity planning processes in the Agent-based Dynamic Activity Planning and Travel Scheduling (ADAPTS) model. *Transportation Research Part A: Policy and Practice*, *46*(8), 1386–1403. https://doi.org/10.1016/j.tra.2012.05.017

Balint, T., Lamperti, F., Mandel, A., Napoletano, M., Roventini, A., & Sapio, A.* (2017). Complexity and the economics of climate change: A survey and a look forward. *Ecological Economics*, *138*, 252–265. https://doi.org/10.1016/j.ecolecon.2017.03.032

Beltratti, A., & Margarita, S., (1992). Evolution of trading strategies among heterogeneous artificial economic agents. In J. A. Meyer, H. L. Roitblat, & S. W. Wilson (Eds.), *From Animals to Animats 2*. MIT Press.

Beltratti, A., Margarita, S., & Terna, P., (1996). *Neural Networks for Economic and Financial Modeling*. International Thomson Computer Press.

BenDor, T., Scheffran, J., & Hannon, B.* (2009). Ecological and economic sustainability in fishery management: A multi-agent model for understanding competition and cooperation. *Ecological Economics*, *68*(4), 1061–1073. https://doi.org/10.1016/j.ecolecon.2008.07.014

Berger, T.* (2001). Agent-based spatial models applied to agriculture: A simulation tool for technology diffusion, resource use changes and policy analysis. *Agricultural Economics*, *25*(2–3), 245–260. https://doi.org/10.1016/S0169-5150(01)00082-2

Berger, T., & Troost, C.* (2014). Agent-based modelling of climate adaptation and mitigation options in agriculture. *Journal of Agricultural Economics*, *65*(2), 323–348. https://doi.org/10.1111/1477-9552.12045

Bieber, N., Ker, J. H., Wang, X., Triantafyllidis, C., van Dam, K. H., Koppelaar, R. H. E. M., & Shah, N.* (2018). Sustainable planning of the energy-water-food nexus using decision making tools. *Energy Policy*, *113*, 584–607. https://doi.org/10.1016/j.enpol.2017.11.037

Blanchard, O., Amighini, A., & Giavazzi, F. (2020). *Macroeconomics: A European Perspective*. London.

Blanchard, O., & Brancaccio, E. (2019). Crisis and revolution in economic theory and policy: A debate. In *Review of Political Economy*. https://doi.org/10.1080/09538259.2019.1644730

Blanchard, O., & Fischer, S. (1989). *Lectures on macroeconomics*. MIT Press.

Blaug, M. (1976). Kuhn versus Lakatos or Paradigms versus research programmes in the history of economics. In *Latsis (Author), Method and Appraisal in Economics* (pp. 149–180). Cambridge University Press. https://doi.org/10.1017/CBO9780511572203.007

Bookstaber, R. (2017), *The End of Theory: Financial Crises, the Failure of Economics, and the Sweep of Human Interaction*. Princeton University Press

Borrill, P. L., & Tesfatsion, L., (2010), *Agent-Based Modeling: The Right Mathematics of the Social Sciences?, WP 10023.*. Iowa State University

Botta, A., Caverzasi, E., & Russo, A. (2020). When complexity meets finance: A contribution to the study of the macroeconomic effects of complex financial systems. *Research Policy*, https://doi.org/10.1016/j.respol.2020.103990

Botta, A., Caverzasi, E., Russo, A., Gallegati, M., & Stiglitz, J. E. (2019). Inequality and finance in a rent economy. *Journal of Economic Behavior and Organization*, https://doi.org/10.1016/j.jebo.2019.02.013

Bower, J., & Bunn, D. W.* (2000). Model-based comparisons of pool and bilateral markets for electricity. *Energy Journal*, *21*(3), 1–29. https://doi.org/10.5547/ISSN0195-6574-EJ-Vol21-No3-1

Bower, J., Bunn, D., Bower J. & Bunn D.* (2001). Experimental analysis of the efficiency of uniform-price versus discriminatory auctions in the England and Wales electricity market. Journal of Economic Dynamics and Control, 25, (3-4), 561–592. https://doi.org/10.1016/s0165-1889(00)00036-1

Brady, M., Kellermann, K., Sahrbacher, C., & Jelinek, L.* (2009). Impacts of decoupled agricultural support on farm structure, biodiversity and landscape mosaic: Some EU results. In *Journal of Agricultural Economics*, *60*(3), 563–585). https://doi.org/10.1111/j.1477-9552.2009.00216.x

Brancaccio, E. (2010). On the impossibility of reducing the surplus approach to a neo-classical special case. A criticism of Hahn in a Solowian context. *Review of Political Economy*, *22*(3), 405–418.

Brancaccio E., Saraceno F. (2017). Evolutions and Contradictions in Mainstream Macroeconomics: The Case of Olivier Blanchard. *Review of Political Economy*, *29*, (3), 345–359. https://doi.org/10.1080/09538259.2017.1330378

Brancaccio, E., & Califano, A. (2018). Anti-Blanchard macroeconomics. A comparative approach. Edward Elgar. ISBN: 9781788118996. https://doi.org/10.4337/9781788119009.

Buiter, W. (2009). The unfortunate uselessness of most 'state of the art' academic monetary economics. *VoxEU, Research-based policy analysis and commentary from leading economists, March 6, 2009, Available at SSRN:*. https://ssrn.com/abstract=2492949

Caiani A., Catullo E., Gallegati M. (2018). The effects of fiscal targets in a monetary union: a Multi-Country Agent-Based Stock Flow Consistent model. *Industrial and Corporate Change*, *27*(6), 1123–1154. https://doi.org/10.1093/icc/dty016

Caiani, A., Godin, A., Caverzasi, E., Gallegati, M., Kinsella, S., & Stiglitz, J. E.* (2016). Agent based-stock flow consistent macroeconomics: Towards a benchmark model. *Journal of Economic Dynamics and Control*, *69*, 375–408. https://doi.org/10.1016/j.jedc.2016.06.001

Caiani, A., Russo, A., & Gallegati, M. (2019). Does inequality hamper innovation and growth? An AB-SFC analysis. *Journal of Evolutionary Economics*, *29*, 177–228. https://doi.org/10.1007/s00191-018-0554-8

Caiani, A., Russo, A., & Gallegati, M. (2020). Are higher wages good for business? an assessment under alternative innovation and investment scenarios. *Macroeconomic Dynamics*, *24*(1), 191–230. https://doi.org/10.1017/S1365100518000299

Cardaci, A., & Saraceno, F. (2019). Inequality and imbalances: a monetary union agent-based model. *J Evol Econ*, *29*, 853–890. https://doi.org/10.1007/s00191-019-00611-4

Carroll, C. D. (1997). Buffer-stock saving and the life cycle/permanent income hypothesis. *Quarterly Journal of Economics*, *112*(1), 1–55. https://doi.org/10.1162/003355397555109

Cats, O., & Jenelius, E.* (2015). Planning for the unexpected: The value of reserve capacity for public transport network robustness. *Transportation Research Part A: Policy and Practice*, *81*, 47–61. https://doi.org/10.1016/j.tra.2015.02.013

Caverzasi, E., & Godin, A. (2015). Post-Keynesian stock-flow-consistent modelling: A survey. *Cambridge Journal of Economics*, *39*(1), 157–187. https://doi.org/10.1093/cje/beu021

Caverzasi, E., & Russo, A. (2018). Toward a new microfounded macroeconomics in the wake of the crisis. *Industrial and Corporate Change*, *27*(6), 999–1014. https://doi.org/10.1093/icc/dty043

Chen, S. H.* (2012). Varieties of agents in agent-based computational economics: A historical and an interdisciplinary perspective. *Journal of Economic Dynamics and Control*, *36*(1), 1–25. https://doi.org/10.1016/j.jedc.2011.09.003

Chen, S. H., & Yeh, C. H.* (2001). Evolving traders and the business school with genetic programming: A new architecture of the agent-based artificial stock market. *Journal of Economic Dynamics and Control*, *25*(3–4), 363–393. https://doi.org/10.1016/S0165-1889(00)00030-0

Chen, S. H., & Yeh, C. H.* (2002). On the emergent properties of artificial stock markets: The efficient market hypothesis and the rational expectations hypothesis. *Journal of Economic Behavior and Organization*, *49*(2), 217–239. https://doi.org/10.1016/S0167-2681(02)00068-9

Chen, T. D., Kockelman, K. M., & Hanna, J. P.* (2016). Operations of a shared, autonomous, electric vehicle fleet: Implications of vehicle & charging infrastructure decisions. *Transportation Research Part A: Policy and Practice*, *94*, 243–254. https://doi.org/10.1016/j.tra.2016.08.020

Cincotti, S., Raberto, M., & Teglio, A.* (2010). Credit money and macroeconomic instability in the agent-based model and simulator Eurace. *Economics: The Open-Access, Open-Assessment E-Journal*, *4*(2010–26), 1. https://doi.org/10.5018/economics-ejournal.ja.2010-26

Cogliano, J. F. (2013). *New Directions in Political Economy: Value Theory, Agent-Based Computational Modeling, and the Dynamics of Labor Mobility*. Ph. D. thesis, New School for Social Research.

Cogliano, J. F., & Jiang, X. (2016). Agent-based computational economics: Simulation tools for heterodox research. In *Handbook of Research Methods and Applications in Heterodox Economics*. https://doi.org/10.4337/9781782548461.00020

Cogliano, J. F., Veneziani, R., & Yoshihara, N. (2016). The dynamics of exploitation and class in accumulation economies. *Metroeconomica*, *67*(2), 242–290. https://doi.org/10.1111/meca.12114

Cogliano, J. F., Veneziani, R., & Yoshihara, N. (2019). Exploitation, skills, and inequality. *Review of Social Economy*, *77*(2), 208–249. https://doi.org/10.1080/00346764.2019.1596296

Cong, R. G., Smith, H. G., Olsson, O., & Brady, M.* (2014). Managing ecosystem services for agriculture: Will landscape-scale management pay$\alpha$. *Ecological Economics*, *99*, 53–62. https://doi.org/10.1016/j.ecolecon.2014.01.007

Corsi, M., D'Ippoliti, C., & Lucidi, F. (2010). Pluralism at risk? Heterodox economic approaches and the evaluation of economic research in Italy. *The American Journal of Economics and Sociology*, *69*(5), 1495–1529.

CRD (Centre for Reviews and Dissemination) (2009). *Systematic Reviews: CRD's Guide for Undertaking Reviews in Health Care.*. York: York Publishing Services.

D'Ippoliti, C. (2021). "Many-Citedness": Citations Measures more than just Scientific Quality, Journal of Economic Surveys, First published: 27 January 2021. https://doi.org/10.1111/joes.12416

Dawid, H., & Delli Gatti, D. (2018). Agent-Based Macroeconomics. *Handbook of Computational Economics*, *4*, 63–156. https://doi.org/10.1016/bs.hescom.2018.02.006

Dawid, H., Harting, P., & Neugart, M.* (2014). Economic convergence: Policy implications from a heterogeneous agent model. *Journal of Economic Dynamics and Control*, *44*, 54–80. https://doi.org/10.1016/j.jedc.2014.04.004

de Haan, P., Mueller, M. G., & Scholz, R. W.* (2009). How much do incentives affect car purchase? Agent-based microsimulation of consumer choice of new cars-Part II: Forecasting effects of feebates based on energy-efficiency. *Energy Policy*, *37*(3), 1083–1094. https://doi.org/10.1016/j.enpol.2008.11.003

Delli Gatti, D., Di Guilmi, C., Gaffeo, E., Giulioni, G., Gallegati, M., & Palestrini, A.* (2005). A new approach to business fluctuations: Heterogeneous interacting agents, scaling laws and financial fragility. *Journal of Economic Behavior and Organization*, *56*(4 SPEC. ISS.), 489–512. https://doi.org/10.1016/j.jebo.2003.10.012

Delli Gatti, D., Gaffeo, E., & Gallegati, M.* (2010). Complex agent-based macroeconomics: A manifesto for a new paradigm. *Journal of Economic Interaction and Coordination*, *5*(2), 111–135. https://doi.org/10.1007/s11403-010-0064-8

Delli Gatti, D., Gallegati, M., Giulioni, G., & Palestrini, A., (2003). Financial fragility, patterns of firms' entry and exit and aggregate dynamics. *Journal of economic behavior & organization*, *51*(1), 79–97.

De Vany, A., & Lee, C.* (2001). Quality signals in information cascades and the dynamics of the distribution of motion picture box office revenues. *Journal of Economic Dynamics and Control*, *25*(3–4), 593–614. https://doi.org/10.1016/S0165-1889(00)00037-3

Di Guilmi, C. (2017). The agent-based approach to post Keynesian macro-modeling. *Journal of Economic Surveys*, *31*(5), 1183–1203. https://doi.org/10.1111/joes.12244

Dilaver, Ö., Calvert Jump, R., & Levine, P. (2018). Agent-based macroeconomics and dynamic stochastic general equilibrium models: Where do we go from here? *Journal of Economic Surveys*, *32*(4), 1134–1159. https://doi.org/10.1111/joes.12249

Dobb, M. (1973), *Theories of Value and Distribution since Adam Smith. Ideology and Economic Theory*, Cambridge University Press.

Dosi, G., Fagiolo, G., Napoletano, M., & Roventini, A.* (2013). Income distribution, credit and fiscal policies in an agent-based Keynesian model. *Journal of Economic Dynamics and Control*, *37*(8), 1598–1625. https://doi.org/10.1016/j.jedc.2012.11.008

Dosi, G., Fagiolo, G., Napoletano, M., Roventini, A., & Treibich, T.* (2015). Fiscal and monetary policies in complex evolving economies. *Journal of Economic Dynamics and Control*, *52*, 166–189. https://doi.org/10.1016/j.jedc.2014.11.014

Dosi, G., Fagiolo, G., & Roventini, A.* (2010). Schumpeter meeting Keynes: A policy-friendly model of endogenous growth and business cycles. *Journal of Economic Dynamics and Control*, *34*(9), 1748–1767. https://doi.org/10.1016/j.jedc.2010.06.018

Dosi, G., Napoletano, M., Roventini, A., & Treibich, T. (2017). Micro and macro policies in the Keynes+Schumpeter evolutionary models. *Journal of Evolutionary Economics*, *27*, 63–90. https://doi.org/10.1007/s00191-016-0466-4

Dosi, G., Pereira, M. C., Roventini, A., & Virgillito, M. E. (2018). The effects of labour market reforms upon unemployment and income inequalities: An agent-based model. *Socio-Economic Review*, *16*(4), 687–720. https://doi.org/10.1093/ser/mwx054

Dosi, G., & Roventini, A. (2017). Agent-Based Macroeconomics and Classical Political Economy: Some Italian Roots. *Italian Economic Journal*, *3*, 261–283. https://doi.org/10.1007/s40797-017-0065-z

Dosi, G. & Roventini (2019). La solitudine dell'agente rappresentativo:Eterogeneità e interazione per una nuova macroeconomia. *Moneta e Credito*, *72*(287), 173–182.

Dow, S. C. (2007). Variety of methodological approach in economics. *Journal of Economic Surveys*, *21*, 447–465. https://doi.org/10.1111/j.1467-6419.2007.00510.x

Duffy, J.* (2001). Learning to speculate: Experiments with artificial and real agents. *Journal of Economic Dynamics and Control*, *25*(3–4), 295–319. https://doi.org/10.1016/S0165-1889(00)00028-2

Dumenil, G., & Levy, D. (1985). The classicals and the neoclassicals: A rejoinder to Frank Hahn. *Cambridge Journal of Economics*, *9*, 327–345.

Dutt, A. K. (1990). *Growth, distribution, and uneven development*. Cambridge University Press.

Dutt, A. K. (2017). Heterodox theories of economic growth and income distribution: A partial survey. *Journal of Economic Surveys*, *31*(5). 1240–1271. https://doi.org/10.1111/joes.12243

Eatwell, J., & Milgate, M. (1983). *Keynes's Economics and the Theory of Value and Distribution*. Oxford University Press.

Eatwell, J., Milgate, M., Eatwell, J., & Milgate, M. (2015). The Imperfectionists. In *The Fall and Rise of Keynesian Economics*. https://doi.org/10.1093/acprof:osobl/9780199777693.003.0008

Ellison, G. (2002). The slowdown of the economics publishing process. *Journal of Political Economy*, *110*, (5), 947–993.

Eppstein, M. J., Grover, D. K., Marshall, J. S., & Rizzo, D. M. (2011).* An agent-based model to study market penetration of plug-in hybrid electric vehicles. *Energy Policy*, *39*(6), 3789–3802. https://doi.org/10.1016/j.enpol.2011.04.007

Faber, A., Valente, M., & Janssen, P.* (2010). Exploring domestic micro-cogeneration in the Netherlands: An agent-based demand model for technology diffusion. *Energy Policy*, *38*(6), 2763–2775. https://doi.org/10.1016/j.enpol.2010.01.008

Fagiolo, G., & Roventini, A. (2012). Macroeconomic policy in DSGE and agent-based models. *Revue de l'OFCE*, *5*(124), 67–116. https://doi.org/10.3917/reof.124.0067

Farmer, J. D., & Foley, D. (2009). The economy needs agent-based modelling. In *Nature* (Vol., 460, Issue (7256), pp. 685–686). Nature Publishing Group. https://doi.org/10.1038/460685a

Farmer, J. D., Hepburn, C., Mealy, P., & Teytelboym, A.* (2015). A third wave in the economics of climate change. *Environmental and Resource Economics*, *62*(2), 329–357. https://doi.org/10.1007/s10640-015-9965-2

Farooq, B., Bierlaire, M., Hurtubia, R., & Flötteröd, G.* (2013). Simulation based population synthesis. *Transportation Research Part B: Methodological*, *58*, 243–263. https://doi.org/10.1016/j.trb.2013.09.012

Filatova, T., Van Der Veen, A., & Parker, D. C.* (2009). Land market interactions between heterogeneous agents in a heterogeneous Landscape - Tracing the macro-scale effects of individual trade-offs between environmental amenities and disamenities. *Canadian Journal of Agricultural Economics*, *57*(4), 431–457. https://doi.org/10.1111/j.1744-7976.2009.01164.x

Foley, D., Michl, T. R., & Tavani, D. (2019). *Growth and distribution*, 2nd edn., Harvard University Press.

Fourcade, M., Ollion, E., & e Algan, Y. (2015). The superiority of economists. *The Journal of Economic Perspectives*, *29*(1), 89–114.

Franke, R.* (2009). Applying the method of simulated moments to estimate a small agent-based asset pricing model. *Journal of Empirical Finance*, *16*(5), 804–815. https://doi.org/10.1016/j.jempfin.2009.06.006

Franke, R., & Westerhoff, F.* (2012). Structural stochastic volatility in asset pricing dynamics: Estimation and model contest. *Journal of Economic Dynamics and Control*, *36*(8), 1193–1211. https://doi.org/10.1016/j.jedc.2011.10.004

Gallegati, M., & Kirman, A. (2012). Reconstructing economics: Agent based models and complexity. *Complexity Economics*, https://doi.org/10.7564/12-COEC2

Gallegati, M., Palestrini, A., & Russo, A. (2017). Introduction To Agent-Based Economics. In *Introduction to Agent-Based Economics*. https://doi.org/10.1016/c2015-0-00736-5

Garegnani, P. (1990). Sraffa: Classical versus Marginalist Analysis Pierangelo Garegnani. In K. Bharadwaj (Ed.), *Essays on Piero Sraffa*. Bertram Schefold. Routledge.

Geanakoplos, J., Axtell, R., Farmer, J. D., Howitt, P., Conlee, B., Goldstein, J., Hendrey, M., Palmer, N. M., & Yang, C. Y.* (2012). Getting at systemic risk via an agent-based model of the housing market. *American Economic Review*, *102*(3), 53–58. https://doi.org/10.1257/aer.102.3.53

Gibson, B., & Setterfield, M. (2018). Real and financial crises in the Keynes–Kalecki structuralist model: An agent-based approach. *Metroeconomica*, *69*(3), 566–592. https://doi.org/10.1111/meca.12201

Gintis, H.* (2007). The dynamics of general equilibrium. *Economic Journal*, *117*(523), 1280–1309. https://doi.org/10.1111/j.1468-0297.2007.02083.x

Godley, W., (1997). Macroeconomics without Equilibrium or Disequilibrium. Working Paper Series 205, The Levy Economic Institute of Bard College.

Godley, W., & Lavoie, M., (2007). *Monetary Economics An Integrated Approach to Credit, Money, Income, Production and Wealth*. Palgrave MacMillan.

Godley, W., & Zezza, G., (2006). *Debt and lending: A cri de coeur*. Technical report, Levy Institute at Bard College.

Graziani, A. (2003). *The Monetary Theory of Production*. Cambridge University Press.

Greenwald, B., & Stiglitz, J. E. (1987). Keynesian, New Keynesian and New Classical Economics. *Oxford Economic Papers*, *39*(1).119–133.

Greenwald, B., & Stiglitz, J. E. (1988). Pareto inefficiency of market economies: search and efficiency wage models, NBER Working Paper No. 2651, July.

Gualdi, S., Tarzia, M., Zamponi, F., & Bouchaud, J. P.* (2015). Tipping points in macroeconomic agent-based models. *Journal of Economic Dynamics and Control*, *50*, 29–61. https://doi.org/10.1016/j.jedc.2014.08.003

Hahn, F. (1982). The neo-Ricardians. *Cambridge Journal of Economics*, *6*(4), 353–374. https://doi.org/10.4337/9780857934680.00101

Hahn, F. H. (1975). Revival of Political Economy: The Wrong Issues and the Wrong Argument. *Economic Record*, *51*(3), 360–364. https://doi.org/10.1111/j.1475-4932.1975.tb00262.x

Haldane, A. G., & Turrell, A. E. (2018). An interdisciplinary model for macroeconomics. *Oxford Review of Economic Policy*, *34*(1-2), 219–251. https://doi.org/10.1093/oxrep/grx051

Hamermesh, D. S. (2013), Six Decades of Top Economics Publishing: Who and How., *Journal of Economic Literature*, *51*(1), 162–172.

Happe, K. (2004). *Kathrin Happe Agricultural policies and farm structures*.

Happe, K., Balmann, A., Kellermann, K., & Sahrbacher, C.* (2008). Does structure matter? The impact of switching the agricultural policy regime on farm structures. *Journal of Economic Behavior and Organization*, *67*(2), 431–444. https://doi.org/10.1016/j.jebo.2006.10.009

Hassani-Mahmooei, B., & Parris, B. W.* (2012). Climate change and internal migration patterns in Bangladesh: An agent-based model. In *Environment and Development Economics*, (Vol., *17*, Issue (6), pp. 763–780). https://doi.org/10.1017/S1355770x12000290

Hicks, J. R. (1939). *Value and Capital: An Inquiry into Some Fundamental Principles of Economic Theory*. Clarendon Press.

Hodgson, G. M., & Knudsen, T.* (2004). The complex evolution of a simple traffic convention: The functions and implications of habit. *Journal of Economic Behavior and Organization*, *54*(1), 19–47. https://doi.org/10.1016/j.jebo.2003.04.001

Hunt, J. D., & Stefan, K. J.* (2007). Tour-based microsimulation of urban commercial movements. *Transportation Research Part B: Methodological*, *41*(9), 981–1013. https://doi.org/10.1016/j.trb.2007.04.009

International Monetary Fund. (2012). World Economic Outlook - Growth Resuming, Dangers Remain. In *World Economic Outlook*.

Kahneman, D. (2003). Maps of bounded rationality: Psychology for behavioral economics. In *American Economic Review*. https://doi.org/10.1257/000282803322655392

Kaufmann, P., Stagl, S., & Franks, D. W.* (2009). Simulating the diffusion of organic farming practices in two New EU Member States. *Ecological Economics*, *68*(10), 2580–2593. https://doi.org/10.1016/j.ecolecon.2009.04.001

Kirman, A. P., & Vriend, N. J.* (2001). Evolving market structure: An ACE model of price dispersion and loyalty. *Journal of Economic Dynamics and Control*, *25*(3–4), 459–502. https://doi.org/10.1016/S0165-1889(00)00033-6

Klemm, K., Eguíluz, V. M., Toral, R., & San Miguel, M.* 2005 Globalization, polarization and cultural drift. *Journal of Economic Dynamics and Control*, *29*(1–2), 321–334. https://doi.org/10.1016/j.jedc.2003.08.005

Klos, T. B., & Nooteboom, B.* (2001). Agent-based computational transaction cost economics. *Journal of Economic Dynamics and Control*, *25*(3–4), 503–526. https://doi.org/10.1016/S0165-1889(00)00034-8

Köhler, J., Whitmarsh, L., Nykvist, B., Schilperoord, M., Bergman, N., & Haxeltine, A.* (2009). A transitions model for sustainable mobility. *Ecological Economics*, *68*(12), 2985–2995. https://doi.org/10.1016/j.ecolecon.2009.06.027

Kowalska-Pyzalska, A., Maciejowska, K., Suszczyński, K., Sznajd-Weron, K., & Weron, R.* (2014). Turning green: Agent-based modeling of the adoption of dynamic electricity tariffs. *Energy Policy*, *72*, 164–174. https://doi.org/10.1016/j.enpol.2014.04.021

Krupa, J. S., Rizzo, D. M., Eppstein, M. J., Brad Lanute, D., Gaalema, D. E., Lakkaraju, K., & Warrender, C. E.* (2014). Analysis of a consumer survey on plug-in hybrid electric vehicles. *Transportation Research Part A: Policy and Practice*, *64*, 14–31. https://doi.org/10.1016/j.tra.2014.02.019

Kurz, H. D., & Salvadori, N. (1995). *Theory of Production. A Long-period Analysis.*. Cambridge University Press.

Kydland, F. E., & Prescott, E. C. (1982). Time to Build and Aggregate Fluctuations. *Econometrica*, *50*(6), 1345–1370. https://doi.org/10.2307/1913386

Lamperti, F., Dosi, G., Napoletano, M., Roventini, A., & Sapio, A. (2018). Faraway, so close: Coupled climate and economic dynamics in an agent-based integrated assessment model. *Ecological Economics*, *150*, 315–339. https://doi.org/10.1016/j.ecolecon.2018.03.023

Lavoie, M. (2015). Should heterodox economics be taught in or outside of economics departments?, *International Journal of Pluralism and Economics Education*, *6*(2), 134–150.

LeBaron, B.* (2000). Agent-based computational finance: Suggested readings and early research. *Journal of Economic Dynamics and Control*, *24*(5–7), 679–702. https://doi.org/10.1016/s0165-1889(99)00022-6

LeBaron, B.* (2001a). A builder's guide to agent-based financial markets. *Quantitative Finance*, *1*(2), 254–261. https://doi.org/10.1088/1469-7688/1/2/307

LeBaron, B.* (2001b). Evolution and time horizons in an agent-based stock market. *Macroeconomic Dynamics*, *5*(2), 225–254. https://doi.org/10.1017/S1365100501019058

LeBaron, B., & Tesfatsion, L., (2008). Modeling macroeconomies as open-ended dynamic systems of interacting agents. *American Economic Review*, *98*(2), 246-50

Leijonhufvud, A.* (2009). Out of the corridor: Keynes and the crisis. *Cambridge Journal of Economics*, *33*(4 SPEC. ISS.), 741–757. https://doi.org/10.1093/cje/bep022

Lengnick, M.* (2013). Agent-based macroeconomics: A baseline model. *Journal of Economic Behavior and Organization*, *86*, 102–120. https://doi.org/10.1016/j.jebo.2012.12.021

Liedtke, G.* (2009). Principles of micro-behavior commodity transport modeling. *Transportation Research Part E: Logistics and Transportation Review*, *45*(5), 795–809. https://doi.org/10.1016/j.tre.2008.07.002

Liu, J. S., Lu L. Y. Y., Lu W.-M., Lin B. J. Y., (2013). Data envelopment analysis 1978–2010: A citation-based literature survey. *Omega*, *41*(1), 3–15. https://doi.org/10.1016/j.omega.2010.12.006.

Liu, J., & Zhou, X.* (2016). Capacitated transit service network design with boundedly rational agents. *Transportation Research Part B: Methodological*, *93*, 225–250. https://doi.org/10.1016/j.trb.2016.07.015

Lu, Q., Korniss, G., & Szymanski, B. K.* (2009). The naming game in social networks: Community formation and consensus engineering. *Journal of Economic Interaction and Coordination*, *4*(2), 221–235. https://doi.org/10.1007/s11403-009-0057-7

Mankiw, N. G. (2006). The macroeconomist as scientist and engineer. *Journal of Economic Perspectives*, *20*(4), 29–46. https://doi.org/10.1257/jep.20.4.29

Marshall, D. A., Burgos-Liz, L., Ijzerman, M. J., Osgood, N. D., Padula, W. V., Higashi, M. K., Wong, P. K., Pasupathy, K. S., & Crown, W.* (2015a). Applying dynamic simulation modeling methods in health care delivery research -

The SIMULATE checklist: Report of the ISPOR simulation modeling emerging good practices task force. *Value in Health*, *18*(1), 5–16. https://doi.org/10.1016/j.jval.2014.12.001

Marshall, D. A., Burgos-Liz, L., Ijzerman, M. J., Crown, W., Padula, W. V., Wong, P. K., Pasupathy, K. S., Higashi, M. K., & Osgood, N. D.* (2015b). Selecting a dynamic simulation modeling method for health care delivery research - Part 2: Report of the ISPOR dynamic simulation modeling emerging good practices task force. *Value in Health*, *18*(2), 147–160. https://doi.org/10.1016/j.jval.2015.01.006

Matthews, R., & Selman, P.* (2006). Landscape as a focus for integrating human and environmental processes. *Journal of Agricultural Economics*, *57*(2), 199–212. https://doi.org/10.1111/j.1477-9552.2006.00047.x

Mazzocchetti, A., Raberto, M., Teglio, A., & Cincotti, S. (2018). Securitization and business cycle: An agent-based perspective. *Industrial and Corporate Change*, *27*(6), 1091–1121. https://doi.org/10.1093/icc/dty042

Mike, S., & Farmer, J. D.* (2008). An empirical behavioral model of liquidity and volatility. *Journal of Economic Dynamics and Control*, *32*(1), 200–234. https://doi.org/10.1016/j.jedc.2007.01.025

Minsky, H. P. (1982). The Financial Instability Hypothesis: A Restatement. In *Can 'It' Happen Again? Essays on Instability and Finance*.

Minsky, H. (1986). *Stabilizing an unstable economy*. Yale University Press

Monasterolo, I., & Raberto, M. (2018). The EIRIN flow-of-funds behavioural model of green fiscal policies and green sovereign bonds. *Ecological Economics*, *144*, 228–243. https://doi.org/10.1016/j.ecolecon.2017.07.029

Monasterolo, I., & Raberto, M. (2019). The impact of phasing out fossil fuel subsidies on the low-carbon transition. *Energy Policy*, *124*, 355–370. https://doi.org/10.1016/j.enpol.2018.08.051

Mueller, M. G., & De Haan, P.* (2009). How much do incentives affect car purchase? Agent-based microsimulation of consumer choice of new cars-Part I: Model structure, simulation of bounded rationality, and model validation. *Energy Policy*, *37*(3), 1072–1082. https://doi.org/10.1016/j.enpol.2008.11.002

Nikiforos, M., & Zezza, G. (2017). Stock-flow consistent macroeconomic models: A survey. *Journal of Economic Surveys*, *31*(5), 1204–1239. https://doi.org/10.1111/joes.12221

Padgett, J. F., Lee, D., & Collier, N.* (2003). Economic production as chemistry. *Industrial and Corporate Change*, *12*(4), 843–877. https://doi.org/10.1093/icc/12.4.843.

Pasinetti, L. (1977). *Lectures in the Theory of Production*, Macmillan, London.

Pasinetti, L. (1983). *Structural Change and Economic Growth: A Theoretical Essay on the Dynamics of the Wealth of Nations.* . Cambridge University Press, Cambridge.

Pasinetti, L. (2000). Critique of the neoclassical theory of growth and distribution. *BNL Quarterly Review Quarterly Review*, *53*(215), 383–431. https://doi.org/10.13133/2037-3643/9924

Passarella, M. (2012). A simplified stock-flow consistent dynamic model of the systemic financial fragility in the "New Capitalism. *Journal of Economic Behavior and Organization*, *83*, 570–582. https://doi.org/10.1016/j.jebo.2012.05.011

Peeta, S., Zhang, P., & Zhou, W.* (2005). Behavior-based analysis of freeway car-truck interactions and related mitigation strategies. *Transportation Research Part B: Methodological*, *39*(5), 417–451. https://doi.org/10.1016/j.trb.2004.06.002

Ponta, L., Raberto, M., Teglio, A., & Cincotti, S.* (2018). An agent-based stock-flow consistent model of the sustainable transition in the energy sector. *Ecological Economics*, *145*, 274–300. https://doi.org/10.1016/j.ecolecon.2017.08.022

Reis, V.* (2014). Analysis of mode choice variables in short-distance intermodal freight transport using an agent-based model. *Transportation Research Part A: Policy and Practice*, *61*, 100–120. https://doi.org/10.1016/j.tra.2014.01.002

Riccetti, L., Russo, A., & Gallegati, M.* (2015). An agent based decentralized matching macroeconomic model. *Journal of Economic Interaction and Coordination*, *10*(2), 305–332. https://doi.org/10.1007/s11403-014-0130-8

Riccetti, L., Russo, A., & Gallegati, M. (2016). Financialisation and crisis in an agent based macroeconomic model. *Economic Modelling*, *52*(Part A), 162–172. https://doi.org/10.1016/j.econmod.2014.11.028

Riccetti, L., Russo, A., & Gallegati, M. (2018). Financial regulation and endogenous macroeconomic crises. *Macroeconomic Dynamics*, *22*(4), 896–930. https://doi.org/10.1017/S1365100516000444

Romer, P. (2016). The Trouble With Macroeconomics. *The American Economist, forthcoming.*.

Roorda, M. J., Cavalcante, R., McCabe, S., & Kwan, H.* (2010). A conceptual framework for agent-based modelling of logistics services. *Transportation Research Part E: Logistics and Transportation Review*, *46*(1), 18–31. https://doi.org/10.1016/j.tre.2009.06.002

Russo, A. (2017). An Agent Based Macroeconomic Model with Social Classes and Endogenous Crises. *Italian Economic Journal*, *3*, 285–306. https://doi.org/10.1007/s40797-017-0060-4

Russo, A., Catalano, M., Gaffeo, E., Gallegati, M., & Napoletano, M.* (2007). Industrial dynamics, fiscal policy and R&D: Evidence from a computational experiment. *Journal of Economic Behavior and Organization*, *64*(3-4 SPEC. ISS.), 426–447. https://doi.org/10.1016/j.jebo.2006.06.016

Russo, A., Riccetti, L., & Gallegati, M.* (2016). Increasing inequality, consumer credit and financial fragility in an agent based macroeconomic model. *Journal of Evolutionary Economics*, *26*(1), 25–47. https://doi.org/10.1007/s00191-015-0410-z

Sander, B., Nizam, A., Garrison, L. P., Postma, M. J., Halloran, M. E., & Longini, I. M.* (2009). Economic evaluation of influenza pandemic mitigation strategies in the United States using a stochastic microsimulation transmission model. *Value in Health*, *12*(2), 226–233. https://doi.org/10.1111/j.1524-4733.2008.00437.x

Sargent Thomas, J. (1993). In *Bounded rationality in macroeconomics : The Arne Ryde Memorial Lectures*. , OUP Catalogue, Oxford University Press, Oxford.

Scalas, E., Gorenflo, R., Luckock, H., Mainardi, F., Mantelli, M., & Raberto, M.* (2004). Anomalous waiting times in high-frequency financial data. *Quantitative Finance*, *4*(6), 695–702. https://doi.org/10.1080/14697680500040413

Schasfoort, J., Godin, A., Bezemer, D.i., Caiani, A., & Kinsella, S. (2017). Monetary policy transmission in a macroeconomic agent-based model. *Advances in Complex Systems*, *20*(8), 1–35. https://doi.org/10.1142/S0219525918500030

Schreinemachers, P., Berger, T., & Aune, J. B.* (2007). Simulating soil fertility and poverty dynamics in Uganda: A bio-economic multi-agent systems approach. *Ecological Economics*, *64*(2), 387–401. https://doi.org/10.1016/j.ecolecon.2007.07.018

Schwoon, M.* (2006). Simulating the adoption of fuel cell vehicles. *Journal of Evolutionary Economics*, *16*(4), 435–472. https://doi.org/10.1007/s00191-006-0026-4

Sensfuß, F., Ragwitz, M., & Genoese, M.* (2008). The merit-order effect: A detailed analysis of the price effect of renewable electricity generation on spot market prices in Germany. *Energy Policy*, *36*(8), 3086–3094. https://doi.org/10.1016/j.enpol.2008.03.035

Seppecher, P.* (2012). Flexibility of wages and macroeconomic instability in an agent-based computational model with endogenous money. *Macroeconomic Dynamics*, *16*(SUPPL. 2), 284–297. https://doi.org/10.1017/S1365100511000447

Silvia, C., & Krause, R. M.* (2016). Assessing the impact of policy interventions on the adoption of plug-in electric vehicles: An agent-based model. *Energy Policy*, *96*, 105–118. https://doi.org/10.1016/j.enpol.2016.05.039

Simon, H. A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, *69*(1), 99–118. https://doi.org/10.2307/1884852

Simon, H. A. (1979). Rational decision making in business organizations. *American Economic Review*, *69*(4), 493–513. https://doi.org/10.2307/1808698

Solow, R. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics*, *70*(1), 65–94. https://doi.org/10.2307/1884513

Solow, R. (2008). The state of macroeconomics. In *Journal of Economic Perspectives*. *22*(1), 243–250. https://doi.org/10.1257/jep.22.1.243

Solow, R. (2010), Prepared statement, house committee on science and technology, Technical report, Subcommittee on Investigations and Oversight.

Squazzoni, F.* (2010). The impact of Agent-Based Models in the social sciences after 15 years of incursions. In *Complexity and the organization of economic life* (Vol., 18, Issue (2)).

Stiglitz, J. E. (1987). Pareto Efficient and Optimal Taxation and the New New Welfare Economics. NBER Working Paper 2189, March.

Stiglitz, J. E. (2011). Rethinking macroeconomics: What failed, and to how repair it. *Journal of the European Economic Association*, *9*(4), 591–645. https://doi.org/10.1111/j.1542-4774.2011.01030.x

Tang, L., Wu, J., Yu, L., & Bao, Q.* (2015). Carbon emissions trading scheme exploration in China: A multi-agent-based model. *Energy Policy*, *81*(2015), 152–169. https://doi.org/10.1016/j.enpol.2015.02.032

Thaler, R. (2016). Behavioral economics: Past, present, and future. *American Economic Review*, *106*(7).1577–1600.

Teglio, A., Raberto, M., & Cincotti, S. (2012). The impact of banks' capital adequacy regulation on the economic system: An agent-based approach. *Advances in Complex Systems*, https://doi.org/10.1142/S0219525912500403

Tesfatsion, L.* (2001). Structure, behavior, and market power in an evolutionary labor market with adaptive search. In *Journal of Economic Dynamics and Control*, *25*, 3–4. 419–457. https://doi.org/10.1016/S0165-1889(00)00032-4

Trichet, J.-C. (2010). Reflections on the nature of monetary policy non-standard measures and finance theory. Opening address at the ECB Central Banking Conference, Frankfurt, November 18. In *The Clare Distinguished Lecture in Economics and Public Policy*.

Van Noorden, R., Maher, B., & Nuzzo, R. (2014). The top 100 papers. *Nature*, *514*, 550–553. https://doi.org/10.1038/514550a

Veit, D. J., Weidlich, A., & Krafft, J. A.* (2009). An agent-based analysis of the German electricity market with transmission capacity constraints. *Energy Policy*, *37*(10), 4132–4144. https://doi.org/10.1016/j.enpol.2009.05.023

Vriend, N. J.* (2002). Was Hayek an Ace? *Southern Economic Journal*, *68*(4), 811. https://doi.org/10.2307/1061494

Weidlich, A., & Veit, D.* (2008). A critical survey of agent-based wholesale electricity market models. *Energy Economics*, *30*(4), 1728–1759. https://doi.org/10.1016/j.eneco.2008.01.003

Westerhoff, F. H., & Bamberg, B.* (2008). The use of agent-based financial market models to test the effectiveness of regulatory policies. *Jahrbucher Fur Nationalokonomie Und Statistik*, *228*(2–3), 195–227. https://doi.org/10.1515/jbnst-2008-2-305

Wicksell, K. (1898). *Geldzins und Güterpreise bestimmenden Ursachen. Jena: G Fischer. Trans. by R.F. Kahn as interest and prices: A study of the causes regulating the value of money*. Macmillan, 1936.

Willis, G. (2015). Income distribution and income shares: Wealth and income distributions explained using generalised Lotka-Volterra SFC ABM models. *International Review of Applied Economics*, *29*(6), 816–842. https://doi.org/10.1080/02692171.2015.1065225

Wright, I. (2008). The Emergence of the Law of Value in a Dynamic Simple Commodity Economy. *Review of Political Economy*, *20*, (3), 367–391, https://doi.org/10.1080/09538250701661889

Wright, I. (2011a). Convergence to natural prices in simple production. *Open Discussion Papers in Economics, no. 75*. The Open University.

Wright, I. (2011b). Classical macrodynamics and the labor theory of value. *Open Discussion Papers in Economics, no. 76*. The Open University.

Xiao, Y., & Watson, M. (2017). Guidance on conducting a systematic literature review. *Journal of Planning Education and Research*, *39*(1), 93-112. https://doi.org/10.1177/0739456x17723971

Zahle, J., & Kincaid, H. (2020). Agent-based modelling with and without methodological individualism" in advances in social simulation – looking in the Mirror, Harko Verhagen. In M. Borit, G. Bravo, & N. Wijermans (Eds.). Springer, 15–25.

Zhang, J.* (2003). Growing Silicon Valley on a landscape: An agent-based approach to high-tech industrial clusters. *Journal of Evolutionary Economics*, *13*(5), 529–548. https://doi.org/10.1007/s00191-003-0178-4

Zhang, J.* (2004). Residential segregation in an all-integrationist world. *Journal of Economic Behavior and Organization*, *54*(4), 533–550. https://doi.org/10.1016/j.jebo.2003.03.005

Zhang, J.* (2011). Tipping and residential segregation: A unified schelling model. *Journal of Regional Science*, *51*(1), 167–193. https://doi.org/10.1111/j.1467-9787.2010.00671.x

Zheng, N., Waraich, R. A., Axhausen, K. W., & Geroliminis, N.* (2012). A dynamic cordon pricing scheme combining the Macroscopic Fundamental Diagram and an agent-based traffic model. *Transportation Research Part A: Policy and Practice*, *46*(8), 1291–1303. https://doi.org/10.1016/j.tra.2012.05.006