Frontiers in Science and Engineering
International Journal

Edited by The Hassan II Academy of Science and Technology of Morocco

Strategic Studies and Economic Development

Contents

ACADEMY Press MA

Volume 9 - n° 1 - 2019

Editorial board

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Dépôt légal : 2012 PE 0007
ISSN : 2028 - 7615

ACADEMY Press MA

Email : fse@academiesciences.ma
www.academiesciences.ma/fse/

Layout by : AGRI-BYS S.A.R.L
Printed by : Imprimerie LAWNE
11, rue Dakar, 10040 - Rabat

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Once, a certain number of papers in a specific thematic, is reached, the Academy might edit a special paper issue in parallel to the electronic version.

FOREWORD

The Frontiers in Science and Engineering International Journal is devoting the present issue to Strategic Studies and Economic development, and especially to a hot topic: Economics, highlighting some notorious scholars in the field.

This issue was coordinated and introduced introduced by our colleague Prof. Rédouane Taouil

These five articles were collected and peer reviewed through the college of Strategic Studies and Economic development of The Hassan II Academy of Science and Technology.

Driss OUAZAR
Executive Director and Associate Editor-in-Chief

INTRODUCTION

Economics : a discipline of debates

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Economics, argues A. Berthoud, is a discipline under tradition and a set of analysis under authority: "Whether one is concerned about the evolution of a text, the urgency of a problem or the conditions of a problem history or the logic of an argumentation (...) it is always to an author that one addresses himself to strengthen his position, to identify his intervention, to authenticate his intention and to answer a worry on the truth of his affirmation "(1992, 132).

Keynes perfectly illustrates this assertion. To observe the trajectory of macroeconomics since its establishment as a particular branch up to the present day, one realizes that it is indissolubly linked to the problem inherited from the central figure of economic science in the 20th century. The traditions of analysis refer to it in order to integrate propositions into the problematic of equilibrium, to criticize its approach and results or to reinterpret it as an irreducible project to the neo-classical theory. So much so that the history of macroeconomics is interpreted as the story of its relationship with the economy of the author of the General Theory of Employment, Interest and Money. The words "New Keynesian", "New Keynesian" or "Post-Keynesian" or "New Classical Economy" used by his supporters to mark their opposition to ... Keynes

This master book, which analyzes an economy in which money plays a key role, argues that the level of employment is determined by expectations of the level of aggregate demand by firms, and not by the labor market. Unemployment is explained in this context by the lack of demand. From this perspective, Keynes questions the centerpiece of the theses of Pigou and Robbins: the natural convergence towards full employment under the influence of price flexibility and wages.

With Lucas, figurehead of the new classical economy, Keynes's theory is not an analytical framework to enrich as the Synthesis incarnated by Samuelson, Modigliani and Tobin has used, but a reference to give up in favor of the Walrasian vision of the markets. Using the discipline of equilibrium that he reformulates under the assumption of rational expectations, Lucas promotes a modeling strategy, whose key conclusion is that the rational behavior coupled with the adjustment by the prices guarantees the full employment so that the public decision-maker must ensure that his monetary and fiscal actions are based on explicit rules. This strategy, based on the principles of dynamic and stochastic general equilibrium (DSGE), is the basis of the models of the new dominant macroeconomic consensus today (Woodford, Blanchard,) which combines the study of nominal rigidities and imperfections. under the dual aegis of optimizing rationality and the rational formation of expectations with a view to describing cyclical fluctuations and the conditions for the exercise of monetary policy.

At the opposite of the works of Lucas, Pasinetti develops, on the basis of an internal critique of the neoclassical approach an alternative project. Protagonist of the controversy of the two Cambridge, Great Britain (Robinson, Garegnani, Pasinetti) and Massaschuchets (Samuelson, Solow), on the measure of the capital, it establishes the impossibility of this measure starting from the function of aggregate production and productivities marginal factors. In this respect, he shows that the valuation of capital in terms of price requires knowledge of the rate of profit as an exogenous variable, irreducible to a deduction according to the neoclassical theory of the distribution of income. The negative consequences of this result, which is in line with the production price models of Sraffa (1960), were recognized by Samuelson (1966), who did not fail to recall "the scientists were not born to lead a peaceful existence". At the same time, Pasinetti demonstrates, from an examination of Kaldor's model, that the rate of profit depends on the rate of growth and the propensity to save capitalists even when employees do not consume all of their income. This result, qualified as a theorem, contributed to the renewal of the classical (Ricardo) and Marxian tradition that Pasinetti pursued by rewriting the links between accumulation, profit and wages and the extension of the method of the vertical integration with structural changes.

Coase's "The nature of firm" (1937) and "The problem of social cost" (1960) demonstrate how two short contributions can renew microeconomics and extend their scope. The first question is about enterprise, as a different way of allocating resources than the market, which relies on eliminating transaction costs through optimal internal organization procedures associated with authoritative relationships. The second, dealing with externalities and the mechanisms for their correction by the exchange of clearly defined property rights, shows that these exchanges result, in the absence of transaction costs, on optimal contracts that do not require public intervention. such as taxes or subsidies.

Contrary to the dominant trend in economics, Coase does not use the deductive approach on which he has strong reservations, he prefers to infer propositions from particular cases or empirical statements. In spite of this angle of analysis, his contributions shaped the theory of the firm and the economy of the environment and, moreover, dedicated the emergence of the current, Law and Economics, as an interdisciplinary field.

Heir of Coase, Williamson, is the architect of a work that has largely fertilized the economy of institutions by an approach in terms of transaction costs. For the author of the influential Market and Hierarchies (1975), the market economy is specified by various organizational modalities following arbitrations that lead to contractual relations. This property implies that the hierarchical mode of governance is an effective alternative to the market that ensures coordination through information incentive and disclosure mechanisms that can reinforce agents' rationality and reduce uncertainty about their interactions. The imprint of Williamson, whose approach, unlike his master, the theory for a predictive instrument, is also considerable, not only in microeconomics and management, but also in sociology of organizations and the economy of law. The study of these figures of economic science in the twentieth century shows that the major contributions maintain relations between them that are placed under the sign of synthesis, convergences, recoveries or ruptures. Nature responds only in the language that we approach it, writes W. Shea. The same reasoning applies to Economics in the light of the variety of answers that it gives to its foundational questions.

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JOHN MAYNARD KEYNES'S METHODOLOGICAL REVOLUTION IN THE LIGHT OF RECENT RESEARCH ON COMPLEXITY IN ECONOMICS

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Abstract :

It is argued in this paper that it is possible to extract a coherent method in J.M. Keynes's economic analysis, that it constitutes a radical departure from conventional economics, and that it relies on complexity features of the economic material that are similar to those of contemporary research on complexity in economic analysis. However, it is claimed that Keynes's thinking goes deeper than the today's dominant, tool-first Complexity Economics. It pertains to a problem-first approach having to deal head on with questions not amenable to "classical" tools of analysis. These features render it much closer to the new Deep Complexity research than to what tends to become a conventional Complexity Economics. It entails a re-evaluation of Keynes's revolution. Today's relevance of its method makes its methodological side appear more important than its theoretical side.

Keywords: Problem-first approach, tool-first approach, intractability, Complexity Economics, Deep Complexity.

Introduction

This contribution is at a crossroads between my own work on complexity theory in economics and social science, more generally, and the subsequent discovery to which it led of the visionary thinking of J.M. Keynes in connection with complexity. I will attempt to suggest that it is possible to extract from Keynes's writings a coherent, though partial, set of ideas about his method, without artificiality. I am not addressing this issue as a methodologist but from the standpoint of theorizing complex problems and its connection with method.

J.M. Keynes is the author of a methodological revolution in economics that is still broadly unrecognized by economic theory. Rather, it is what has been labelled his "theoretical revolution" (Klein, 1947, 1968) that has been the main focus of attention and of controversy for decades in economics whereas its methodological base has been broadly overlooked and even discredited. Accusations of inconsistency followed from it. However, the works on Keynes' method by a plurality of economists and methodologists, which have developed in the 1980's and 1990's in the wake of the publication of *The Collected Writings of John Maynard Keynes*, suggest forcefully that what has been put under the label of a "Keynesian revolution", mostly by taking the *General Theory* at face value, differs from what Keynes wrote about the way his theoretical ideas could not be separated from his method. A sample of these works is Carabelli (1988, 2012, 2011 with Cedrini,), Backhouse and Bateman (2010), Chick and Dow (2001), Dow (1991, 1996, 2010), Fontana (2001), Gerrard (1992, 1995),

Hillard (1992), Hoover (2006), Kregel (1976), Lawson (1985), Marchionatti (2010), Rotheim (1989-90). However, these insights remain dispersed and marginalized.

Among the reasons for this disinterest and confusion, there seems to be first the lack of an explicit systematization of his method by Keynes himself. He never exposed thoroughly his method. And, however path breaking his method may be, efforts at systemizing it reveal deficiencies in it.

Keynes appears as a precursor who attempted to adapt in his own way his thinking to what he experienced as the complexity of the subject matter of economics. Among the notions which stand out in his oeuvre, organic interdependence, uncertainty, and the difficulty to deal with them within the orthodox or classical mode of reasoning, play an especially central role from a methodological standpoint. These features are particular aspects of the high-level intricacy and the difficulty to cope with it which are the defining characteristics of complexity in the present-time thinking on complex systems and problems.

I - Extracting Keynes's method

A. An issue of systematization

Several reasons explain why systematization is a central issue in the search of Keynes's method.

First, Keynes's statements on his method are scattered throughout his writings, which creates an overall elusiveness.

Second, confusion is doomed to arise when the lack of systematization of method cannot be compensated by undisputable substantive theoretical outcomes.

Third, the orthodox approach to which Keynes wanted to bring an alternative is itself backed by a systematized method. Then, if Simon's rule operates: "You can't beat something with nothing" (Simon, 1978), having a systematized method is a necessary condition before it can be envisaged to be an effective alternative to the orthodox approach.

Fourth, reliance on a firm methodological framework is required when theoretical research is explicitly developed outside the orthodox framework. Whereas the methodological toolkit of orthodox research is known and does not need to be explained in every instance, things go in the opposite way for non-orthodox reasoning.

Finally, and not least, the literature on Keynes's method is itself scattered and lacks any attempt at organizing the plurality of ideas it delivers into a sufficiently complete and unified setting.

How to systematize?

The method for systematizing needs itself to be systematized. Without going into more details (see Delorme, 2013) several guidelines are presented below.

1) Establish the necessary conditions for Keynes's method to be an effective alternative to the orthodox method, i.e., meeting Simon's rule.

2) Retain the notions referred to, or put into practice by Keynes and gathered from Keynes's writings and subsequent literature.

3) Establish a term-by-term comparison with the orthodox method.

4) Organize the comparison in a sequence ranging from presuppositions to theorizing.

5) Be transactional in the Deweyan way, after John Dewey (Delorme, 2010). This means that, rather than taking the terms that are compared as absolute, ontological opposites, they are taken as distinctions within a broader setting and are structured by an order of priority between the paired terms. The pairs of notions are therefore a matter of priority of one term on the other rather than of mutual exclusion. Seven of them stand out.

B. Seven priorities

1) Priority to realities of the world rather than to analytical tractability

"Do not be reluctant to soil your hands" (Keynes, XIV, 300)[1]. This advice to Roy Harrod resonates as an encouragement to strive to do science even when the realities of the world do not fit with the available analytical toolkit. It entails making science in an economic world not deprived of its attributes of complexity, our knowledge of which is severely bound to be incomplete and frequently qualitative only. It goes with a projective character of knowledge and theory. They are tied up with action. Theory is an instrument of inquiry into facts about causes suggesting tendencies and influences to provide guidance to policy making.

This priority runs against the priority to "analogue economies" (Lucas, 1981, 272, Sugden, 2000) designed to guarantee internal validity through a simple and clear enough structure that ensures that deduction will be possible even at the cost of a problematic external validity (Cartwright, 2007). In sum, it runs against both the emphasis on deduction from axiomatized assumptions through mathematically formalized structures, and a detached view of theory.

2) Priority to organic interdependence rather than to atomicity

In Keynes's words, the organic interdependence view of the economic material is in contrast to the view of the social world as consisting of "legal atoms (without any implication about their size) such that each of them exercises its own separate, independent and invariable effect", and in which "each atom is treated as a separate cause and does not enter into different organic combinations in each of which it is regulated by different laws" (VIII, 276-277).

In the organicist view, the relations between ultimate entities are internal rather than external. By this is meant that the essential characteristics of an entity are the outcome of its relations with other entities whereas in atomism the ultimate reality is made up of externally related entities. In this kind of organicness, parts are not replaced by wholes. Instead, parts are continually redefined as they collectively interact. The economic process is conceived in terms of recursive interdependencies between wholes and parts.

3) Priority to uncertainty rather than to risk.

Keynes's famous sentence needs only to be recalled here: "The sense in which I am using the term "uncertain knowledge" … is that in which there is no scientific basis on which to form any calculable probability whatever. We simply do not know." (XIV, 113-114). Keynes's uncertainty denotes situations of numerically immeasurable probability. It does not exclude situations of risk when it is appropriate.

4) Priority to human logic and ordinary language rather than to formal logic and formalized language.

Keynes's writes in 1921 in his *Treatise on Probability*: "In most branches of academic logic…the arguments aim at demonstrative certainty. They claim to be conclusive. But many

[1] All references to Keynes are to the *Collected Writings* with their volume number.

other arguments are rational and claim some weight without pretending to be certain…If logic investigates the general principles of valid thought, the study of arguments to which it is rational to attach *some* weight, is as much a part of it as the study of those which are demonstrative (italics in original, VIII, 3).

In 1931, Keynes quotes approvingly Frank Ramsey's distinction between "formal" logic (the rules of consistent thought) and "human" logic, the "useful mental habits for handling the material with which we are supplied by our perceptions and by our memory and perhaps in other ways, and so arriving at or towards truth; and the analysis of such habits is also a sort of logic…The chief danger to our philosophy…is scholasticism, the essence of which is treating what is vague as if it were precise and trying to fit it into an exact logical theory"(*Essays in Biography*, 1931, X, 338, 343).

And Keynes writes in *The General Theory*: "In ordinary discourse (as opposed to "symbolic pseudo-mathematical methods") where we are not blindly manipulating but know all the time what we are doing and what the words mean, we can keep "at the back of our heads" the necessary reserves and qualifications"(VII, 1936, 313).

5) Priority to non-dualism and open-endedness rather than closed, excluding dualism.

Dualism denotes "the practice of organizing thought by means of all-encompassing mutually-exclusive categories, with fixed meanings" (Dow, 1990, 143). Keynesian thinking stands beyond it, for it consists in an "exercise in containment rather than rejection" (Chick, 1995), in a "Babylonian" rather than "Euclidean-Cartesian" style conditioned by the problem at hand, which employs a "range of methods suited to the problem…these methods cannot be combined into one formal deductive argument without drastically changing their nature" (Dow, 1996,13).

Open-endedness signals the absence of any pre-defined outcome or end-state equilibrium, which makes it differ from eg Hayek's emphasis on equilibrating forces and a spontaneous order.

6) Two levels of method

The distinction between levels of reasoning (object-level, meta-level, meta-meta level) is a cornerstone of the recent research on complexity in economics evoked here, known as the Deep Complexity procedure (Delorme, 2017, 2010). The meta-meta level pertains to the level of the founding presuppositions. Here, it is the first priority, that of realities of the world. Beyond this, I claim that one finds a striking parallel with the other two levels in Keynes's writings on method.

There is first the level of provisional assumptions, e.g. partial equilibrium, to thinking out particular problems "after we have reached a provisional conclusion by isolating the complicating factors one by one, we have to go back on ourselves and allow, as well as we can, for the probable interactions of the factors among themselves. This is the nature of economic thinking" (VII, 297). Second, there is the level of Keynes's "main reasons for departing from the traditional theory…[that] are of a highly general character and are meant to be definitive" (XIV, 122), among which are uncertainty and the other components of the systematization presented here. In Deep Complexity terms, the level of "provisional assumptions" is the object-level method, and the "definitive" method is at the meta-level.

7) The non-separation of method and theory, and the primacy of method

Although it might look at first sight quite unoriginal to consider that method and theory are not independent from one another, non-separation takes on a quite specific meaning in Keynes's thought as is illustrated several times by himself. A first instance is the famous "The theory of economics does not furnish a body of settled conclusions immediately applicable to policy. It is a method rather than a doctrine, an apparatus of the mind, a technique of thinking, which helps its possessor to draw correct conclusions" (XII, 856, 859). Keynes also writes that "The object of our analysis [the General Theory – RD] is, not to provide a machine, or method of blind manipulation, which will furnish an infallible answer, but to provide ourselves with an organized and orderly method of thinking out particular problems" (VII, 297). A final clarification appears in his *The Quarterly Journal of Economics* (February 1937) article on the General Theory: "I am more attached to the comparatively simple fundamental ideas which underlie my theory than to the particular forms in which I have embodied them, and I have no desire that the latter should be crystallized at the present stage of the debate" (XIV, 111). Then, for Keynes, the "particular forms" in which his "fundamental ideas are embodied" are less important than the "simple fundamental ideas that underlie (his) theory. This can be stated in the language of Deep Complexity: for Keynes, theory at the object-level is less important than meta-level ideas.

It is apparent here that the distinction between the provisional and definitive levels of method helps make sense of an accompanying distinction between theoretical "fundamental ideas", at the "definitive" level, and "particular forms" at the provisional level. Partial equilibrium can thus be provisionally introduced at the provisional, object-level of reasoning, and be compatible with a "definitive" method at the meta-level of reasoning which entails an out-of-equilibrium general stance.

C. Pending unanswered questions

This reconstruction of a Keynesian method should not mask that several questions remain unanswered. The systematic comparison of Keynesian elements of method with their orthodox counterparts reveals a coherent sequence susceptible to make up a method. Yet, to be an effective alternative to the orthodox method, it should include important aspects which are addressed by the orthodox method in its own way but which are absent from Keynes's "definitive" method (Delorme, 2013). I mention some of these questions below.

1) What is the meaning and substance of "suited to the problem at hand"?

2) How is the compatibility between the "provisional" and "definitive" levels established?

3) Given its open-endedness, how to move from the Keynesian method to the orthodox method and vice versa?

4) Given the non-separation between method and theory, what is the ending point of inquiry since there are seemingly no declared-in-advance criteria?

5) Isn't the dichotomy between formal logic and human logic quite problematic? It creates a void in between them. Keynes equates formal logic with the particular, though reigning, (either…or) disjunctive logic and its excluded middle. This equation excludes any idea of a (both…and) conjunctive way of reasoning as one finds it in recent research on complexity in economics (Delorme, 2017).

6) What analytical framework is compatible with Keynes's method? Can human logic constitute an alternative scientific frame of reference? Shouldn't an effective alternative to the orthodox frame of reference be another full-fledged frame of reference?

II- The connection with the present time study of complexity in economics

A. Two approaches to complexity

Notwithstanding the limitations mentioned above, it can be claimed that the seven priorities listed above hold together. On the whole, they make up a radical departure from the "classical", to use Keynes's term, or orthodox, mainstream approach to economics. I claim also that Keynes's methodological revolution antecedes to a wide extent the present time movement toward the study of complexity in economics. It antecedes it not in the sense of generating it, but in the way important commonalities can be found in spite of a several-decade historical gap. However, before moving further in the comparison, a necessary distinction needs to be drawn between two ways of studying complexity in economics nowadays. The first one follows from the hardware and software digital computer revolution. It has become overwhelmingly dominant under the label of "complexity economics" (CE). It equates the study of complexity in economics with computer simulation in a variety of ways ranging from complex adaptive systems (CAS), to agent-based computational economics (ACE), agent-based models (ABM) or agent-based simulation (ABS). The second way originates from the realization in research on specific empirical phenomena that there may arise problems that are not amenable to the available tools of analysis, including ABS, i.e. problems that are intractable, given the present state of development of available tools of analysis. This possibility, and actuality, of significant, empirical phenomenal intractability is ignored, by construction, in the theoretical, computer-simulation based approach of complexity economics, since it addresses the dynamic intricacy of complex systems and seemingly solves it. In the end it reduces complexity to its intricacy component. It is a tool-first approach. The second way evoked here is a problem-first approach. It is encompassing and incorporates both the intricacy and the possible intractability components of complexity. It is developed by Delorme (2017, 2010, 2014 with Lassarre) under the name of Deep Complexity. I address succinctly below the connections of these approaches with Keynes's method.

B. "Complexity Economics" and Keynes

"Complexity Economics" (CE) brings a different way to look at the economy (Arthur, 2015), and a different way to do science in economics (Tesfatsion, 2006, Borrill and Tesfatsion, 2011, Velupillai, 2010). I present the central ideas without discussing them.

On the first account, CE relies on a more realist view of agents. Rationality is strictly bounded, agents are heterogeneous. It studies out of equilibrium dynamics. It emphasizes contingency, indeterminacy and openness to change. It is less equation based, more procedural, more algorithmic than conventional economics. It also differs from the conventional way of doing science. It is less general in its claimed shift towards particular explanations and solutions. It is more concerned with generative processes. On top of that, it carries with it a reorientation of the concepts of proof, of solution, and of theory. The notion of proof shifts from (assumption, proof, conclusion) to (input data, algorithm/procedure, output data). The notion of solution moves from numerical solutions to other types. It is no longer necessarily a set of mathematical conditions, but a pattern, a set of emerging phenomena (Arthur, op. cit.). And a theory is no longer the discovery of theorems of "undying generality", but the understanding of mechanisms that create dynamic patterns (Arthur, ibid.).

Although it is quite summarized, this presentation seems sufficient to point out to several similarities with elements found in Keynes's method. They are: the claim to be more realist than conventional economics, the dealing with high level intricacy which echoes organic interdependence, the heterogeneity of agents, and the hard-to-predict outcomes of the dynamics of complex systems which echoes uncertainty. These similarities pertain to items 1 to 4 in § II.B. CE is silent on items 5 to 7.

C. Deep Complexity and Keynes

Deep Complexity is an analytical framework developed on the basis of a cognitive behavioral frame of reference for coping with intractable complex phenomena in economics and social science more generally (Delorme, 2017). Although a complementarity with CE can be envisaged, Deep Complexity differs from it in an essential way: it is a problem-first approach to complex phenomena whereas CE is a tool-first approach.

CE has become equated with the study of what complex systems simulation, in its various forms, delivers. The problem-first approach of Deep Complexity follows from the study of particular and significant empirical complex phenomena as they manifest themselves in real, experienced economic life. It entails the possibility of having to face problems that are not amenable to the available tools of analysis in their present state of development, including the tools of CE, i.e. problems that are intractable. It is a phenomenal intractability. By construction, the CE tools are immune to it. And it is foreign by nature to the computational intractability pertaining to the logical and mathematical limits to knowledge that are present in theoretical computer science. This situation calls for coping with phenomenal intractability without waiting for future, hypothetical progress in CE. It entails designing an alternative analytical framework. Deep Complexity provides a framework that makes possible first to draw a dividing line between tractable and intractable problems, second, to analyze what is intractable.

Then, not only does Deep Complexity incorporate all the components of Keynes's method as identified in § II.B above, it also allows to identify two central differences between Keynes's method and CE which make the former much closer to Deep Complexity than to CE. These differences reside in the "problem-first" stance, and in intractability faced frontally. On the first account, although the same phrase of "realities of the world" can be used in the case of Keynes, and is used by CE proponents, it works quite differently. As already mentioned, in CE, these realities are constrained by what the given, available tools, can deliver. They seemingly solve for dynamic intricacy, by construction. But a problem-first perspective exposes to bump into obstacles that are not solved with the available tools. This is the way the "realities of the world" can be understood in Keynes's method.

On the second account, not having at his disposal digital computer simulation, Keynes had to make his own way through the difficulties of dealing with organic interdependence and uncertainty. The several priorities that were detected above in his method signal the way he responded to these difficulties. They constitute the benchmarks of the way Keynes dealt with intractability. But the absence of a unified setting left Keynes's method underspecified. And it paved the way for accusations of confusion, inconsistency, and floating eclecticism. A more complete specification is provided by Deep Complexity. It brings a unified setting and helps highlight today's relevance of Keynes's methodological revolution.

IV- Conclusion

Deep Complexity, not detailed here, was used as a guiding framework for extracting methodological principles in Keynes's oeuvre. Seven principles or priorities were detected. Their combination makes up a coherent, though partial, whole or method. It forms a radical departure from conventional analysis and has affinities with the current burst of interest for the study of complexity in economics. Yet, there is more to the study of complexity in economic analysis than "Complexity Economics". It also includes Deep Complexity. Deep Complexity is a problem-first, rather than tool-first, approach. It is based on recognizing and coping with intractable complex phenomena. These two key features are present in Keynes's method but not in "Complexity Economics", which highlights the visionary content of Keynes's methodological revolution. It is a revolution in which method has primacy over theory, which suggests that Keynes's methodological revolution is more important than his theoretical revolution. In the end, the argumentation developed here points to the issue of the quality of knowledge that is produced in theoretical work in economics, and its dramatic neglect in the literature and the academia.

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ROBERT LUCAS AND THE FOUNDATIONS OF MACROECONOMIC MODELS

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Abstract : It is rarely underlined that Lucas's work contains epistemological considerations on the scope and method of macroeconomics. The purpose of this article is to clarify the nature of these considerations and to identify their impact on modeling today. Lucas is the craftsman of a model based on the combination of fictions, according to the equilibrium discipline, in order to infer predictions. This approach, which governs the dynamic stochastic general equilibrium methodology (DSGE), is at the basis of the New Synthesis aiming to establish the micro-foundations of imperfect competition macroeconomics and the rules of monetary policy through a rewriting of the aggregate demand function and the Phillips equation.

Keywords: models, DSGE, New Synthesis.

Introduction

A central figure of the new classical economy, Lucas is widely regarded as "the architect of modern macroeconomics" (V. Chari, 1998). His systematic adoption of the hypothesis of rational expectations against that of adaptive expectations, its supply function resulting from the islands model, its analysis of the equilibrium cycle in terms of impulse and propagation, such as the eponymous criticism and his proposal for the inefficiency of systematic economic policy are central to the building of macroeconomic models today. The reference to the contribution he has made to the construction of the epistemological foundations of macroeconomics, however, remains very discreet despite the renewal of questions of method that has

come to undermine the curse of Stigler [2](1963). Macroeconomics owes Lucas theses in the field whose influence is obvious as evidenced by the rise of DSGE models today.

Inspired by Friedman's famous *Essays in Positive Economics* (1953), Lucas's epistemological reflections proceed to a reformulation of the status of models, which consists of considering them as irreducible formal constructions with descriptions of real economies.: neither the hypotheses nor the predictive consequences must have an observational content. Under the categorical imperative of micro-foundations, the models must rely, Lucas prescribes, on the *fictions* of optimal behavior and market clearance to infer predictions about the impact of economic policies in a normative perspective that grants pre-eminence to the conceptual language. The models of the new synthesis, which have been a basic reference since the 2000s in the agendas of macroeconomic research and central banks (Woodford, 2003), bear the imprint of the Lucasian methodology. Exploring the implications of Lucas's critique, these models derive the determination of macro-variables from the identification of micro-decision parameters. On this basis, they bring together in the same framework of analysis, under the aegis of the discipline of equilibrium, the intertemporal behavior of agents and the rationality of expectations, imperfect competition and nominal rigidities in order to define the functions aggregated demand and supply and the conditions for the exercise of monetary policy.

[2] From the 1970s, the epistemology of the economy has largely asserted itself by questioning the relevance of extending schemas of general epistemology to the fields and methods of economics. Blaug's Methodology Economic (1980, 1992), which argues for Popper's thinking, Caldwell's Beyond Positivism (1982, 1994), which opts for methodological pluralism, are exemplary of the constitution of a domain recognized as productive. Taking into account the work of McCloskey (1994), Hausman (1994), Hutchison's articles published in Journal of Economic Methodology and the monumental anthology Philosophy and Methodology of Economics (1993), Stigler's famous statement, " Methodological controversies have never had for scientific progress a marginal product greater than zero "(1963, p. 63), seems to be without any predictive value

A- Fictions to the normativity of the reference system of equilibrium

" One of the functions of theoretical economics is to provide fully articulated, artificial economic systems that can serve as laboratories in which policies that would be prohibitively expensive to experiment with in actual economies can be tested out at much lower cost. To serve this function well, it is essential that the artificial "model" economy be distinguished as sharply as possible in discussion from actual economies. Insofar as there is confusion between statements of opinion as to the way we believe actual economies would react to particular policies and statements of verifiable fact as to how the model will react, the theory is not being effectively used to help us to see which opinions about the behavior of actual economies are accurate and which are not. This is the sense in which insistence on the "realism" of an economic model subverts its potential usefulness in thinking about reality. Any model that is well enough articulated to give clear answers to the questions we put to it will necessarily be artificial, abstract, patently 'unreal'."(1980, p. 696).

These statements, which are at the heart of Lucas' analysis, are in line with the methodology of M. Friedman according to which a theory constitutes a predictive instrument whose hypotheses must in no case have an empirical content. This challenge to the principle of realism of hypotheses implies that rich hypotheses, from a descriptive perspective, are inadequate because they violate the principles of parsimony and simplicity under which a theory can claim to be a system of concepts and proposals of general scope. In this sense, the most appropriate hypotheses for the theoretical construction are those which have a low descriptive value or which are obviously false. It follows that the theoretical statements are to be constructed by means of hypotheses which owe nothing to the actual behavior of the economies. Like the author of *Essays in Positive Economics*, Lucas relies on the exemplary case of the postulate of maximizing rationality, which he considers irrefutable, so much cannot be doubted by observations or surveys of motivations and actions of the agents. In this respect, the modeler must resort to fiction-based standards of analysis by considering that the maximization of function-

objectives principle should be applied as if the agents conform to it in their decision-making process.

The principle of "as if" is essential because of its cognitive function, which consists in delimiting a body of hypotheses and exploring their consequences[3] . Equipped with this vocation, the hypothesis of rational expectations, whose place is crucial in exploring the prospective dimension of individual choices, implies that agents behave exactly as the theory expects them to (knowledge of the economic system in the same way as the modeler, calculation of probabilities, ...).

In accordance with the imperative of micro-foundations of macroeconomics [4] , this hypothesis is doubled by the fiction of the representative agent embodied by the firm or the household or the representative producer-consumer.

The use of these fictions derives from their ability to explain the production of shocks and their propagation, the individual reactions of agents, the fallout of economic policies and the behavior of the cycle in a dynamic perspective. In this context, the theory is an organic system consisting of analytical statements built on a language that is not based on observations, but on conceptual entities that relate to each other. so that the meaning of each term is fixed by its relations to others. Using this language, the theory formulates explanatory propositions intended to allow consequences in terms of forecasting and determination of economic policies : " A 'theory' is not a collection of assertions about the behavior

[3] This principle is at the heart of the thought of Hans Vaihinger whose imposing The Philosophy of as if is held for a founding work of a theory of science where fictions are cognitively primordial. Questioning the Smithian presupposition of the motivation of exchange by the search for private interest, he maintains that it is erroneous but useful for the deduction of general laws on market competition and prices. "There are," he says, "representations from the theoretical point of view that are recognized directly as false, but nevertheless [...] render us certain services "cited by C. Bouriau (2013, p.102).

[4] The implications of this approach are summarized by R. Lucas in these terms: " most interesting recent developments in macroeconomic theory seem to me to be describable as the reincorporation of aggregative problems such as inflation and the business cycle within the general framework of 'microeconomic' theory. If these developments succeed, the term 'macroeconomic' will simply disappear from use and the modifier micro will become superfluous.‖ (Lucas, 1987, p. 108).

of the actual economy but rather an explicit set of instructions for building a parallel or analogue system – a mechanical imitation economy. A 'good' model, from this point of view, will not be exactly more real than a poor one, but will provide better imitations. Of course, what one means by a 'better imitation' will depend on the particular questions to which one whishes answers" (Lucas 1980, 697).

In recognizing such a prominence in the conceptual scheme, Lucas stands out from Friedman's asymmetrical thesis that predictions lend themselves, contrary to hypotheses, to empirical testing [5] . Howver, he suggests calibrating the keystone of applied models (F. Kydland and E. Prescott, 1991). This method is based on a global procedure that determines, under the auspices of a formal model, the values of the structural parameters, from constructed data or independent observations. In this perspective, digital resolution establishes a necessary correspondence with the theoretical model in respect of the constraints of coherence. In this respect, the latter is used to analyze the effects of changes in economic policy. Unlike the empirical approach, calibration implies that only theory determines the structure of economic relations. First, econometrics can not be a judicial instance of the validity of theories. By emphasizing the need for a strong link between hypotheses and consequences, the theoretical model does not call for the evaluation of the empirical relevance of structural forms. Then, the basic assumptions are, by construction, subtracted from the tests [6]. This is the case with the rational formation of expectations and the perfect flexibility of prices, the function of which is to participate in the systematic inference of consequences by

[5] According to D. Hausman (1992), the descriptive content of hypotheses conditions the quality of predictions insofar as it delineates the class of phenomena for which these predictions can be supported by empirical evidence. In this context, Friedman's methodology ruins itself by refraining from adopting realistic hypotheses. Lucas's methodology escapes this reproach because it does not postulate that predictions must be subjected to empirical control.

[6]Echoing the disjunction established between the models and the empirically observed characteristics, F. Kydland and E. Prescott argue that "statistical hypothesis testing, which is designed to test assertions about actual systems, is not an appropriate tool for testing economic theory. "(1996, 83).

the only analytical way. The theoretical model is not considered as an intermediary between theory and empiricism. The specifications are not to be adjusted on the basis of econometric results. Finally, because of the place given to empirical considerations, the main criterion of evaluation of a model is the faithful reproduction of certain characteristics. Empirical control can not be used as an instrument of discrimination between competing models. By focusing on simulation, the calibration ultimately dedicates the refusal to emphasize the econometric approach, even if it serves a theoretical explanation, in favor of structural models that combine explicit rules of economic policies. the equilibrium modalities. The discrepancies between the analysis proposals and the observations that this exercise may reveal are supposed to come from the instruments by which these observations are made.

In these aspects, the Lucasian methodology is related to the fictional approach of the physical theory of as if [7] whose approach is summarized by two procedures (JM Schaeffer, 1999). On the one hand, it envisages fictions whose purpose is to imagine ideal configurations, apart from considerations of empirical adequacy, in order to make quantified predictions based on the language of the theory (N. Cartwright, 1983). On the other hand, it engages in simulations designed to identify the possibilities of unreal or artificial situations (M. Boumans, 1977). These thought experiments make it possible to explore the consequences of fiction and to imitate the behavior of economies and to question the validity of the theory[8] .

[7] In defense of the unrealistic assumptions, C. Azariadis asserts, in line with Lucas, that "modern physics, particularly atomic physics, is based on assumptions about particles that are strange. The largest part of classical mechanics derives from the assumption that particles minimize the integral of their energy. There is strong doubt that the particles are able to minimize anything. Such a principle of analysis is, however, effective: it is a robust instrument that makes it possible to establish knowledge from few hypotheses "(C. Usabiaga Ibáñez (ed.), 2002, 43).

[8] In this regard, Townsend (1988) clearly states, in examining the Lucas conception, that general equilibrium models can be held for laboratories in which the researcher conducts experiments.

In view of this kinship, Lucas' methodology is at odds with the realistic vision. By arguing against the existence of an independent reality of conceptual options, she shares more than one common feature with theories that the real exists only as conceived in a world- versions (N. Goodman, 2006), a description of the world (H. Putnam, 1984) or in a scientific image of the world (W. Sellars, 1992)[9] . The model is, in these conditions, a fictional representation with predictive virtue that is in no way constrained by a correspondence with a supposedly invariant empirical basis.

It is in this context, where the objects of the model are the result of theoretical options, that the construction of micro-foundations is conceived according to the discipline of equilibrium[10]. This discipline stipulates that two standards must control the theoretical construction in macroeconomics : Optimizing behavior under constraint and permanent clearance of markets. These norms, which must be protected from being tested, are considered as heuristic value propositions (M. De Vroey, 2009). The equilibrium, which they imply, covers, beyond the compatibility between supply and demand plans of the agents, the coherence of rationally formed decisions in an environment of flexible price markets which is dynamic and stochastic[11] . This extension of rationality to the formation of forecasts is part of an approach that conceives of equilibrium based on the essential property of an instantaneous adjustment of present and future markets under the effect of rational expectations of an exogenous hazard near .The primacy thus granted to individual

[9] According to Goodman, the datum only makes sense in a version of the world that translates recognition into a language game. Starting from his side of the refusal of the double observational / theoretical and fact / value dichotomy, Putnam (1984) argues that the objects of the world are cut and articulated within a theory according to standards of simplicity and coherence and ethical norms. . In the same vein, Sellars (1993) prescribes the rejection of the myth of the given in favor of a conception of knowledge as a conceptual activity structured end-to-end by linguistic expressions.

[10] Drazen sums up the requirements of the competitive equilibrium benchmark very well by noting: **"**Explanations of macroeconomic phenomena will be complete only when such explanations are consistent with microeconomic choice theoretic behavior and can be phrased in the language of general equilibrium theory" (Drazen 1980, p. 293).

[11] Lucas, unlike Friedman, as De Vroey points out (2009), places himself in a Walrasian perspective by taking over the central nucleus of microeconomics, the Arrow-Debreu model.

rationality leads the discipline of balance to admit that prices are formed on the markets following the interaction of agents' decisions without questioning the procedures of this training based on technology data , preferences and resources. As a result, market clearance as well as optimizing behavior are fictions that serve as a predictive analytics tool within a given language structure. This conception implies that equilibrium is not a limit case in which empirical configurations of dysfunction are measured, but a hypothesis which has no reference in reality in that it does not postulate the objective existence of markets which are permanently sold.

Thus defined, the equilibrium discipline provides the frame of reference within which the macroeconomy must formulate its theoretical propositions. Lucas rejects the hypothesis of price defect on the grounds that it is incompatible with maximizing rationality. As the discipline of equilibrium supposes, as a grid of positive analysis, the optimal allocation of resources by the agents and the compatibility of their actions, it leaves room for the integration of the frictions as soon as the norm of the behavior optimizer is respected[12] . Its scope is expanded. Therefore, its purpose is to identify macroeconomic balances under two polar figures: according to the assumptions on agents and prices, the level of activity is determined by supply or demand. The clearance of transactions by prices or quantities expresses market equilibrium where the results of agents' actions are in line with their expectations so that they do not revise the plans of their operations on the assets taking into account their constraints. . The distinction between these figures is based on a difference approach that specifies market frictions in contrast to the assumptions and properties of existence and optimality of the overall competitive equilibrium. The treatment of market rigidities and imperfections is done according to the standard of individual rationality on the basis of deviations from the conditions of immediate price adjustment. Thus, the

[12] In setting the goal of establishing links between macroeconomic mismatches and individual behavior in the context of nominal frictions, the new Keynesian economics tried to explain market rigidities from the rationality of agents

viscosity of prices, wages or the interest rate is seen as the effect of lack of flexibility and competitive imperfections as the consequence of market power, asymmetric information or product differentiation. Frictions are short-term constraining market changes ; in the long term, the macroeconomic balance is in full employment. This negative approach to a perfectly competitive economy ultimately leads to identifying macroeconomic balances as deviations from the Paretian efficiency associated with the principle of market clearing.

The Lucasian methodology is a reverse of the ontological realism of U. Mäki (2003, 2009), often sought in the criticism of the dominant macroeconomy [13]. According to this conception, the model is an instrument of idealization and representation of components of the real economy *carrying the truth*. As such, it necessarily rests on abstractions in the form of hypotheses, which may be false, which make it possible to organize the range of phenomena under examination[14]. At the same time, it is *subrogated* by its function to identify the structures and mechanisms at work. In this context, the truth value of the model lies in the similarities between the identified causal connections and those that govern the actual behavior of the economy. This criterion is intended, according to Mäki, to predict the relevance of models and to discriminate between theories.

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[13] The questioning of the macroeconomics method is also based on the critical realism of T. Lawson, who enjoys wide reception in the post-Keysian economy (J. Jespersen, 2009). The author of *Economic and Reality*(1997) considers that the purpose of economics is to identify underlying structures, mechanisms and trends in the economic system. To this end, he relies on the distinction, which he regards as essential, between closed systems which are characterized by empirical regularities and open systems whose interactions do not lend themselves to apprehension in terms of the constant conjunction of causal mechanisms. The method of the mainstream project - Lawson writes - is to model closed systems. Such an approach is deeply flawed because the social world is fundamentally open. To illustrate this reproach, the corollary of which the rejection of the exclusive adoption of the deductive method is, he questions the relevance of the formal conditions for the application of instrumental rationality: besides imposing arbitrary restrictions on the behavior of agents, they have no explanatory power. On this basis, he advocates the abandonment of unrealistic assumptions in favor of the description of individual actions in their social and institutional context.

[14] In his analysis of Friedman's methodological instrumentalism, Mäki asserts that it contains assertions of philosophical approaches that are inextricable. Also he talks about it about F-Mix (2003.

The methodology of Lucas can not be appreciated by the yardstick of ontological realism : These are two incommensurable options with a triple title. First, the conception of the model as a network of fiction does not postulate, unlike the model as a *subrogating* system , the existence of a world independent of theoretical representations. Moreover, such an existence is meaningless?. Then, it implies that the domain of objects makes sense only within a conceptual schema. Therefore, this register and that of reality are heterogeneous and can not be put in relation. Finally, it is not liable, by definition, to the criterion of truth as a correspondence between analytic statements and the referent of the real economy ; it imposes the exclusive evaluation with regard to the constraints of the coherence of deductive inferences.

B- The dynamic general equilibrium method and macroeconomics today

« That macroeconomics is going through a period of great progress and excitement and that there has been convergence in both vision and methodology over the past two decades. There is, however, such a thing as too much convergence." (Blanchard 2009, p. 225). In many respects, macroeconomics gives the image of a discipline tightened around a commonly shared framework (Woodford 2009). If the last decade of the 20th century was marked by competition between the new Keynesian economy and the new classical economy, the 2000s saw the emergence of a broad consensus around an approach called " the new synthesis (Goodfriend and R. King, 1997) . The clarification of the impact of Lucas' methodology within this approach is certainly useful for understanding the unification that is now being experienced in macroeconomics. Under the primacy of the representative agent on aggregated behavior, this unification takes place through a rewriting of the IS-LM model in the wake of the Lucasian methodology, which consists of revising the equation IS, to derive a Phillips' relationship from price decisions of firms in monopolistic

competition and to establish an optimal rule of interest rate of the monetary authorities by eliminating LM[15] .

Proponents of the *New Synthesis* affirm in the form of a *leitmotif* , to mark their convergence with the new classical economy, that their models escape the criticism of Lucas. This criticism, which has imposed a serious challenge on macroeconomics, assumes the stability of the parameters adopted by the tradition of structural econometrics, for a major flaw in the evaluation of alternative economic policies. The key argument in this respect is deployed from the representation of the economy by a recurrence equation (R. Lucas, 1976):

$$y_{t+1} = F(y_t, x_t, \theta, \epsilon_t) \quad (1.1)$$

where y_t and x_t are respectively the vectors of the variables of state and control, ϵ_t random disturbances identically and independently distributed over time, θ the parametric vector.

The knowledge of F and the estimation of θ on the basis of data guarantee the determination of the values of the components of the vector of the instruments $\{x_t\}$.

Such an approach seems to Lucas to be questionable in that the parameters vary systematically under the effect of this vector. Also, he suggests the abandonment of the exogeneity of the parameters vis-à-vis the economic system by redefining the instruments. Therefore :

$$x_t = G(y_t, \lambda, \eta_t) \quad (1.2)$$

[15] R. King's position is representative of dissatisfaction with the IS-LM model inherited from the New Keynesian tradition: "The IS-LM model has no greater prospect of being a viable analytical vehicle for macroeconomics in the 1990s than the Ford Pinto has of being a sporty, reliable car for the 1990s. Because of its treatment of expectations, the IS-LM model, as traditionally constructed and currently used, is a hazardous base on which to build positive theories of business fluctuations and to undertake policy analysis"(1993, p.68).

G is specified *a priori* , is a vector of parameters and is a vector of random shocks.

From then on, the model of the economy becomes :

$$y_{t+1} = F(y_t, x_t, \theta(\lambda), \epsilon_t) \quad (1.3)$$

The behavior of agents is, therefore, determined by economic policy variables and hazards. They could not be defined *ex ante* from estimates. Beyond the questioning of the econometric approach, Lucas's critique imposes protocols for the construction of theoretical models where the concern for coherence between individual decisions and the aggregate behavior of the economic system becomes decisive (A.Vercelli, 1991).The conjugation of the imperative of micro-foundations with this requirement is translated by the adoption of a modeling strategy which assigns a vocation of representation from a system of relations in this form. :

$$Y_t = E_t[F(Y_{t+1}, Z_t, \theta, \mu_t)] \quad (2.1)$$

$$Z_t = G(Z_{t-1}, v_t) \quad (2.2)$$

Yt is a vector of endogenous variables, Z_t a vector of exogenous variables, μ_t and are shocks and E_t the operator of rational expectations.

The function F is defined from the representational content that the model expresses by means of fictions which describe the dynamic behavior of the economy taking into account the rules of economic policy, represented by the relation G.

Thus grasped, the model specifies the domain of objects in respect of a double constraint which is related to the incorporation of the endogenous formation of private expectations and the intertemporal dimension of the agents' choices in a stochastic general equilibrium context. This strategy, which consists in providing the model with a predictive aim, supposes that the agents determine their optimal decisions according to a representation of the economy identical to that of the

modeller. This symmetry ensures the coherence between the predictions of this one and the dynamic programming to which the agents proceed in their decision-making.

In contrast to Keynesian macroeconomics, Lucas' methodology prescribes a strategy for modeling dynamic equilibria with rational expectations[16] . Denying behavioral parameters the structural attribute, this strategy, which leads to a conception of the relationships between the agents and the *policy maker* in the terms of a game, establishes a hierarchy between the parametric components of the model by giving primacy to principles of individual action. In this provision, preferences, technologies and endowments are placed in the rank of *profound* parameters independent of private behavior as conditions for the exercise of economic policy. Such determinants of choice are the corollary of the ontological presuppositions of the model defined from a nomenclature of goods. Agents are thus identified by their relations to the goods they offer or require for consumption or production purposes and by their physical and temporal characteristics[17] . Production techniques such as preferences are imposed as invariant data of the structure of the model defined directly on the actions and the environment of the agents. In this context, individual behaviors being under stress, they take the place of *contingent* parameters that result from the combination of maximizing rationality and cognitive rationality. The requirement of a

[16] The language and formal principles of this strategy are increasingly disciplining macroeconomic knowledge : "The virtue of DGE macroeconomics is brought out in the following encounter with a frustrated student. He protested that he knew there were many theories of macroeconomics, so why was I was teaching him only one? My reply was that this was because only one theory was required to analyze the economy, and it seemed easier to remember one all-embracing theory than a large number of different theories" (Vickens, 2008, pp. xiii-xiv).The interest shown in the strategy of the DSEE models is also emblematic of the work that exposes synthetic versions such as those of G. Abraham-Frois (2007), W. Carlin and DS. Soskice (2006), by P. Bofinger, E. Mayer and T. Wollmerhauser (2006a, 2006b)

[17] His positive initial act [the Arrow-Debreu model] is the postulate of a given list of goods before any indication relating to individuals and society "(Benetti, J. and Cartelier, J. (1995: 220).

unambiguous determination of the optimal decisions imposes a process of choice according to the adequacy between the means of the agent and its ends. The consistency of this procedure is doubled with that of the rational mode of anticipation formation on the basis of information processing using a probability distribution. According to this mode, the agent decides his future action A_{t+1} considering that the endogenous variables they anticipate have a form conditional on the history of the environment : $Y_t = G^e(Y_{t+1}/\Omega_t)$ (3.1)

Post *hoc* validation of expectations by the behavior of the economic system implies :

$$Y_t = G^e(Y_{t+1}/\Omega_t) = F(A_{t+1}) = F\left(A\left(G^e(Y_{t+1}/\Omega_t)\right)\right)$$
$$= T\left(\left(G^e(Y_{t+1}/\Omega_t)\right)\right) \quad (3.2)$$

The objective expectations T that arise from the market adjustment according to the model coincide with the subjective expectations G^e.

The information set contains variables that are under the control of the *policy maker* , the representative parameters of the economic policy regime. Agents shape their forecasts by incorporating the present and future behavior of the public decision-maker. In return, the optimal choice of monetary and fiscal decisions is constrained by private reactions. However, the model identifies economic policy instruments, not as a vector of variables, but as parameters that reflect rules. In doing so, he conceives interactions as the expression of strategic choices, as opposed to the mechanical game implied by economic policy models conceived under the hypothesis of the invariance of expectations with regard to sequences of public actions. This integration of strategic rationality implies that the participants in the economic policy game collectively determine the variables on which the state of the system depends.

Focusing on the triple dimension of rationality individual, the lucasian methodology captures the mutual compatibility of actions through the conditions of coherence of anticipations appropriate to the existence of equilibrium as configuration of rules of private decisions in a random universe that modifies the endowments and allocations.

"The model is, in short, the work of fictions" (N. Cartwright 1983, p.153) who play a figurative role through the representation of the insignificant characteristics of the economic system and a demonstrative role *via* the combination of formal procedures of dynamic programming in the derivation in a systematic form of macroeconomic properties. It is this strategy that models of new synthesis implement by endeavoring to respond, at new expense, to the exhortation of Sargent (1982) to go beyond the curves of supply and demand of macroeconomics.

The rewrite of the demand function is based on the analysis of the behavior of a representative household with an intertemporal utility function whose present value is maximized :

$$E_0\left\{\sum_{t=0}^{\infty}\beta^t\ u(C_t\ ,\xi_t)\right\} \quad (4.1)$$

The variable C_t is a continuum of goods whose elasticity of substitution, noted, θ is greater than 1 (A. Dixit and J. Stiglitz, 1977).

It is defined by the CES function :

$$C_t = \left[\int_0^1 c_t(i)^{\frac{\theta}{\theta-1}}\ di\right]^{\frac{\theta-1}{\theta}} \quad (4.2)$$

Household behavior is subject to a budget constraint that is written :

$$\sum_{t=0}^{\infty} E_0 Q_{0,t}\,[P_t\,C_t] \leq\ W_0 + \sum_{t=0}^{\infty} E_0 Q_{0,t}\ [P_t Y_t - T_t] \quad (4.3)$$

where W_o is the nominal wage, T the taxes, P_t the price index and $Q_{t,t+1}$ is a discount factor of acquired securities that is given by $(1+i_t)^{-1}$.

Maximizing the objective function of the program involves equalizing the relationship between marginal utilities and prices :

$$\frac{u_c(c_t,\ \xi_t)}{u_c(c_{t+1},\xi_{t+1})} = \frac{\beta}{Q_{t,t+1}}\ \frac{P_t}{P_{t+1}} \quad (4.4)$$

The utility level of each period is affected by the consumer's degree of impatience ξ_t and by the term β which reflects stochastic disturbances of preferences related to changes in the real interest rate or degree of impatience.

The first order condition can be rewritten in a form that incorporates the nominal interest rate :

$$(1+i_t) = \beta^{-1}\left\{E_t\left[\frac{u_c(c_{t+1},\xi_{t+1})}{u_c(c_t,\ \xi_t)}\frac{P_t}{P_{t+1}}\right]\right\}^{-1} \quad (4.5)$$

By introducing public expenditure, the expression above becomes :

$$(1+i_t) = \beta^{-1}\left\{E_t\left[\frac{u_c(Y_{t+1}-G_{t+1},\xi_{t+1})}{u_c(Y_t-G_t,\ \xi_t)}\frac{P_t}{P_{t+1}}\right]\right\}^{-1} \quad (4.6)$$

Thanks to the log-linear expression of the optimality condition around the stationary state, the dynamic IS equation is obtained :

$$\widehat{Y}_t = E_t(\widehat{Y}_{t+1} - g_{t+1}) - \sigma(\hat{\imath}_t - E_t\pi_{t+1}) + g_t \quad (4.7)$$

or Y_t is aggregate demand, σ the intertemporal elasticity of substitution of consumption, $\hat{\imath}_t$ the interest rate as set by the monetary authorities $E_t\pi_{t+1}$ and E_tY_{t+1} are the inflation and demand expectations for period t + 1. g_t is an exogenous shock as a result of public spending and the change in the ratio of consumption to income.

This specification of global demand, which reflects the intertemporal choices of consumption and savings taking into account the interactions between current values and future values in a stochastic environment, is established under the discipline of equilibrium. As such, it seeks reference to intermediation of price and wage flexibility. So, she is rewriting :

$$\widehat{x_t} = E_t\hat{x}_{t+1} - \sigma(\hat{\imath}_t - E_t\pi_{t+1}) + \hat{Y}_y^n + g_t (4.8)$$

$\hat{x}$ the output gap and the interest rate are set in deviation with their long-term level. $\hat{Y}_y^n$ is the exogenous variation of the growth rate of the natural product.

In this form, the IS equation reflects the impact of the real interest rate and future income on aggregate demand and hence substitution decisions over time, and smoothing of consumption corresponding to changes in demand. in anticipation of future developments in the business.

The construction of the aggregate supply equation obeys, in turn, the imperative of micro-foundations through the analysis of price behavior embodied by a representative form confronted with the resolution of a program in imperfect competition. in markets affected by nominal rigidities. Price dynamics are defined in this context by:

$$P_t = \zeta(p^*, P_{t-1}) \ (4.9)$$

where p^* is the optimal price.

If the assumption of staggered fixing is assumed, the general price level is the weighted average of prices priced by all firms (G. Calvo, 1983):

$$P_t = \left[\left((1-\alpha){p_t^*}^{1-\theta} + \alpha \int_0^1 P_{t-1}^{1-\theta} \ (i^{1-\theta})di\right)\right]^{\frac{1}{1-\theta}} (4.10)$$

Each producer has an exogenous probability of judging timely price maintenance in response to the market signal he receives and the probability of 1-α opting for an

optimal decision to revise. The corresponding program involves maximizing the objective function :

$$\max E_t = \left\{ \sum_{j=t}^{\infty} \alpha^{j-t} \gamma_{t,j} \, \pi\left(p_t(i), P_j, Y_j, \chi_j\right) \right\} (4.11)$$

α^{j-t} is the probability of maintaining the fixed price in t at period j, $\gamma_{t,j}$ is the discount factor at period t of values in j, π is the profit function, which depends on the individual price $p_t(i)$, the general level of prices P_j and aggregated demand Y_j and the parameters relating to preferences and technology χ_j.

La condition d'optimalité s'écrit :

$$\sum_{j=t}^{\infty} (\alpha\beta)^{j-t} \; E_t\left[log p_t^* - log P_j - \zeta\left(\overline{Y_j} - \overline{Y_j^n}\right)\right] = 0 (4.12)$$

β is a discount factor. $\overline{Y_j}$ and Y_j^n are the deviations of the current and natural production differences at their stationary value. The price behavior of the firm depends in this context of the *outputs gap*.

The logarithmic formulation of the price index equation gives :

$$P_t = (1-\alpha) \log p_t^* + \alpha \log P_{t-1} \; (4.13)$$

The combination of this representative relationship of inflation dynamics and the optimality condition makes it possible to determine aggregate supply in the form of a Phillips curve that combines the current and future conditions of the economic system :

$$\pi_t = \gamma x_t + \beta E_t \pi_{t+1} (4.14)$$

The behavior of inflation is thus derived from the aggregation of firms' individual decisions taking into account the frequency of price adjustments according to the level of activity.

The maximizing rationality is extended to the monetary authorities through a program defined by a function of loss of social well-being:

$$L_t = E_t \sum_{i=1}^{\infty} (\delta^{\tau} l_{t+r}, \kappa) \quad (4.15)$$

δ is a discount factor, l_{t+r} the loss function at the period t+r and κ a hazard.

The behavior of the Central Bank is determined under the constraints of aggregated demand and the Phillips relationship using a reaction function that is written:

$$i_t = \emptyset(\pi_t, \pi_t^*, Y_t, \varrho_t) (4.16)$$

π_t^* is the inflation target v_t is an exogenous disturbance term .

The log-linear transformation gives the monetary policy rule:

$$\hat{\imath}_t = \bar{\imath}_t + \emptyset_{\pi} \pi_t + \emptyset_x x_t \ (4.17)$$

$\bar{\imath}_t$ covers contingencies arising from the interactions between the inflation target and the shocks that affect the use of the interest rate as an instrument.

According to this rule, the policy rate must be adjusted upwards or downwards taking into account inflation and product deviations. The extent of the central bank's reactions depends on its preferences in terms of price stability $\emptyset\pi$ and activity $\emptyset x$. The interest rate takes place in this context of an endogenous response to cyclical fluctuations as they result from the behavior of agents. Placed as an active rule, it is designed according to the imperative of microeconomic foundations as evidenced by the place allocated to rational choices in dynamics. Since trade-offs are determined by real prices, the monetary authorities must adjust the interest rate, in case of price pressure, more than proportionally to the inflation gap at its target. This reaction, necessary to raise the interest rate, induces a slowdown in production. As such, it engenders appropriate behaviors to control

the dynamics of inflation. As Taylor's principle (Woodford, 2003) states, monetary policy coefficients must satisfy inequality :

$$\emptyset_{\pi} + \frac{1-\beta}{\gamma}\emptyset_{x} \geq 1 (4.18)$$

If the rise in the interest rate is lower than that of inflation, the fall in the real correlative rate, stimulates household consumption thus hindering the control of inflation.

« The new science of monetary policy" [18] (E. Clarida E., G. Jordi and G. Gertler, 1999) establishes the rule of behavior of the central bank from consumer actions and prices of agents. Such a method of analysis differs from that which postulates the exogeneity of the quantity of money in circulation and its corollary, the targeting of the money supply, as an intermediary objective between the instruments and the ultimate objective of price stability. Thus, it is not by the addition of a macro-variable, money supply, that the exercise of monetary policy is envisaged, but by the inference of a reaction function where expectations play a role. determining role: these constitute a primary channel for the transmission of monetary impulses. When anchored on the inflation target, the central bank is able to cushion demand and supply shocks. As a result, the endogenous variables that express the aggregate behavior of the system appear as the resultant of actions and behaviors of private expectations. The exclusion of money supply results in the reduction, under the aegis of the double fiction of instrumental rationality and the rational formation of expectations, of all the variables at real magnitudes, including the rate of director's interest. Under these conditions, inflation results from a price-

[18] The main statements that summarize this view of monetary policy are (C. Bean, 2007, F. Mishkin, 2007): i) Monetary policy is inefficient in the long run ii) In the short term, the relationship between the product and the inflation is positive due to rigidities iii) monetary policy is the main lever for aggregate demand management iv) The independence of the central bank is necessary to promote credibility according to the priority objective of price stability v) the interest rate is the instrument of action on inflation vi) The steering of expectations occupies a primary place in the conduct of monetary policy.

level path that combines the decisions of firms that adjust prices and those that do not. It is thus a reflection of relative price dynamics affected by the double distortion resulting from adjustment costs and price deviations from their optimal long-term value.

conclusion

"I am Madame Bovary". By launching this apostrophe to criticism, Flaubert sought, no doubt to put a stop to the realistic interpretations of his work, to emphasize that the heroine of his novel is the product of his imagination. For its part, dynamic general equilibrium is a content of imagination (A. Barberousse and P. Ludwig, 2000). As such, it condemns the empirical objections that emanate from econometric tests or observational data. Such objections, which today are largely opposed to the DSGE strategy in the macroeconomic debates, do not seem to undermine the method of the new synthesis or its analytical proposals, since it confines itself to invoking the discrepancy between the joint hypotheses. rational expectations, the representative agent and the efficiency of the financial markets, and the observation of dysfunctions caused by the global financial crisis (Acemoglu, 2009), V. Charii (1998), J. Cochrane (2009), D. Colander, P. Howitt, A. Kirman A., A. Leijonhufvud, and P. Mehrling (2008), A. Kirman, 2011, P. Krumgan 2009, P. Krugman, 2012, W. White (2009) . Such criticism, often accompanied by considerations in favor of realism, is altogether fruitless. In observing the dynamics of macroeconomics, it appears that the evaluation of the scope of competing hypotheses does not give the empirical role a binding role. Thus, although they have evidence from behavioral economics or econometric tests to their credit, the hypotheses of adaptive anticipations and limited rationality have not been able to shake those of rational expectations and instrumental rationality that benefit from a hegemonic status despite the upheavals they suffered. The empirical value does not serve to separate hypotheses in competition. On the other hand, the magnitude value, which measures the extent of the explanatory capacity, is crucial in this respect. The parables of rational anticipation and

representative agent remain largely consecrated because of their predictive power which is the inference of a cumulative number of fundamental propositions using rigorously identified fictions. Multiple agent models, which are based on complex systems theory, are able to enrich the description of adaptive behaviors using simulations, but can not provide unique predictions as they dilute the question of determining individual choices in a variety of configurations (D. Colander et al., 2009). When empirical objections are taken into account, they are ultimately counterproductive in that they reinforce the scale of the offending model. As the loosening of the assumption of the efficiency of the financial markets shows, some proponents of the new synthesis extend the DSGE strategy to the study of financial frictions thus widening the field of competitive imperfections of their reference framework (V. Curdia and M. Woodford, 2010). The challenge to this strategy does not seem to undermine the cumulativity of the new synthesis. The twilight of fiction is probably not for tomorrow.

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LUIGI PASINETTI AND THE POLITICAL ECONOMY OF GROWTH AND DISTRIBUTION

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Abstract

The purpose of the essay is the show the most innovative and original aspects of Luigi Pasinetti's contributions to economic theory and policy in a dynamic setting. Pasinetti's analyses of vertically integrated systems, of the links between growth and distribution and his critique of the Neoclassical production function, are founded on an analytical method expressed in terms of structural changes which cannot to be reabsorbed within the framework of the static equilibrium and of steady state equilibrium growth.

Keywords : Vertically Integrated Systems, Growth, Distribution

Introduction

This paper arises from a set of notes I wrote in July 2014 for Thomas Ferguson, the Research Director of the Institute for New Economic Thinking in New York, as he prepared for a series of meetings with Professor Luigi Pasinetti in Milan. Both he and Professor Geoffrey Harcourt strongly encouraged me to expand these. In the present paper the sequence is kept as in the original notes with some important additions while the text has been changed into a more discursive style.

Pasinetti's writings express – in a most consistent way from 1958 to the present – two interrelated features: extreme clarity and the fact that the philosophical, historical, and societal implications of his works emerge rather straightforwardly from the analytical framework contained in them. This aspect will be singled out as I proceed through his contributions. For the purpose of this paper I will divide Pasinetti's works into a number of stages. This is done essentially for analytical simplicity since the stages are themselves integrated with each other. For instance,

the 1980s and most of the 1990s are dominated by his theory of vertically integrated processes and structural change (Pasinetti 1981, 1993). By contrast the 1960s appear to be characterized more by his publications on Ricardo's theory of capital accumulation (Pasinetti 1960); on debates over capital theory and on the neoclassical rate of return (Pasinetti 1966, 1969); as well as on his seminal completion of Kaldor's Post-Keynesian theory of income distribution and growth culminating in the Cambridge equation (Pasinetti 1962, in Pasinetti 1974, ch. V). However Pasinetti presented the first draft of his novel approach based on vertically integrated sectors already in 1965. Furthermore his preoccupation with dynamic processes related to the growth of productivity – the main objective of the vertically integrated approach – dates back to the late 1950s when, in a debate with Robert Solow, he came to the conclusion that the Solow type production function cannot account in any theoretically significant way for technical progress (Pasinetti 1965, 1959).

I will call the first stage the Cambridge-Sraffa phase, setting the cut-off point with the publication of the 1981 book *Structural Change and Economic Growth*. This period can be divided in two sub-phases: the Ricardo-Cambridge-Kaldor sub-phase and the Sraffa sub-phase. The last section of this survey will be devoted to Pasinetti's theoretical treatment of issues related to two ongoing crises: the European one and the global financial one.

1. The Cambridge-Sraffa stage

In the Ricardo-Cambridge-Kaldor sub-phase the essential text is Pasinetti's volume *Essays on Growth and Income Distribution* (1974) which includes, among other chapters especially written for that volume, the 1960 essay on Ricardo, the 1962 one on Kaldor's theory of income distribution and growth, as well as a very relevant critique of trade cycle models grafted onto a growth trend published in 1960. This latter showed that no trend factor can be consistently obtained from multiplier-accelerator cyclical models (Pasinetti 1974, ch. III). Pasinetti developed this view in

a criticism of Duesenberry who attempted to do just that. The idea that cycles and growth could not be combined was also developed by Kalecki but in a much more cumbersome way than Pasinetti, since Kalecki did attempt to bring the two elements together but eventually gave up.

The 1960 paper on Ricardo lucidly showed that the latter's theory contains a logically consistent process of accumulation and growth leading eventually to a stationary state. The analytical foundations of such a dynamics lie in the Classical view that savings are made only for investment purposes, that wages are at subsistence so that the rate of profits is thereby determined as a residual, and that the diminishing fertility of each additional plot of land does not impact upon prices but affects, instead, the distribution of income of rents relative to the share and rate of profits. Pasinetti then goes on to show that Keynesian dynamics is distinct from Classical dynamics where wages are fixed at subsistence (Ricardo) or gravitate around subsistence (Marx). In Keynesian dynamics – from Harrod to Domar and, especially, in Kaldor – wages, not being at subsistence, emerge as a residual while the rate of profit is fixed first. In Keynesian dynamics the principle of effective demand, absent in the Classics, requires that wages grow at the same rate as productivity: were they to grow less the system would relapse into a state of Keynesian unemployment (Pasinetti 1974a).

In analyzing Keynesian dynamics Pasinetti established the general validity of the Kaldor-Cambridge equation where what matters is the saving propensity out of profit (sp) even with a positive saving propensity out of wages (sw), provided the latter is LESS than the propensity to save out of profit. One of the main implications of the result consists in that without the condition sp > sw, a capitalist economy would not be able to function since the agents of capital accumulation (the capitalists) would eventually disappear. The robustness of the Cambridge equation is confirmed also by considering the case when wage earners save and receive interest. Yet when this is taken into account it cancels out, the crucial link being that between the growth rate and the propensity to save out of profits

(Pasinetti 1974b). The outcome of the Pasinetti theorem is relevant in relation to the Piketty debate (Piketty 2014). In a capitalist economy the rate of profit will have to be always greater than the growth rate even under a more or less fair or stable distribution of income and wealth. A related implication concerns the importance which is to be assigned to stockholders' financial values: Very little. The crucial factor in ensuring capital accumulation is the reinvestment of profits not the distribution of dividends to stock owners (Pasinetti 2012).

In Pasinetti's works on growth, distribution and, later, on structural change, Keynes's principle of effective demand plays a crucial role because the evolution of the capitalist system has led to a state where profits no longer have to be residually determined. In building up the importance of Keynes's principle, Pasinetti shows that it stands independently from the theory of liquidity preference thereby driving a big wedge into the Hicks-Modigliani textbook version of Keynesian economics. It is shown that the principle is based on the distinction between actual production and productive capacity (Pasinetti 1974c) and this is what differentiates industrial from agrarian societies (notice how the historical divide between the two types of society emerges from the clear analytical approach that Pasinetti develops in order to explicate the principle of effective demand). In an agrarian society unsold fish and vegetables will rot, hence farmers will be tempted to get rid of the unsold produce, normally by reducing prices. By contrast in a modern economy if demand for industrial commodities declines there will be a downward adjustment in output and employment leading to unused productive capacity. The concept of productive capacity is central to Pasinetti's theory of growth and structural change published in 1981.

We now come to the Sraffa sub-phase which overlaps in time with the Cambridge-Kaldor phase. The fundamental text here is Pasinetti's 1977 *Lectures in the Theory of Production*, published two years earlier in Italian (Pasinetti 1975, 1977).

Pasinetti's Lectures spell out fully the significance of Piero Sraffa's construction undertaken in his famous and slim book *Production of Commodities by Means of Commodities* published in 1960 simultaneously in Britain and in Italy. In Pasinetti's volume the relevance of the Sraffa system ranges from Leontief's input-output analysis – which in those years, while extensively used by international organizations, was being twisted towards a neoclassical factor substitution based framework, prompted by the influential neoclassical book of Dorfman, Samuelson, and Solow (1958) - to Marx's Labor Theory of Value and Neoclassical Capital Theory. At this point it may be more useful to proceed in a point by point manner.

(a) To begin with, Pasinetti shows that Leontief's and Sraffa's matrices are mutually consistent, one being the transpose of the other. This should cast doubts about the legitimacy of using the Leontief input-output system in a neoclassical fashion. In Sraffa's book and in Pasinetti's Lectures the price system emerges from the conditions of production, under the assumption of a uniform rate of profits, without any need to resort to supply and demand relations.

(b) Through an original elaboration of the Sraffa system, the Lectures show that the Classics, while grappling with a pure labor theory of value, were in fact gravitating towards a pure capital theory of value which obtains, in the limit, when the wage rate is zero so that the profit rate is at a maximum. It should be remembered that in Sraffa the full validation of the labor theory of value occurs, in a multi commodity framework, when commodities are produced by labor only.

c) The *Lectures* show the consistency of Sraffa's Standard system where an invariable standard is obtained. This part may appear obscure as it is an issue completely internal to the relationship between Sraffa and the Classics. However it is an important issue in regard to the Classical quest to separate values from distribution. The *Lectures* show that it is possible, through the standard commodity,

to treat variations in distribution independently from changes in relative prices – which is what both Ricardo and Marx wanted to achieve via the labor theory of value. In fact, through the Standard system it is possible to abstract from different capital to labor ratios (in Marxian terms, from the different organic compositions of capital) prevailing in a multi-sector economy.

e) By using a Sraffa type system the *Lectures* unlock the transformation problem in Marx. They prove that it is perfectly feasible to move from prices of production to labor values. What cannot be shown is which should come first, i.e. whether values arise from prices of production or vice-versa.

d) The Neoclassical reaction to Sraffa's book was that its price system - free from demand and supply relations - depended on the special case of non-substitution or fixed coefficients of production. Pasinetti shows that there are Neoclassical fixed coefficients models where prices arise from traditional conditions. A most important example comes from the Dorfman-Samuelson–Solow (DOSSO) linear fixed coefficients neoclassical production model yielding radically different outcomes from Sraffa's theory. In the DOSSO case prices always emerge as scarcity indexes even though the DOSSO model is of a fixed coefficients kind. Thus, as Pasinetti points out, in a DOSSO model non-scarce commodities would have a zero price whereas in a Sraffa system non-scarce commodities have a positive price. It cannot, therefore, be argued that the Sraffa system is a special case of the neoclassical production model.

f) Indeed, on the basis of the points (a) to (e), it is shown in the *Lectures* that it is the PAS system that is the a special case (PAS = Paul Anthony Samuelson). The Neoclassical monotonic inverse relation between capital intensity and the rate of interest applies exclusively when there is only one sector in the economy. In general the principle of substitution is irrelevant.

Point (f) is a negative result regarding the neoclassical theory of substitution. It was however already anticipated in Pasineti's 1981 *Structural Change and Economic Growth*, where a striking result was obtained in relation to the choice

> of techniques: variations in the wage rate do not matter in the choice of the methods of production, whereas variations in the rate of profits do, but the direction in which they impact upon the choice of the methods of production cannot be uniquely determined. This is a very important theoretical conclusion due to the conceptualization of production in terms of vertically integrated processes.

Pasinetti has provided the best and most lucid analysis of production systems. His treatment of capital in production models is particularly relevant today in the light of the renewed interest in the non-applicability of production functions extensively used to measure growth and factors' shares by organizations like the OECD, IMF, etc (Felipe and McCombie 2013).

2. The vertical integration stage: from 1981 onward

The first version of his approach, which Pasinetti elaborated in his Cambridge Ph.D. Thesis, was published in Vatican City in 1965. Afterwards the two main texts appeared. They are *Structural Change and Economic Growth and Structural Economic Dynamics* (Pasinetti 1981, 1993).

In both books the economy is described at a basic "natural" level, an idea also found in the Classics but which the Classics mixed, and confused, with actual states. Vertical integration is defined as a series of processes going back in the production of any given commodity. Hence each commodity occupies a certain slice of the economy. For instance a cell phone will absorb a certain slice of the aluminum, plastic, rare earth minerals, etc. It will also indirectly absorb a certain slice of the machinery used to mine rare earths, produce aluminum, etc., as well as a slice of the machinery needed to produce machinery. Since labor is assumed to be used in each and every process, each commodity can be expressed as a series of labor inputs (coefficients), while output is expressed in terms of units of productive capacity. The direct labor coefficients represent the labor input used to produce the final products, the indirect ones represent the labor going to produce the

machinery (and its replacements) needed to produce the final product, while the hyper-indirect labor coefficients represent the labor inputs needed to produce new machinery net of replacement, that is capital accumulation. Each of these coefficients change (decline) because of technical progress. Prices are, in turn, determined in two ways. In a static way they are determined by the costs of production, but their changes depend on technical progress, that is on the decline of labor coefficients. Hence – and this is truly brilliant -- the dynamics of natural prices are determined by changes in the amount of labor needed to produce commodities. In a paper published a few years after his 1981 book, Pasinetti, by using the Sraffian concept of subsystems, proved that growing subsystems in a vertically integrated context allow for a generalization of the labor theory of value. More specifically he showed that to each quantity of a consumption good there corresponds a definite quantity of labor needed for its production (Pasinetti 1988).

Labor coefficients change at different rates from sector to sector. Hence the dynamic process is not uniform. Alongside labor coefficients there are per capita demand coefficients. They behave according to Engel type curves. Hence there is no symmetry between the dynamics of labor coefficients and those of per capita demand. Example: because of technical change labor coefficients in the bread industry will decline, but if Engel type behavior is assumed on the demand side, it is certain that the demand for bread won't rise enough to prevent a loss of jobs. The opening of new products to absorb the unemployed thus generated is a possibility but its occurrence on a scale that can prevent systemic unemployment is unsure. It will depend on two conditions discussed below.

The first is the effective demand condition: that is the condition whereby all the per capita demand coefficients together generate a level of effective demand which employs all the labor force for the production of what is being demanded. A condition unlikely tobe met by itself. The second condition is the capital accumulation condition. This is the dynamic condition for all the productive capacities to be utilized and capital to be added exactly in the proportions required

to keep full employment. However by itself this condition may also not be satisfied if the effective demand condition is not satisfied as well. The full employment effective demand condition highlights theoretically that the problem of effective demand arises conceptually prior to the problem of capital accumulation. This line of reasoning is developed further in the 1993 book where all output is produced by labor only, hence there is no capital accumulation, and yet the problem of effective demand still arises.

In Pasinetti's framework the wage rate represents the connecting element in the system if it grows at the same rate of the average productivity rate. This is because it redistributes purchasing power throughout the economy through the dynamics of the coefficients of per capita demand. The wage rate has therefore an eminently macroeconomic meaning. With static wages evidently per capita demand cannot grow, hence the limited changes in some per capita demand coefficients must be offset by opposite changes in some other per capita demand coefficients. It must be pointed out though that even if wages were to operate efficiently by growing with average labor productivity, the formation of unemployment could still be possible. There is no guarantee that the rise in per capita demand for expanding products will create enough employment to absorb the redundancies arising from the declining sectors. Two observations follow. The first is that microeconomic efficiency does not entail macroeconomic efficiency. Pasinetti proves analytically what Keynes had rather casually stated in the *General Theory of Employment Interest and Money*. Namely, that while there is no reason to doubt entrepreneurs' ability to select their inputs appropriately the failure to attain a full utilization of resources depends upon the system as a whole. Thus one should aim at a satisfactory, from an employment point of view, rather than at an optimal growth rate (Pasinetti 1987). The second observation is that it would be impossible to keep full employment over time without entrusting the task to a Central Agency.

In Pasinetti there is a continuous process of technical change but not a mechanism of factor substitution based, in the traditional sense, on changes in the relative

prices of "factors" of production. There is no production function starting from initially given endowments. This is not an assumption, but an outcome of his vertically integrated approach and it may well be worthwhile spending few lines on the issue. A method of production is defined by the summation of the value of the direct, indirect, and hyper-indirect labor coefficients required to produce the final commodity. In this context the prices of capital goods are determined by the wage rate that multiplies the labor coefficients applied to the production of capital goods both for replacement and expansion as well as by the rate of profit that multiplies the proportion of capital goods that goes into the expansion of capital goods.

There is however a difference in the way in which the wage rate and the rate of profits contribute to the final prices of the means of production. As stated above the wage rate multiplies the labor coefficients of every single method of production and it therefore multiplies both the capital goods that are allocated for replacement and those produced for the net expansion of the stock of capital. The rate of profits by contrast enters into the price of capital goods via the annual amount of the lifetime of a machine produced for the net expansion of the stock of capital. Thus, if the life time of a new net machine is ten years, the rate of profits c – measured per annum – will multiply the annual amount of that machine, that is 1/10, adjusted for the proportion of productive capacity of the machine going to the capital goods sector itself. It follows that while the wage rate can be factored out since it multiplies, through the labor coefficients, all the elements entering into the final price, the rate of profit cannot be taken out as it does not multiply all the said elements. If there are, say, three different methods of production A, B, C, the wage rate will multiply all of them equally. Their relative position will remain unchanged in the wake of variations of the wage. Changes in the wage rate are therefore immaterial to the choice of techniques. By contrast, this is not true for the rate of profit, because it does not equally multiply all the elements. Changes in it therefore will impact upon the relative position of each method of production. Yet we cannot say beforehand in which direction the choice of techniques will

occur. This is a very important result that builds upon, but goes well beyond, the capital theory debates of the 1960s which culminated in the QJE symposium of 1966 with Pasinetti's crucial participation.

The analysis of the process of technical change and of the choice of techniques in the vertically integrated framework has important constructive implications. The capital theory debates of the 1960s reached a negative conclusion: the inverse monotonic relation between capital intensity and the rate of interest is an oddity. Nothing can be said beyond the observation that in general the relation will not hold. By contrast, in the Pasinetti framework the treatment of technical change and of the choice of techniques help us uncover important aspects of the economics of international trade and of development.

Pasinetti's approach has appeared to me to be most fruitful as it undermines completely traditional views about dualism and comparative advantages. We have seen that changes in the wage rate do not affect the choice of the technique of production. By the same token the methods of production used in a given country do not depend upon whether or not the wage rate is higher or lower relatively to that of other countries. This means that the Leontief paradox is no longer a paradox since what matters for the definition of capital intensity is not the capital/labor ratio – which defines the degree of mechanization – but the capital/output ratio, which defines the capital intensity of production. In this case an economy with a high level of labor productivity may well have a capital/output ratio lower, much lower, than less developed economies where labor productivity is significantly lower. Thus it is misleading to view trade as governed by relative factor endowments. It is rather determined by two principles: the principle of comparative productivity change advantage and its industry specific variant.

On the basis of the above considerations, the implications for the economy of export sectors are gauged on whether or not their productivity gains are leaked abroad, through lower prices for the consumers of the importing countries. If in a

country the export sectors display a growth of productivity higher than that of the domestic non-tradable sectors by comparison with the same ratios in the importing country (say China is the exporting country and the USA is the importing one), then it can be said that China is leaking its productivity gains abroad. Thus the concentration of technical progress in the exporting sectors may not bring benefits to the domestic economy although, for the purpose of learning about new technologies, such a concentration may be initially necessary. By contrast, in a developed economy the technological differences between domestic and exporting sectors are not as big as in the less developed ones. Hence the developed economy's domestic sectors' productivity growth will roughly be the same as that of its own exporting sectors, so that the developed country is better able to retain productivity gains at home. This conclusion stems from the basic feature of Pasinetti's system where prices are determined by production costs so that their changes are governed by the dynamics of labor productivity throughout the whole chain of the vertically integrated labor coefficients. Pasinetti's point can be understood by looking at the issue from the angle of per-capita demand: the dynamics of per capita demand is linked to the dynamics of the wage rate which, in turn, is tied to the *average* growth rate of labor productivity. The wage rate is the element connecting the whole system, but if the largest part of it, i.e. the domestic sectors, displays a growth of productivity significantly below that of the exporting sectors, there would be little room to expand per capita demand. Hence, in the exporting country, dualism will set in because the importing countries will show a more even relation between productivity growth in the export and domestic sectors.

When applied to specific industries the principle of comparative productivity change advantage takes on a special dimension of practical relevance. When productivity growth in a particular exporting industry in a particular country, relative to the productivity growth in the rest of the economy in the same country, is greater than the same ratio in the rest of the world, then the competitive position

of the exporting industry of the particular country will improve. In other words, if productivity growth in the Chinese auto industry relative to productivity growth of the Chinese economy is greater than the productivity growth of the auto industry in the rest of the world relative to productivity growth of the rest of the world economy, the international position of the Chinese auto industry will improve. If the dynamics of that ratio (auto industry productivity growth in China /China's productivity growth compared to auto industry productivity growth in the rest of the world/ rest of the world's productivity growth) is markedly favorable to China, the auto industry of the advanced countries (rest of the world) will find itself back in a position previously ascribed to infant industries. It will thus require protection in the same way as it was argued for the infant industries. Pasinetti calls this situation the mature industry case for protection. It should be noticed that Pasinetti wrote his theory – starting with his Cambridge University Thesis – when the phenomenon of massive industrial displacement arising out of industrial exports from much poorer countries was very limited. And yet he got the structural tendencies quite correctly.

Furthermore, it would be mistaken to conclude that when the ratio discussed in the foregoing paragraph is favorable to, say, China, the improvement in the international position of the Chinese auto industry will automatically benefit China. For this to happen it is necessary that, on the Chinese side, the ratio is improved by an expansion of the numerator, that is by an increase in the productivity growth of the auto industry relatively to the productivity growth of the Chinese economy. If, instead, the expansion of the Chinese ratio relatively to the same ratio in the rest of the world occurs because of a fall in the Chinese denominator then, the Chinese economy will not benefit, although the international position of its auto industry will. Conversely if the Chinese ratio falls compared to the rest of the world ratio because of a big rise in the Chinese denominator then too bad for the international status of the Chinese auto industry, but it is good news for China because it means that its overall productivity has expanded.

Luigi Pasinetti's treatment of international economic relations is compelling and it is powerful also at the didactic level due to the pristine clarity of the author's exposition. I have used Pasinetti's theory in my Masters course called China in the World Economy which I developed at the University of Sydney in 2004 in order to look more closely into the striking transformation of the People's Republic. The students found Pasinetti's approach to be an effective conceptual framework to navigate the evolution of the Chinese economy in its international dimensions. We also conducted comparisons with other economies like Mexico, Brazil, and India and we asked questions like why hasn't this kind of development happened to the same degree with Mexico or India or Brazil? Here too Pasinetti's approach is most illuminating. If one uses the vertically integrated labor coefficients approach to industrial production, it would not take long to understand what happens if VW managers were to say "in the Congo wages are so low that we are going to move there." Even assuming that local labor is perfectly malleable, for VW the outcome will be a disappointment. All the materials, machinery, transport equipment and related facilities will have to be imported from the EU and calculated according to EU costs of production. The end result will be that EU priced capital charges will figure in a very high proportion of the final production price of the Congo made VW where the only local inputs, the direct labor coefficients, are priced at the very low Congo wages. This means that the Congo made VW would not have a domestic demand basis. Moreover, the importation by VW of the machinery and transport equipment from Europe will show up as foreign capital inflows spent to pay for those imports. This may well leave the Congolese financial system saddled with an external debt while the economy is subjected to a steady flow of industrial imports. How much labor would Congo have to sacrifice in export activities in order to sustain the process? Given the high price of the imported goods from Europe by VW, it is possible that the amount of labor which will have to be sacrificed will end up being excessive relatively to domestic developmental needs. I will return on this issue in the next paragraph. Thus for a China type phenomenon

to emerge it is necessary that there exist a domestic industrial structure capable of undertaking the transformation without its production costs being burdened by excessive capital charges arising from inputs and machinery imported from countries with much higher per capita incomes and, therefore, much higher production costs.

But how can a poor country avoid, or minimize, the risk of being burdened by too high capital charges from the richer countries? Traditional theory would tell us to this very day – although things have been made more complicated with informational asymmetries, rent seeking activities, etc., the basic skeleton has remained the same – that the poor country would have to adopt production techniques based on those domestic factors that are more abundant, therefore cheaper. Capital – real – not being among them, the choice of technique should fall on labor intensive productions. We have seen however that in a proper system of production, of which the vertically integrated process is an expression, the relative wage rate is immaterial to the choice of techniques. Hence if a poor country has access to the most advanced methods of production – available, say, in Sweden – it should adopt them forthwith. For comparable production, the best method in Sweden is also the best method in Papua New Guinea. Yet the gap in the wage levels between the two countries is such that were Papua New Guinea to import the methods from Sweden it would find itself burdened by the high level of capital charges in its final prices. The answer is that the poor country should weigh against the importation of the most advanced methods of production the amount of labor it has to surrender abroad in order to pay for the imported technologies relative to the amount of labor it will have to lock into less efficient home produced methods. The amount of labor surrendered abroad is simply the labor needed to produce the goods which have to be exported. If this amount exceeds the labor required to produce home-made technologies and capital goods then it will pay to refrain from buying the most advanced methods from abroad. The conclusion to which Pasinetti's theory brings us in relation to the selection of technologies in an

underdeveloped country converges towards similar considerations raised in the development planning literature of the 1950s and 1960s especially in Cambridge and in India (Dobb 1960; Sen 1960). However a significant difference exists between the earlier literature and Pasinetti's theory. In the Dobb-Sen models priority was supposed to be given to the capital goods sector and that was it. Just about nothing could be said about the status of consumptions goods and, more importantly, about the status of those who were supposed to consume the goods.

The vertically integrated theory of Luigi Pasinetti is based on a multiplicity of consumption goods the demand for which follows an Engel type pattern. To each consumption good a capital goods sector is attached, producing a machine for itself and for the consumption goods sector. It follows that investment priority in the capital goods industry does not make much sense unless further specified. It is the developmental priority in a set of consumption goods that will entail an investment priority in the corresponding, indeed attached, set of capital goods. How should the set of consumption goods be selected? In Pasinetti per capita demand coefficients are not randomly listed. They are arranged according to a hierarchical order not dissimilar to Engel's characterization. Thus priority should be given to those commodities where demand should grow most. If, say, in a country the main issue is to change nutritional patterns, investment should go into those sectors providing the machinery and technologies needed to modify them. This may well mean that if agricultural equipment is lacking, and importing it is subject to the limitations described above, that machinery will have to be produced in the country which may require building the relevant steel plants, mechanical industries, etc. But if the program is to be completed successfully the agricultural sector should, for a while, absorb a large slice of the sectors directly and indirectly contributing to it. The hierarchical order in which consumption should be selected arises in Pasinetti as a theoretical necessity rooted in the social reality of mass poverty to this very day. It also expresses the philosophical humanism of Luigi Pasinetti, centered on the centrality of labor, to which I will now turn.

The superiority of labor over capital is the overarching theme in the two Pasinetti books on structural change. The special role of labor stems from the fact that humanity's creative and productive activities require labor. Only the latter can make capital goods not the other way round. In a growing economic system the production of additional capital goods requires a rate of profit but this too arises from labor. In Pasinetti's natural economic system the rates of profit are determined by the growth rate of population and the growth of per capita demand for the commodities concerned. Since the growth of demand for each commodity is different, natural profit rates will differ as well. If population growth is zero, profit rates will be determined solely by the growth of demand for each commodity. Clearly this growth of demand is entirely determined by the growth rate of labor productivity. Thus the Pasinetti rate of profit is in fact determined by labor, that is by its growth and by its productivity. This view was already contained in the Cambridge-Kaldor phase of his writings. The 1974 book of essays on *Growth and Income Distribution* ends with a long chapter, chapter VI, dedicated to closing the debate over Kaldor's theory of growth and over the Pasinetti Theorem - where it is proven that long term equilibrium growth depends on the rate of profit multiplied by the saving propensity out of profits independently of everything else - which upon its publication elicited a neoclassical response from Franco Modigliani and Paul Samuelson. At the end of the chapter Pasinetti points out that in long term, growth, with all profits saved, the stock of capital disappears altogether from the fraction (P/K) defining the rate of profits. In other words, the rate of profit turns out to be independent of the stock of capital, being exclusively determined by the growth rate of population and of labor productivity (Pasinetti 1974b). Thus labor is the crucial factor for the formation of a rate of profit. Labor is also a crucial factor in the formation of the rate of interest in a manner that is totally independent from the rate of profits.

In his 1993 book Pasinetti showed how from even the simplest form of such a natural system, a situation where there is no accumulation and everything is

produced by labor, a positive monetary rate of interest arises even with no rate of profits and hence with no accumulation of capital. The procedure is rather straightforward: it is enough to assume that while all output is consumed, some households will save, consume less than their total income, and some households will borrow to consume what savers have not. Then there will be a financial system with credits and debts and a rate of interest attached to the loans. This rate of interest arises totally independently of profits. The objective justification for charging an interest on loans resides in protecting the value of the loan during repayment. In Pasinetti's system, labor is the source of all productive activities and, as we have seen, also the natural rate of profits is determined by the growth of labor productivity. Preserving over time the value of loans/debts means therefore maintaining their purchasing power in terms of labor. If a loan is made at time t(o) to be repaid at time t(1), and if from t(0) to t(1) labor productivity increases by z% , the corresponding rate of interest, i.e. the rate of interest which will safeguard the purchasing power in terms of labor of the loans made at t(0), will have to be equal to the growth rate of productivity z. This is what Pasinetti has called the natural rate of interest. That rate of interest happens, as he himself pointed out (Pasinetti 2002), to be consistent with the principle of equal exchange as no advantages are obtained by either borrowers or lenders. It will be noticed that both the (natural) rate of profits and (natural) the rate of interest are determined by labor through its productivity, although they arise for totally different reasons. The rate of profits emerges because of the production and utilization of capital goods, while the rate of interest may exist also in a zero profits economy provided there are individuals who save and individuals who borrow to consume more than their current income.

Chronologically, after Karl Marx, Luigi Pasinetti is the thinker that has most strongly put labor at the very centre of economic activity. He has done it in a different philosophical framework which, in its own right, has vastly enriched our understanding of both theory and society.

3. Pasinetti and the present crises.

The conceptual consistency of Pasinetti's contributions has proven itself also in relation to the economic recession and stagnation which set in since 2008, as well as in relation to the quagmire in which the area of the European Union covered by the European Monetary Union (the Eurozone) finds itself. Let us begin with the European situation.

Shortly after the signing of the Maastricht Treaty Pasinetti saw the problems arising from the Maastricht criteria of a 3% government budget deficit and a 60% ceiling on the national debt. In the 1990s to that effect he gave seminars at the Bank of Italy. He defined the Maastricht criteria as being either a myth or a folly since there is no reason why a particular set of values should define the limit of the deficit and of the debt. Just the same he took a proactive position by putting forward an argument aimed at reducing the damage as much possible

In 1998 in a now famous *Cambridge Journal of Economics* paper he showed that debt stabilization as a criterion is a much preferable to straight convergence to Maastricht values. For countries with a high debt ratio the stabilization criterion would imply a much less restrictive budgetary policy (Pasinetti 1998). Countries would not be compelled to undertake drastic austerity measures which, as now amply proven, fail in their own terms, leading to higher debt levels. Alongside the CJE article Pasinetti also produced theoretical and empirical papers regarding the sustainability zone devising a method aimed at showing the burden of the debt (Pasinetti 1997). This is the amount of income that has to be given up as proportion of nominal GDP in order to service the debt. In fact Pasinetti developed two conditions:

(1) $t = (i-g)D/Y$, where t is the burden of the Debt D and i and g are the interest and nominal growth rates respectively. Y is nominal GDP.

The second condition is a debt sustainability condition which is expressed as:

(2) $S/Y \geq -gD/Y$ Where S is not savings but the government's surplus

On policy makers the impact of those contributions has been negligible because, from the start, in Europe, excluding the U.K., the discussion about the single currency has been taken out of the realm of rational discourse. We can now move to the present crisis.

In the press the crisis has often been linked, with good reasons, to the priority that the institutions of modern capitalist countries, at least those of the United States and of the United Kingdom, with the crucial participation of Swiss, French and German banks and the entire Spanish, Irish and Icelandic economies, have given to the inflation of the value of financial assets and to physical assets containing a dominant component of financial rents, such as real estate. The increasing importance that, over the last two to three decades, has been assigned to stockholders' values is a major factor in the priority given to asset price inflation. In this context Pasinetti has published recently in the *Cambridge Journal of Economics* an essay I have referred to at the beginning of this survey but only in a cursory manner (Pasinetti 2012).

In that paper it is pointed out that neoclassical theory when applied to financial matters such as the value of stocks and dividend policies obscures the objective role of capitalists' savings. Their main function is to sustain the accumulation of capital through investment. By contrast, says Pasinetti, neoclassical economics has come up with a number of constructions where the focus is not the maximization of profits through investment but the maximization, through the stock exchange, of corporate stock values. Pasinetti mentions explicitly the Modigliani-Miller theorem of the late 1950s noting that "the theorem has led to the belief that there is no difference between the two traditionally considered alternatives regarding the allocation of each single firm's profits, i.e. (i) that of using them internally by adding them to the existing capital stock, or (ii) that of immediately distributing the dividends to the shareholders" (Pasinetti 2012, p.1442). The belief arises from the, ideological, acceptance of perfect financial markets. The influence of both the Modigliani-Miller theorem and, I should add, of Fama's efficient market

hypothesis, on financial institutions and on policy making bodies created an atmosphere conducive to economic irresponsibility with regard to corporations' use of their profits. It has also blinded the political institutions' view as to the requirements of real capital accumulation for the economy as a whole.

Pasinetti observes that in final analysis the stability or instability of the economy will be determined by whether or not the conditions for real capital accumulation are satisfied in relation to the conditions of full employment growth. This is precisely what is highlighted in the Pasinetti Theorem of 1962 (Pasinetti 1962, 1974 ch V). Without the saving propensity out of profit being greater than the saving propensity out of wages, so that the latter is always smaller than the ratio of aggregate investment over national income ($sw < I/Y$), the economy would not be in a position to function. The implications arising from the Kaldor-Pasinetti framework combined with the labor focused approach of the 1981 and 1993 contributions, are then contrasted with the Modigliani-Miller view. Financial securities, instruments and paper assets can be created ad infinitum without any physical limits. But capital goods cannot be produced beyond what is required for full employment growth. Were this to occur the economy would be quickly struck by the formation of unused capacity thereby leading to unemployment.

The crisis of 2008 and beyond was not caused an over-production of capital goods but the merit of the example lies in showing the boundaries within which the economy can operate and gauge whether financial companies' ability to generate unlimited instruments creates the illusion of being in an unbounded system, on the debt-credit side, with negative consequences for employment[i].

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THE CONTRIBUTION OF OLIVER WILLIAMSON TO SOCIAL SCIENCES: A SELECTIVE REVIEW

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The 2009 Nobel Laureate, Oliver Williamson, provides the conceptual foundations of the transaction costs (TCs) theory. TCs theory provides a framework for the analysis of individuals and institutions interactions which is much closer to reality than earlier approaches. It recognizes that although economic agents are rational, such rationality is limited especially in a complex world. Moreover, investment is often specific to a given relationship and economic agents behave opportunistically. Starting with economics, the contribution of Williamson gradually proves path-breaking in many other social sciences. This paper presents the contribution of TCs theory to the development of different branches of social sciences. These include the organization of public services, international relations, politics, environment and labor market.

Keywords : transaction costs, Institutions, Rationality

1. INTRODUCTION

The name of the 2009 Nobel Laurate in economics, Oliver Williamson, cannot be dissociated from the transaction costs (TCs) theory although the expression has been used before his contributions. The first use of "transaction costs" goes back to an earlier Nobel Prize in economics; Ronald Coase. In his 1937 paper on the nature of the firm, Coase asked "why a firm emerges at all in a specialized exchange economy?" The response is that because there are costs of using market transactions. Without such transaction costs the firm should not exist (Blair and Kaserman, 1983). Labor, capital and the other intermediate products would be linked by a set of contracts between their owners. The production decision is then translated into a multilateral negotiation among them rather than a process of centralized decisions (the firm). The decentralized framework can, however, be very expensive if market transactions have costs. The alternative solution for organization transactions with lower costs is the hierarchical decision process inside a firm. Coase's approach suffered, however, from the lack of a clear identification of the determinants of the transaction costs and how they combine to explain the extent of the firm. These shortcomings were addressed by Williamson (1975, 1985).

The wok of Williamson allows not only to give a rational to Coase's assertion by also to clarify many issues if the real life.

Starting with economics, the contribution of Williamson gradually proves path-breaking in many other social sciences. This is not surprising because Williamson's contribution is based on a framework much closer to reality than earlier approaches. He recognizes that although economic agents behave rationally, such rationality is not limited especially in a complex world. Moreover investment is often specific to a given relationship and economic agents can behave opportunistically. The approach was first used to understand the much debated phenomena of vertical integration and to motivate an antitrust treatment distinct from the one of horizontal integration. It, then, developed to highlights the cost and benefits of the form of organization of public institutions before being extended to various aspects of labor market, politics or environment. The present paper aims at highlighting the contribution of TCs theory to different branches of social sciences. In 2008, Macher and Richman offered a review of the various application of TCs theory. However, that review remained mainly confined to sub-disciplines of economics. In this paper we extent the analysis to other social sciences outside economics. In particular, we discuss the organization of public services, international relations, politics, environment and labor market.

The rest of the paper is organized as follows. Section 2 presents the main features of the TCs theory. As the theory was initially developed to explain vertical integration, we will follow the same path in this section for simplicity and clarity. In Section 3 we develop a simple formal model of the theory. The following section explains how the theory has been adapted to other fields and the empirical work based on TCs and pertaining to each field. Section 5 concludes.

2. TRANSACTION COSTS

Sources of transaction costs

TCs have their origin in a combination of four factors: two of them are environmental (complexity and/or uncertainty and small numbers) and the others are human (bounded rationality and opportunism).

Bounded rationality expresses the difficulty for an individual to conceive and exploit complex information systems. It comes from physical or linguistic limitations. The physical limitations refer to the difficulty for an individual to receive, stock, find and process a set of information in an efficient fashion, that is, without losses or errors. The language limitations represent the difficulty of expressing the knowledge and intuition by words, numbers and schemes in a way that is intelligible to others.

Bounded rationality does not pose a problem unless it manifests itself in the presence of complexity or uncertainty. Conversely, if rationality was unbounded,

the existence of complexity and uncertainty become unimportant. The complexity of the environment can be crucial, even if there is no uncertainty. For example, chess would be of no interest if one could set up the entire decision tree. However, while it is not subject to uncertainty, determining the entire decision tree is very costly if not impossible: for approximately 30 possible movements at each stage of the game, one has to foresee 10^3 possibilities for one movement and its response and 10^{120} possibilities for the complete game (Williamson, 1975). Thus there is a very important cost of establishing the complete decision tree even if the evolution of the game is deterministic.

Opportunism is more difficult to define with precision. It expresses the idea that economic agents are guided exclusively by their own interest. This involves self-interest seeking with guile and has profound implications for choosing between alternative contractual relationships. It involves making false or empty, that is, self-disbelieved, threats and promises in the expectation that individual advantage will thereby be realized (Williamson, 1975: 26).

Opportunism gains in importance if a condition of small number is satisfied, that is, if the one suffering from an opportunistic behavior cannot easily change partner. If the number of alternative solutions is high, opportunism will be without effect. Competition between (numerous) rivals will allow the agent to change partner and to obtain better conditions elsewhere. The opportunistic behavior of partners would thus be reduced. The small number situation may only appear after the signature of the contract. One gets, therefore, a large number ex ante and a small number ex post.

Transaction costs as a motive of vertical integration

To explain how human factors (bounded rationality, opportunism) and environmental factors (complexity and uncertainty, small numbers) make internal transfer preferable to the market, we proceed in two stages. We first show that the combination of bounded rationality and complexity induces the signature of incomplete contracts. We then explain that, if contracts are incomplete, the combination of opportunism and small numbers makes integration preferable to market transaction.

The establishment of a contract is not an easy task. Owing to bounded rationality and complexity, there may be substantial costs that make the setting up of complete contracts almost impossible. They include the costs of

- anticipating all the events which may take place during the time of the contract
- negotiating and reaching an agreement on the way to deal with these events
- writing a contract that is sufficiently clear and precise to be enforceable.

These costs do not involve any aspect of information asymmetry between partners. The problem comes from the difficulty to transmit the information to other

people. It concerns the information asymmetry between the two parties on the one hand and a third party (for example, a judge) on the other hand. The states of nature may be observable (by the first two parties) but are not verifiable (by the third party). Hence, it becomes very difficult to establish a completely contingent contract that sets out the actions that should be taken in each occurrence without ambiguity and clearly enough to be constraining on the parties. Given these costs, the parties generally content themselves with incomplete contracts. According to Hart and Holmstrom (1987), a very large number of litigations that come to trial are due to contract's incompleteness. The contract does not stipulate certain events because they are not foreseen or because parties prefer to 'wait and see' rather than try to cover a range of possibilities that have a low probability.

When the contract is incomplete and the agreement implies specific investments (to the relationship between partners), opportunistic behavior emerges. Owing to the specificity of investment, the ex-ante large number relationship becomes an ex post small number relationship. Whereas before investment each of the two agents could choose among several possible partners (quasi-competitive case), the agent becomes tied to a given partner (and cannot substitute someone else for that partner) once the investment is made. The specific investments represent sunk costs because they would generate only a weaker return if used differently from initially planned. The difference in return represents the quasi-rent that can be appropriated by one of the parties.

The combination of incomplete contracts and opportunism may lead to one of the two partners threatening to denounce the contract (if it finds this profitable) unless it receives all or part of the quasi-rent. Aware of the risk of opportunism from its partner, the agent that makes the specific investment will try to limit the cost of its investments or to find additional protection mechanisms in order to minimize the potential loss and reinforce its post-contractual position. These efforts will generate additional costs to the one of a possible litigation.

The above costs, which are specific to using the market, may be avoided, using integration, because inside the firm:

- Adaptation to changes in the environment may be easier. It is easier to communicate, to reduce the reaction time and to adopt coherent approaches among members of the same firm than among different firms.
- Agents tend to maximize a common objective and not separate objectives which reduces their opportunistic inclinations,
- Hieratical organization offers managers a broad set of instruments to deal with opportunism. As long as the managers command, reward and punish, the firm will deal with "internal" opportunism in a more efficient way than with "external" opportunism.

3. A SIMPLE MODEL OF TRANSACTION COSTS AND VERTICAL INTEGRATION

Consider a downstream firm producing a final good *y* which is sold on a competitive market at the price *Py*. For this purpose, it needs capital (*K*) and an intermediate good *x*. To put aside the double marginalization problem, capital is sold at its marginal costs of production *q*. The cost of producing one unit of *x* is *Cx*. The firm has two choices i) buying the good *x* from an independent upstream manufacturer or ii) producing the good *x* itself. In the case i), the price of the intermediate good *Px* is the result of a Nash bargaining between the two producers. In the case ii), the level of *Px* is irrelevant since the downstream firm is both buyer and seller.

Figure 1 summarizes the decision tree and the timing of the game. In Period 0, the firm decides whether to produce the good *x* or to buy it. Depending on this decision, the firm sets the level of investment *K* (Period 1). If the firm has chosen to enter into a transaction with an upstream producer of *x,* it should negotiate the level of *Px* in Period 2. Because of contract incompleteness, the price of the intermediate input *Px* cannot be bindingly negotiated prior to investment in the specific asset. Provided it is still beneficial, the production of *y* takes place in Period 3. The other assumptions of the model are that:

- The capital acquired to produce *y* is specific and non-contractible. Specificity implies that the unit value of *K* drops to 0 in any use other than producing *y*.
- The bargaining powers of the downstream and the upstream firms are $0 < \gamma < 1$ and $(1 - \gamma)$ respectively. This means that if there is any surplus to share, the downstream firm will get γ of the whole surplus and the upstream producer gets $(1 - \gamma)$.[1]

To solve the model, we use a backward solution approach and assume for simplicity a Cobb-Douglas production function downstream:

$$y = K^{a} x^{\beta} \qquad (1)$$

Under ***separation***, the downstream firm is aware of the possible opportunism of its partner who can threaten stopping the exchange (Period 2). In this case, the downstream firm is left with a capital amounting to 0 instead of *q K* which is its value if the exchange has continued. Hence, the downstream firm is locked to its partner who will renegotiate *Px* in order to catch a higher benefit than without renegotiation.

Assuming that the firms are interested in maximizing their surpluses, a generalized Nash bargaining solution implies efficient use of inputs and the sharing of economic profit between the two firms in constant proportions. These proportions reflect the negotiation power of the parties.

The efficient use of inputs implies setting x such as to maximize the sum of the two producers' surpluses (TSS) which is the total sales minus the total costs:

$$TSS = \left(P_y Y - P_x x\right) + \left(P_x x - C_x x\right) = \left(P_y Y - C_x x\right) \quad (2)$$

In Equation (2), K doesn't appear because in Period 2 it has already been bought (Period 1) and its resale value is 0. This is like if K was available for free in Period 2. The maximum of the total surplus is given by combining Equations (1) and (2) and setting the first derivative of the resulting expression, with respect to x, equal to 0. This gives the equilibrium levels of the total surplus and of x in Period 2:

$$TSS^*(K) = \left(P_y K^{\alpha} {x^*}^{\beta} - C_x x^*\right) \quad (3)$$

$$x^*(K) = \left(\frac{\beta P_y K^{\alpha}}{C_x}\right)^{\frac{1}{1-\beta}} \quad (4)$$

The optimal levels, x^* and TSS^*, now depend only on the level of capital that is supposed to have been chosen in Period 1.

In Period 1 the downstream firm anticipates that it will get $\gamma\, TSS^*(K)$ in Period 2. Hence, it will set the optimal level of capital, KS^*, such as to maximize its intertemporal surplus:

$$\gamma\, TSS^*(K) - q\, K \quad (5)$$

To avoid trivial solution, (5) is assumed positive and concave. The solution is given by the condition:

$$\left[\frac{\partial(\gamma\, TSS^*(K) - q\, K)}{\partial K}\right]_{K=KS^*} = 0 \quad (6)$$

Under ***integration,*** the downstream producer chooses both x and K. Being the unique producer, he/she will set x so as to maximize the Period 2 total surplus; that is $x(K) = x^*(K)$. As explained above, in this case Px is irrelevant. The downstream intertemporal surplus in Period 1 equals

$$TSI^*(K) = TSS^*(K) - q\, K = \gamma\, TSS^*(K) + (1 - \gamma)\, TSS^*(K) - q\, K \quad (7)$$

The optimality condition for choosing K is similar to (6). The level of capital will be set at its optimal level KI^* so as:

$$\left[\frac{\partial TSI^*(K)}{\partial K}\right]_{K=KI^*} = \left[\frac{\partial(\gamma\, TSS^*(K) - q\, K)}{\partial K} + \frac{\partial\left((1-\gamma)\, TSS^*(K)\right)}{\partial K}\right]_{K=KI^*} = 0 \quad (8)$$

Note that combining Equations (2) and (3), shows that $TSS^*(K)$ is positive and increasing in K and that $[\gamma\, TSS^*(K) - q\, K]$ is decreasing for $K > KS^*$. Moreover, Equation (6) implies that

$$\left[\frac{\partial(\gamma\, TSS^*(K) - q\, K)}{\partial K}\right]_{K=KS^*} = 0 \qquad (9)$$

This implies that

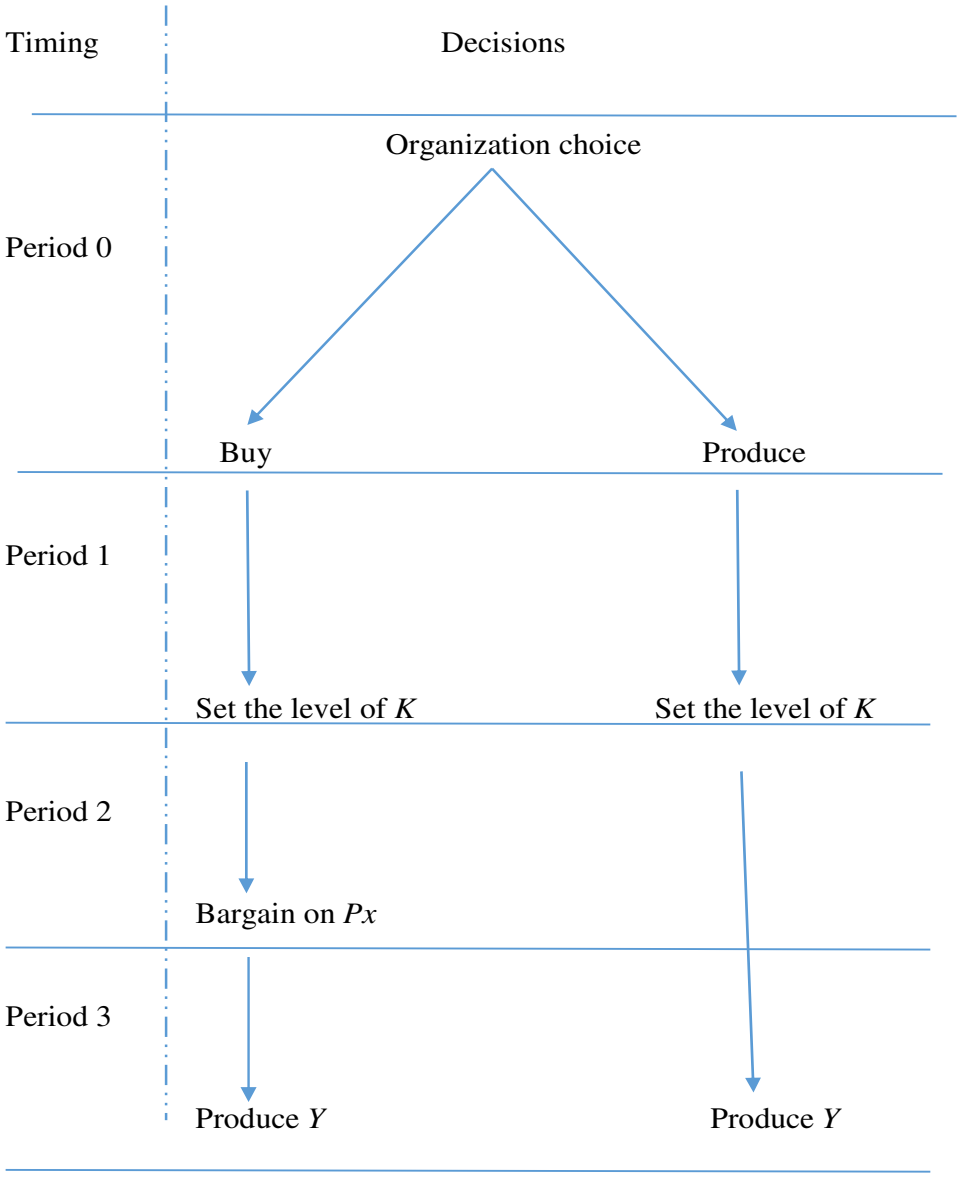
$$\left[\frac{\partial TSI^*(K)}{\partial K}\right]_{K=KS^*} = \left[\frac{\partial(\gamma\, TSS^*(K) - q\, K)}{\partial K}\right]_{K=KS^*} + \left[\frac{\partial((1-\gamma)\, TSS^*(K))}{\partial K}\right]_{K=KS^*} = \left[\frac{\partial((1-\gamma)\, TSS^*(K))}{\partial K}\right]_{K=KS^*} > 0 \qquad (10)$$

Equation (10) means that if under ***integration*** capital is set at the level which is optimal under ***separation***, $K = KS^*$, surplus under integration is not at its maximum. Since $TSS^*(K)$ is positive and increasing in K, the optimal level of capital under ***integration*** will be higher than its optimal level under ***separation***, $KI^* > KS^*$

The above results have three important implications. First, the benefit under integration will be always higher than under separation. Second, the investment will always be higher under integration than under separation. Third, from the antitrust point of view alluded to in the introduction, integration is welfare enhancing since it brings investment to its socially optimal level. To see this, note that Equation (8) is exactly the same as the one a "social planner" would use to set K.

It is important to note that the results are only due to TCs and have nothing to do with the existence of any other imperfection in the economy. Moreover, the model used here is, on purpose, over-simplified is order to convey the main intuition of the theory. Relaxing some hypothesis such as setting the resale price of K above 0 (provided it is still below q), using a different production function, introducing an intertemporal discount factor or endogeneizing bargaining powers would not change the main conclusions. Instead, changing the timing of the game or introducing additional players may change a lot of things (see Lyons and Sekkat, (1991)).

Figure 1: Decision tree for choice of organization structure, investment, input price



3. TRANSACTION COSTS AND RESEARCH IN SOCIAL SCIENCES

The firm

Unsurprisingly the earliest empirical tests focused on vertical integration. The researches have included both detailed case studies of particular firms and econometric tests. In fact the TCs approach has stimulated much more empirical work than any other theory of vertical integration. Following Joskow (2005), there have been at least 500 published papers that have empirically examined various aspects of the TCs approach. It is, therefore, not possible to survey all the papers. We present a selection below starting with a brief reminder of the early studies surveyed previously.

An interesting illustration of the TCs approach concerns the famous case of General Motors and Fisher Body (Klein et al., 1978). The relationship between the two firms has evolved through three phases. In the beginning, the two enterprises had more or less autonomous contractual relations concerning the supply of bodywork, which was made out of wood at that time. Afterwards, with the progress of technology, Fisher Body started producing metal bodies. This new production required more specialized machinery. The resulting asset specificity created a significant dependence between General Motors and its supplier. A new contractual structure was therefore established. A ten-year contract for the supply of bodywork was signed between the two firms. Moreover, in order to stimulate Fisher Body to make specific investments, an exclusive purchase contract in which General Motors promised to buy all its bodies from Fisher Body was also signed. However, this procedure implied a potential advantage for Fisher Body, since it could then attempt to impose a monopolistic price. Therefore the price had to be fixed, but other difficulties appeared. The unanticipated variability of the demand on the one hand and the variation of the production's conditions on the other made it very difficult to choose a price satisfactory to both parties. Finally, General Motors found the situation intolerable and vertical integration took place in 1926. So, in response to a progressive rise in the specific investments, the two firms moved from a standard contract to vertical integration, this progression corroborating the TCs theory.

An early econometric test of the TCs approach focused on two companies: General Motors and Ford. Monteverde and Teece (1982) collected information on whether a given component of a car is produced internally and the extent to which this component is specific to the produced car, requires specific investment or is difficult (complex) to produce. Using a Probit regression, they explain the existence of vertical integration in terms of specificity and complexity. The results show that specific components or components requiring advanced engineering are most likely

to be produced internally. Moreover, integration is more likely to occur if know-how is important and not transferable by license. Masten et al. (1989) used a slightly different approach and focused on the distinction between human and physical capital specificity. The percentage of the input of a given US auto manufacturing company (Chrysler, Ford and General Motors) which is produced under the control of the firm (a measure of the firm's integration) is regressed on three independent variables: the importance of engineering (a proxy for the transaction-specific human know-how), capital specificity (the used physical assets are specific to the car maker) and site specificity (the importance of locating close to adjacent stages of the manufacturing process). The empirical results were that specific human capital has a positive and significant influence on the percentage of the component produced in-house. The coefficients of physical asset specificity were not statistically significant. Therefore, the results suggest that investments in specialized human know-how have a stronger influence than those in specialized physical capital on the decision to integrate production within the firm. Masten (1984) applied a similar approach to the aerospace industry. The findings are that the coefficients associated with complexity and capital specificity are both highly significant and have the expected positive sign implying that the probability of a firm vertically integrating is higher in the case of complex and highly specific inputs.

The subsequent studies based on TCs focused on more sophisticated implications. Argyres and Mostafa (2016) examine the respective roles of "inherited" knowledge and TCs in the decision to integrate a given production stage and the performance of this stage. This is motivated by the evolution and strategy literature which suggests that the knowledge "inherited" by the founder of an activity from his/her previous employer can contribute highly to the performance of the new activity. More precisely, the authors examine whether, the TCs incentive to integrate a key production stage still holds when knowledge inheritance is taken into account. A Probit estimation is conducted using the data over the period 1895 to 1931 of USA auto firm companies. The dependent variable is a dummy which takes the value of 1 if the firm in question vertically integrates the production of a given engine ***at the time of entry*** and 0 otherwise. Since, larger engines tend to require more idiosyncratic, or at least more complex, investment, a standardized score of the engine's horsepower is introduced as a proxy of TCs. As a proxy of "inherited experience", a dummy taking the value of 1 if the new firm is a spinoff and a parent having produced the given engine in-house at the time of, or prior to, the spinoff's entry and 0 otherwise. The results show that the proxies of TCs and of "inherited experience" are positive and significant implying that both effects play at the same time.

Mizutani and Uranishi (2013) contribute to the lively academic and policy debates recommending vertical separation of the rail industry as a way of reducing costs

and improving efficiency. Hence, the paper focuses on the impact of vertical separation in the rail industry on cost's structure changes. The sample includes railway organizations from European and East Asian OECD countries between 1994 and 2007. The data source is the International Railway Statistics which gives a rich set of information such as total cost, cost structure, passengers, freight, distance and organization (vertical separation or integration). Cost functions are explained in terms of a large set of variable including whether the company is vertically integrated or no. This effect is conditioned by the importance of asset specificity. As predicted by the TCs theory, with lower asset specificity vertical separation tend to reduce the total cost of a railway organization. But as asset specificity increases, vertical separation increases costs.

Gugler et al. (2017) also focus vertical separation in utilities. The question is whether the benefits of increased competition in power generation would offset the efficiency losses from vertical divestiture. The study seeks to evaluate the extent of vertical economies in the supply stages of *generation* and *transmission* of European electricity. The sample consists of 28 major European electricity utilities from 16 European countries for the period 2000–2010. It includes all organizational company structures from pure generators, pure transmission operators to vertically integrated utilities. Comparing the costs across the different organizational forms and including a large set of control variables, it was found that vertical integration between *generation and transmission* is associated with significant cost savings. For the median integrated utility in the sample, cost savings from vertical integration amounts to around 14%. Cost savings increase with firm size. Large scale utilities may decrease total costs by more than 20% from vertical integration.

Agriculture

As stated by Cuevas (2014), the TCs that face agriculture are numerous and various. They include information asymmetry, risk and uncertainty, property rights and institutional functioning. These issues make agriculture a fertile field for the application and testing of TCs theory. The research in this field has covered different dimensions such as the determinants of TCs, the organization production and output market, the use of alternative agricultural inputs, the access to infrastructure the role of cooperatives and the choice between different forms of contracts (wage, share of crop, and fixed rent).

Aust (1997) analyzed the organization of the market of the broiler industry in the USA. This industry involves, on the one hand, a processing firm and, on the other, a grower providing the physical structure for production. The processing firm provides growers with the young chicks, feed, poultry science and other technical support, and delivery and pick-up of the chickens. It uses field supervisors to oversee production units. The assets used by growers during production, such as

land, broiler-housing structure and waste disposal facilities, are highly specific, immobile assets with little or no alternative use. On the processing firm's side, asset specificity is characterized by machinery which has no alternative use. Moreover, the firm faces uncertainty in broiler supply, quality and size and changing consumer tastes and preferences. In spite of these feature which, in general, favor integration, the authors showed that vertical separation is preferred to vertical integration by both farmers and processing firms. The reason is that asset specificity on both sides creates a situation of mutual 'hostages' which limit opportunistic temptation

Man et al. (2016) focused on the role of TCs in determining the decision of farmers to hire of some agricultural machinery and equipment to complete a specific process within the farm instead of owning these machineries. The hire decision is better when it comes to achieve a particular job quickly while reducing costs because the lease does not need a large capital. However, the hiring decision is a transaction which has costs. Farmer must search for information and monitor the ongoing process to ensure a positive deal. The econometric analysis examines the decisions to hire and buy of 391 framers from Iraq (Alnajaf province) in 2015. This is explained in terms of the degree of asset specificity: (Nonspecific, mid-specific, or high specific), uncertainty: (High or low) and complexity of the task to be performed (Difficult, Easy). The results show that TCs are important to understand how and why farmers prefer to hire machinery than buying their own equipment. Some transactions cost attributes such as a specificity, uncertainty and complexity of the services concerned are important determinants of the hiring decision.

Stall et al. (1997) have observed that in peri-urban areas of Africa (150 km or less from the capital city), dairy offers high potential as a smallholder diversification activity but it is not fully exploited. The authors explored the role of TCs for both production and marketing in limiting growth in smallholder dairying. The study is conducted in Kenya and Ethiopia where smallholder dairy is much more prevalent than in the rest of Africa. Data come from surveys of dairy operations carried out in 1992 and 1993. Transactions costs include, inter alia, the costs of searching for a partner, screening potential trading partners, bargaining with partners (and, in some cases. officials who can hold up trade), transferring the product (including transportation, processing and packaging) and monitoring the agreement. The findings show that transactions costs are high and explain the low percentage of milk production that is commercialized in Kenya and Ethiopia, compared to that in developed countries.

Cai and Ma (2015) examined the determinants of farmers' contract enforcement in six sub-districts where apple production is mostly located in China (Qixia, Longkou, Zhaoyuan, Mouping, Jiaonan, Laixi). The data used in the study come from a farm household survey that was conducted from January to March 2011. An ordered Probit model is estimated in order to explain the degree of contract enforcement. The measure of farmer's compliance is based on the reported share

of the delivered quantity to agribusiness firms in the total contracted quantity. In relation to TCs, the results show that if the delivery place is at great distance, the likelihood that farmers choose to enforce a contract is reduced. Delayed payment increases the probability of contract breach.

Lijia and Xuexi (2014) investigated the role of TCs and their components in joining cooperatives. The study is based on a questionnaire-based survey conducted in Shaanxi province in China during June to August in 2011. The subject of the study is motivated by the increasingly important role played by cooperatives in the development of rural economy and in being a connection between producers and markets in China The dependent variable (participating in cooperatives or not) takes two values: 1 represents apple producer participating in cooperatives; 0 represents apple producer not participating in cooperatives. Components of TCs are information costs, negotiation costs, enforcement cost and transportation costs. The results suggest that producers can annually save more than a thousand yuan if they participate in cooperatives. Results also highlight that the medium scale producers would be beneficial most from being a member in cooperatives compared with small- and large-scale ones.

Alston et al. (1984) compared three choices for a farmer willing to make the most of its land: hiring labor, renting or using sharecrop contracts. In this context, TCs are composed of negotiation, supervision, and enforcement costs. The supervision costs, in particular, are different across type of contracts. These costs tend to decrease the more closely effort is linked with reward. Under wage contract, supervision costs are greater since the reward is based on the amount of time a worker spends rather than on his output. In contrast, these costs are lower under a fixed-rent contract because the landlord receives his payment for land regardless of the length and intensity of work effort. The results confirm that systematic variations in the use of sharecrop contracts result from TCs.

Rørstad et al. (2007) analyzed the difference between the levels of TCs for 12 different agricultural policy measures in Norway. The measures span a large spectrum including price support for milk, price support for home refined dairy products, subsidy for reduced tillage, acreage support to organic farming and support for preserving cattle breeds. They also investigated the causes of the differences in TCs along three dimensions: asset specificity, frequency, and "point of policy application". "Point of policy application" shows whether the policy measure is applied to a commodity. Frequency shows how often the transaction is undertaken and how many agents can be treated similarly. The findings confirm that there are differences in TCs between different policy schemes. The analyses also support the hypothesis that these differences are due to differences in point of policy application, asset specificity and frequency. TCs are lower for policies that are applied to commodities than other fields of application and they increase as asset specificity increases and/or frequency decreases.

Organization

Beside the firm or the farm, the TCs theory has implications for the organization of other types of private and public institutions. The same determinants of TCs explained above may make hierarchy and centralization more costly than decentralization. Inside an organization, one or several sub-groups of agents can develop and follow objectives that are different from the global strategy of the organization. These groups may bias the information that is communicated to the other sub-groups or to the managers which may lead to the formation of coalitions inside the institutions aiming at maintaining the status quo as long as possible.

As the size of the organization increases it becomes difficult to identify of the above non-cooperative behavior. By multiplying the hierarchical levels in the organization the increase in size can induce a loss of information at the different stages of communication and make the identification of the person responsible for miss-behavior more difficult. Moreover, workers may become less motivated in very large organizations. Without perceiving the impact of their efforts on the performance, some agents may be less motivated and their "moral commitment" toward the organization will also decrease. A reorganization of communication and management, for instance in an M-form (multidivisional form) fashion, can limit these inconveniences. However, it will be unable to completely eliminate them.

While the above discussion is relevant for both private and public institutions, Williamson (1999) pointed that when it comes to public transactions, the original set of key determinants of transactions, should complemented by an additional factor which is "probity". He defines "probity" as loyalty and rectitude in the fulfillment of public transactions. This explains that government itself organizes some transactions not because it can do it cheaper or more efficiently but because it alone embodies the public's interest. These transactions are, in general, sovereign tasks such as foreign affairs, military, foreign intelligence, money supply, and the judiciary (Williamson, 1999, 321).

On the empirical side, Canbäck et al. (2006) examined one of the earliest propositions of TCs theory; that is higher firm size can reintroduce TCs considerations inside the firm. The study is based on cross-sectional data pertaining to 784 publicly traded manufacturing firms with headquarters in the USA in 1998. The authors used number of employees as the size metric and split bureaucratic diseconomies into atmospheric consequences, insularity, incentive limits and communication distortion. The results show that bureaucratic failure, in the form of atmospheric consequences, bureaucratic insularity, incentive limits and communication distortion, increases with firm size.

Zhou (2013) focused on the benefits and costs of a divisionalization decision. On the one hand, divisionalization reduces the burden on managers by dividing tasks

across multiple divisions and allows divisions to specialize and better adapt to their immediate task environment. On the other hand, divisionalization generates demand for coordination between divisions, especially when the task structure of the organization is complex. This creates a tradeoff between the gains of specialization and of coordination. Using a sample of USA equipment manufacturers over the period from 1993 to 2003, the test focuses specifically on the relationship between task complexity and divisionalization. The results show that divisionalization increases with task complexity, suggesting that complex task systems encourage more division of managerial responsibilities. However, divisionalization decreases as task systems become less decomposable. Organizational hierarchy increases as task systems become less decomposable.

While the above paper has explained the reason of the choice between different forms of organization, Norton and Pittman (1988 examined whether a given form of organization is more profitable than another. The analysis compares the M (decentralization) and the U (centralization) forms of organization. Following the TCs theory the move from firms organized using U-form to firms organized using M-form is, in certain cases, profitable. The sample concerns the USA and covers all firms appearing in both the Fortune 500 (US) and Moody's Industrial Manual. The results are strongly supportive of the Williamsonian hypothesis. The adoption of M-form leads to statistically significant increases in return on asset and return on equity measures.

Hill (1985) investigated a similar question for the UK. The research is based on a survey of organizational attributes and operating procedures for the top 500 quoted UK industrial and commercial firms as given in the Times 1000 listing for 1980/81. The results are broadly consistent with the theoretical predictions and the findings of other researchers in so far as the pure M-form (multidivisional) structure is found to be associated with superior profitability. In contrast, Cable and Yasuki (1985) focusing on Japan didn't confirm this result. The study used a sample of 89 firms among the 1977 top-100. No sign of a positive M-form effect on profitability is found.

Ingham (1992) switched the focus from manufacturing to services. The paper examines organizational structures within the insurance industry in the UK. This industry has undergone significant, regulatory-driven structural change and, as a consequence, the majority of companies have undertaken organizational change. To examine the effect of such change, a survey was conducted in June 1989 and covered 87 firms. The results presented show that the complexity of a company's operations critically affects its organizational choice. The larger the size of the average division, the greater is the probability that the firm will employ a divisionalized governance structure. However, the additional analyses didn't show that the chosen organizational structure is optimal.

As explained above the TCs theory has been extended to the study of public services organization. Alonso et al. (2013) investigated the effect of the New Public Management (NPM) strategy on public sector efficiency. The NPM implies slimming down the public sector both through sales and through the application of management techniques borrowed from the private sector. It targets a reduction in public spending. It can, however, also induce costs in terms of management and supervision of contracts regrading service delivery which can be magnified due to the limited number of competitive suppliers in the market. Hence, the expected positive effects may be reversed due to the dynamic nature of contractual relationships. The issue is examined using a panel data model for the EU-15 Member States over the period 1983-2011. Two dependent variables are considered: one is the ratio of total general government expenses to GDP and the other is the ratio of government employees to the working-age population. Each of these variables is explained in terms of NPM defined as the sum of intermediate consumption plus social transfers in kind outsourced to market producers as a share of final government consumption. The findings show that the whole strategy is not associated with a reduction in public sector size. In contrast, administrative decentralization seems to lead to a smaller public sector in terms of expenditure but not in terms of employment.

Ferris and Graddy (1994) addressed a similar question but focused on local governments. These governments can choose between public and private (including non-profit and for-profit) organizational forms. Such choice has implications both in terms of scale economies and in terms of TCs. The used sample concerns health services including hospital services, substance abuse prevention and treatment programs, and mental health program across U.S. cities. The econometric analysis includes three models. One model concerns the choice between public and private organizations. The other model concentrates on the choice between internal and external public organizations. Finally, the third model considers the choice between for-profit and non-profit ones. Monitoring Costs are used as a proxy of TCs. Scale economies are approached on the basis of Jurisdiction population. It appeared that scale economies drive the choice between external and internal public organizations while TCs determine the choice between for-profit and nonprofit private organizations.

Instead of the choice between different organizational solutions, Brown et al. (2015) examined the mix of different forms of service delivery by local governments. The latter can choose one form or a mix of the following forms for service delivery: direct service delivery, where governments use their own employees exclusively to deliver the service or contract service delivery, where governments enter into a contract with another government, private firm, or a non-profit organization. Since, the different organizational forms have different implications for both production costs and quality of services, mixed service

delivery might allow coupling the advantages of the different solutions. To investigate when local governments select mixed service delivery practices, data from the International City/County Management Association's (ICMA's) Alternative Service Delivery surveys from 2002 and 2007 are used. Each service delivery mode chosen (including Mix) by each government is explained in terms of, inter alia, transactions costs which are supposed to depend on service-specific characteristics, market conditions and the number of alternative suppliers. The results show that over 20% of local government services are delivered through a mix of direct and contract. Local governments are most likely to use mixed service delivery when services are moderately difficult to describe, require moderately specialized investments and there are multiple alternative suppliers. When they choose mixed service delivery, local governments split service delivery tasks with private firms when services are easier to describe and make. Government, however, choose non-profits and other governments when services become difficult to describe and make. The findings support that local governments choose mixed approaches in response to the TCs and market factors.

Another form of organization of public service delivery is Public-Private Partnership (PPP). De Schepper et al. (2015) offered a comparative assessment of the magnitude and the determinants of the TCs for two modes of public infrastructure delivery. The modes are PPP and Traditional Public Procurement (TPP). The determinants of transactions costs are split into three components: asset specificity, uncertainty and frequency. The data for the analysis are based on a survey of 200 Belgian contractors in 2012. The magnitude of each component of TCs is assumed to depend on the organization mode (PPP and TPP) and other explanatory variables. The findings show that that PPP projects have higher TCs than TPP projects. However, TCs of the two modes depend on different components. The complexity of TPP tenders is reflected in the procurement time while the chance of winning a tender reflects the complexity for PPPs. Previous partnership and project experience do not only affect partnership success but are among of the main factors that reduce the relative size of the TCs in the procurement phase.

As discussed above, probity is important when it comes to public organizations. Bureaucracy should do what is intended to do otherwise the legitimacy of institutions would be put into question. To prevent such a risk, the initial design and attributes of administrative agencies is of prime importance. This may, in turn, entail high TCs. Wood and Bohte (2004) used data on the design and attributes of 141 US federal administrative agencies created between 1879 and 1988 to examine how such attributes can reduce the risk of failure. The attributes considered include structural autonomy (i.e. whether the agency was created as an independent commission or as an executive branch), budgetary autonomy, delegation of rulemaking authority by Congress and the authority to adjudicate cases and

controversies internally. The probability of failure is assumed to depend on the potential executive-legislative conflict, past electoral turnover, party strength and contemporaneous coalitional conflict. Using structural Probit analysis, the results show that these factors significantly affect agency design attributes involving structure, process, and monitoring. The statistical analysis is consistent with the hypothesis that the attributes are manipulated in order to increase the TCs of changing the functioning of the agency

International relations

At the international level, TCs theory has been used to explain a number of issues. A major research strand examines how firms organize their entry into international markets. In other words, how firms choose between direct exporting, licensing, majority-ownership of plant or joint venture. Another filed if international relations where the TCs theory has been applied is the rationale behind the building and the functioning of international institutions. These institutions can be multilateral or bilateral and cover products, services, political linkages, technical standards and economic unions.

In the field of entry into international markets, Henisz (2000) considered the effects of contractual and political risks. Contractual risk is reflected in asset specificity, possible technological leakage or free-riding on brand name and reputation. Political risk is linked to policy shifts in taxation or regulation and expropriation. The empirical analysis is conducted using a two-stage bi-variate Probit specification on data of about 461 firms from 112 countries over 12 years. The entry decision and the market entry mode are regressed on several country and firm observed characteristics. The entry decision is found to depend on the wealth of the domestic country and the population size as well as on the stability of the policies. The entry mode is determined by the contractual and the political risks and their interaction. The test also supports that, if both contractual and institutional risks are important, the entry mode will be predominantly majority-owned plant. These result was subsequently confirmed by Brouthers (2013) using a selection of the 1000 largest EU companies.

Khemakhem (2010) examined two other modes of entry. These are direct exporting, which implies selling directly to a foreign distributor or to one's own foreign-based subsidiary; and indirect exporting, which consists in selling domestically to a foreign importer or to a national middleman. The empirical investigation used data of 420 Tunisian exporting firms. The firms were surveyed to explore the determinants of their entry mode choice decision and their relations to TCs. It is expected that technologically complex products and sophisticated products should be exported directly. In contrast, the importance of providing of pre and post service motivates the firm to export indirectly. The estimation implies

that export product characteristics don't influence the entry mode choice. The importance of before or after sales services pushes the firm to export indirectly.

Christmann and Taylor (2006) focused on firms ISO certification. This is often seen as a requirement for exporting. However, firms may use it as a signal without fully complying with the standard's requirements. Hence, ISO certified firms can strategically select their level of compliance depending of various factors such as customer monitoring and expected sanctions by customers. Monitoring of standards by independent auditors reduces the risk of opportunistic disconnection between the certification and its implementation. The paper used the results of a survey of 172 ISO 9000 certified firms in China in 2003 to examine the determinants of firms' compliance. The dependent variable is the degree of compliance with standard and is measured as the average score obtained for the following three questions: i) To what extent are the documents created for the purpose of ISO 9000 used in daily practice?, ii) To what extend has the ISO 9000 system become part of your regular routine? and iii) To what extent are preparations for external audits made at the last minute? The dependent variable is explained in terms of responses to the questions i) How important are the quality of products and on-time delivery for your major customers in their selection of supplier? ii) Do your major customers assess the quality performance through formal evaluations? iii) Do your major customers provide you with feedback about the results of their evaluations? and iv) Do your major customers use a supplier certification program to certify suppliers' quality? The results support that firms strategically choose symbolic implementation to avoid the higher costs of substantive implementation unless this behavior entails adverse consequences. Suppliers choose symbolic standard implementation if they perceive that their customers do not place high importance on the issue addressed by the standard, that customers are not likely to detect their quality of implementation, and that sanctions are unlikely or not costly for them.

Nunn (2007) examined whether a country's ability to enforce contracts is a source of comparative advantage. To address this question, the author constructed, for each good, a measure of the proportion of its intermediate inputs that require relationship-specific investments. This gives a list of industry for which contract incompleteness is important. The econometric analysis explains the total exports of a given industry in a given country in terms of the importance of contract incompleteness and of the quality of contract enforcement in the exporting country. The findings are that countries with good contract enforcement mechanisms specialize in industries where relationship-specific investments are the most important. According to the estimates, contract enforcement explains more of the global trade than countries' endowments of physical capital and skilled labor combined. Estimates support that a nation's ability to enforce contracts is an important determinant of comparative advantage.

Baccini (2014) considering that the duration of negotiation increases TCs, investigated whether countries with high quality of institutions are likely to sign Preferential Trading Agreement (PTA). The measure of the quality of institutions is based on the extent of the control of corruption and the enforcement of the rule of law. The sample covers all the trade agreements signed between 1990 and 2007 by 167 countries. The results strongly support the hypothesis that countries with high quality of institutions form more agreements in a shorter period of time than countries with a low quality of institutions. Both the control of corruption and the rule of law play an important role.

Politics

Dixit (2003) views politics and policymaking as processes constrained by asymmetric information and limited commitment mechanisms. He, therefore, suggest that TCs could play a role at least as crucial in politics as in economics. Caballero and Soto-Oñate (2016) conceptualized the parallel between TCs economics and politics by treating a part of the political activity as an exchange on political markets involving citizens, candidates, legislators, political parties, trade-unions and governments. The transactions include the right to vote, the right to legislate, the right to govern etc. As a result, political exchanges and the underlying TCs determine political outputs (public policies, budgets, constitutions…).

Another strand of the related literature sees political organizations as ways of reducing TCs. In this respect a special attention has been granted to the role of political parties (Jones and Hudson**,** 1998). Because it is unlikely that any voter will access all potential signals of candidates' policy, positions and personality, membership of a political party is a low cost source of potentially accurate information although the function of political parties is not solely to provide low-cost information. Political parties can not only reduce information costs but they can also reduce opportunism on the part of politicians. Following Davis and Ferrantino (1996), there is a tendency for politicians to make exaggerated claims. Since the interests of politicians are short lived while the reputation of political parties is important for the future, parties tend to discipline the 'excesses' of politicians.

Jones and Hudson (2001) tested the above claim that political parties reduce information costs. They used responses to a questionnaire from the British Social Attitudes Surveys of 1994 and 1996. One dependent variable is a dummy which takes a value of one if the respondent uses party's signals regardless of candidate. The second dependent variable concerns voters' identification with a given party. The results indicate that those who are less familiar with electoral competition (youth) and those less able to access other sources of information (poorly education) rely more heavily on party's signals when voting. In other words, voters with bounded rationality, reduce transactions costs by making use of party's signal.

Regarding the second dependent variable, the lack of faith in political parties and cynicism with respect to candidates' truthfulness reduce individual identification with the Conservatives and increase identification with the Labor party

Leifeld and Schneider (2012) focused on the formation of policy networks defined as sets of formal and informal linkages between governmental and non-governmental actors aiming at sharing beliefs and interests in public policy making and implementation. In particular, the analysis investigates the reasons why political actors establish contacts with some actors but not with others. While the literature often attributed this behavior to preference similarity, influence of reputation, social trust, and institutional actor roles, the authors argue that political opportunity structures and TCs play at an equally important role. The empirical analysis focuses on tie formation in relation to the German toxic chemicals policy. In the winter of 1984/85, 39 organizations from governments, parties, lobbies, scientific/research organizations and international organizations were selected. Participants were asked to fill out a standardized questionnaire. The questions relate to political/strategic and scientific/technical information exchange. Using an exponential random graph model, the analysis showed that political organizations take TCs into account when considering whom to approach. When an actor chooses a potential interaction partner in order to attain policy- goals, he/she also consider if this potential partner is are easy to reach. This finding suggests that politics is not merely power-driven, but also resource-dependent. In sum political actors choose contacts which minimize TCs while maximizing outreach and information.

Lee (2016) examined the effect of TCs on the performance of participatory governance in the USA. Participatory governance is an institutional arrangement that allows the public to take part in deliberations, negotiations, and administrative decisions about public affairs. For the purpose of the study, data on 27 federal regulatory agencies were collected. Four policy functions were considered: program purpose and design, strategic planning, program management and program results. Such participatory governance takes the forms of advisory committees and public meetings. The TCs vary across projects, especially due to complexity. The tests show that the positive effect of participatory governance is limited under high-TCs policy conditions. When TCs increase, agencies need to spend more time and human resources on the interaction with social policy stakeholders, thereby wasting administrative resources.

Green and Colgan (2013) studied the determinants of the delegation of the management of some issues to international organizations (IO). The analysis focuses on environmental problems which are characterized by a high degree of complexity, interdependence and relatively low hierarchical state relations. The study covers a century of multilateral environmental agreements resulting in 152 decisions between 1902 and 2002. The analysis distinguishes the possible delegation

of 5 the policy functions: Rulemaking, implementation, monitoring, adjudication, and enforcement. It also computes their sovereignty costs. The actors responsible for those functions are the states themselves, state agent(s), an IO, or a private actor. The analysis shows that the states take the delegation decision with care: States tend to delegate functions with lower sovereignty costs, such as implementation and monitoring, but rarely delegate rule making and enforcement. Heterogeneous preferences among states increase the likelihood of delegation.

Environment

Environment is a source of numerous and various externalities. Cooperation is often seen as a good tool to manage these externalities. It is basically a contractual process among partners which defines and assigns property rights, responsibilities and rules surrounding these externalities. However, costs of applying this contractual process can be high if there are difficulties in collecting information about the good to be exchanged, matching buyers and sellers and establishing rules for access and withdrawal. In other words, there are TCs of defining the property rights and managing benefits and costs of environment issues (Coggan et al., 2010).
Because of these externalities, environment also leads to an intense process of discussion and negotiation at the international level. However, the demand for such agreements comes from those who value property rights and stand to gain from multilateral action. International leaders will cooperate only when doing so serve domestic interests. Otherwise opportunistic behaviors are real risks and it is very difficult to find ways for avoiding them. Scientific uncertainty, differences in preferences and perceptions, asymmetric information and costs of compliance magnify the risk of opportunism (Libecap, 2014).
Mettepenningen et al. (2009) estimated the level and importance of private TCs associated with Agrienvironmental schemes in Europe. Under the framework of the 2005 European Common Agricultural Policy (CAP) reform, the European Commission has introduced changes to the support of rural development. In particular, the changes allow for compensation of TCs. Private TCs involve farmers as sellers and the public authorities as buyers and concern the organization of the transfer of goods and services between the two agents. The data combine the responses to a survey of general perceptions of TCs by participants and costs (labor, operational and administrative) and revenues of parcels of land included in an the new scheme. The results show that private TCs are significant. They represent about 15% of the total scheme costs and about 25% of the compensation payment.

McCann and Easter (2000) focused on the TCs of policies targeting a reduction in nonpoint source pollution in the USA. Such TCs include the costs of policy design, the structural costs of the administering agency, variable enforcement costs (for

monitoring, assessment, and litigation), and the costs of periodic policy reevaluation. The data come from the National Resource Conservation Service (NRCS) and was collected in a nationwide survey. They consist of 6007 National Resource Inventory points. TCs are found to represent a significant portion (38%) of overall costs. In order to identify the determinants of TCs, their amount was regressed on abatement costs, complexity of the farming system and topography, management ability of the farmer and a set of regional dummies. The abatement costs, complexity, management ability of the farmer and the regional dummies were significant.

Gangadharan (2000) studied the decisions of firms to participate trade in the Regional Clean Air Incentives Market which uses emissions trading to reduce smog creating pollutants in Los Angeles. The data are obtained from the South Coast Air Quality Management District and includes trades through August 1997. These data contain information about the amount of permits traded, the trade price, the buyer and the seller identities and the zone in which the facility is located. The Maximum Likelihood Probit method is used to determine which factors affect the decision to participate in trade. Explanatory variables pertaining to TCs are whether the trader is a facility or a broker, search costs and information costs. The results show that TCs variables can explain why a significant number of facilities do not trade in this program. These variables include search costs and information costs incurred by the facilities. In 1995, TCs are identified to be the reason behind a 32% decrease in the probability of trading.

Labor

The relationship between workers and employers is not a simple exchange between buyer and seller (Weakliem, 989). It is, in general, governed by a contract which, although potentially incomplete, inscribes itself within an institutional framework specifying rights, obligations, and procedures for resolving disagreements. This employment contract takes different forms (Willman et al., 2012). One form is a simple spot contract where at a given point in time the parties agree a price for the supply of a labor services. This characterizes a casual labor market and its effect is not relevant here since it involves, in general, no attributes of TCs. A second type of contract is contingent claims contracting which governs a longer term employment relationship across a specifiable range of events; each leading to demand for a predictable set of labor services. The third from of contract involves capitalist ownership of equipment and inventories coupled with an employment relationship between the capitalist and the worker. The employee accepts the authority regarding work assignments provided that they fall within the zone of acceptance defined by the contract. This last type of contract poses a problem from the TCs perspective because of contract incompleteness which does not always allow a precise definition of assignments falling inside the zone of acceptance. The

employment contract is, therefore, very sensitive to the determinants of TCs but at different degrees; with the spot contract as the least sensitive and the authority contract as the most sensitive (Weakliem, 989).

Once a relationship has been established on the labor market, a "bilateral monopoly" situation may emerge. Both sides can threaten stopping if specific investment has been made. However, both parties can lose something if the contract is terminated. The TCs theory suggests that some institutional arrangements can protect each side against the possible opportunism of the other. Unionization might be one solution (Williamson, 1985:272). Unions are often seen as only seeking to benefit workers at the expense of the employer but they can also be a vehicle for enhanced efficiency. They can provide relevant information about workers' preferences, assist employees in evaluating offers and facilitate the achievements of efficient bargains. Moreover, the firm incurs less bargaining expenditures because it is negotiating with one representative instead of a many, potentially opportunistic, individual workers. Finally, the pay and promotion scheme is made more objective and transparent, which may induce workers to voluntary cooperation and increase their willingness to invest in firm specific knowledge.

The above discussion suggested that unions can not only affect firm investment decision but also enhance efficiency by organizing a dialogue with workers. Bronars and Deere (1993), tested whether unionized firms invest less in durable capital, advertising, and R&D. Each type of investment is examined separately. The sample includes 667 firms from New York and American Stock Exchange. The dependent variables are the ratios of expenditure in each type of investment to the book value of existing plant and equipment. The findings led strong empirical support to the under-investment hypothesis in large publicly traded firms. There is a significant negative relationship between unionization and investment in both tangible and intangible capital. In particular, the elasticity of the expenditures on plant and equipment, R&D, and advertising with respect to unionization are -0.22, - 1.46, and - 1.02, respectively.

Carluccio and Bas (2015) investigated how the cross-border organization of firms is affected by bargaining in the labor market. More precisely, assuming the incompleteness of labor contracts and possible opportunism, the paper examines how the bargaining power of workers in a country affects the choice by multinational firms between holding subsidiaries in that country and importing from the country. The analysis is conducted using data on intra-group international exchange in 1999 produced by the French Office of Industrial Studies and Statistics. The dependent variable is the share of intra-firm imports and it is explained in terms of worker bargaining power, a collective relations indicator and union power. The results show that firms are more likely to import intermediate inputs when the exporting country has high bargaining power of workers. The

negative correlation between the share of intra-firm exports and worker bargaining power increases with capital intensity in industries for which relationship-specific investments are substantial. The effect of the bargaining power of workers is sizeable. Taking two contrasted countries (Italy and Denmark), the authors found that if Italy's labor market institutions were equal to Denmark's, the average intrafirm exports to France would increase by 7.6%.

In a context of incomplete contract, potential opportunism and, specific investment by both workers and the firm, Vázquez (2004) examined the allocation of decision right between employers and employees. The sample is built on the basis of responses to a questionnaire filled by all firms in the Spanish food and electronics industries with a turnover of at least three million euros in 2000. The responses allow the identification of different tasks and whether they are centralized or delegated inside the firm. The tasks considered include strategic decisions, operating decisions and the choice between teamwork or specialized organizations. The allocation of decision rights on each of these tasks is explained in terms of, inter alia, worker opportunism defined a behavior that consciously reduces the quantity and quality of output and managerial opportunism defined as a propensity to impose orders exceeding the previously agreed limits. Evidence shows that both types of opportunism determine the allocation of decision rights. However, employer opportunism deems to offer greater explanatory power than employee opportunism.

Anderson and Schmittlein (1984) addressed the issue of the organization of a firm's activity from the angle of human capital specificity and effort. They examined the relationship between the costs of contracting over (and verifying) sellers' efforts and the firm decision to distribute its good directly or through independent retailers. The sample concerns the electronic components industry and is based on the managers' survey. The dependent variable represents the probability that a firm resells its own product itself. The explanatory variable of interest concerns the difficulty of evaluating the performance of the resellers. Two interaction variables have been added in order to measure the possible dependence between uncertainty and the existence of specific assets. One is the interaction between the specificity and the uncertainty of demand while the other is the interaction between the specificity and the difficulty of evaluating performance. The effects of uncertainty are supposed to be higher when there are specific assets. The coefficients of the difficulty of evaluating performance and of the specificity of human assets are significant and have the expected positive sign implying that TCs determine the decision of firms to resell their own product themselves in the electronic components industry.

5. CONLUSION

The paper presented a selective review and a discussion of the contribution of transaction costs (TCs) theory to different branches of social sciences. Although coined in 1937 by the forthcoming, at that time, Nobel Prize in economics; Ronald Coase in his paper " The nature of the Firm", the terms stand up as an autonomous theory following the rich work by, the Nobel prize, Oliver Williamson from the early 1970s. What shifted the terms to the status of the theory is the provision by Williamson of a clear identification of the determinants of the transaction costs and of a coherent conceptual framework of the interaction between these determinants. Not only had the wok of Williamson given a rational to Coase's assertion but it also clarified many important economic issues. Another important reason for the effectiveness of the work is its closeness to reality in comparison to earlier approaches. Recognizing on the one hand that although economic agents behave rationally, such rationality is not limited especially in a complex world and on the other hand that investment is often specific to a given relationship and that economic agents can behave opportunistically, makes the theory very useful in understanding real phenomenon and providing worthwhile recommendations. It is, therefore, not surprising that, starting with economics, Williamson's contribution gradually proves path-breaking in many other social sciences. This is evidenced not only by the adaptation of the framework to the conceptual analysis in other social sciences but also, and chiefly, by its empirical validation in different contexts as shown in this paper.

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SOCIAL COST IN PUBLIC ORGANIZATION AND MANAGEMENT : THE COASE PERSPECTIVE

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Abstract

The article seeks to understand how the basic foundations of institutional economy may be incorporated into the management performance of governments. There are two aspects to this. Firstly, if there is more focus on the Agency, the public organization will place itself in the price system, if the relevance shifts to the TCT however, resources are managed centrally. The second aspect tries to evaluate whether credible promises from governments are sufficient to improve their capacity to implement actions that result in greater efficiency. Through a methodological discussion of the arguments contained in the theory of agency and transaction costs, and a discussion of the literature regarding the performance of institutions, the article analyzes public economic organizations including Public Universities (PU). It concludes that even though public organizations should be evaluated because credible promises are exhausted, and the price system matters, the classification of a PU implies a high specificity in its assets and especially that of its professors and researchers. Growth it therefore intra. It is distanced vertically from an in-depth analysis of the productivities in the price system and does not resolve the issue of equity in the reward of loyal taxpayers.

Introduction

Although institutional analysis in the work of Ronald Coase did not arouse much interest at the time of his work, over the last 40 years it has been adopted by various fields of the economy as can be seen in the Handbooks of Institutional Economics already several editors (Menar and Shirley (2008), Brousseau and Glachant (2008), Brosseau and Glachand (2002), Sen (1996), Hart (1995), Martin (1993), Williamson and Winter (1993), Williamson (1990,1985)) and this is explored in this essay. The article deals specifically with Public Sector management. This sector has been the focus of several disciplines including Public Economy Theory itself. This has evolved in the last two decades[19], as it has incorporated a focus on

[19] The thematic content of some classic text books on public economics (from Musgrabe (1959) or Brown and Jackson (1978) to Hindriks and Myles (2006) or Tresch (2008) to give some examples) is an example

institutional economies in various thematic areas corresponding to the variety of activities of the same sector. This is markedly different from the private sector in as much there is no market suitability, similar to that of agents, businesses and non-governmental organizations where the public sector is in constant contrast.

The interest of this research focuses on whether the cost of public management in a mixed system balanced against a capitalist one (in the sense of how much production is carried out by private companies and how much by the public sector and how much contracts in the market and how much is not) is detrimental to the economy and society both present and future. This idea naturally is restricted by the efficiency of the price system, a pillar of orthodox approaches from the most neoclassical to the theory of institutional and management control of resources (without subtracting in any way the political economy of the nineteenth century). However, we cannot ignore other arguments that discuss the effects of a strong government (pseudo-monopoly) and the capacity it has to independently propose whether actions and policies result in better efficiency or if they are costly. In this type of regime there may be variations due to local idiosyncratic influences, in regard to the government's capacity to understand what has to be done and how to effect change. It is not immediately obvious that the efficient allocation is the one that guides the economy and capital, but in a more pragmatic way, the agents and institutions with more power impose the allocation and this is how it advances or retreats in the purely economic (growth and quality) as in the social. There would then be two varieties of allocations, one for the price system and another for the real capabilities of governments not only to finance but to execute.
Institutional Economics and property rights fall into the first situation, *ee* efficiency. The subject of this research necessarily involves a deeper understanding of an institutional focus to see if it is possible to evaluate the government when there is no an idea of something like an internal market inside and neither the possibility to leave all economic and social activities to the private sector. The article explores the idea that the improvement of public sector management does not necessarily have to be done through markets that are already exhausted (the external) but also through the quasi-internal markets of the public sector. This implies that -intra can render governability and that this enters the field of the institutional economics but above all that this results in a kind of quasi-market.

The article has two exploratory objectives. To elucidate how one could determine if, over time, property rights are substantive enough to allow a government millage to impose policies in the economic and educational fields. A second aspect is how governance in public education organizations, such as Public Universities (UP), is

of the increase on new subjects and the way it is analyzed which imply theoretical developments and as well a more complex public sector activity.

planned, taking as a starting point the hybridization of vertical growth and facilitating the price system in this sector.

In this article, in the first section a methodological issue is raised by incorporating the variable of property rights in the public sector (intra), that is, by regulating its organizational and internal management function as opposed to the external including the market and agents other than the government and non-government organizations. We consider how the public sector operates internally through the lenses of institutional economy theory, without leaving aside the focus of agency. The second section deals with the aspect of credible proposals as a way of analysing the effectiveness of government action, or deficiency of property rights and their deterioration. It is proposed that there should be feedback between the capacity of government and the establishment of property rights. In the third section, the analysis of external transaction costs and the managed cost of resources in public universities is taken up by making some comparisons with quasi-private universities in regard to their incorporation into the price system and the quasi-profit university. In the final section some conclusions are drawn.

Property rights and the public sector. A methodological connection.

The public sector is extremely diverse and reference is made to only one part of its organization. This dimension allows us to make an association to property rights, however in an analysis of institutional change one does not necessarily begin with the public sector and then property rights. The relationship between the two implies several aspects of the economic analysis and the linkage is an aspect that falls within the realm of epistemology, since on the one hand, in a Coasean approach, the analysis focuses on why and economic organization, the firm, is (or belongs) in the price system, and on the other hand, the concept of property rights an explanation for why some institutional arrangements give different results from others that offer growth and prosperity. Without really going into this last aspect, there would be a methodological connection for the analysis of public organizations (PO) derived from the analysis of Coase and also an evaluation to investigate the performance of these POs over time. First, the methodological linkage of the PO with the Coase approach to derive a greater precision of property rights will be discussed below. And second, the discussion of North and Weingast (1989) regarding the role of property rights in economic development, contrasted with the real capacity of governments to impose actions will be explored.

When you begin to understand the strength of the theory of Coase (1937, 1960, 2005), and its later reinterpretation by Alchiam and Demsetz (1972), among others, that is to say, understanding the firm as a team and as a main contractor results in the impossibility of agents reassigning themselves and that the market cannot resolve the output of allocations. Hence, the question of how to reward the agent´s

product not only complicates the residual, but the indivisibility of their productivities makes the firm become the centre, not only of monitoring but also of coordination. When these productivities are not evident for a proportional allocation, assignments could be considered through a primary idea of incentives laid down in a contract which would leave unresolved where the residual is left (that is to say, the imperfections of the relations). Needless to say, when the residual is small, so is the inefficiency. A first review of the company focuses on the theory of the firm from the -agency, and is influenced by the work of Frank Knight in 1921.

In the first instance, it would be a question of evaluating whether the above, the agency, could serve as a scenario to introduce a public organization (PO) as a representation of the public sector. On the one hand, the analysis involves entering the PO into the price system, but at the beginning, it is outside of it- or at least an important part of it explicitly. However, the analysis of the indivisibility of productivities, that is, internally, is not resolved in the PO, but apparently there would be a comparison with the analysis of private economic organizations in the education sector (schools, lyceums, universities) in a quasi- market. On the other hand, the question of the meaning of the residual is more difficult to locate in a PO since it would imply that when it is close to zero it could be because of greater equity and social welfare. Now, Coase's analysis shows that when there is no option to go to the market, reassignment is internal, through a centralized management of resources. The solution that Knight's offers in regard to the firm has to do with risk and uncertainty. While in Coase, it involves a comparison between the cost of going to the market and the cost of solving it internally. And from there derives the explanation regarding internal – or vertical - growth.[20]

To resolve it internally, intra is a starting point for the internal component of public management. The question then, in the Cosean context, is whether there exists a - space for the equivalent of the market, which would include the phenomenon of agent exchange operating in the public sector sphere. The idea is that the approach of allocative efficiency, coming from the price system, extends to the public sector, but locating organizations that assign in the same way as a firm in the business sector; that is to say, without full knowledge of productivities and assignments and leaving a lighter contract since it could be more expensive to monitor their follow-up. Two methodological aspects emerge. Firstly, the intra analysis within the government and outside the external market sphere where the agents undertake transactions of specific goods and can capture quasi-rents. Secondly, the residual does not disappear with contracts and rather than surplus, there could be a loss. These two aspects form a methodological analysis which rests on the Coasean

[20] See Demsetz (1997) to an exposition of the Frank Knigth (1921) regarding this issue. Also, Jensen and Meckling (1976) Fama (1980), and Putterman (1986).

notion of the firm as a framework for analysis, to which is added the interpretation of either a positive or negative remnant. As has been explained, the answer lies in locating the company in the price system, since this implies a cost that would be for market use. (See, Jardon, 2011, Klein, Grarwford ,Alchiam (1978))

The interpretation of agents productivities in Williamson's approach of transaction costs, the opportunism of the agents and the capital´s specificity, all becomes central to an intra-vertical explanation. There would however be those who are not convinced and who depart from the agency´s approach. It is argued that agents opportunism is one reason amongst others to remain in a bilateral relationship between agents, without going to the market. Nevertheless, the opportunism of the agents is also central to economic theory since it deals with self-interest as an axiom. This argument could weaken if what is of interest is the role of the firm in the price system. What the theory resolves with a rational behaviour of the agents, is not to decipher the role of the company in the price system, but rather the imperfect assignment when agents have incomplete information. Nevertheless, interpreting the behaviour of the agents based on their conduct, does not necessarily lead to results different from those of non-perfect assignments. This is basically the heart of the theory, imperfection. A disqualification in the argument in favour of the rational choice theory does not lead to other results, and if so it would not be optimal either. Rather, the result of the non-optimal has important effects when analysing the economic organization as such. In this way, the epistemological question is that there would be differences in each approach: from observing the results from the analysis of the firm's institution, to the results of the agent's conduct, interpreted under a behavioural and cognitive concept. (Williamson, 1975 1985, 2002).

From the perspective of this research, despite the fact that rational behaviour is central to economic theory, what is important is not to leave aside the opportunism of agents working in a non-interested way, especially if they are entrepreneurs. Following on from this, methodologically for the analysis of PO there would be another theoretical option to explain how to rationalize allocations when there is an intra relation and there are agents with an opportunistic behaviour in a context that conducive to this; the specificity of capital and specialization following Williamson (1985). But it is also the case that the conditions are up to a certain point OP's determined and institutionalized to some extent, and in fact, what is natural is a vertical growth, where there would be other characteristics which would explain transaction costs as well as the theory of regulation where the theory of industries and markets are analysed.

Management capabilities and property rights

A further issue is that the public sector activity involves diverse and complex aspects. As we have stated, using a property rights approach in economic development have been important, but they have also been influenced the capability of governments and the state to impose policies that have had strong effects on economies. In regard to this one can make a distinction, which is commonplace in the study of organizations, between searching for the notion of efficiency for the norm which directs policies, versus an idea of the -power of states- without bothering as to whether they are allocative efficient, but rather have power as in totalitarian regimes and strongly hierarchical structures (or even with strong institutions that do not lack diversity, neat and complex). One can project the idea that in organizations, the specification of property rights helps lower transaction costs as opposed to the idea that these do not matter if governments are strong to impose policies regardless of whether they are efficient or not. The latter can be an alternative to assess the results of public management in that it is not about measuring the allocative efficiency, but rather the skill and how effective governments are in raising resources to put into effect a policy that goes against opportunism, etc.

The methodological question that one wants to emphasize in this second aspect is that by analysing the performance of the economics with an institutional approach and property rights approach to explain the success of the good or bad outcomes, is that this can be biased in as much as the capacity governments to impose themselves in an efficient manner or not is not put into perspective. If the government and the state are dominant in an economy and are capable of imposing policies in a forceful way (i.e. they are effective) the issue of efficiency loses important, especially if institutions are not strong. This implies that an educational policy when the state is strong, such as for example in the 1930s Mexico, when the state promoted secular and public education (in other words is effective in applying such policy), it does not matter whether property rights are adequate but rather that this prosperity should not be seen through the lens of adequate property rights. This implies a question that limits the field of whether the performance of economies can be analysed with property rights.

The question that comes to the fore in the analysis of institutional change is whether a government has power and capacity if it lacks strong institutions. What can best be proposed is the existence of a co-evolution between government capacities and the strengthening of property rights through better and evolving institutions. In the long run, the capacities of governments with hierarchical and less democratic regimes are unable to sustain themselves without building strong property rights and institutions.

Who must pay for the agents' productivities

A third aspect deals with the analysis of whether the price system allocates more efficiently and could be applied to a situation where there is a lack and / or scarcity of resources to finance public goods. If the activity is carried out by the public sector, a strong reason to methodologically link the problem of how to allocate implicit tax more efficiently. And particularly when resources are limited these should be subject to an evaluation of optimal social cost so as to avoid waste and misuse. The solution offered by Coase for the analysis of the intra relation becomes imperative with this new argument of scarce resources and social commitment. In addition, the question of neutrality to solve equity gains relevance. The production of public goods has to be financed. It is not irrelevant if one evaluates precisely the economic sense, that is to say, to pay not only to agents but also the same institution. This is why evaluation of the productivities makes more sense when it is dealing with the social, because in the private firm, it would only deal with owners.

One cannot evade the fact that the focus on agency offers a useful basis for demonstrating the principle that it is the agents of the formal economy that contribute with taxes and that one factor are the parents and the students who would demand better use of resources. Shirking and the problem of residual provide a fertile scenario for their analysis.
But on the other hand, from the economy as a whole the optimal taxes would also treat a part of this problem. However this is not part of the objective of this article.

The weak specification of property rights (of public goods) within the public sector

In order to explore the argument of credible promises in the analysis of public management in the case of a public good, it is first necessary to limit the specifics of property rights. The discussion of differences in the spectrum of private and public goods implies certainty not only in the government model but also their action on the good. The case for -Education in regard to the diversity of property rights, there are strong and weak points. On the one hand, in the case of tax-funded public education, the more it approaches to a -fiscal exchange model of government- the more accurate the destination of the tax resources is. The property rights of taxpayers could have a specification similar to when it is a private property in education. On the other hand, if education falls within a broad public spectrum, and is thus not a strictly a public good whereby the government model is not a fiscal exchange, but rather, fiscal transfer, despotic benevolent or even leviathan model, the specification would be weak. There, we are dealing with a problem in specification.

In private education, when the organization or any agent has no influence on the private good, it would not diminish the specificity. If private education is exempt from taxation, but not from regulation, this scarcely affects specification.

In education quality is an important factor and one can observe how the price system allow for allocation, such as in private economic organizations, firms, affects this. It would be comparable to the case of a business firm in the market where the Coasean approach provides a framework for understanding the role of the firm in the price system and allocative efficiency. Analysing the cost of offering more quality when the former is decreasing, could be typical of a competitive market. Thus, the competition to offer more quality at a lower price and as a consequently at a lower cost would become a trend. But quality can also be interpreted as the way in which the sector itself is organized through the economic organizations of education services. Quality could be seen as a pseudonym of an imperfect market, in as much as organizations differ in offering education service. In the literature of industrial economics this is referred to differentiation of the product in the market, but since this is not the central discussion of institutional economics and property rights, the question of quality is here refers to a way in which public organizations are defined in regard to their educational supply. It is generally assumed that PO's don't maximize profits, but this could be substituted by an improvement on quality- an objective by itself. There are further aspects that can be incorporated into the analysis of organizations, from absorbing profits under uncertainty and risk. This takes time and is an issue addressed by F Knigth. From the perspective of Coase, on the cost of using the market and the alternative of deciding whether to go outside or resort to arrangements internally. In both cases there is room to raise property rights. However, this does not apply to public education and hence, the issue of quality. Several aspects must be taken into account.

One part of the analysis it is take advance of Coase's approach by introducing the relationships between agents within the organization, *ee* intra. What is analysed at the intra-level in an economic organization, implies the execution of internal sub-activities of an organization. In this way, a comparison of this intra-segmentation could be contrasted with each PO in order to take it up again in an -inter form, that is to say by making inter comparisons of the intra.

In addition there would be two other aspects, one methodology, the other the production or service because not only are there are idiosyncratic aspects but also a technical and technological structure with a set of latent and dominant variables; in the example which we are dealing with education would be a service. It would be a methodological question because what defines whether one deals with the external or the internal, not only depends on price (which would be the conventional

starting point), but also the advantages the agents have for coordinating vertically for the present and the future. Since not everything (or almost nothing) in public education (and private) is for profit, the question of what remains could not only imply a quantity of economic performance but also another kind of decision which could be interpreted through intra-analysis and technical relations.

There may be arrangements between agents to share some of the residual. This could be agents' quasi-rents. However, it would imply knowing whether the economies are real or pecuniary. One hypothesis that is derived from the intra analysis is that when they are real, they can involve more externally the organization and in this case the market and the price system. Otherwise, most would be pecuniary. Property rights are not clear in either of these two positions.

When it comes to the rights of taxpayers on public education, in general, the certainty of the good specification would not be staged. It would be difficult to improve the specification because, among other things, the origin of the resources that are grouped in a fund and their application in the budget of different sectors of the economy would not be known. Nevertheless, the contributing and non-contributing agents could be addressed. But this first differentiation solves a problem since part of it is advanced in specifying about those who contribute with taxes and those who do not contribute. If parents of public education students contribute with tax, much progress would be made with specifying property rights. But in an economy where there is a broad informal sector, the specification of property rights becomes blurred as there would be cases where the parents of the students who are in public education are not necessarily taxpayers. Either cases are examples of free rider behaviour, particularly those in the informal sector, or who are unemployed. The specification loses clarity of definition.

The incorporation of quality has relevance to improve the perspective of the specification. If the quality of the education is inferior, there is a gap for taxpayers, say parents, who allocate part of their resources and who would somehow expect their contribution to finance public education. But the fact that their contribution does not materialize in something tangible to each taxpayer makes property rights diffuse and in many cases non-existent. In this way, quality would neither have an effect to increase the precision of education except through a path towards informality. Being in informality requires cooperation and this can be identified and diagnosed. Unemployment is not considered here, as in addition this implies a temporal aspect.

Collection capacity and credible commitments

As we have mentioned in regard to public education, the desire to improve quality with more resources by increasing taxing for its financing, implies that in order for

taxpayers to cooperate, government commitments should be credible. In order for government plans to be successful under a planning scheme property rights of government institution are required to make the cooperative agreement between taxpayers effective.[21]

North and Weingast (1989), North (2005) emphasize that the lack of property rights discourages economic activity by not guaranteeing property and profits, in addition to having consequences on loans and financing. Based on the advantages of how the principle of "Common Law" is adapted to the interests of firms and specifically to strengthen the guarantees on investment and income, compared to the "Civil Law" that does not necessarily resolve directly on property rights, a discussion has developed especially to legitimize the role of property rights as catalysts of prosperity. In the literature, this may refer to the incentives that are obtained once the rights between the agent and the principal are specified. Transferring this to the public sector the issue can become complex because there would be no market idea and it is not clear if the price mechanism manages to allocate. The question is also whether there would be another substitute in order to be able to proceed with this approach and assert efficiency over the government's enforcement capacity. In other words, placing an intrinsic focus of efficient allocation in the same public sector.

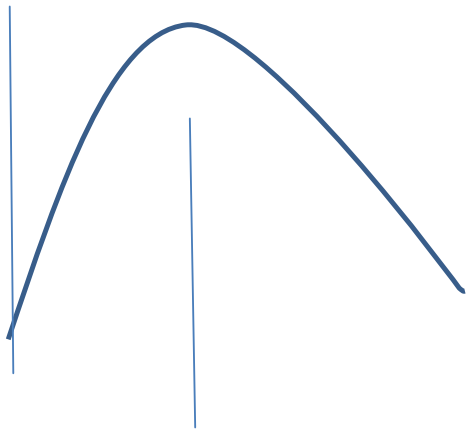
When the state has collection capacity, the question of the role of property rights does not fully explain the performance of a sector. That is to say, if there is collection capacity and if this is used to allocate more resources to a quality education service, it is unlikely for there to be complications hindering quality in the short term. The state is strong but does not guarantee that it remains permanent, and the question of time enters as a phenomenon not uncommon in economic analysis. When there is not a clear specification but rather, on the contrary, weak or non-existent, the service deteriorates and as a result the credible commitments disappear.

Some authors (Irigone and Grafe, 2012), have resorted to an inverted U curve similar to the Laffer curve, but not interpreted in the same way. Figure below would try to represent that the quality of education would be a function not only of the existence of property rights, but also of the capacity to force government actions. In the left section, there would be property rights and coordination to execute programs when the state has the financial capacity to capture both taxation and to exercise resources in quality. The right hand side shows weak property rights

[21] Here we do not make a strong difference between promise and commitment. However clearly North and Weingast article do it and they are referring to the last one but it doesn´t mean that all government (actions) promises will not exit. So, a person do promises and commitments as well and we accept both and also we know the difference because the last one could be more serious and this is not possible to see with governments actions where we expect a pure commitments.

and at the same time low government capacity to obtain resources. This would be the predation phase. The intention here is to state that in the growing part there would be three possible situations: when property rights are well specified, when there is capacity for taxation to transfer them to education, and an evolving of both. The right hand side shows the deterioration, a depredation of quality explained by lack of property rights, and the lack of invested resources and / or both.

Improving growth and distribution



The rise and decline and / or deterioration of the quality of education could be grouped into a double-entry scheme.

	Growth	Decrease
PR		
GC		

It is not possible to have property rights (PR) without having resources for investment. A typical case of questionable commitments. Credible commitments depend on several factors: Financial resources, clarity in the technical arguments, regulations and legal rules, elements to reduce uncertainty.

Clear PRs do not necessarily have an effect on the prosperity and growth and a good performance as long as there is no government capacity (GC) on the left hand side. But there could also be limited financial capacity but strong PR and low prosperity. When PRs are clear and there is no GC to finance, as can be observed on the right hand side of the figure the situation deteriorates severely. But this can also happen when there is no GC and not necessarily PR. But when there is neither of the two, the impact of the deterioration is greater.

There would be situations where the improvements can not be understood without the PR and the GC alongside each other, given that the GC can not be understood if there are no institutions that support it, such that in the left hand side a co-evolution of both aspects is involved and the right hand side a failure of one or both. This necessarily would be an alternative to both North and Weingast's and also that of Irigone and Grafe as there would have to be a co-evolution or a disconnection. This could apply to the case of insecurity in countries like Mexico.[22]

Public organization and its governance structure

What is does institutional governance in the education sector mean whether private or public? As we have discussed above, institutional governments could serve to explain why in some cases property rights in the public sector cannot be improved due to lack of specification. By understanding the governance of the entities responsible for the quality of education, on can then draw conclusions as to whether property rights are ever lost or if they are diminished through with the cost of a net waste of resources.

Two approaches to government could be considered to explain vertical integration: that of the managed control resources or that of the price mechanism. In regard to the first, the analysis has focused on whether opportunism is the main factor, given that in the industrial economy oligopolies and monopolies have from the entry blocked, scale economies, technological leadership, etc. However, the specificity of capital increases opportunism and renders assets in the public sector static as they depend technical and idiosyncratic factors. This, of course, makes Williamson's assessment more applicable to the education sector than a more conventional approach to industrial economics and regulation.

The education sector and its organization

Funding resources for public and private universities

A public (and economic) organization such as the Public University hires personnel: professors, employees and in general acquires supplies and services in

[22] Other authors like for example Stasavage (2002), do not agree completely with North and Weingast about credible commitments. However it is not discussed here.

the market. On the one hand, there is a normative and regulatory framework for labour relations. On the other hand, the PO itself involves institutionalized arrangements with a certain independence of the agents. The Theory of Transaction Costs economy (TCT) is considered here to define property rights between the parties; the Public University (PU) as an organization and institution with employees and then the interaction between the employees themselves.

In comparison with the PU, property rights of private universities differ in some aspects but are not radically different. Funds for the payment of direct expenses come not only from the contributions of the consumers but also from public resources. PU financing is less diversified. Through financial resources and within this broad spectrum, it can be observed that what each teaching institution does is not necessarily related to whether it is public or private but rather to combination of resources. This spectrum is composed of enrollment fees, tuition, payments for various services collateral to education, funds and external aid, public resources from tax and government rents, and resources from abroad. There are universities that capture funding from all sources and universities that depend solely on federal transfers.

In retrospect, a breakdown of public resources helps to understand -indirect financing- to public and private universities, in other words, the funding is not necessarily a tax in the form of a grants for one and another institution. This can appear in the case of the public universities where funding does not come from taxes, but rather from resources of the public or private sector which, if not destined to the PU, would have finance other activities in the public sector. A portion of these kinds of resources are taxes that are channelled under a regulation already established for financing public goods. Also in the PUs there can be resources from the public sector itself which are destined to education as unconditional grants. For private organizations, the indirect portion generally comes from resources that instead of coming from tax, finance private activities within a legal and regulatory framework. In any case, indirect funding represents resources that cannot be defined as tax and whose final use is part determined by the market and in part by central management.

Financing

	Government Public Resources		Private Resources	
	Direct	Indirect	Direct	Indirect
PU				
PrivU				

The more vague the funding source, the less accurate the property right for resources. Thus, while a PU is tied to a single resource, which could be very well be specified and legally regulated, there is a certainty for its development and growth compared to a Private University (PrivU) where property rights are not necessarily secure given that some cases will depend on the circumstance of the market and the uncertainty in general. When the private university has a reputation, the institution as such is provided with certainty and the issue of financing falls into second place. However, when there are insufficient resources, since there are no other rights, the public university would be disadvantaged since its growth is vertical and not horizontal. That is, it does not have the capabilities to promote itself in the market, nor services to offer.

The hiring of qualified personnel: externally and internally

The hiring of qualified personnel as teachers implies an important difference compared to other private educational organizations. The advantage of hiring personnel in the market or of developing their own personnel is not clear, as it does not necessarily lead to the same results in either type of university. The most successful universities are looking for outstanding people throughout the global labour market. If this is a condition of private universities, PUs would not necessarily be unaware of this, but the procedure could be different.

In public universities the teaching staff in many cases is taken from the same group of alumni who have been educated, trained and in many cases come to obtain specialized knowledge, and as integrated into the academic workforce. This process is neither horizontal nor vertical, that is, it does not go to the market forever and does not avoid the formation of resources within the same institution if there are growth prospects. Within the analysis of the TCT could be a decision of an external and a quasi-internal market. The external would be the conventional one where the university has a regulations for national and international open competitions, to attract the largest number of interested candidates and choose the best if there is no opportunism amongst agents and within the institution. In addition, this also implies a cost that is not necessarily rewarded. Thus, searching the market can be expensive and even more so if you do not obtain the expected objectives. This way of looking the TCT in the market is becoming more common with horizontal growth, since it does not have to increase the size of the organization to obtain qualified teachers but rather it finds them in other sectors of the economy.

In the case of vertical growth, that is, developing one's own resources, can also consider the internal labour market to be a quasi-market. It depends on other variables but in the end there would be a choice if there were the option to choose. For a private university one could have the option of choosing and that would make it more flexible. However, for a public university, it is not clear whether the transaction cost of going to the market is less than managing the resources internally, and there would be no direct response besides that it would depend on other factors outside the price system.

Specificity of the capital of qualified personnel.

Both public and private universities have already demarcated their institutional space and governance structure for their development and this is moreover a central issue in the TCT. Part of the governance structure depends on choosing between going to the market and the horizontal relationship this implies or resorting to the management of own resources in a vertical relationship. However this choice is limited up to a point. When the institution invests in specialized researchers, in the sense that it allocates resources and long-term commitments to produce knowledge, the capital will certainly be very specific. This investment refers to whether you use market searches or whether the university trains human capital for the future in the form of researchers with a high degree of specialist knowledge. Hybrid forms of organization imply that the economic organization as an institution unfolds in an environment where it not only grows in a vertical manner but also becomes more flexible and goes to the market horizontally. In private universities, part-time hiring or hiring public services and / or selling consulting increases, and there would be shared resources and reserves leading to a more flexible structure in comparison to the public university.

Assuming that the growth of the public university is vertical, it is quite feasible to find that professors are hired on a full-time basis. If the seniority and the right of permanence are recognized following union demands, then this will make the forms of labour organization more rigid and the specificity of capital will be high. It is observed that the specificity of capital, whether in a public or private university, once it is established, belongs to a government framework where the imperative becomes the development and management of human and financial resources. When there is a parallel commitment from another organization inside the public sector which work as complement of the specific capital inherent in the highly specialized research professor, the intra relation can be understood as substitute of the external market.[23]

[23] A typical situation are those institutions which offers incentives to researchers according with its productivity measured in a kind of not clearly productivity of published papers in a distinguished journal where it can´t be avoid from the problem of remnant.

Workers

Employees can expect a written contract detailing shared rights. However, this does not necessarily happen. Clauses should include: a) salary increase due to negative effects on changes in relative prices, b) non-compliance with the contract, c) salary improvements due to an increase in productivity on the part of the employee. Assuming that employees rights are established in writing, any possible disputes would not be considered in the contract unless inconsistencies caused by a high specificity of the capital were to occur. However, in the staff unions, a detailed contract is not common since at any given time the employment contract can be terminated. While this could be typical of a private organization, it is not the case for a public organization where the union can be interpreted as a specificity of capital and thus increasing the opportunism of the agents.

The Union

In the majority of cases, as a routine matter, union representatives are clear about what to request in negotiations with the employer. Nevertheless, there is no certainty regarding the interests of the members because, due to the specificity of capital of the employees', this introduces elements that are open to interpretation and may be distorted by any of the agents who are involved in the disputes. To begin with, it is difficult to get all the skilled workers *ee* professors together and the way in which this is resolved on the ground is the most pragmatic: salary increase. Salary increase is a way to unify the members and for it to have more strength in negotiations, nevertheless, with the exception of some unions of the PU whose objectives lie beyond a simple salary increase. Likewise, it implies ways of reaching agreements by sections (if there are any) and there would not be much margin for incorporating the variation that falls on: restoring the effects of purchasing power, improving perks, solving hiring cases and aid. There is no guarantee that what is voted in the sections will be the most attractive for the union members.

There will be cases where the representative of each section has more influence on other sections. In any case, if the way of shaping interests changes, which could occur following in the case of individual indifference map as in Lindhal's theory, there would be more real and more *ad hoc* indifferences to the interests of the union members. Otherwise, the way agreements are reached is inter-sectional. If indeed this were intra, there would be an alternative means of judging to where to push for wage increase rather than improving administrative transparency in the organization.

This implies that the sections cannot be markedly differentiated before union representatives. These may behave opportunistically because the productivities are different and the aspirations of the workers cannot be guarantee. The latter have no

way of making it more effective to guarantee their interests. If the interest was more institutional, the problem is greater since not all would agree with its interest. As for example, prioritizing the university over and above the loss of salary. In this way, the leader must fulfil the specific request of what the sections demand, though he can negotiate on his own.

A question that does not define the intra-labour relationship is the degree of specialization and what this implies regarding a high capital specificity. When a university prefers standardization in its teaching staff, and in teaching itself, and there is little research activity, it is best to go to the market to meet the needs of hiring personnel. However, when the public university does do research it is because its base of research professors and its relationship with the market is different. In the former case, the university goes to the market to obtain specialized personnel and in the latter, the institution goes to the market to offer research services. The union will be more viable if the teachers are more standardized rather than specialized. Hence, the more the specialization occurs, the lower the weight of the union organization. In a PU however, the union may end up insisting on their most basic of demands- that of fallen wage – though this would be inconsistent with its institutional mandate.

The boss

It is not clear whether the rector is the employer PU employer in a similar way to a Chief Executer Officer or owner of a company. In many UPs, growth is vertical growth with great specificity of capital. This means that the options open to a rector are one-directional. On the other hand, the CEO, or rector of a private university that would certainly not be similar to that of an oil company, has another type of incentive. The rector's incentives are broader and therefore more ambiguous. Indeed, the rectorship can be held either symbolically or actively. The scope of work and what can be done is much more reduced than in the private university. The CEO or rector of a private university, would in most cases let go if the company began to lose its share value. The rector of the PU moves in another sphere.

In many public universities the rector depends on the democratically elected Governor of a State. This is established in part by the Constitution and regulated by an educational institution that acts as an executor, which in turn involves implicit power. In comparison with the rector of a private university, who can also be elected among the shareholders, and the more fragmented these are, the greater his power. Another difference is that results can be seen in a more limited time. The Governor (and rector), despite being democratically elected, do not control everything and even less increase the budget, because this depends on other institutions, Congress, and how the economy is prospering. In both cases, the

organization and relations with other parties to obtain resources are different. In addition, the governor will also impose his own interests on the PU. This implies means that there is no real clarity in regard to property rights between the PU and the Government, given that agents in both institutions may operate opportunistically. Of course, there may also be unwritten agreements and obstacles. Nevertheless, the governor will count on a vertical government structure which could limit the autonomy of the PU and the rector.

Students

The rights of the students could be interpreted as the rights of the parents whose contribution comes in the form of taxes. This is both tangible and direct. Students could claim their tax contribution. When there are other values such as the right to education and transparency, the union should be responsive.

Conclusions

Despite discussing some of the adaptations of the theory of agency and transaction costs in an PO and a PU, in fact, methodological problems involved impede a full understanding of cost and growth in private companies. The specificity of capital in the PU makes the differentiates the analysis when applied to a private firm. In other words, the characteristic of specific capital results in marked difference in the pattern of growth and in comparison to the PU. Nevertheless, there is no guarantee that this specificity of capital guarantees the success of an activity given that if property rights are not clearer, any effort by government with shrinking resources would have an increasingly marginal effect. This in turn would imply that the PO deteriorates and is unable to evaluate itself, since it cannot be located in the price system.

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