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An inquiry into the explanatory virtues of transaction cost economics

Lukasz Hardt

Abstract: The aim of this paper is twofold. First, we offer a methodological reflection on how the explanatory virtues of economic theories can be assessed in a systematic way. Second, we use that theoretical apparatus to study the explanatory virtues of Transaction Cost Economics (TCE, henceforth). Precisely, we are primarily interested in assessing the progress within TCE with respect to its explanatory power rather than directly comparing TCE's explanatory virtues to alternative theories. The paper offers also some general insights into the way we compare economic theories.

Key words: Oliver Williamson, explanatory power

Introduction

There is an ongoing debate in the literature on transaction cost economics on its evidential virtues. Some authors argue that "virtually all predictions from transaction cost analysis appear to be borne out by the data" (Lafontaine et al. 2007, p. 558) or even that "TCE is perhaps the single most influential theory found in the social sciences" (Carroll et al. 1999, p. 3). Not surprisingly also Oliver Williamson claims the following: "I have no hesitation, however, in declaring that transaction cost economics is an empirical success story" (Williamson 1999a, p. 1092). However, on the other hand, there is another group of scholars declaring that "the empirical evidence does not decisively support Williamson's TCE" (Hodgson et al. 2006, p. 461) or that "testing hypotheses of this sort [i.e., of TCE] requires a professional framework governing articulation of the issue and the process of weighting the evidence. Currently there is none" (Acheson 2000, p. 347), or even that "Transaction costs have a well-deserved bad name as a theoretical device ... [partly] because there is a suspicion that almost

anything can be rationalized by invoking suitably specified transaction costs” (Fischer 1977, p. 322). However, what lacks in many studies on TCE is the precise definition of what is really meant by success story or its opposite. The aim of this paper is to offer a deeper understanding of the meaning of explanatory virtues of economic theories, and particularly those of TCE. In other words, our task is to assess the explanatory power of TCE in a systematic way. We restrict our analysis to the Williamsonian TCE and consequently also to his definition of TCs. In order to do it, we present here a theoretical framework for assessing the explanatory virtues of economic theories.

Although the compatibility of empirical phenomena with predictions of a given theory is an important virtue of a theory in question, that cannot alone offer a good measure of the goodness of explanations. Here we claim that there is a distinction between explanatory and evidential virtues of explanations. Evidential virtues are about to what extent a given explanation is supported by evidences and the abovementioned literature on TCE is precisely about that. In case of explanatory virtues we are asking “how good the explanation is, if it is true” (Ylikoski et al. 2010, p. 2). Also, explanatory virtues are not about the likeliness of the explanation. Consequently, here we focus on assessing the explanatory virtues of TCE and later we show how the appraisal of evidential virtues of TCE fits with our framework. Since there is nothing like a widespread consensus in the philosophy of science on how explanatory virtues should be defined, we start below with some basic insights into the way we understand explanatory power of theories [1]. Next, in the later parts of the second section, we present a precise theoretical framework for assessing explanatory power. Then, in the subsequent section, we start our case-study by briefly reconstructing the history of TCE where we identify its main stages of development. Next, we apply the approach here developed to the analysis of explanatory virtues of TCE. Conclusions follow.

Theories of explanatory power

There is a good set of various labels for describing explanatory virtues of theories, however, from the point of view of our study the two deserve greater attention, i.e., the explanatory power and the explanatory depth. First, in the case of explanatory power there is an implicit assumption that a given theory should be compared with another (this theory is more powerful than that one).

Second, in the case of the depth of reasoning (explanatory depth), we are not required to make comparisons but rather to analyze the dynamics of explanation in a given explanans [2] (e.g., we can find a more accurate determinant for an explaining item). However, we claim that we can use the framework for assessing the explanatory power in cases where we do not compare a theory in question to the other one but rather we ask whether there is a change in the explanatory power of a given theory in its various stages of development and hence comparisons are made primarily within a particular theory and not between theories. Nevertheless, some general comparisons of TCE with neoclassical economics are also made [3].

The idea of explanatory power can be approached in a very intuitive way. We often say that some theories are more powerful than others and also that a given theory in its different stages of development offers us divers levels of explanatory power. Take the example of physics. We agree that Einstein's theory of relativity has a higher explanatory power than the Newtonian mechanics. However, there comes a moment when we cannot intuitively asses the explanatory power of a given theory. Take the example of Gallileo's law of free fall and Newton's mechanics. Try to assess which is more powerful in an explanatory sense. It is not obvious and some clarifications and definitions of explanatory power are needed in order to address these kinds of questions systematically [4]. We do it in the present section.

First, we use a clear distinction between the explanandum and the explanans present in Deductive-Nomological theory (D-N model, henceforth) (Hempel et al. 1948). Consequently, the questions and answers we are analyzing are related to the two abovementioned elements of every scientific theory. Since the very practice of constructing the explanans and the explanandum means excluding some elements from these two sets, our theories can be conceptualized as isolations. The method of isolation is widely used in economics and is present in TCE where the typical problem to be explained is the question of whether a given transaction should be organized internally or just on the market (make-or-buy decisions) (cf. Mäki 2004). Correspondingly for the explaining domain, where explanations are constructed on the basis of the principle of economizing on TCs, precisely that the contracting parties chose the governance structure which is characterized by a relatively low level of TCs (Coase 1937). We need to use the distinction between explanandum and explanans in order to distinguish

between various stages of TCE development and hence we are to differentiate these stages by analyzing the changes in explanandum and explanans of TCE.

Second, another important contribution of the D-N model of explanation is its conceptualization of explanatory power, i.e.: "[...] the systemic power of a theory *T* will be reflected in the ratio of the amount of information derivable by means of *T* to the amount of initial information required for that derivation" (Hempel et al. 1948, p. 164). The more powerful a given theory is, the more kinds of events it explains while trying to restrict the size of its explanans [5]. The virtue of explaining much by little emerges and that forms the methodological fundament for the idea of theoretical unification. There is a shared belief amongst philosophers of science that unification is a methodological virtue, however, that raises the question whether more unified theories provide more powerful explanations. Also, there are some differences in the way philosophers conceptualize the very meaning of unification. However, in our study we simply use the idea of explaining much by little and in the case study on TCE we are to check also whether there is a raising explanatory power in such a sense.

Since we are to assess the explanatory power of TCE, let us focus more precisely on the issue of the relationship between unification and explanation. What is needed is a more clear definition of unification. According to the above mentioned D-N model explanations must appeal to true and objective laws (essential laws of nature) [6]. However, we have many sciences that are based on generalizations that have an explanatory role but fail to satisfy the criteria for lawfulness. That is the case, for instance, of economics where the "laws" have a different status than the ones in natural sciences. Therefore, in the subsequent Kitcher's account of unification the laws were substituted with generalizations. However, that did not change the very sense of unification – the virtue of explaining much by little is still in force and more precisely a theory is unified "when it provides one (more generally a few) pattern(s) of argument which can be used in the derivation of a large number of sentences we accept" (Kitcher 1981, p. 333). Consequently, unified theories can have many patterns but they should have a common core (Mäki et al. 2009, p. 186). In other words, explanations reduce to the fundamental core and hence in writing the casual histories of events we reach the basic cause or mechanism, e.g., the principle of economizing on TCs in TCE. In Kitcher's view unification simply equals explanation, while many others claim that unification and explanation are separate issues. For instance, Morrison (2000) claims that there is a trade-off

between unification and precision (of explanations), i.e., the more a given theory unified, the less precise explanations it offers. What is clear from the above discussion is that the issue of unification and explanation is rather complex and the two should be studied separately. That is mainly due to the fact that explanation as such is not a one dimensional phenomena. We are to come back to that issue later after discussing various dimensions of explanatory power.

Since the aim of the paper is to study the explanatory power of TCE, we should focus primarily on describing the designate of explanatory power, namely the explanandum and explanans, and the relation between them. Consequently, both the dynamics of change in the explanandum and the explanans as well as the dependencies between the two should be analyzed. Therefore, we make use of the Woodward's contrastive-counterfactual theory of explanation (CCT, henceforth), precisely that : "in order for a generalization to be explanatory in our sense, it need not be a law, and indeed not be an exceptionless regularity" (Hitchcock and Woodward 2003, p. 182). What follows is the claim that generalizations must be invariant under testing conditions. The more invariant a given explanation is, the deeper explanations it provides. One reservation must be made here, i.e., we are interested in invariance with respect to variables present and not present in generalization (i.e., in the explanans). Thus we should ask *what-if-things-had-been-different questions* in explanans and in the background factors. One more conclusion from CCT is worth mentioning here, i.e., the possibility of a trade-off between accuracy and explanatory depth. Therefore, as Woodward concludes, "explanatory depth is not one-dimensional" and that forms a theoretical foundation for the framework here proposed [7].

The above discussion allows us to indicate at least two important dimensions of explanatory power, i.e., the non-sensitivity and precision. Secondly, as it is clearly stated in Woodward's CCT, explaining is also an epistemic activity as far as "an explanation can only relate things described or conceptualized in a certain way" (Ylikoski et al. 2010, p. 204). Thus understanding matters. Moreover, having in mind that explanation is always dependent on the number of counterfactual inferences that the explanatory information enables and secondly that our cognitive capacity is limited one should conclude that what can be explained is constrained by our cognitive apparatus. In other words, the more *powerful* one's cognitive system is, the more counterfactual inferences it can absorb and hence the more it can explain. The possibility of absorbing new counterfactual inferences is dependent upon their characteristics. For instance,

if we have a huge number of inferences but each with a common core, then understanding of one event would ease understanding of another one. Therefore, following Ylikoski et al. (2010), we introduce cognitive salience as an important dimension of explanatory power that "refers to the ease with which the reasoning behind the explanation can be followed, how easily the implications of the explanation can be seen and how easy it is to evaluate the scope of the explanation and identify possible defeaters or caveats" (ibid., p. 214). Cognitive salience depends also indirectly on the familiarity of the language or argument structure of a given theory. Here we assert that the more familiar (in a psychological sense) a given theory is, the more counterfactual inferences one can make. Finally, we need the dimension for the truthfulness of the explications which using the label from Ylikoski's paper is called factual accuracy. Consequently, we use the framework and dimensions of explanatory power proposed in Ylikoski's contribution, however, we make some changes. In other words, we implement a predefined theoretical framework to study the explanatory virtues of TCE. Therefore, our case-study somehow also tests the applicability of the method proposed by Ylikoski et al. (2010). Before presenting our case-study some general comments on dimensions of explanatory power are needed.

Dimensions of explanatory power are independent and there might be some trade-offs between them. It is not usually the case that an improvement in one dimension results in improvements in other dimensions. Consequently, there is no such thing as an integrated measure of explanatory power. Also there is not an objective hierarchy of dimensions. What dimension is more important is rather the matter of a goal-dependent choice of the researcher and his choice is usually based on pragmatic reasons, e.g., he is interested in that dimension of explanatory power which is currently more important with regard to the kinds of questions he is asking. Moreover, the assessment of explanatory power in a given dimension is also dependent upon researcher's needs. The fact that we cannot give an objective measure of explanatory power does not imply that we are unable to compare different theories on the basis of their explanatory power. For instance, if we have two distinct theories and they are the same with respect to the level of explanatory power described in four dimensions (e.g., non-sensitivity, precision, factual accuracy, and degree of integration) but differs in cognitive salience, then we would say that the theory which gives a better explanatory power is the one with "higher" cognitive salience. So, below we present each of the dimensions of explanatory power and next we come back to

the issue of using the proposed framework for assessing the explanatory power of a given theory (here: TCE) in its various stages of development. Also, we are to comment on the relation of the framework here presented to the above mentioned "standard" vision of explanatory power as the realization of explaining much by little imperative.

The degree of integration

The assumption underlining the concept of the degree of integration states that the more a given theory is integrated into an existing theoretical framework, the more *what-if-things-had-been-different questions* it can answer. That is due to the fact that a new theory can bridge the gaps in the preexisting theoretical framework and also that a new research perspective together with the existing one may open up new dimensions of explanations. It is derived from the fact that "an integrated body of knowledge is more than the sum of its parts" (Ylikoski et al. 2010, p. 213). Also, integrated theories may enable us to make more counterfactual inferences. What we would like to add here is that the degree of integration enhances the rhetorical power of a new theory, i.e., convincing the public to the virtues of the new theory is easier if it is formulated in a language known to the audience. The rhetorical goodness of theory increases also the cognitive accessibility of a given theoretical approach.

Cognitive salience

The precise definition of cognitive salience was given earlier in this section. Here we want to underline that cognitive salience does not refer to the formal characteristics of theories. Thus there is not a direct trade-off, for instance, between the level of mathematization of a given theory and its cognitive salience. We may have two very axiomatized theories but one with a high level of cognitive salience (making of counterfactual inferences is easy) and another with a very limited cognitive salience (making of counterfactual inferences is a difficult undertaking). Although there is not a general trade-off between the mathematical complicateness of theories and cognitive salience, in many cases more complex theories are characterized by a lower cognitive salience. Also, often theories built upon the concepts known from everyday experience are the ones with high cognitive salience. The same holds for theories formulated with the use of previously known theoretical approaches. However, there is not a

prevailing trade-off between familiarity (in a psychological sense) and cognitive salience. Later in the paper we show that cognitive salience is an important dimension of explanatory power of TCE.

Non-sensitivity

We have touched upon the issue of non-sensitivity earlier in the discussion of CCT. The basic idea is that the more sensitive an explanation is with respect to changes in background factors, the less explanatory power it offers. Here we distinguish between two kinds of background factors, or, in other words, two designates of non-sensitivity. First, an explanation can be sensitive with respect to changes in the range of values the variables not present in explanans take. Second, an explanation can be sensitive with respect to the range of values the variables in explanans can take without breaking the explanatory relationship. Consequently, the wider the range of values the variables in (and beyond) explanans are taking without breaking the explanation, the more non-sensitive a given theory is. Non-sensitivity is an attribute of the explanans.

Precision

The definition of this dimension is rather intuitive. Here the question is how precisely the explanation characterizes the explanandum phenomena. Thus, precision is an attribute of the explanandum. The more detailed the description of the explanandum is, the better (more powerful) the explanation. Here we assume that the explanation is correct, namely that it correctly describes the relation between the explanans and the explanandum. Consequently, the sharpness of the explanandum matters. An important trade-off between precision and non-sensitivity emerges, i.e., "the sensitivity of an explanation is usually increased when precision of the explanandum is increased. This is simply because smaller causal deviations are needed to disrupt the dependency between the explanans and a fine-grained explanandum than coarser-grained ones" (Ylikoski et al. 2010, p. 211). We offer an example of this in our accounts of TCE.

Factual accuracy

Factual accuracy is a measure of the realisticness of the explanation [8]. Science should provide true explanations, namely the ones that describe the true causal

order of things. Consequently, "one explanation is factually more accurate than another if it has (roughly) the same level of abstraction and detail, but includes fewer falsehoods." (Ylikoski et al. 2010, p. 212) Factual accuracy refers to the isolations we often make while constructing our theories. That is also the case in economics where in basic models we do not find the notion of transaction costs. However, in recent decades many economists horizontally de-isolated the General Equilibrium Framework by incorporating transaction costs; however, it did not result in the lower level of abstraction of these models (e.g., Kurz 1974) 191. One remark should be made here, namely that it is not only the level of abstraction that matters, but also the items we are abstracting from. However, the judgment about the importance of omitted factors is usually subjective and it is often the sole decision of the researcher. Isolations are also related to the question of familiarity of a given theory. It is obvious that an important role of idealizations is to provide comprehensible explanations. In other words, we make abstractions, because our cognitive ability is limited and we are unable to analyze theories with a huge number of items in explanans and explanandum.

Earlier, we have noticed that the above methodology was originally developed for assessing the explanatory power of a given theory in comparison with another one. However, what we claim here is that it can be used to appraise also explanatory depth, since each of the dimensions presented above can serve as a "measure" of the dynamics of explanations. In that sense we are not obliged to compare a given theory to another one but rather we can compare different "versions" of a theory in question. Consequently, in such a case we can use the notion of explanatory power as a substitute for explanatory depth. We do that below in our case-study when we contrast various "versions" of TCE (e.g., Williamsonian TCE with and without production costs in its explanans). Consequently, the questions we ask are of the following kind, e.g.: does Williamsonian TCE of the 90's is more precise than his approach from the early 70's? Does Williamsonian TCE is more integrated with the "rest" of economics now or in the 70's? So, in the following section our main task is to clearly define its main stages of development.

However, before moving to our case-study some comments are needed in order to place the apparatus above described within the wider tradition of assessing explanatory power of theories and particularly the one based on explaining much by little imperative. Such an understanding of explanatory power is in general shared by D-N model and Kitcher's approach. So, what is the relation

between a growing explanatory power in Kitcher's sense (explaining much by little) and the dimensions described above? First, let's take the precision. Here there is not a general rule – one may have a more unified theory, but at the same time less precise (e.g., smaller explanandum and a radical reduction of the number of elements in explanans) than previously or vice versa (e.g., more elements in explanandum and less in explanans). Second, if unification means less elements in explanans while keeping the number of elements in explanandum constant, then we may have a growing non-sensitivity – the explanation is sensitive to a smaller number of explaining items [10]. However, if unification keeps the number of elements in explanans constant while enriching the explanandum, then the sensitivity may not change. In case of factual accuracy the theory characterized by a high explanatory power is the one holding the same level of abstraction but with less falsehoods. Holding the same level of abstraction means not changing the explanandum, then unification is only possible by reducing explanans. However, it is difficult to assess the effect of this on the number of falsehoods in a given theory. As far as the cognitive salience is concerned, what matters is not the number of elements in explanandum and explanans but their familiarity to the user of a given theory. That holds also for the degree of integration. So, in these two dimensions it is difficult to conclusively establish the character of their relation to the process of unification. Therefore, the interplay between unification and various dimensions of explanatory power should be studied on case by case method. That we do in the subsequent part of the paper where after assessing the explanatory power of TCE in five dimensions we ask whether we have a process of unification, and, if so, how it is related to the dynamics of change in the dimensions of explanatory power.

The subsequent case-study part of the paper is organized as follows. First, a brief introduction to TCE is offered, then the most important stages of its development are identified, an assessment of explanatory power in each of its dimensions is provided, and subsequently a general reflection on explanatory power is offered.

Three stages in the development of TCE

Transaction costs economics understood as a research tradition focusing on the determinants of contractual forms should be associated primarily with the Coase's paper *The Nature of the Firm* (1937). In that article Coase asks why

particular transactions are taken from the market and organized within the boundaries of the firm. His answer is based on transaction cost reasoning, precisely that transactions are organized internally when it is more costly to transact on the market than within boundaries of the firms. However, he did not offer an in-depth analysis of the determinants of TCs and only gave such ambiguous insights as the cost of finding a trading partner, etc. The introduction of the idea of TC in his 1937 paper was in line with his methodological insights, precisely that economic theories should be realistic. The firm is no longer the neoclassical "black box", but an entity which exists due to the presence of the costs of transacting on the market. The later post-Coase developments of TC reasoning were particularly marked by various attempts to conceptualize and operationalize TCs, e.g., search models (Stigler), Demsetz's theory of property rights, etc. Last but not least Coase's 1960 paper *The Problem of Social Cost* was of great importance in popularizing the concept of TCs. Finally, the Williamsonian TCE emerged in the 70's.

We do not want to reconstruct here the long past of TCE, however, some more insights into its relatively short history are desirable. That history began in the 1970s with the work of Oliver Williamson. The first appearance of the term 'transaction cost economics' was in the title of his 1979 article, *Transaction Cost Economics: the Governance of Contractual Relations*, however, the TCE framework he presented earlier, in *Market and Hierarchies* (1975) [11]. What Williamson did was not only the rediscovery of Coase's 1937 paper, but more precise analysis of the determinants of TCs. Thus he introduced such concepts as asset specificity, opportunism, bounded rationality, and frequency of transactions. His research is located at the intersection of economics and organization: "I especially found the intersection of economics and organization fascinating, and I felt that there would be a lot of research opportunities here" (Williamson 1990, p. 117). So, his strategy was to use the behavioral setup of the Simonian origin while at the same time keeping the very neoclassical idea of minimizing the costs (here: TCs) [12]. For Williamson the firm was just an avoider of negative, namely of transaction costs. Also Williamson went a step further and he not only abandons the concept of the firm as a black box, but also offered a more in-depth study on various forms the internal organization of firms can take (e.g., the study on the M-forms in: Williamson 1970). Consequently, TCs are the result of a given organizational form and what follows is a clear statement that TCs are determined by institutions (defined as

the rules of the game). Therefore, not surprisingly, Williamson is also the father of the term 'new institutional economics', in *Markets and hierarchy* (1975).

Three important developments in the Williamsonian TCE seem to be worth mentioning here. First, in his 1979 paper Williamson introduced the production costs into his framework, so TCs and production costs should be jointly economized. If production costs are present, so technology should matter also, however, Williamson does not offer an in-depth analyzes from the side of production costs. That was due to his intentional neglect of technological issues: "concentrating on the study of transaction technology resulted in disregarding the role of production technology" (Williamson 1988, p. 361). However, later he offered an analysis on the interplay between asset specificity and production costs (Williamson 1981) and we raise that issue later. Second, from the mid-80's he introduced the concept of a mixed way of contracting, namely the hybrid which had been beyond his interest in the 70's. In *The Economic Institutions of Capitalism* he summarizes his views as follows: "Whereas I was earlier of the view that transactions of the middle kind were very difficult to organize and hence were unstable, ..., I am now persuaded that transactions in the middle range are much more common" (1985, p. 83). However, the final conceptualization of his approach with hybrids on board was offered in his 1991 seminal paper. Third, in his later work from the 90's he started to analyze the issues of whether TCs depend also on the institutional framework of the market. However, he has not proposed such an overlapping theory.

The above discussion enables us to distinguish three important stages in the development of TCE, i.e., 1/ the initial Williamsonian approach (Williamson I, henceforth); 2/ the Williamsonian approach with production costs and asset specificity in the set of the determinants of TCs (Williamson II, henceforth); 3/ the Williamsonian approach with hybrids in the set of possible organizational forms (Williamson III, henceforth). These stages of TCE's development differ in the factors present in explanans and explanandum. We summarize this in the table below. Moreover, we describe the mechanisms explaining the role of various elements from the explanans in determining the emerging organizational forms. We do not claim here that the changes described below are the only differences between various stages in the development of TCE, however, we claim that they are the most important ones and that they form solid separating lines in the short history of TCE.

Table 1 Stages in TCE's development

Stage of TCE's development	Principal elements of explanans	The mechanism(s) explaining the choice of organizational forms	Principal elements of explanandum
Williamson I	Transaction costs and their determinants (mainly opportunism and bounded rationality in the presence of uncertainty)	<p>Transaction costs: "a prima facie case for the development of nonmarket (or quasi-market) forms of economic organization can be said to exist whenever the market [...] experiences 'frictions' [i.e., TCs]" (Williamson 1973, p. 316).</p> <p>Opportunism: "[...] integration harmonizes interests (or reconciles differences, often by fiat) and permits an efficient (adaptive, sequential) decision process to be utilized" (ibid., p. 117).</p> <p>Bounded rationality: "Given bounded rationality, the extent to which uncertain future events can be expressly taken into account [...] is simply limited. Because, given opportunism, incomplete long-term contracts predictably pose interest conflicts between the parties, other arrangements are apt to be sought" (Williamson 1975, p. 17)</p>	Market, firm, and internal structures of the firms (e.g., M-forms)
Williamson II	Elements from Williamson I plus costs of production and asset specificity	<p>Production costs: "The criterion for organizing commercial transactions is assumed to be the strictly instrumental one of cost economizing. Essentially this takes two parts: economizing on production expense and economizing on transaction costs" (Williamson 1979, p. 245)</p>	Elements from Williamson I

Stage of TCE's development	Principal elements of explanans	The mechanism(s) explaining the choice of organizational forms	Principal elements of explanandum
Williamson III	Elements from Williamson II	Asset specificity: "[...] governance costs also vary with asset specificity, and these also have to be introduced into the calculus" (Williamson 1981, p. 558). Elements from Williamson II	Elements from Williamson I plus hybrid

Source: Own research

Since the purpose of this paper is not to give a detailed description of TCE we now move from descriptive accounts of TCE into a more detailed study of its explaining power. However, while assessing its explanatory power in every of its dimensions we in fact quite deeply reconstruct the structure of this research approach, so we will come back to some observations given in this section and the above table. The fact that we have distinguished the three stages in the history of TCE enables us to use here the framework for assessing the explanatory power presented above. Thus we are to compare these stages on the basis of explanatory power they have in each dimension.

An assessment of explanatory power of TCE

In this section of the paper we analyze each dimension of Transaction Cost Economic development to determine whether there is progress, decline or a status quo. We compare TCE to the Coasean initial framework and to neoclassical economics. We start by focusing on the degree of integration with mainstream economic theories. We then address cognitive salience, non-sensitivity, precision and factual accuracy. Finally we investigate whether there is a process of unification within TCE and, if so, how it is related to changes in the dimensions of explanatory power.

In the previous section we touched upon the issue of the recognition of the concept of TCs in various approaches within economics. The notion of transaction costs was already known in the 1970's when Williamson published his most influential papers [13]. As such, economists working in monetary

economics, property rights approach, law and economics, and microeconomics studies on externalities were familiar with his idea of TCE. Though each of these groups of economists defined transaction costs differently, each shared the belief that transaction costs are often responsible for some market imperfections, yet each of these groups defined transaction costs quite differently (Klaes 2001). Because Williamson builds upon a key assumption of neoclassical economics – that of cost minimizing behavior – his framework proved influential and attracted many economists. Williamson expanded upon the neoliberal mainstream consensus by introducing more explanatory items:

“The strategy of borrowing behavioral assumptions from the organization theory literature and developing the implications of the behavior observed within the framework of economic analysis would seem to be one which might find application quite generally. Thus, the organization-theory approach to problems tends frequently to be rich in behavioral insights but weak analytically, while economics generally and the firm literature in particular has a highly developed modeling apparatus but has evidenced less resourcefulness in its use of interesting behavioral assumptions. Combining these two research areas so as to secure access to the strengths of each would thus appear to be quite promising.” (Williamson 1967, p. 135)

Williamson utilizes neoclassical elements rather than rooting his theory in the lesser known parallel field of behavioral economics of Simon and the Carnegie school. For Williamson, the analysis of markets is crucial: “I assume, for expositional convenience, that ‘in the beginning there were markets’. This choice of initial conditions results in what may appear to be a preoccupation with market failure. In fact, however, organizational failure is a symmetrical term meant to apply to market and nonmarket organizations alike.” (Williamson 1975, p. 20) The idea of market failure is central to mainstream economic thought and has been prevalent in the discourse since Mill’s *Principles* (1848). As Pessali (2006) claims in his rhetorical analysis of Williamsonian TCE: “This seems to be a secure starting point in a path of lower resistance with economists. The alternatives would be either to use the new term organizational failures as the natural parameter or to have no fixed parameter. Both would demand more energy from Williamson and his readers and could be seen as a more radical departure from the existing literature” (49). Similarly, Williamson also crafts his framework around the concept of bounded rationality: “I did not make express reference to bounded rationality in my 1971 article, there being other and better occasions to wave a red flag before a bull” (Williamson 1999b, p. 34).

It is clear Williamson was dependent on mainstream economic ideas in his articulation of his theory.

Before comparing Williamson's initial framework (Williamson I) and his later approach (Williamson II), and how the second approach is integrated with neoclassicism, it is helpful to look at Coase's 1937 paper and its relationship with mainstream economic theory. Coase's (1937) claim that firms emerge in order to economize transaction costs was very innovative. Firstly, Coase challenged contemporary of economic theory in the 1930s by focusing more on organizations than on markets. Secondly, Coase contributed the idea that costs resulted from the workings of the market should be analyzed in economic theory. As such, *The Nature of the Firm* (1937) was not well integrated into the existing theoretical framework of economics. Indeed, there was a weak initial response to the paper and a low number of citations in the years following the publication (Klaes 2000).

In contrast to the Coasean model, the Williamsonian TCE is characterized by a relatively high degree of integration with the existing theoretical framework (the so-called neoclassical economics). Williamson accepts its founding assumptions (e.g., "in the beginning there were markets") and then builds upon these assumptions. His strategy for changing the field of economics was to first work within the mainstream in order to garner a following for his new concepts of organizational and economic theory. In that sense he built a theoretical bridge between the mainstream economics and the organizational theory of Simon and the Carnegie school. That is why in the 1970's "he has taken only part of Simon's argument on board" (Hodgson 1993, p. 11).

Moreover, having introduced production costs in the Williamson II he made his TCE even more integrated with neoclassical economics than it was at the beginning of the 1970's, since in neoclassical theory the firm is assumed to minimize production costs under constraints.

We have seen that Williamson's ability to integrate his theory with mainstream economic ideas proved useful; it is now constructive to assess the cognitive salience of Transaction Cost Economics. Because Williamson grounds his theory in known concepts, his novel conceptual apparatus is cognitively salient. The core concept of TCE, namely the one of TCs is not a purely theoretical notion (as for instance the idea of a production function in neoclassical economics) but rather an idea with a clear designate in the real economy – indeed, we all

experience various transaction costs in everyday market activities. Furthermore, TCE itself is not a very complicated approach and it is not formulated in a formal mathematical language as the microeconomics based on GET was in the 70's. The simplicity of TCE (i.e., the relative ease with which our cognitive apparatus can use this theory) comes also from the fact that it is based on the *economizing on transaction costs* principle: "The proposed approach adopts a contracting orientation and maintains that any issue that can be formulated as a contracting problem can be investigated to advantage in transaction cost economizing terms" (Williamson 1985, p. 17). So, simply speaking, the idea is the following: organizational choice depends on the level of TCs (rational agents chose to employ the contractual form with lower level of TCs) and these costs result from asset specificity, bounded rationality, uncertainty, and opportunism. Consequently, TCE explanations are mechanistic—"explanatory process is achieved by opening the black box, and displaying the secret, internal machinery that governs the social event that is the object of our enquiry" (Rios 2004, p. 52). What are observable are the determinants of TCs. In that sense Williamsonian TCE is more operationalized than the initial Coasean claims based on the "costs of the functioning of the market system". We are more familiar (in a psychological sense) with explaining items that have empirical counterparts than with purely abstract ones. Therefore, we claim that TCE is characterized by the growing level of cognitive salience.

Above we have dealt with the issues of cognitive salience and degree of integration of TCE. We concluded that in both dimensions the explanatory power of TCE is relatively high and growing. Below we present the appraisal of its explanatory power in the three remaining dimensions. We start with non-sensitivity and then we turn to the issues of precision and factual accuracy.

The level of non-sensitivity is defined as the level of resistance of the explanation to changes in values the variables from explanans can take as well as the variables from the outside of explaining set. If we focus only on TCs and do not analyze the factors explaining a given level of TC then we can easily assess that the TCE explanations are quite non-sensitive to the changes in the level of TCs. However, this is rather obvious and we should not investigate only the "aggregate variable" of TCs but also its determinants. So, first we should define what factors we have in explanans. Second, we must check whether changes in these variables can breakdown our explanation. Third, we should also examine whether changes in variables from the outside (of the explanans) can

become a serious threat to the explanation. Therefore, we take the very basic model from Williamson's 1979 paper in which he analyses two factors responsible for organizational choice, the frequency of transactions and asset specificity. The more recurrent and idiosyncratic transactions are, and the more specific investments they require, the more probable is the emergence of a unified governance structure (i.e., a firm).

So, in Williamson's explanans we have two elements (frequency and asset specificity) and four possible governance structures as explanandum : one, market governance for nonspecific investments; two, trilateral governance for occasional frequency with mixed and specific investments; three, bilateral governance for recurrent transaction in the presence of mixed investments; and four, unified governance for recurrent contracts with specific investments. If we have a change in explanans values either frequency or the level of investments' specificity, we should have (at least for changes large enough) a change in the emerging organizational form. However, even this would only involve the original explanandum. So, there is not a possible change in explanans *ceteris paribus* that can break the explanation. The same holds for models with more explaining items (e.g., frequency, asset specificity, and uncertainty). This should be contrasted with the initial Williamsonian insights, e.g., from his 1971 and 1973 papers, where we do not find precise definition of the explanans and the emerging explanandum. For instance, in the aforementioned contributions Williamson describes the firm as a solution to various market imperfections described in a very imprecise manner. Consequently, one can find in these papers such statements as "that vertical integration would be more complete in a low-trust than high trust culture" (1971, p. 122), "repeated impersonal interactions may permit even further economies of communication" (1971, p. 114), and also that "individuals are not (all) given to the strict maximization of expected pecuniary gain but also consume "atmosphere"" (1973, p. 317). However, these ideas of atmosphere, low/high trust culture, and economies of communication have been very loosely prescribed by Williamson. That, combined with similarly imprecise explanandum, made his initial explanations quite variable and unstable. Thus we conclude that Williamsonian TCE in the 70's was characterized by a growing non-sensitivity with respect to the changes in values the variables in explanans can take.

Now we should analyze the case when some background variables change (i.e., the ones from the outside of the explanans). In other words we are generally

asking what the factors responsible for a great diversity of organizational forms are. We are concerned firstly, with whether or not contractual forms depend only on TCs, and secondly, with whether TCs depend only on the factors present in Williamson I. The answer to the first question is negative, since in his 1979 paper Williamson introduced the production costs into his framework; TCs and production costs should be jointly minimized. Next, he offered an analysis on the interplay between asset specificity and production costs: "If assets are nonspecific, markets enjoy advantages in both production cost and governance cost respects: static scale economies can be more fully exhausted by buying instead of making; markets can also aggregate uncorrelated demands, thereby realizing risk-pooling benefits; and external procurement avoids many of the hazards to which internal procurement is subject" (Williamson 1981, p. 558). Thus asset specificity started to be a more and more important of TCE's explanans. However, still his on the transaction technology seem to be more advanced (for instance in terms of possible determinants of TCs) than his treatment of production costs. We may just conclude here that before his 1979 paper his approach was quite sensitive to changes in production costs which had been originally outside explanans of his theory (it was not a non-sensitive research program). That changed with his 1979 contribution, so in regard to production costs his approach started to be non-sensitive.

Although non-sensitive with respect to production costs, Williamsonian TCE in the whole 80's suffered from a high degree of sensitivity with regard to changes in the institutional environment of the market. That is to say, institutions responsible for the functioning of the economy (e.g., formal law imposed by the state) have a profound impact on the level of TCs associated with various forms of contracting. If internal organization of transactions is used, because transacting on the market is associated with high level of transaction costs, then a change in the institutional environment aiming at reducing market transaction costs (e.g., by establishing more secure system of property rights) can make market transactions cheaper; it would encourage transacting parties to use markets rather than firms. Thus a change in a variable from the outside (in our example, the institutional environment) without any change in variables present in the explanans breaks the invariance on which the explanation is based. Williamson was conscious of that problem; however, he did not offer a precise way of how institutional environment can be conceptualized in explanans of TCE. That is why he engaged himself in promoting the New Institutional Economics where the interplay between institutions and TCs can be analyzed: "a

combined treatment of the institutional environment [...], and the institutions of governance, which is what TCE deals with, is needed" (Williamson 1994, p. 45). So, at least with respect to institutional environment, explanations given in Williamsonian TCEs are sensitive [14]. However, since such institutional changes do not occur usually in the short run one can rationally assume that institutions in the short run are constant which makes the above mentioned problem of sensitivity less serious. But still we do not have a theory integrating institutional analysis and TCs reasoning and that is why Williamson claims the following: "awaiting a unified theory, we should be accepting of pluralism" (Williamson 2000, p. 595). Additionally, Williamson notes that "although TCE has a broad range, it does not tell you everything" (Williamson 1998, p. 23).

Since there is usually a trade-off between non-sensitivity and precision (the more precise a given explanation, the more sensitive it is) we now turn to the issue of precision of TCE. To determine the precision as a characteristic of explanandum, we should analyze the set of explained items in TCE. We are concerned primarily with how to organize transactions. In Williamson I the choice was mainly between market and hierarchy (firm): "The obvious way to start was with polar modes: markets and hierarchies" (Williamson 2007, p. 375). Later Williamson II and III introduced the mixed way of contracting (e.g., the so-called hybrid): "As I and others got working on contract it was clear that there were intermediate modes of contracting – hybrid modes of organization" (ibid. pp. 375-376). Yet Williamson's contributions from the 70's and the 80's do not offer an in-depth analysis of mixed forms of transacting. Although his concept of a hybrid is rather ambiguous and is often a label under which we can put all the forms of organizational forms that are neither markets nor firms, there is no doubt that late Williamsonian TCE is more precise than Coasean initial insights. Moreover, Williamson investigates the internal structures of the firms (e.g., the so-called M-forms). Consequently, he asks not only when firms emerge, but also what kind of firms emerge. But still TCE's number of elements in explanandum is rather limited. However, this makes this research program relatively simple and hence contributes to its high cognitive salience. Moreover, it should be stressed that the judgment whether TCE offers enough precision is quite subjective since the final assessment depends on the needs of a particular researcher. One can argue that even with such a limited number of classes of explained items, TCE offers good explanations of market phenomena, especially if we are interested not in particular characteristics of organizational forms, but rather by what types of contractual arrangements transactions are organized.

The above discussion brings us to the issue of factual accuracy of TCE. Using the definition presented earlier in the paper, we subscribe to the following: “a factually more accurate explanation enables a broader range of correct inferences than an explanation incorporating idealizations, presuming that the inferences can actually be drawn without the idealizations in question” (Ylikoski et al. 2010, p. 212). If we compare the Coasean initial treatment of make-or-buy decisions with the Williamsonian TCE, we can appraise the latter to be more factually accurate. Williamson’s TCE has more correct inferences (e.g., by introducing precise determinants of TCs) than *The Nature of the Firm*, and at the same time Williamson vertically de-isolates his theory from the Coasean one (e.g., he is not taking only about firms, but also about firms’ internal structure) and also horizontally (e.g., he introduces the intermediate form, i.e., a hybrid). The next step Williamson takes is the introduction of production costs into his scheme. Thus he again de-isolates his theory by allowing production costs to be a part of his explanans (this can be treated as horizontal de-isolation since the level of abstraction remained constant). A rise in the factual accuracy follows.

Now let’s summarize what have we learnt from the above discussion. First, we have shown that TCE is characterized by growing explanatory powers in dimensions of cognitive salience and degree of integration. Second, we maintain that the non-sensitivity of TCE is limited and that particularly TCE explanations are sensitive especially to the changes in variables from the outside of the explanans, for example, the institutional environment. Third, we conclude that factual accuracy of TCE is growing, mainly due to various forms of de-isolations undertaken by Williamson. The same holds for precision, since in the subsequent stages of TCE’s development the explanandum has been enriched. Consequently, the dimensions chosen for this study enabled us to show dynamics in the explanatory power of TCE.

One final remark regarding the issues of choosing proper dimensions is needed. First, as we have mentioned in section 2, we must recognize that there is no such a thing as an objective measure of explanatory power, and thus there is not an objective set of dimensions. Consequently, the choice of dimensions as well as the assessment of explanatory power in each is somehow subjective. Second, one could construct the above case-study on the basis of other dimensions (cf. Marchionni 2009). However, one important point is worth making here, namely that a well-chosen dimension is one which captures the dynamics of explanatory

power of a given theory. In our case-study for sure this is the case with non-sensitivity, degree of integration, cognitive salience, factual accuracy, and precision. But we do not claim that the above used framework is of universal character and can be used to study the explanatory power of other approaches within economics.

Before going to conclusions, we would like to comment on whether changes in the above described dimensions of TCE were accompanied by a growing level of unification within that theory. Our analysis shows that the explanandum of TCE remained relatively stable, with make-or-buy decisions at its core. The only important change was incorporation of hybrid in Williamson III stage. The same holds for the explanans where the only important adjustment was inclusion of asset specificity in Williamson II phase. So, one can conclude that the level of unification of Williamsonian TCE as such remained relatively stable. That is coherent with our earlier theoretical discussion where we concluded that we do not have general rules linking explanatory power in unificationist sense with the approach here described [15].

Conclusions

In this article we have presented a framework which enabled us to assess the explanatory virtues of TCE. Consequently, we analyzed its explanatory power in five dimensions. It appears that TCE is characterized by relatively high (and growing) explanatory power in three dimensions – cognitive salience, degree of integration, and factual accuracy. In the remaining two its explanatory power is more limited. As far as non-sensitivity is concerned, we have shown that explanations in TCE are sensitive to changes in variables from the outside of explanans; however, we concluded that these changes (particularly in the institutional framework of the market) can be in short run neglected. That is why Williamson in his 2000 paper restricts the explanations given in TCE only to situations in which the rules of the game (institutions) are given and the choice is only between various governance structures. Consequently, we claim that by restricting the analysis to situations of constant institutional environment we can significantly increase the non-sensitivity of TCE. The issue of precision is more complex, yet we have shown that the precision of TCE is also growing due to the introduction of new elements into its explanandum. Finally, we may conclude that the general explanatory power of TCE has increased significantly since the Coasean initial insights.

The case of TCE here presented supports also our methodological claims made in the first part of the paper. First of all, the methodology originally proposed by Ylikoski and Kuorikoski (2010) for making inter-theoretical comparisons with respect to explanatory virtues proved to be useful in making intra-theoretical ones. Secondly, we have shown that a raising explanatory power in the sense of D-N model (the virtue of explaining much by little) does not necessarily leads to a higher explanatory power in each of the five dimensions here proposed. In other words, the process of unification does not equal a rise in explanatory power in the sense attached to that idea in the paper by Ylikoski and Kuorikoski (2010). Thirdly, since the idea of explanatory power is a multidimensional one, there is no such a thing as "an aggregate" measure of explanatory power. That leads to a more fundamental question whether economic theories can be compared on purely objective basis, namely without the influence of the needs and the preferences of those making these assessments. Therefore, more research on these methodological issues is needed as well as more case studies using the five dimensional conceptualization of explanatory power.

Endnotes

[1] In recent years some important general contributions on explanations were published (see Woodward 2003, Lipton 2004, Persson et al. 2007). Additionally some work in the domain of economics has been done (see Kuorikoski 2007); however, these publications do not focus directly on the problem of explanatory power.

[2] In the entire paper we subscribe to the Hempel's (1948) conceptualization of explanans and explanandum: "By the explanandum, we understand the sentence describing the phenomenon to be explained (not that phenomenon itself); by the explanans, the class of those sentences which are adduced to account for the phenomenon" (p. 152).

[3] By neoclassicism we simply understand the research approach within economics based on general equilibrium framework without transaction costs, with firms conceptualized as production functions, and without analysis of determinants of given organizational forms.

[4] In recent contributions dealing with explanatory power of theories in social sciences usually some intuitive definitions of explanatory power are used. That is why the authors of such works often write about conformity of theories with evidences rather than about explanatory power (e.g., Franck 2002).

[5] The elements of explanandum are grouped in classes. As such the number of distinct class of items is of importance rather than the the number of items in explanandum.

[6] At least one fundamental law of nature must be included in the explanans.

[7] A similar statement can be found in Marshall's *Principles of Economics*: "every widening of its [economics] scope involves some loss of this scientific precision; and the question whether that loss is greater or less than the gain resulting from its greater breadth of outlook, is not to be decided by any hard and fast rule" (Appendix 3, paragraph 33). Consequently, according to Marshall there is not any hard rule of how one can make general comparisons of economic theories.

[8] Here the term realisticness is particularly used in its referential meaning, namely that explanations refer to real things (here: economic phenomena) (see, Mäki 1992).

[9] Horizontal de-isolation is defined here as including that which has previously been excluded in an isolation while maintaining the same level of abstraction.

[10] That holds under the assumption that reducing the number of elements in explanans does not lead to a higher sensitivity of explanandum to the changes of the values variables in explanans are taking.

[11] Coase did not use the term transaction costs in his 1937 paper, although he developed the idea of TCs. Williamson too did not use the term in his pre-1979 papers; though he extensively wrote on the idea of transaction cost economics, he did not use that term in expressis verbis manner.

[12] For more details on the reasons why Williamson situated TCE at the intersection of economics and organization, see the contributions underlying the role of his Carnegie experience (Hardt 2009, Williamson 1996).

[13] For instance, we have noticed that in the *American Economic Review* the term 'transaction cost(s)' was not present before 1950; however, in the subsequent years it was quickly popularized. In the 50's we find 4 AER papers containing that term, in the 60's 30, in the 70's 98, and in the 80's 163.

[14] There are more factors to which TCE's explanations are sensitive, e.g., a change in cognitive capacities of contracting parties would probably affect the

extent to which they are bounded rationally and thus influence the chosen contractual forms.

[15] Another interesting issue for future investigation is a case where there is a declining explanatory power in the majority of dimensions here described. For us a good candidate for such theory is the modern theory of economic growth rightly described by R. Lipsey as an “internally driven research programme, [namely] a research programme that is driven by its own internal logic. Investigators seek to understand problems created by the models that they are using, rather than deriving their problems from observations.” (2000, p. 177). In such a theory there is a declining degree of integration with an existing theoretical framework as well as a decreasing cognitive salience. Also, since the theory is more and more complicated in its subsequent stages of development, it is losing its factual accuracy (a growing level of abstraction for the same number of falsehoods). Its precision remains stable, i.e., the main research question in its subsequent phases of development is what determines the level of GDP. The issue of non-sensitivity is more complex and requires more in-depth studies. However, the above shows that the framework here proposed is able to identify the theories with decreasing explanatory power.

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