

Ronald H. Coase, Friedrich A. Hayek, and the Institutional Structure of Production and Exchange

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ABSTRACT. In this essay, we carefully examine the multi-dimensional influence of Friedrich A. Hayek on Ronald H. Coase's most important theoretical contributions. We emphasize the shared context at the LSE in the 1930s within which both authors reacted. The same pattern of institutional reaction to the formal similarity proposition of general equilibrium theory is highlighted. In particular, we argue that the economic calculation debate molded Coase's transaction cost institutional argument in his seminal "The Nature of the Firm" (1937) and his account on the so-called (Stiglerian) Coase Theorem in "The Problem of Social Cost" (1960). In the latter, the connection is through the influence of his long LSE friend Abba Lerner.

Key-words. Ronald H. Coase, Friedrich A. Hayek, transaction cost, Coase theorem, institutions.

RESUMO. Neste ensaio, é examinada a influência multidimensional de Friedrich A. Hayek nas mais importantes contribuições teóricas de Ronald H. Coase. É enfatizado o contexto histórico compartilhado por ambos os autores na LSE dos anos 1930. O mesmo padrão de reação institucional a proposição de similaridade formal da teoria do equilíbrio geral é apontada. Em particular, argumentamos que o debate do cálculo econômico moldou o argumento de custo de transação de Coase em seu seminal "The Nature of the Firm" (1937) e no assim chamado Teorema de Coase em "The Problem of Social Cost" (1960). No último, a conexão é pela influência de Abba Lerner, seu amigo dos tempos de LSE.

Palavras-chave. Ronald H. Coase, Friedrich A. Hayek, custo de transação, Teorema de Coase, instituições.

JEL. B20, B31, I30.

Área 1 – História do Pensamento Econômico e Metodologia.

I. PROLOGUE: THE YEARS OF HIGH CONTROVERSIES

The year is 1937. In a relatively short temporal spectrum and small spatial locus, many simultaneous challenging seminal ideas were arising at the center of economic theory, culminating in the publishing of Friedrich A. Hayek's "Economics and Knowledge" (1937), Ronald Coase's "The Nature of the Firm" (1937), John Maynard Keynes' 1937 response to his critics in "The General Theory of Employment" (1937), and one could also argue the lesser-known article by Terence W. Hutchison, "Expectation and Rational Conduct" (1937). The common theme in these four articles of such distinctive authors was a profound critique of 1930s economic theory and its postulates. It was the plea for the analytical internalization of the domains of dynamics, uncertainty, and ignorance, that is, the "dark forces of time and ignorance which envelop our future" (Keynes, 1936, p. 161). The locus was, at the time, the center of the

economic profession, England, especially in the rivalry of the London School of Economics (LSE) and the University of Cambridge.

Hayek was invited by Lionel Robbins to give four advanced lectures in the lent term of 1930-1 at the LSE. After a quite striking entrance in the English academic world, Hayek was invited in April to hold a visiting professorship position using the Tooke Chair at LSE. After two terms, in 1932, it was offered to him by William Beveridge the permanent Tooke Chair in Economic Science and Statistics. With the revision of Robbins, Hayek soon collected his four lectures in his famous and controversial *Prices and Production* (1931). Hayek's entrance was marked by two main controversies that completely influenced the intellectual environment at LSE. The first was the subject of his four lectures, the business cycle. Hayek's business cycle theory starts with the Wicksellian distinction between savings and investment and natural and monetary rates of interest. Hayek then followed the lines of his mentor, Ludwig von Mises, by emphasizing the distributional nature of Wicksellian cumulative processes (the Cantillon effect) and the real effects of this redistribution on the heterogeneous capital structure during the economic cycle.

Following the Austrian capital theory, Hayek understands capital as heterogeneous capital goods integrated within a broader complementary coordinated macro-structure of value imputation. Such a complex structure is both a cause and consequence of the sustained level of productive specialization in an advanced industrial economy. Capital is not a homogenous mass that can be molded, moved, and reshaped without any economic (opportunity) cost. These capital goods are not totally and only determined by its objective physical properties but by the subjective and creative imaginary perception of the entrepreneur. This derives the non-trivial costs of changing, repositioning, and modifying capital in an organic complementary structure. This is analogous to Coase's transaction costs argument regarding the firm. Moreover, pivotal to the Austrian capital theory is the interest rate coordination function in the capital structure. A general price coordination notion that would be crucial to Coase's theory. The second great and influential controversy in which Hayek was actively involved was the economic calculation debate, analyzed in the next section.

In 1929, Coase went to LSE to complete the last year of his Bachelor of Commerce. Although his initial predisposition was a career in law, his "intellectual revelation" to Arnold Plant's seminar in 1931 changed his plans entirely. Plant had been a student of Edwin Cannan and was brought to LSE from South Africa one year earlier, in 1930, by his contemporary, the recently hired and young head of the economics department, Robbins. Cannan had resigned his position in 1927 and his substitute, Allyn Young, suddenly died in 1929. Plant had a tremendous influence on Coase's research interests and in his personal academic life. Plant was a common sense institutional applied economist with an interest in industrial organization. In addition, Plant was suspicious of the more abstract high theory - such as the general equilibrium theory developments. Soon after Coase's final examinations, with Plant's support, he was awarded a Sir Ernest Cassel Travel Scholarship to the United States for the academic year of 1931-2.

In the period before his final examinations, Coase (1988a, pp. 37-8) was particularly interested in cost theory and the construction of cost curves. However, as Coase tells us, "the subject which dominated the discussion of economics at LSE in the last few months of the final examinations was far from my interest. It was the structure of production - not the organizational structure of production that was going to absorb me but the Austrian capital structure of production, both teachers and students at LSE having been captivated by Hayek's public lectures given at LSE in February 1931."

As Coase (1982b, pp. 8-9) recalled, Hayek's intellectual impact was very significant, including on his own thinking. In particular, the economic costs in the capital structure variation, i.e., the cost of market (ex)change.

"They [the lectures] were undoubtedly the most successful set of public lectures given at LSE during my time there, even surpassing the brilliant lectures Viner gave on international trade theory. The audience,

notwithstanding the difficulties of understanding Hayek, was enthralled. What was said seemed to us of great importance and made us see things of which we had previously been unaware. After hearing these lectures, we knew why there was a depression. Most students of economics at LSE and many members of the staff became Hayekians or, at any rate, incorporated elements of Hayek's approach in their own thinking. With the arrogance of youth, I myself expounded the Hayekian analysis to the faculty and students at Columbia University in the fall of 1931."

Coase spent most of his time in the U.S. making primary source empirical research in vertical integration. The embryonic insight of "The Nature of the Firm" was, as it is well known, developed by Coase in this travel. Soon after his return to London, in Summer 1932, Coase started to conceptualize the notion of transaction costs. In Fall 1932, with Plant's recommendation, Coase was hired by Dundee School of Economics and Commerce. Coase presented for the first time the systematized ideas contained in his 1937 paper in the first lecture of his course on "Organization of the Business Unit" at Dundee. He drafted the first version of "The Nature of the Firm" in 1934 and would return to LSE in 1935, after a brief passage at the University of Liverpool in 1934-5 as an assistant lecturer.

Even when Coase (1982a, p. 31) was not at the LSE between 1931 and 1935, his "association with LSE never ceased." Coase's correspondence with his "friend and fellow student, Ronald Fowler, who had received an appointment in the Commerce Department," had kept him "informed of the developments" at the school. Moreover, during his period at Dundee and Liverpool, Coase spent his vacations at LSE collaborating in his study of the pig cycle with Fowler on what would culminate in the first elaboration of the rational expectations notion (Coase and Fowler, 1935, 1937, 1940).

Hayek and Coase shared the spatial and temporal locus at LSE.¹ They also shared the same intellectual context that act as the background of each individual particular contribution. As Coase (1982a, p. 32) recalled, the LSE in the 1930s lacked doctrinal commitment which resulted in a very receptive and open intellectual environment. Hayek and John Hicks were perhaps the most notable examples. Hayek first introduced the Continental Austrian and Wicksellian thought and Hicks reaffirmed the Lausanne general equilibrium perspective. Hayek, in particular, was a gravitational reference figure around which the various controversies occurred.

According to Coase (*ibid.*), "Hayek nonetheless exerted considerable influence through his profound knowledge of economic theory, the example of his own high standards of scholarship, and the power of his ideas." In the context of the intellectual atmosphere within the LSE walls, the modern post-1930 economic theory took its shape. This is recognized by Coase (1982a, p. 34), for whom "[w]hat was done by the economists at LSE, principally by Robbins, Hayek, and Hicks, was to play a leading role in what we can now see was an international movement which brought into being, for good or ill, the modern age in economics."

In an interview with James M. Buchanan, this influence on Coase is admitted by Hayek (1983, pp. 247-8) but is not developed in his remarks. Buchanan asked, "[a]mong prominent thinkers, who are the men you think you have influenced most?" Hayek answers saying that he could not think of anyone in that category, especially of the older generation in the 1930s. But he found that much of the younger generation in the 1930s seemed to be greatly influenced by his ideas. Hayek mentions George L. S. Shackle. Buchanan replied: "Oh, I don't think there is any question of the group at [LSE]: Shackle and Ronald Coase. Surely his ideas on cost were --." Hayek agrees but does not detail his comment: "Yes, Ronald Coase probably, too."

In this essay, we attempt to provide a historiographical detailed discussion of the influence of Hayek on Coase's ideas. The same pattern of institutional reaction to the formal similarity proposition of general

¹ Hutchison studied at Cambridge and, after completing in 1934 his Bachelor's degree in Economics, spent one year at LSE before getting a position in Germany in 1935.

equilibrium theory is highlighted. In particular, we argue that the economic calculation debate molded Coase's transaction cost institutional argument in his seminal "The Nature of the Firm" (1937) and his account on the so-called (Stiglerian) Coase Theorem in "The Problem of Social Cost" (1960). In the latter, the connection is through the influence of his long LSE friend Abba Lerner.

II. HAYEK, ECONOMIC CALCULATION DEBATE, AND "THE NATURE OF THE FIRM"

The English-speaking phase of the socialist economic calculation debate was initiated by Fred Taylor's 1928 American Economic Association presidential address in which he restated the formal similarity of the marginal preconditions to resource efficient allocation in any economy, be that a market decentralized or central planned. Taylor suggested the practical mathematical solution to the same set of general equilibrium simultaneous equations that describes any economy. Other economists - such as Henry Dickinson, Maurice Dobb, Abba P. Lerner, Evan F. M. Durbin, and Oskar Lange (1937, 1938) - developed in more rigorous and elegant general equilibrium frameworks the normative consequences and practical feasibility of the theoretical formal similarity conclusion by equilibrium theory.

In this context, Hayek reacted to this incipient English literature in *Collectivist Economic Planning* (1935), where he recaptures the German-speaking phase of the debate in the 1920s soon after the publication of the inaugural piece by Mises (1920, 1922). Hayek's main point was that the English-speaking participants of the debate were neglecting the insights and certain common knowledge of the Continent, especially the anticipations and advancements of Friedrich von Wieser, Vilfredo Pareto, and Enrico Barone along with the German debate by N. G. Pierson, Mises, and Georg Halm (e.g., Hayek, [1994] 2008, pp. 79-80). In fact, one year earlier Robbins already indirectly reacted to this growing literature in chapter VII of his *The Great Depression* (1934a, pp. 148-56).

As usual in the 1930s economic literature embedded in methodological disputes, Coase starts "The Nature of the Firm" (1937) on some methodological ground, on the nature and significance of the foundations and assumptions of economic theory. In his view, these were not sufficiently clearly stated and explicit. Indeed, this was a common feature at the time when the not so clear statements of assumptions, tautologies, and conflicting definitions generated needless controversies. In this sense, it was needed that the concept of the firm had a clear definition and that this definition could be contrasted with what is understood as the real-world firm, i.e., that the definition could be judged as realistic.

Before giving such a definition, Coase exposes a problem derived from the socialist economic calculation debate. Coase illustrates this problem by the description given by Sir Arthur Salter on the economic system as being coordinated by the relative price system where - now referring to Hayek's inaugural lecture at LSE, "The Trend of Economic Thinking" (1933) - society became not a top-down organization but an interdependent cooperative organism. This economic system "works itself" in the sense that all the allocative coordination of scarce resources is strictly dependent on the price mechanism. This description by Salter is quoted "with approval" by Plant in his own inaugural lecture at LSE, "Trends in Business Administration" (1932). Indeed, Coase (1937, p. 387) goes on, "it is often considered to be an objection to economic planning that it merely tries to do what is already done by the price mechanism." Reverberating in some degree the response to the anarchy of production critique in a market economy, Coase added that "[t]his does not mean that there is no planning by individuals. These exercise foresight and choose between alternatives. This is necessary so if there is to be order in the system."

However, Coase (p. 388) argues that this price mechanism coordination monopoly is not sustained by real-world empirical facts. In a firm organization, "[i]f a workman moves from department Y to department X, he does not go because of a change in relative prices, but because he is ordered to do so." The firm with the entrepreneur coordinator leadership, the figure inserted in the competitive system that "takes the place

of the price mechanism in the direction of resources,” eliminates all market transactions within the internal production. Indeed, Coase indicates, this is precisely the appropriate definition and the distinguishing mark of the nature of the firm. Furthermore, Coase notes that the existence of this kind of supersession of price mechanism in the firm realm is a strong objection to those who are against economic planning on the ground that the problem is solved by the price system. Therefore, these authors (i.e., the anti-planners) “can be answered by pointing out that there is planning within our economic system which is quite different from the individual planning mentioned above and which is akin to what is normally called economic planning” (pp. 387-8).

In this passage, Coase seems to miss the main theoretical point of the economic calculation problem. That is, even in the supersession of exchanges via prices within the firm, the firm and the entrepreneur coordinator have all the knowledge features of relative prices and costs given by the external relative price system, assuming a market for each of the inputs and outputs. Therefore, the economic calculation argument is perfectly compatible with the kind of “planning” within firms. The argument by Hayek ([1935] 1948) and Robbins against planning was not in relation to plan or not in an economy, but what kind of planning coordination, i.e., total central planning or decentralized planning by the individuals (that can be formed in organizations, firms, and associations within the organism of market institutions).

Probably Coase had been exposed to this argument by Hayek and Robbins but apparently he only understands decentralized planning in the (formal general equilibrium) restricted atomistic sense where, in consequence, no space for firms is available. Thus, in 1937 Coase states the dichotomy of exchanges occurred by hierarchies such as the firm and exchanges within the price mechanism as *equivalent* to the central and decentralized planning debate. Coase do not see any difference in *kind* between the two mentioned planning types. That is, between exchanges made in hierarchical organizations such as the firm inserted in an institutional architecture of decentralization of knowledge and central planning within an institutional architecture of total command. Of course, this is the view derived from the atomistic general equilibrium models. It may be no surprise that for Coase the elders at LSE, especially Plant, Hayek, and Robbins, *prima facie* did not give much attention to his paper and to the transaction costs insight.

Nevertheless, Coase (1937, p. 389) concedes that the firm exists, as Robbins (1932, p. 71) pointed out, “related to an outside network of relative prices and costs.” Adding that it is important to discover the nature of this link between the inside firm and the outside market exchanges. Coase also quotes a passage by Dobb in which he describes the organic character of the “single unit cell in a larger organism, mainly unconscious of the wider role he fills.” In a footnote on this quote, Coase (1937, p. 389) explicitly equates the suppression of market exchanges via the price system with such transactions been internally conducted by a new firm organized by an entrepreneur coordinator or by the State, suggesting that the nature of the planning is the same in both cases.

“It is easy to see when the State takes over the direction of an industry that, in planning it, it is doing something which was previously done by the price mechanism. What is usually not realised is that any business man in organising the relations between his departments is also doing something which could be organised through the price mechanism. There is therefore point in Mr. Durbin’s [1936] answer to those who emphasise the problems involved in economic planning that the same problems have to be solved by business men in the competitive system.”

When the analysis is focused on a specific industry in which the markets for the various inputs and the output product is preserved, i.e., the relative price formation of inputs and opportunity costs are able to be formed in outside markets, the nature of the planning inside a firm directed by an entrepreneur or by the State *is* the same. Hayek and Robbins would agree with that since this is not the problem in dispute in the economic calculation controversy. The problem is with total or quasi-total central planning, especially with the entirely suppression of capital goods markets and the incapacity of rational economic calculation in

producers' expectations. Producers' expectations refers to the continued process of adequacy of the higher order goods as a means of production to the lower order goods and thus of consumers' demand.

In a multi-stage, complex capital goods economy, these expectations are imputed from the evaluations by the lower order goods which are in turn imputed from consumers' demand. Mises' initial argument is about how a centrally planned economy without an organized higher order goods market could realize the rational economic calculation made by the process of profit and loss accounting synthesized in monetary exchange value terms, the third function of economic calculation. Without a capital goods market, producers' evaluations are trapped in subjective value terms. There is no mechanism to synthesize in an objective measurable common denominator the rational economic calculation. Without this market, no price formation of capital goods can be formed. Without capital goods prices, there is no way to check producers' expectations in an objective rational form as is made by monetary price and loss accounting.

In Mises' view, the absence of a capital goods market would result in all economic decisions on production being made without market price information about the real value of inputs by consumers because the process of imputation and economic calculation could not be done. Thus, Coase's analysis is problematic when it equates the type of planning such that market socialists were advocating with a new firm creation. Of course this scenario is different regarding the socialization of an entire economic sector or industry. What is interesting is that Coase (1937, p. 389) delimits an important qualitative difference in the case where a new firm emerges spontaneously and contrasts this when the State takes the direction of an industry. The difference, Coase argues, "is that economic planning is imposed on industry while firms arise voluntarily because they represent a more efficient method of organising production. In a competitive system, there is a 'optimum' amount of planning!"

Coase perceives that there is a drastic institutional divergence between a firm and its island of planning surrounded by a sea of market institutional creation, transmission, and storage of knowledge or a sea of central planning. That is, the imposed generalized planning of economic sectors. Hence, in Coase's view, the existence of internal organization to solve the resource allocative problem by the firm is a consequence of the cost of using the market coordination device being superior to the cost of undertaking an internal inputs arrangement by the entrepreneur coordinator. The main items of marketing costs are perhaps the costs of discovering what the relevant prices are, i.e. the costs of discovering the relevant knowledge to production. In addition, the inevitable incompleteness of long run contracts is a fundamental factor for the existence of the firm and for vertical integration.

According to Coase (1937, p. 395), the upper bound of the firm is defined, first, by the "decreasing returns to the entrepreneurial function, that is, the costs of organising additional transactions within the firm may rise." Second, the coordinator suffers from declining marginal gains. These two reasons are synthesized by the diminishing returns to management. Third, the supply function of one or more factors may be more price-elastic to large firms, i.e. the supply price may be greater to large firms. Thus, "a firm will tend to expand until the costs of organising an extra transaction within the firm become equal to the costs of carrying out the same transaction by means of an exchange on the open market or the costs of organising in another firm."

An interesting example of the connection of the Coasean argument for the existence and size of the firm with the economic calculation debate is that Murray N. Rothbard (1974, p. 75) adopted the original calculation argument and applied it to the upper bound of the firm. "This means that, just as Socialist central planning could not calculate economically, no One Big Firm could own or control the entire economy. The Mises analysis applies to any situation where a market for capital goods has disappeared in a complex industrial economy, whether because of socialism or because of a giant merger into One Big Firm or One Big Cartel." During the formation process of the One Big Firm, the capital goods market would be gradually eliminated for all the direct and indirect inputs. With no capital goods markets, the connection

between the firm's internal coordination and the set of knowledge derived from the price mechanism coordination (such as consumers' values) disappears. In this One Big Firm situation, the planning nature within the firm became equal in economic calculation terms of a centrally planned society. In the process of enlargement, the One Big Firm would necessarily have economic calculation problems. The economic calculation problem imposes an upper bound limit to the extent of the firm (cf. Klein, 1996).

There is, as Bylund (2014, pp. 321-2) correctly noted, a crucial difference in Coase's view. Coase sees the firm only from the perspective of substituting and internalizing transactions that would be made external to the firm by the price mechanism because the cost of coordinating the transaction inside the firm is lower than to coordinate from the market. Thus, Coase "assumes prices are given, yet not necessarily known and therefore costly." In this sense, Coase in 1937 failed to see the extent of the nature of the economic calculation and knowledge arguments made by Mises, Hayek, and Robbins. The young Coase is ambiguous with the market socialism literature proposals, such as setting up the pricing with marginal costs rules.

While writing his ideas in "The Nature of the Firm," Coase does not fully perceive the epistemic institutional problems within the economic calculation debate, especially concerning the assumptions of knowledge. For Coase, with his focus on the industrial organization view of the problem, prices (i.e., knowledge) are *given yet not known, thus costly*. The problem is with the cost of using such a knowledge coordination mechanism. Implicit in Coase's view is that all the alternative coordination arrangements have the same capacity of producing the relevant knowledge to the coordination of individual plans. However, and this is Coase's grand contribution, the same amount of coordination can only be produced with different costs in different contexts.

III. UNCERTAINTY AND OPPORTUNITY COST: KNIGHT, HAYEK, AND "THE NATURE OF THE FIRM"

In the late 1930s, Coase already sensed that the practical feasibility of market socialists proposals were fragile. First, Coase (1938) advanced a LSE tradition on opportunity cost in a series of articles to *The Accountant*, discussed in more detail in the next section. Second, in the 1940s Coase (1946) opposed the Hotelling-Lerner marginal cost pricing in declining average (and marginal) costs contexts on account of the marginal cost controversy. The first is important because the Lange-Lerner criterion of marginal cost pricing assumes that cost (thus, prices) is *given and objectively measurable*. This is analytically true in the hypothetical state of stationary equilibrium. However, this vision misses the subjective disequilibrium processes of opportunity cost in economic decisions. In any real dynamic analysis, the marginal cost pricing rule does not give the planner any clear and sensible route guidance to organize the production and relative prices.²

With the notion of subjective opportunity cost, the notion of economic cost changes from the objective accounting of marginal pricing to the subjective value estimations of the best action not taken, i.e., the alternative (second best) path of choice sacrificed in the process of judgment and choice in an uncertain environment. Since the actual alternative path of choice is never really taken because of the time element, the opportunity cost can never be really objectively measured by external observers. Cost valuation is only subjectively determined. Coase shared this view, saying that "[o]pportunity cost is certainly a subjective concept. You choose something and let go all other possibilities." Although the cost is subjective, it is somehow (subjectively) observable, "[o]therwise, it would not be so useful a concept." But an external

² Coase (1946, p. 170) referred to the relevant passage by Hayek (1935, pp. 226-31) in his account on the marginal cost controversy. Hayek (p. 228) also refers to Fowler's book, *The Depreciation of Capital, Analytically Considered* (1934), as supporting the view of the impossibility of marginal pricing in public utilities. This is a position that Coase would revive in his article on the marginal cost controversy and his multi-part tariff proposal.

observer, as a central planner, cannot objectively and “directly measure cost, either. The highest opportunity that you let go when you make a choice will never materialize. In that sense, it is not knowable” (Wang, 2014, p. 116).

After providing the reason why firms and markets exist, Coase (1937) mentions the classification of one of the assumptions of equilibrium static theory by Kaldor (1934) as that all relevant prices are known to all individuals, contrasting this to be an unrealistic perspective. This has a more profound critique. Namely, that is an implicit assumption by neoclassical equilibrium theory of perfect relevant objective knowledge given to all agents. This theme can be understood as *the* main theme of all four 1937 articles mentioned. The general equilibrium theory, used to state the theoretical formal similarity of different institutional forms of organizing production and to defend the *practical* feasibility of an alternative system that would mimic the functions of the price mechanism that is embedded in a particular proper institutional framework, has as hypothesis an unrealistic fictional assumption, perfect objective knowledge.

The concurring alternative theories for the existence of firms is seen as unsatisfactory by Coase (1937). One of these views, propagated by Abbott Payson Usher and expanded by Dobb, is that the firm is a necessary consequence of the increasing complexity of the division of labor where the need of an integrative force is given by the firm. Coase (1937, p. 398) rejects this view suggesting that the need of an integrative force in an economic system is already given by the price mechanism, adding that “[i]t is perhaps the main achievement of economic science that it has shown that there is no reason to suppose that specialisation must lead to chaos.” In his view, the problem is not that there is an integrative force in specialization and division of labor, but what integrative forces should prevail in each specific particular context, i.e., the integrating force of the firm lead by the entrepreneur coordinator or the price system impersonal and decentralized integrating force. The most interesting and accepted alternative explanation for the firms’ existence, Coase argues, is the one given by Frank Knight’s *Risk, Uncertainty, and Profit* (1921).

Coase gives great detail to the discussion of Knight’s views. Knight was a great influence on Coase’s thinking and at the LSE in general in the 1930s. Especially, as we will see, in both Hayek and Hutchison important 1937 papers. According to Coase (1993, p. 239), mainly as a result of Robbins’ teaching, Knight “was regarded at London School of Economics as one of the greatest of economists” with his book being “closely studied by all serious students of economics there.” In some sense, it was Knight that grew the early embryonic ideas and anticipated directly some aspects of Hayek, Coase, and Hutchison contributions - and also indirectly Keynes’ ideas on uncertainty and time. In his trip to the United States in 1931-2, Coase visited some universities including the University of Chicago and he talked to Viner and sat in Knight’s early morning class.

Knight was extremely influential in LSE in the 1930s. One of the initiatives taken by the lead of Robbins was to translate and reprint important economic theory tracts, especially in Continental economic theory, as a manner to introduce foreign advances in the insulated British intellectual thought. Knight’s book was not *prima facie* intended in this project of reprints, it was after all written in English. But the book had become so central in Robbins’ course in “General Economic Analysis” that the students’ demand *vis-à-vis* the supply price of the available previous editions turned out prohibitive for the book purchase. The original publisher had ceased the printing of the book. Thus, the book was number 16 in the Series of Reprinted of Scarce Tracts in Economic and Political Science edited by LSE, in 1933. Nevertheless, it is important to point out that Coase (1988b, pp. 48-9) did not read Knight’s book until May 1933, so “[i]t can, I think, be said with some confidence that Knight played no part in the development of my ideas on the firm.” Even if Knight did not cause the discovery of the transaction costs concept by Coase, he deeply influenced the

manner in which Coase structured his thoughts in the 1937 article and also his later interests and views. Especially in his view on the problem of social cost (see Buchanan, 1982, pp. xiii-xiv).³

As Coase (1982a, p. 33) remembers, Robbins' course on "General Principles of Economic Analysis" was heavily influenced by Knight. Coase did not attend Robbins' lectures, "apart from one or two, to which I went mainly to observe the expository skills of the lecturer." However, he copied out the lecture notes of the course from Vera Smith (a Ph.D. student of Hayek and later Vera Lutz, after she married the German Princeton economist Friedrich A. Lutz). Therefore, Coase "was familiar with Robbins' treatment."

Coase disagreed with Knight's characterization of the firm organization as being the mode of payment on the entrepreneur capacity decision or judgment in an uncertain environment. Nevertheless, Coase (1937, p. 392) agrees that "[i]t seems improbable that a firm would emerge without the existence of uncertainty." The upper limit to the size of the firm, especially in relation to the diminishing returns to management reasons, is anticipated by Knight when he says that the powerful incentive to the continuous and unlimited expansion of the firm must be in some way offset by some equally powerful force of decreased internal organizational efficiency. Coase quotes very long passages of Knight explaining the theoretical change in which the economy operates when the perfect knowledge of individuals is dropped out and uncertainty is introduced in the analysis. These would be exactly the same passages that will mark Hutchison's argument on his long-life career (cf. Hutchison, 1937b, p. 638; 2009).

According to Knight (1921, pp. 267-8), "[w]ith uncertainty entirely absent, every individual being in possession of perfect knowledge of the situation, there would be no occasion for anything of the nature of responsible management or control of productive activity." The world, in this case, would have no real coordination problem since the individual actions in the market would be mechanical and automaton. "The flow of raw materials and productive services to consumers would be entirely automatic." However, with the introduction of uncertainty defined on "the fact of ignorance and the necessity of acting upon opinion rather than knowledge," i.e., with an epistemic postulation of fallible knowledge, "the actual execution of activity, becomes in a real sense a secondary part of life; the primary problem or function is deciding what to do and how to do it."

In this scenario, the entrepreneur is in charge of forecasting consumers' demand, deciding what to do, how to do it, and of making this decision in uncertainty, that is, in exercising judgment. The decision-making process and execution in internal organization, Knight (ibid.) continues, "is no longer a matter of indifference or a mechanical detail." Therefore, in a world where the dark forces of time and ignorance domains, a special class of agents that direct the production activities come to existence by the distinctive nature of making judgments about the future. "The result of this specialisation is the enterprise and wage system of industry," because the entrepreneur coordinator has to advance and guarantee wages to his workers of a production output revenue that has not had been sold yet and is dependent on the forecasting of consumers' wants and desires.

For Coase (1937, p. 401), however, the entrepreneur judgment element in an uncertain context does not characterize the distinctive nature of the firm. The reward aspect for the correct judgment in the form of entrepreneur profit is not restricted in the production sphere, "it is possible to get a reward from better knowledge or judgment not by actively taking part in production but by making contracts with people who

³ However, as Coase (1988b, p. 49) admitted, "[i]t might of course be argued that Knight's ideas were so much in the air at LSE that I would be exposed to them without reading him. And this is true. Everyone at LSE referred to *Risk, Uncertainty and Profit* whether they had read it or not. But what mattered to Robbins (and he was the main expositor of Knight's views at LSE) was the distinction between risk and uncertainty and the analytical scheme and arguments of Part 2 of Knight's book. I doubt very much whether the economists at LSE ever discussed Knight's views on those aspects of economic organization that interested me. Of course, afterwards I read Knight's work with care, and I have little doubt that in my later writings I have been greatly influenced by him, although in what ways it is not easy to say. But in 1932, when I formulated that ideas of "The Nature of the Firm," my analytical system, such as it was, came from Plant."

are producing. A merchant buying for future delivery represents an example of this.” Moreover, Coase sustains that almost the totality of jobs in an advanced industrial economy are made by contracts, the contractor advances and guarantees a certain sum accorded in the arrangement normally before the employer performs the agreed acts. But this kind of contract does not involve any direction by the producer entrepreneur. Finally, Coase notes that even in the automaton world without uncertainty and with perfect knowledge Knight considers that there would be coordinators that would merely perform a routine and automatic management function without any responsibility of any sort. Thus, Coase asks, “by whom are they paid and why? It seems that nowhere does Professor Knight give a reason why the price mechanism should be superseded.”

The questions raised by Knight are intrinsically connected to the problem of equilibrium and knowledge in Hayek’s discussion. In the very first page of his 1937 article, Hayek (1937, pp. 33-4) reminded the reader that the many contemporary attempts in different fields of economic theory to push theoretical investigation beyond the limits of traditional equilibrium analysis has inexorably entered into the sphere of foresight. And this question, is “if not identical with mine, is at least part of it.” Hayek mentions the field of the theory of risk - and, in consequence, uncertainty - as the natural field where the foresight question first attracted attention. Irving Fisher’s monograph, *Appreciation and Interest* (1896), is probably the pioneer in the introduction of anticipations and expectational elements in the economic analysis when introducing his famous formula of expected inflation. But, of course, the greatest work in risk, expectations, and foresight beyond the particular field of risk is Knight’s *Risk, Uncertainty, and Profit*. “The stimulus which was exercised in this connection by the work of Professor F. H. Knight may yet prove to have a profound influence far beyond its special field.”⁴

In Hayek’s (1937, p. 34) view, expectations play a central role and central concepts “like those of an equilibrium rate of interest, could be properly defined only in terms of assumptions concerning foresight. The situation seems here to be that before we can explain why people commit mistakes, we must first explain why they should ever be right.” Once the problem of expectations is announced, the problem with the exact assumptions in economic theory on which Coase started his 1937 paper is evident - and this is one of Hayek’s central points. Hayek (p. 35) states that whether the discussion is confined to economic static equilibrium theory (the pure logic of choice) or beyond (empirical propositions about the world, i.e., equilibrating tendencies or not) “we cannot escape the vexed problem of the exact position which assumption about foresight are to have in our reasoning.”

What is the exact position about foresight in equilibrium theory? Hayek says that it is perfect knowledge. Correct foresight is the defining distinguishing characteristic of a state of equilibrium, knowledge “is identical with foresight only in the sense in which all knowledge is capacity to predict” (Hayek, 1937, p. 50). Thus, for Hayek (1937, p. 48), it is by no means of a coincidence that Kaldor (1934, p. 123) “felt it necessary to add ‘perfect knowledge’ as an additional and separate condition.” That is, that all the relevant prices in all markets are known to all individuals. The emergence of fallible knowledge in equilibrium

⁴ In recalling the intellectual and contextual influences of his “Economics and Knowledge,” Hayek (1983, pp. 425-6) named his “essays on socialism, the use in my trade-cycle theory of the prices as guides to production, the current discussion of anticipation, particularly in the discussion with the Swedes on that subject, to some extent perhaps Knight’s *Risk, Uncertainty and Profit*, which contains certain suggestions in that direction -- all that came together.” Beyond the sub-field of the theory of risk, assumptions concerning foresight had been central in the resolution of what would be modern game theory problems, exemplified in the 1930s with the “puzzles of the theory of imperfect competition, the questions of duopoly and oligopoly” (Hayek, 1937, pp. 35). Indeed, one of the central critiques of the nature of expectations in neoclassical theory by Hutchison (1937b, p. 644) is that it excludes by principle situations of mutual dependence of decisions, classic in oligopolistic game theoretic environments. Moreover, all the dynamic questions of money and industrial fluctuations are necessarily fulfilled with assumptions on expectations.

theory and the tendency to equilibrium as a knowledge-based coordination problem showed the true problem nature in dispute in the economic calculation debate.

According to Hayek, (1937, p. 53), the tendency to equilibrium, perhaps the foundational stone of the discipline of political economy, can only be understood in the sense relative to the capacity of learning the necessary knowledge “which people will acquire in the course of their economic activity.” If the knowledge is regarded as an exogenous Langean data given to the maximizand, equilibrium analysis “can really tell us nothing about the significance of such changes in knowledge, and would go far to account for the fact that pure analysis seems to have so extraordinarily little to say about institutions, such as the press, the purpose of which is to communicate knowledge. And it might even explain why the preoccupation with pure analysis should so frequently create a peculiar blindness to the role played in real life by such institutions as advertising.”

Coase (1974a, 1977) understood the importance of general institutional arrangements and also in such a particular form that communicates knowledge as advertising, what he called the market for ideas. Competition in the market of ideas is not about given resource allocation, but “an exploration into the unknown. The human capacity to generate novel ideas appears infinite and ever growing, which means that competition is needed to select good ones and winnow out bad ones. But the conventional scarcity-conflict-rights-based approach is ill-positioned for this task” (Coase and Wang, 2011, p. 3; see Wang, 2014, pp. 116-7; Hayek, 1946, 1968).

Coase learned with Plant that economic theory teaches the power of the market in coordinating different and conflicting activities in a modern economy through the price system. It was a revelation. However, static equilibrium economic theory says little about the exact functioning of this system and how the relative price system operates in a broader institutional context in the real world. Costs of coordination, i.e., the costs of using the price mechanism, are zero. In addition, Coase sensed that the theory did not allow a place for the existence of the firm as an alternative coordination mechanism beyond the market price mechanism domains. Thus it did not explain the various combinations of different production methods by the price mechanism and by internal organization along with questions of vertical integration and short and long-term contracts. If the coordination cost is zero, and given the relevant knowledge (i.e. prices) to the agents, the institutional means of coordination does not matter to the allocative problem. We are in the formal similarity world. The marginal preconditions of maximization are the same whatever the coordination methods (central or decentralized planning) are used, given the postulates of equal institutional coordination capacity of all the alternatives and perfect knowledge. But this is not compatible with the real world, the various coordination methods have different costs in different specific contexts (see Coase, 1995, p. 245).

Coase’s response to the economic calculation debate is not in showing the benefits of planning in a big factory way like Soviet Russia, but in pointing out that both the division of totally central planning (i.e., total vertical organization big factory like) and total decentralized system is false and ignores the different coordination costs. In Coase’s opinion, firms exist because of the costs of using the market, the marketing costs of discovering what the relevant prices are and the inevitable incompleteness of contracts. Markets exist because of the internal organization costs, e.g., bureaucracy costs and the diminishing management returns to entrepreneurial function. The extent of each coordination device in actual society depends on the relative costs of the alternatives.

Because of this institutional sterility, economic theory was trapped in a fictitious *a priori* normative analysis that missed the real decision about what is the best institutional means in the particular historical situation to approach the welfare problem. This was Coase’s critique of the Pigouvian tradition in welfare economics. It missed the institutional nature of the problem because it assumes zero marketing costs. Coase demonstrates that in this Pigouvian world, with zero transaction cost, all the distributional changes via

transaction by the agents would occur and the resources would be moved to the highest valued allocation independent of the legal structure. Externality problems do not really exist, in the same way that the coordination problem will not really exist if agents are given perfect objective and relevant knowledge, as Knight and Hayek pointed out. In addition, the Pigouvian welfare theory also assumed the relevant knowledge was possessed to correct in the exact amount the divergence of private and social costs.

IV. COASE, LERNER, AND “THE PROBLEM OF SOCIAL COST”

When Coase was appointed assistant professor at LSE in 1935, he became in charge of two courses, theory of monopoly and economics of public utilities. Coase found out that little empirical historical research had actually been done on how public utilities - such as postal service, water supply, gas, electricity, and broadcasting - were conducted and offered in Britain. This was a research program that would take Coase's attention for many years. One product of this was his book on *British Broadcasting: A Study on Monopoly* (1950). In this book, Coase makes a historical account on how broadcasting became a public monopoly in Britain and how the empirical evidence was different from what was expected by economic theory. Coase questioned the reasons that justified the public monopoly of broadcasting.

In 1950, with matrimonial problems and a more interdisciplinary interest, Hayek left LSE for the Committee of Social Thought at the University of Chicago, founded in 1941 by John U. Nef, Knight, and Robert Hutchins. With Hayek's Tooke Chair in vacancy, the chair was offered to Coase. However, Coase denied the offer and migrated to the United States in 1951 to start a project on the political economy of broadcasting based on the experience of Britain, the United States, and Canada. The entire initial project was never completed, but a product was “The Federal Communications Commission” (1959) which led to the construction of “The Problem of Social Cost” (1960) and the modern topic of law and economics.

Coase's 1959 paper deals with the Federal Communications Commission (FCC) regulatory role in the introduction of the color television system in the United States. Leo Herzel (1951) in a comment note in the *University of Chicago Law Review* was the first to suggest the use of the price mechanism to substitute the government internal administrative organization. Thus to determine the different allocative patterns of the radio frequency spectrum. Herzel (1951, pp. 811-2) proposed a logical application of the Lange-Lerner method of trial and error to find out the relevant equilibrium prices to mimic the market system. The main exposition of this “solution” was by Abba P. Lerner in *The Economics of Control* (1944). Lerner was once a former Ph.D. student under Hayek's supervision and a close friend in Coase's circle at LSE.

Herzel refers the reader to Knight's little textbook, *The Economic Organization* (1933, pp. 6-13, 31-5), for an exposition of the logic of private enterprise economy based on the price system. In addition, Herzel refers to Lerner's book (1944) regarding the same logic applied by whatever allocation system of scarce resources. Herzel's framework is the formal similarity proposition on the marginal maximization preconditions to an optimum allocative pattern in whatever institutional coordination system, “given data” and zero coordination costs. Hence, the same price mechanism logic is developed in a market or sector that is not “necessarily based on the private ownership of property, e.g., frequency channels.” This was the essence of Lerner's *The Economics of Control* (1944, pp. vii-viii), one of “conscious recognition of the problems of social organization and the exercise of conscious control over the economic systems.”

Indeed, Herzel (ibid.) notes that “[a] similar scheme has been used as the basis for recent theoretical developments in economics which use the price mechanism for the solution of the problem of how to allocate resources rationally in a socialist economy. Frequency channels are a socialized sector of the economy. [...] The suggested plan would give the same results as those achieved in an economy based on Lerner's scheme to the extent that broadcasters-licensees did not behave as monopolistic buyers.” The difference in Herzel's scheme with the one by Lerner is that the broadcasters under his proposal would

operate and act as in their own economic interest and not by following an abstract general rule like the one proposed by Lange-Lerner marginal cost pricing.

Coase (1993, p. 248) recognizes this influence, saying that “[w]hile he was an undergraduate, Herzel had become very interested in the debate over whether a rational, efficient system for allocating resources would be possible under socialism. As a result, he read Abba Lerner’s *The Economics of Control* soon after it was published in 1944. This debate, particularly Lerner’s detailed proposal for market socialism in *The Economics of Control*, was the inspiration behind his views.” Therefore, the main influence for Herzel on his FCC proposal was Lerner. On Lerner, Coase (2014, p. 74) writes:

“Abba Lerner was of course one of the group of students at the London School of Economics from whom I learned my economics and in the preface to the book [*The Economics of Control*] he acknowledges the influence, among others, of Arnold Plant. However, Abba Lerner was a socialist who thought that a socialist system could be run in such a way as to reproduce the optimum results as described in economic theory, in the main, by imitating the market, but not always. I remember that he went to Mexico to persuade [Leon] Trotsky that all would be well in a communist state if, among other things, prices were set equal to marginal costs.”

Coase (2014, pp. 73-4) had read Herzel’s paper but, at first, he was not convinced by the argument since the public utilities problem was about “defining the property rights and making sure that these rights were respected,” an issue that Lerner and Herzel took for granted. For Coase, the problem was to institutionally define enforceable property rights in the radio frequency spectrum and compare the relative transaction costs of each coordination solution. This institutional structure (and the relevant knowledge) in which the production and exchange takes place both Lerner and Herzel took for granted, as a given. On the other hand, Coase also takes as constant the relevant knowledge (prices) but he varies the relative coordination costs of processing that knowledge by different institutional architectures.

Coase was only convinced by Herzel’s argument one year later, in 1952, when Herzel (1952) wrote a rejoinder note to Dallas Smythe (1952) who was the FCC chief-economist. For Coase, Smythe’s arguments were so weak that he ended up accepting by exclusion Herzel’s proposal. This acceptance is explicitly stated when Coase came to write his FCC paper in 1958-9. Coase (1993, p. 249) notes that he was “well acquainted with his [Lerner] views, and I knew their strength. But on reading Herzel’s article I did not immediately jump to the conclusion that a market with pricing would be superior to regulation by the FCC. It was necessary to take into account the existence of transaction costs.”

If property rights are well defined and negotiable in the market and there is no transaction cost, Herzel’s argument is valid. But these costs are not zero. Weighing the relative costs of internal government regulation and of using the price system, Coase convinced himself that the market solution was the best way to coordinate the radio frequency spectrum. In his view, even when considering transaction costs and the problem of establishing a property rights system, Herzel’s proposal of using the price mechanism to allocate the use of radio frequency spectrum seemed to be right. Thus, Coase defended this position in his FCC paper. It was “abundantly clear” to Coase (1993, p. 249) “that the Federal Communications Commission conducted its affairs in an extremely imperfect way.” Therefore, Coase used Herzel’s modified idea in his FCC paper in 1958-9 while in the Center for Advanced Study of the Behavioral Sciences at Stanford.

The pure logic of choice in this case is the same as Coase’s 1937 paper. If transaction costs are zero the nature of the institutional coordination process does not matter, since the relevant knowledge is taken as given, being this in relation to the firm or public utilities as the radio frequency. Although this is analytically true at the equilibrium state given the relevant knowledge, Coase argued that the world is not described by zero transaction (i.e., coordination) costs. In addition, the radio spectrum case has a particular problem common to public utilities. They suffer from externalities, divergences between private and social costs.

The signal of one radio station can interfere with another and thus worsen the signal reception of other stations.

This led Coase to critically examine the traditional Pigouvian welfare approach. If property rights are well defined and transaction costs are zero, as Lerner and Harzel assumed, externalities could not exist because the parties in conflict will negotiate monetary compensations until the private benefits and costs are equal. Initial property rights endowments would not matter for the optimum final allocative pattern. Therefore, the legal decision on who is enforced to recompense the other does not affect the way resources are used and allocated. Legal institutions are neutral and sterile in affecting economic outcomes. This is the essence of the first part of “The Problem of Social Cost.”

In a sense, this is the mere application to the welfare economics in general, and to the externality problem in particular, of the general institutional antiseptic proposition of formal equilibrium. It is not surprising that when Coase was writing his FCC paper and Lerner visited the Center at Stanford, Lerner fully agreed on this point. Coase (2014, p. 75) told Lerner about his “argument that the way in which resources were used was independent of the legal decision on ownership of rights. He [Lerner] got the point in a minute and agreed with it.”

Coase attributes this easy agreement with Lerner due to the common concept of what James M. Buchanan called the LSE tradition on cost, i.e. cost as the subjective opportunity cost in the act of choice (Buchanan, 1969; Buchanan and Thirlby, 1973). This tradition has its roots in the Austrian tradition with its special emphasis on the subjective nature of cost, in opposition to a long labor-measured objective tradition of the English classical economists. Wieser advanced this alternative-cost approach and the theory of imputation in his *Natural Value* ([1889] 1893), dividing accounting costs (costs of production) and economic costs (opportunity costs). Indeed, Wieser himself coined the term “opportunity cost.” This doctrine was also called in the early decades of the twentieth century as Wieser’s Law, a name given by Maffeo Pantaleoni (the Italian Marshall). Coase ([1938] 1973, 1990) continued this London tradition in his series of articles in *The Accountant* on the proper notion of opportunity cost as the defining distinction of every cost notion, including in accounting.

As Buchanan (1973, pp. 4-5) made clear, evoking Hayek’s individual and societal equilibrium distinction, “[t]he theory of social interaction, of mutual adjustment among the plans of separate human beings, is different in kind from the theory of planning, the maximization of some objective function by a conceptualized omniscient being. [...] Shadow prices are not market prices, and the opportunity costs that inform market decisions are not those that inform the choices of even the false omniscient planner.” This became clearer for Coase with the passage of time. Opportunity costs and individuals’ subjective preference evaluations are in the market process competition translated into an objective social fact to the other agents through the price system. This consumers’ maximization result is widely known in economic theory but the institutional driven process is taken as given to the theoretical construct, as it is to market socialism. The point is taken by Coase, by which he refers to the “great point” of the “nice article on market competition” by Hayek (1968). According to Coase, shadow prices are not market prices, “[p]rice won’t have any meaning unless it results from actual market competition. [...] Competition is a process, not an equilibrium outcome. The outcome of competition is always open, not something that can be derived from or predicted by any theory. [...] What you get from the models depends on what you put in. You can choose assumptions [e.g., perfect knowledge] such that you get whatever result you want” (Wang, 2014, p. 117).

Coase (2014, p. 75) notes that this opportunity cost view and, in his opinion, its consequences, “also illustrates the importance of being at a school at which you learn useful ideas.” Nevertheless, Coase’s justification is historiographically fragile. It is difficult to claim that price theorists like Aaron Director, George Stigler, and Milton Friedman ignored completely the notion of opportunity costs, although Coase has a point when pointing out the vice of the Marshallian-Pigouvian tradition (which the second generation

of Chicago economists affiliate themselves) in the application of opportunity costs to the rationale of property rights. The real decisive background context shared by Coase and Lerner, which most of the Chicago economists struggled to understand, was the economic calculation controversy. This is so even though both Stigler (1945) and Friedman (1947) had reviewed Lerner's *The Economics of Control* (1944). The so-called Stiglerian Coase Theorem is just a welfare corollary of the formal similarity proposition derived from equilibrium theory and its postulates.

Coase sent his FCC paper to the then recently founded *Journal of Law and Economics* by Director at the University of Chicago Law School. Director disagreed with the passage where Coase re-stated Herzel's argument on the radio frequency spectrum and supported it in the case of *Sturges v. Bridgman*. Director wanted Coase to delete it. Coase (1993, p. 249) held his ground and maintained the passage in the article "arguing that, even if my argument was an error, it was a very interesting error." Some months after the FCC paper publication, in 1960, Stigler invited Coase to give a talk at the Industrial Organization Workshop at the University of Chicago. Coase accepted the invitation on the condition that the passage of his paper dealing with the allocative result in a zero transaction costs world would be discussed. One of the most famous events in the history of economic thought then was prepared and took place at Director's house. After the discussion Coase was asked to write up his positions for the *Journal of Law and Economics* and "The Problem of Social Cost" (1960) was born.

Coase (1993, p. 250) adapted the title of "The Problem of Social Cost" from an early Knight's article on Pigouvian welfare, "Fallacies in the Interpretation of Social Cost" (1924). The main point for Coase was that the way economists were evaluating the welfare problem in terms of divergences of private and social costs ignored the real problem of comparative institutional analysis in alternative coordination costs mechanisms. The failure in Pigou's analysis, given its hypotheses, was that he could not see that the divergence between private and social costs could only arise because of the failure to institute secure and definite property rights in a zero transaction cost world. In a zero transactions cost world, if the property rights are well defined and subject to market transactions, i.e., subject to a market for the real social opportunity cost of these rights, this leads to the Stiglerian Coase theorem. For Coase, his argument "could be seen as a natural extension of Knight's insight that the institution of property rights would ensure that the excessive investment which Pigou thought private enterprise would make in industries subject to decreasing return would not in fact happen." If the externality problem did not exist within the standard economic theory assumptions, the proper notion of Pigouvian taxation is unfounded.

There is *no* real problem of externalities in a zero transaction cost world. But this world does not exist. This is not the relevant positive theoretical point that Coase is making. Externalities problems are a result of property rights incompleteness. This is analogous with Coase's discussion of the inevitable incompleteness of contracts in the market because of transaction costs (e.g., labor contracts). In this case, the solution is to internalize these transactions in vertical integration by the firm. The point to Coase is that all coordination mechanisms are costly. In the real world, the institutional legal order is decisive to the relative costs between the alternative coordination methods and thus one of the main determining factors of economic performance through time. Hence, even the traditional Pigouvian welfare response to externalities cannot be decided in *a priori* way, but only based on the comparative coordination costs analysis.

One example studied by Coase (1974) is the case of the lighthouse in Great Britain, a classic textbook natural public good that was once provided by the market because of the institutional devices in the legislation that permitted the appropriation and internalization of the service social benefits. Lighthouses were granted with exclusive franchises and state-conferred authority to legally collect payments from all the ships that used the offered services. The classical case of the non-rival public good was bypassed by designed legal institutions that permitted the private sector to operate. Coase demonstrates that the standard

problems of externality in economic theory when the transaction costs are zero did not, by definition, demand any kind of government corrective action given their own assumptions. In other words, “all that this did was to show the emptiness of the Pigouvian analysis. Once the assumption of zero transaction costs is abandoned and the fact that carrying out market transactions is a costly process is incorporated in the theory, it follows that alternative ways of coordinating the employment of resources, even though costly and in various ways imperfect, could not be dismissed out of hand as inferior to reliance on the market. What would be best depended on the relative costs of these alternative ways of coordinating the employment of resources, and about this we knew very little” (Coase, 1993, pp. 252-3; cf. 1960, pp. 18-9). When coordination is costly, the different institutional arrangements matter for the final output allocation because they determine the relative cost patterns of the alternative coordination mechanisms. The legal institutions are important because they determine the relative values of transaction costs of competing coordination devices. Thus, it determines the different market incentives to the institutional structure of production and exchange in the use of market versus internal organization, short and long-term contracts, vertical integration processes, and divergences between private and social costs.

IV. EPILOGUE: TRANSACTION COST ECONOMICS AS AN INSTITUTIONAL REACTION TO THE ECONOMIC CALCULATION DEBATE

The study of the institutional structure of production and exchange is the central message of Coase’s work. The existence of transaction costs implies necessarily a comparative institutional analysis of the different means of coordination. “The Nature of the Firm” could be argued as the inaugural piece of new institutional economics and it is easy to see the importance of transaction costs and institutional settings for economic performance through time. In this point, Coase’s analysis converges with Demsetz’s productive specialization emphasis. The economic welfare of nations depends on the labor productivity in an economy of production and exchange. Since Adam Smith’s times, it is known that the level of labor productivity is a function of the division of labor and productive specialization and, thus, voluntary cooperation in the form of transactions and exchange.

Productive specialization is only possible if there is a counterpart in exchanges, thus the marketing costs determine the upper bound in which the division of labor can operate in the economy. Moreover, as Coase (1992, p. 716) argued, “a large part of what we think of as economic activity is designed to accomplish what high transaction costs would otherwise prevent or to reduce transaction costs so that individuals can freely negotiate and we can take advantage of that diffused knowledge of which Hayek has told us.” But what determines the costs of exchanges? The transaction costs and the relative costs of different coordination mechanisms are institutionally determined, coordination solutions in one specific time and place context are not subject to general theoretical rules.

In particular, Coase has a special interest in the realm of the institutional structure of *production*. In this context, the Coasean definition of alternative coordination mechanisms by hierarchies (such as the firm) and the market is a valid analytical fiction. Neoclassical theory, as exemplified by Robbins’ (1932, p. 70) statement, treated the internal organization process as a black-box because of its real interest on the Smithian coordination problem of decentralized exchanges. Ironically, the interest in the price system as a coordination device led to the demise of the proper institutions in which the price system operates. “Even more surprising, given their interest in the pricing system, is the neglect of the market or more specifically the institutional arrangements which govern the process of exchange. As these institutional arrangements determine to a large extent what is produced, what we have is a very incomplete theory” (Coase, 1992, p. 714). The greater expression of this irony is the socialist economic calculation debate. Coase’s 1937 article can only be understood as a reaction to this debate. This controversy did not *cause* Coase to come with the

transaction costs notion but this was the contextual intellectual environment which in his investigations were dealing with and, thus, molded the argument and its implications.

Why, as Plant taught, the firm and internal organization exist if all the coordination is done by the price mechanism? This question is naturally connected with the economic calculation in socialism since Vladimir Lenin said that the Soviet Union planned economy would operate like a single one coordinated Big Factory. However, as Coase (p. 715) puts it, “many economists in the West maintained that this was an impossibility. And yet there were factories in the West, and some of them were extremely large. How did one reconcile the views expressed by economists on the role of the pricing system and the impossibility of successful central economic planning with the existence of management and of these apparently planned societies, firms, operating within our own economy?” The answer is the transaction cost of using each coordination device, with the difference that in a market society the optimum degree of internal organization planning would be discovered (and not centrally imposed) by competition. As discussed above, the character of planning in the firm is not equivalent to the controversial point in dispute in the calculation debate but, nevertheless, it molded the Coasean argument.

This character of the transaction cost argument would again play a role in the welfare corollary theorem of the formal similarity proposition in “The Problem of Social Cost.” With zero transaction costs and given equal institutional alternative coordination capacity, the formal similarity proposition appears. With zero transaction costs and given tradable property rights endowments, the allocation pattern will always be conducted to the higher social valued optimum, independent of the initial allocation of property rights. No real externality problem exists. This is the world of Stiglerian Coase Theorem. When positive transaction costs are considered, different legal arrangements have a major impact on resource allocation. Coase’s theory is in part a response to the institutional sterilization of neoclassical economics as exposed by the excessive focus on equilibrium states. This pattern can be identified both in the general economic coordination context (as exposed in the economic calculation debate and in the nature of the firm) or in the Pigouvian tradition in welfare economics.

As mentioned, for Coase (1988b, p. 51) the reaction toward his “The Nature of the Firm” by his colleagues at LSE was of indifference. Although Plant and Arthur Sargent congratulated Coase on the day the issue of *Economica* was published, neither ever referred or mentioned the article again. Robbins and Hayek also never mentioned the article, although Coase “relations with both of them were quite cordial.” But Coase’s personal account did not fully capture the intellectual respect that Hayek had by his work. After Hayek was awarded the Nobel Prize, one of his duties as a Nobel Laureate recipient to the Swedish Academy was to suggest other possible laureates for nomination consideration. This task was not performed by Hayek every year. However, on three occasions in which Hayek was consulted (1978, 1982, 1985) Hayek nominated Coase as who most deserved the prize (Caldwell, 2016, p. 12). In addition, David Handerson (2018) “remember telling Friedrich Hayek, in June 1975 [...], that I thought Alchian deserved the Nobel Prize, and asking him what he thought. Hayek had his characteristic wince as he replied: ‘Two people who deserve the Nobel Prize, but won’t get it because they haven’t written enough, are Armen Alchian and Ronald Coase.’”

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