ISSN 1801-0938

New Perspectives on Political Economy
Volume 2, Number 1, 2006, pp. 14 – 36

The Coordination Problems, the Market and the Firm*

Judit Kapás†

JEL Classification: B53, D20, P10

Abstract: The aim of this paper is to contribute to a better understanding of the market and the firm through an analysis of the coordination problem. An important question is to what extent the nature and process of the coordination differs in the market from that within the firm. The paper deals only with those aspects of this issue which are related to a distinction between two types of coordination proposed by Klein (1997) and Sautet (2002). The author presents three dilemmas stemming from this framework and investigates the similarities and differences between the firm and the market by providing answers to these.

* This paper has benefited from the support of the Hungarian Scientific Research Fund (contract no: T 49602).

† Associate Professor, Department of Economics, University of Debrecen, 26 Kassai street, H-4028 Debrecen, Hungary; Tel: + 36-52-416-580, Fax: + 36-52-419-728; e-mail: judit.kapas@econ.unideb.hu

1 Introduction

The issue of coordination, both from a theoretical and empirical point of view, has been of primary importance in economics since Adam Smith. The major question is how a multitude of individuals participating in a complex division of labor can successfully coordinate their actions and minimize disappointments, when each possesses different and changing knowledge and expectations about future possibilities? How do agents make the decisions necessary to fulfill their goals when the success of their own actions depends upon the decisions and actions of others (Ebeling 1987)? These questions suggest that coordination is one of the essential ingredients for the functioning of society and organizations. In a broad sense, all actions are always somehow coordinated; the important question however, is how this coordination is achieved (Hülsmann 1997), and this leads to the issue of what the arenas of coordination are and how coordination is achieved within them.

That markets provide important institutions of coordination is widely accepted in economics. Hayek (1945, 1946, 1978) contributed to a significant extent to an understanding of how coordination is achieved through a price system, and in addition, to an explanation of how the institutions of the market evolve spontaneously (Hayek 1967). "The institutional setting and the allocation of resources matter in economics precisely because behavior in a changing world is not automatically coordinated" (O'Driscoll 1977:141).[1] Besides the market, business institutions also arise as solutions to coordination games (Langlois and Robertson 1993). The issue of how coordination is achieved within firms is extensively discussed in the theory of the firm which developed from Coase's (1937) seminal paper.[2] Nevertheless, the perspective of the theory of the firm is restricted to a view of the firm from a transaction-cost-efficiency point of view, which hampers this theory's conception of the very essence of coordination and the nature of the coordination process (Langlois 1997).

[1] Note also that the problem of economic coordination is important not simply because the decision-making is decentralized, although this is an important aspect of the problem, but because of constant change. Decentralization in an unchanging environment will not cause serious problems.

[2] I will not criticize here the Coasean-Williamsonian theory of the firm, it is beyond the scope of my present paper, but it is important to stress that for a better explanation of the firm "we have to show how firms are part of the market process" (Sautet 2000:69). That is, we need to explain how existence of firms is linked to the operation of the market process.

An important question is to what extent the nature and the process of the coordination differs in the market from that within the firm. In this paper I am concerned with this issue. My aim is to contribute to a better understanding of the firm and the market through an analysis of the coordination problem. I will not strive to give an all-embracing account of how coordination is achieved in the market and within firms; this is beyond the scope of this paper. Instead I will deal only with those aspects of the issue which are related to a distinction between different types of coordination proposed by Klein (1997) and Sautet (2002). That is, my starting point will be the distinction between two kinds of coordination (type I and type II), and two kinds of solutions to these (catallaxy and conventions respectively). My argument will be that this simple schema poses severe problems in several respects; the major issue amongst them concerns the role of the firm in solving the coordination problem. I will investigate the similarities and differences between the firm and the market in terms of what kind of coordination problem is solved in what way in the market and within the firm.[3] The major conclusion will be that both the market and the firm could be seen as particular solutions to both kinds of coordination problems.

The paper is organized as follows. Section 2 shows the two kinds of coordination and, based on certain controversial issues stemming from Sautet's (2002) and Klein's (1997) framework, draws up three dilemmas, the answers to which may help to better understand both the market and the firm. Section 3 and 4 deal with the issue of coordination in the market and within the firm respectively, while also providing answers to the dilemmas. Section 5 concludes.

2 Two kinds of coordination

According to Sautet (2002) and Klein (1997) there are two kinds of coordination[4]. Although there is a slight difference in their views, basically they take the same position.[5] Type I coordination is a process through which mutual awareness of individuals becomes

[3] The issue of whether firms and markets are essentially different or similar things is an important question, on which views differ largely. For an overview, see Cowen and Parker (1997).

[4] The word coordination comes from the Latin words co (meaning together) and ordinare (to arrange).

[5] I use Sautet's labels, i.e. type I and type II coordination, while Klein calls these metacoordination and coordination, respectively.

gradually greater. Here coordination happens without individuals being aware of it and without their ever knowing each other. Type I coordination means that a concatenation of activities is arranged so as to produce good results. As opposed to this, type II coordination refers to situations where one coordinates one's actions with those of others in a purposeful way. Here coordination is understood as something one hopes to achieve in one's interaction with others, i.e., it is defined as the achievement of concerted action. This kind of coordination problem, contrary to type I coordination, can be assessed by the human mind. In this case the coordination requires the use of certain common means to achieve a particular end. The difference between the two meanings can be explored in terms of whether the verb coordinate is transitive or intransitive (Klein 1997). As an intransitive verb it means: "to be or become coordinate esp. so as to act together in a smooth, concerted way" (Klein 1997:326). Here there is a direct object only of a reflexive kind. This is type II coordination. Coordination as a transitive verb means "to put in the same order or rank ... to bring into common action, movement, or condition" (Klein 1997:326), which is type I coordination.

The two authors argue that these two kinds of coordination are solved in two different ways. Type I coordination is the result of the entrepreneurial competitive process as described by Hayek (1946) and Kirzner (1973). An entrepreneur, by discovering profit opportunities, turns information into knowledge and tends to improve the degree of coordination of individuals' plans: discoordinatedness is gradually replaced by a greater degree of coordination. Since past entrepreneurial acts create new profit opportunities (Holcombe 2003), this process never comes to a state of rest.[6] Out of this process emerges a spontaneous social order that exists without being planned, which is based on abstract rules and has no particular purpose. The social order is achieved by following certain rules and utilizes the knowledge of all its members without the knowledge being available to any particular mind.

Type II coordination is solved by rules or conventions such as "we all drive on the same side of the road". To put it differently, while the resolution of type I coordination brings about "a pleasing arrangement" (Klein 1997), that of type II means an agreeable interaction for the actors. An important point is that rules or conventions that are solu-

[6] Two other factors that create profit opportunities are as follows: (1) factors that disequilibrate the market, (2) factors that enhance production possibilities (Holcombe 2003).

tions to type II coordination permit the functioning of type I coordination: these rules establish a framework that makes type I coordination possible (Sautet 2002)[7]. That is, type I coordination can be solved by institutions that are in their turn solutions to type II coordination problems. This means that the two kinds of coordination have a hierarchical relationship.[8] To summarize Sautet's and Klein's views, type I coordination refers to a coordination where the invisible hand coordinates the acts of many purposeful individuals, while type II coordination means an intentional coordination of the acts of many purposeful individuals by themselves.

From the above rather simple schema of the two scholars three propositions arise. The first is that the two types of coordination differ essentially from one another in intentionality. The second is that while type I coordination admits only organic solutions, that is solutions that emerge from the process itself, type II coordination may admit organic and pragmatic solutions as well (Sautet 2002). The third proposition maintains that type I coordination can be solved exclusively by the spontaneous market process, or put differently, firms solve exclusively type II coordination problems. My argument is that all these three propositions are controversial and require further investigation. It is worth transforming these assertions into dilemmas or questions to be answered.

The first dilemma concerns whether coordination in a market, i.e., type I coordination is unintentional and all conventions and rules, i.e., type II coordination is intentional. The second question is whether the solutions to type I coordination could have an exclusively non-designed (organic) character. The third dilemma refers to whether type I coordination can be solved exclusively by the spontaneous order, or put alternatively, do firms exist to solve exclusively type II coordination problem?

My argument is that answers to these questions may help to better understand both the market and the firm. In what follows, by analyzing the coordination both in the market and within the firm, I will provide answers to the above three dilemmas. The argumentation will be based upon two things. First, I will emphasize more explicitly the difference as regards the nature of coordination problems (whether type I or type II) and

[7] "Social order emerges through the existence of meta-market institutions such as property rights and contract law, and market institutions such as firms" (Sautet 2002:35).

[8] This view will be supported by what will be said in Section 3.3. and 4.2.

their solutions (whether the market process or conventions and rules[9]). This suggests, as I will discuss below at greater length, that there is no one-to-one correspondence between them, in contrast to what both scholars have argued. On the other hand, I will show that it is crucially important to differentiate between the coordinating institutions and the solutions to coordination. This framework will allow me to draw some new conclusions.

3 Coordination by spontaneous order

Adam Smith (1776) argued that the invisible hand of the market produces coordination in an economy, albeit the details of how coordination is achieved remained unexplained. Hayek (1945, 1946) and Kirzner (1973) provided an explanation for this. In this section I will first show the Hayekian-Kirznerian theory of coordination. Then I will turn to the first two dilemmas I have raised above and will discuss the issue of intentionality in the market and the issue of the organic character of the market.

3.1 The Hayekian-Kirznerian theory

The coordination problem is of central concern in Austrian economics. Based on Hayek (1945), who speaks of coordination in terms of individuals' plans which reflect individuals' knowledge and expectations, coordination is needed because of dispersed knowledge[10]. Dispersed knowledge has to be coordinated in order to exploit it for the benefits of humans. The problem that the market has to solve is in fact how individuals' particular knowledge can be diffused and made general (Bianchi 1994). Hayek's theory maintains that in an uncertain world the discovery procedure of market competition spontaneously coordinates decentralized knowledge. According to him, this coordination is achieved by the mechanism of prices.

Hayek's (1945) major achievement has been to show that the advantage of decentralized decision-making in a market stems from the fact that this is an extremely efficient way to coordinate dispersed knowledge. Efficiency is reflected, on the one hand, in the fact that the price system allows us to economize on knowledge: the only thing we must

[9] What Klein (1997) means by conventions, can be regarded as institutions.

[10] Knowledge exists only in "the dispersed bits of incomplete and frequently contradictory knowledge which all the separate individuals possess" (Hayek 1945:77).

know is prices.[11] On the other hand, exchange enables us to make our local tacit knowledge socially usable for others: buying and selling for instance convey our knowledge to others without the need to articulate our knowledge.[12] To put it differently, the major advantage of the market process is that it allows us to utilize a much greater amount of knowledge than under an alternative system.

In Hayek's view there is a tendency to equilibrium in a decentralized exchange system, which is brought about by competition and entrepreneurship. Here the role of the entrepreneur becomes crucial because the coordination depends upon his activity (Kirzner 1973).[13] "A fully coordinated state of affairs ... is one in which each action can be taken by each individual in a demarcated set of actions, correctly takes into account (a) the actions in fact taken by everyone else in the set, and (b) the actions which the others might take were one's own actions to be different" (Kirzner 1998:292). Clearly, a state of perfect coordination, by definition of the market process, never can be reached. Accordingly, the term coordination is used to refer to the process in the course of which a state of discoordinatedness gradually comes to be replaced by successive state of greater and greater degrees of coordinatedness. That is, coordination is a dynamic concept: plans become more consistent over time.[14] Entrepreneurial competition must be seen as responsible for coordination: individuals are constantly revising their plans in a way that brings them into greater uniformity: "The very disappointments and regrets that results from initial coordination failures systematically bring about improved sets of market decision" (Kirzner 1992:146). The above coordination story is about how markets work; accordingly, the Austrian theory of the market process is in fact a coordination theory. When arguing that there is a tendency toward diffusion of knowledge and increased consistency of plans, we speak of an ex post coordination (O'Driscoll 1977) which is conceptually different from an ex ante coordination.

[11] See the tin case in Hayek (1945).

[12] In this sense, according to Hayek, the market is a communicative process. For a critique of this, see Hülsmann (1997).

[13] Kirzner's view of equilibrating entrepreneurship is very often contrasted with Schumpeter's disequilibrating entrepreneurship. See among others Kirzner (1973), Boettke and Coyne (2003).

[14] This means that the market economy is characterized by continual planning and plan revision, albeit on a decentralized level. That is, spontaneous order does not preclude planning as such; the argument is that only planning by individuals in decentralized markets will tend towards an optimal use of knowledge (Barry 1982).

In a state of disequilibrium individuals' plans are not perfectly coordinated, which is reflected, however, in price discrepancies in product and input markets (Kirzner 1973).[15] All this means that prices are always, to some extent, "incorrect" in the Kirznerian sense because they are disequilibrium prices. What is of significance is that the coordinatedness is not perfect in the market; as a consequence we can conceive various degree of coordinatedness. A system is better if it exhibits a higher degree of coordinatedness, and, according to Hayek (1945), the price system is a system that can produce the highest degree of coordinatedness.[16]

To refer to the complex system that assures coordination of individuals' acts Hayek (1964, 1973) uses the term spontaneous order or catallaxy. According to him, spontaneous order consists of those institutions that are the result of human action but not the result of some specific human intention. In other words, spontaneous order or catallaxy is a network of firms and households and has no specific purpose of its own; rather it serves as a process by which individuals and organizations pursue their own purposes. Catallaxy is that which results naturally from the interaction of firms and households through the market exchange.

3.2 On intentionality

The coordination that is achieved through the spontaneous order, as noted above, is referred to as type I coordination by Sautet (2002) and Klein (1997). The important thing is that here individuals are not aware of the fact that they participate in a coordination game. In this sense the coordinatedness – which is not perfect, as I have argued above – is an unintentional result of the activities of all market actors. Clearly, here unintentionality refers to the way the coordination problem is solved since the outcome of the market process looks as if it had been designed and predicted by an omnipresent actor, but clearly could not have been. Actors whose activities become coordinated act intentionally, i.e.,

[15] Note that the Kirznerian concept of equilibrium (there are no unexploited profit opportunities) differs from the Hayekian concept (the plans of all individuals are mutually compatible). See Holcombe (1999) for the details.

[16] Hayek's concern was to show the advantage of the price system in coordination over other systems, and, in this spirit he claims that the price system exhibits better coordinatedness than other systems. This view, however, does not give a criterion for the quality of the coordination, which would be indeed necessary as is also stressed by Hülsmann (1997).

they pursue their own interest. Nevertheless, the solution to such a coordination problem emerges as an unintentional result of the actors' intentionality. All this concerns the first dilemma (i.e. whether it is in terms of intentionality that the basic difference between the two types of coordination lies) I have drawn up above.

In order to better understand the whole issue of intentionality I propose to differentiate between the nature of coordination problems and the solutions to them. The ambiguities that are embedded in Sautet's and Klein's framework stem precisely from the fact that they fail to distinguish between these two things. My argument is that intentionality must be interpreted in terms of how the solutions to coordination problems are achieved, while the nature of the coordination problem refers to whether the actors are aware of the fact that they are playing a coordination game or not. It follows that, of course, the two types of coordination differ in intentionality, but, it is not intentionality that constitutes the fundamental difference between them. Instead, what constitutes the difference is to be found in the fact that actors are not aware that they are playing a coordination game in type I coordination, while they are aware of this in type II. And it is precisely this latter concept which is reflected in the question of whether the solution is an intentional (type II coordination) or unintentional (type I coordination) result of individuals' intentional acts.[17] To put it differently, difference in intentionality between the two types of coordination is best seen as a consequence of individuals' awareness, i.e., the nature of the coordination problems, rather than as a cause of it.

3.3 The organic versus pragmatic character of the market

What was said above leads us to the second dilemma: whether the solutions to type I coordination could have an exclusively non-designed (organic) character. My answer is no. The fact that solutions to type I coordination problems emerge unintentionally does not mean that designed (pragmatic) institutions do not play a role in this. For instance, for markets (spontaneous orders) to emerge there are some preconditions such as private property rights, freedom to contract and contract enforcement (Hodgson 2001:310). When these institutions exist, markets can emerge to a large extent spontaneously. In addition, in many cases people who expected to undertake a great many transactions

[17] In this sense intentionality per se is not missing from type I coordination, since actors behave intentionally in both types of coordination.

and valued the private benefits to be gained from making the market above the private costs invested in making markets (Loasby 1999:119). There were periods in history when rulers or kings initiated markets, or buyers and sellers or other organizations created markets by inventing new institutions necessary for the market to operate (Lamoreaux et al. 2003)[18]. This is to say that markets, which are the best way to solve the type I coordination problem, could emerge either spontaneously or to a certain extent deliberately. This seems to contradict what Hayek (1973) said about the spontaneous origin of the market process. Thus, this is only a paradox which can be resolved by rethinking what the market means.

The point is that the "market" is not a simple term (Ménard 2005) and has two meanings. The first meaning of the "market" is market economy. In this sense "market" means the general set of arrangements of how an economic system operates and cannot be equated with particular markets. It involves the set of institutions that embed all modes of organizations and make them possible to operate. A "market" in the sense of the market economy is a purely spontaneous result of the actions of humans, as Hayek argued. In another sense "market" delineates a concrete mode of organizing exchanges (spot markets) as opposed to arranging them within the firm. Here markets are understood as one of the governance structures in Williamsonian terms (Williamson 1985). In this sense a particular market can be partly created by purposeful actors as in the case of the wheat market in Chicago.

Let me now focus on the first meaning of the market, i.e., the market economy and analyze how coordination is achieved in the catallaxy. In fact, the word catallaxy describes the network of market institutions that surround the use of exchange as a means of achieving human ends. These institutions facilitate coordination by providing rules that guide actors making choices in a world of uncertainty (Horwitz 2004). As argued by Lachmann (1970) there are various institutions through which coordination can be assured in the market, which means, in fact, that it is not the market itself that coordinates, but the various institutions of the market: "An institution provides means of

[18] Lamoreaux et al. (2003) argue that in the second half of the 19th century some markets (for instance the wheat market in Chicago) could not work properly even despite the significant decrease in transportation and communications costs in the U.S. because of the "lemons" problem. To resolve this problem the Board of Trade worked out three categories of wheat (standards of quality) and hired inspectors to control quality in stores. This proves that in some cases markets need assistance to emerge.

orientation to a large number of actors. It enables them to coordinate their actions by means of orientation to a common signpost" (Lacmann 1970:45). In this spirit I argue for a differentiation between the coordinating institutions and the solutions to coordination. Solutions to coordination are those complex institutions such as for instance the catallaxy and firms, which themselves encompass numerous institutions such as rules and conventions, which may emerge either spontaneously or deliberately.[19] That is, institutions which are "the social crystallization of rule-following behavior" (O'Driscoll and Rizzo 1985:6) and from which the market economy is built up serve to coordinate individuals' dispersed knowledge, while the market economy is a complex of interrelationships and the institutions. Market in the sense of market economy involves particular markets, firms, long-term contractual relationships between firms, all contractual institutions, etc.

Clearly, the price system could not have been equated with catallaxy, unlike in Sautet (2002) and Klein (1997); the price mechanism is only one of the coordinating institutions of the market.[20] As Hayek (1945) pointed out, prices convey information, which serves to achieve a greater consistency between plans. Moreover, prices do not simply summarize an already existing information set, they also provide the incentives for the discovery of new information (Hayek 1978)[21], which enforces individuals to revise their initially uncoordinated decisions. Individuals base their plans on prices, even though these prices reflect past ratios of exchanges. Nevertheless, it is not only prices that coordinate activities and plans in the market, but all other market institutions as well. Amongst them, let me start with the role of trust. Trust should be seen in the context of the anonymity of market interactions. What markets do is to promote cooperation in anonymity (Ebeling 1987) by enabling anonymous actors to have high levels of trust in each other. The trust that actors have in each other is not the sort of personal trust that comes from face-to-face relationships; rather this trust is institutionally driven. Another, and probably the most fundamental institution of the market economy is private property (Mises 1920). As Hülsmann (1997) points out it is not prices that coordinate the actions: prices are the outcome of the coordination. Rather, it is property that coordinates the individuals'

[19] See Sugden (1989) for an explanation of how rules can evolve without conscious human design.
[20] Similarly, firms involve numerous coordinating institutions too, an idea which will be developed in the following section.
[21] Note that both the market and the firm provide an incentive system. I will discuss this at greater length below.

actions because only a property owner can "select knowledge in terms of importance" (Hülsmann 1997:44). And of course, the other coordinating institutions such as the rule of law, contract enforcement, rules of how to make contracts, smaller scale norms, practices, etc. are also necessary for catallaxy to operate. Some of these institutions, such as private property, rule of law, freedom to contract must assure the stability of the broad institutional framework in the market economy (Lachmann 1970).

It follows from all this, that good institutions are important because they coordinate our behavior by limiting our choices: they make behavior more predictable, which enhances the coordination of our behavior with that of others.[22] In most cases the institutions of catallaxy work best when they emerge as unintended consequences of human choices, rather than being imposed (Horwitz 2004). In other words, rules appropriate for spontaneous order are more likely to be discovered than deliberately created (Barry 1982), which does not exclude the fact that some rules may have a pragmatic origin.[23]

To summarize, the spontaneous order consists of various coordinating institutions which are mostly, but not exclusively, of a non-designed character. However, designed (pragmatic) institutions are much important when thinking of the market in its second meaning, i.e., a particular market for organizing particular transactions. Note that this meaning may also involve those long-term relationships between firms which are basically of market-type contracts (e.g., supplier programs, joint ventures, outsourcing, networks of firms). Since these modes for organizing transactions are deliberately chosen by the actors they entail numerous designed institutions such as quality standards, standards in production, distribution and quality control, etc. However, we must recognize that here, to a significant extent, the coordination game is well-defined and well-known to the participants (for instance for the firms who belong to the same franchise system). Accordingly, in many respects firms in a network coordinate their activities similarly to

[22] "To justify one's faith in the coordinating function of markets, one cannot simply assume that prices are coordinating at their ex ante equilibrium level. Rather, one must be concerned with the institutional environment of economic systems and the appropriateness of these institutions for the emergence of a spontaneous market order" (O' Driscoll 1977:141).

[23] For instance, in some markets property rights have evolved spontaneously, while in many other cases they were created deliberately (Sugden 1989).

the way activities are coordinated inside firms.[24] Without going into details, from the viewpoint of my present context the important thing is that market in its second meaning involves a mixture of type I and type II coordination problems and I argue this for the same reasons I will present in the next section in case of firms.

My intention was only to draw attention to the fact that when thinking of the market in its second meaning, i.e., a particular mode for organizing transactions, it can be seen as a solution to the type II coordination problem, the actors being aware they are playing a coordination game. It is only in this sense that the market may have a largely pragmatic character.

4 Coordination within the firm

Sautet (2002) and Klein (1997) suggest that firms are solutions to type II coordination, although they are rather ambiguous as regards the role of firms. The third dilemma I have drawn up above specifically concerns how coordination is achieved within firms. In providing answers to this dilemma I will use the framework I have used in the case of spontaneous order. That is I will rely on a distinction, on the one hand, between coordinating institutions and solutions to coordination, and, on the other hand, between the nature of coordination problems and solutions to them.

First of all, note that it is self-evident that the more the work is subdivided inside the firm, the greater is the danger of confusion and the greater is the need for coordination. Coordination, of course, resolves task dependencies that result from the division of work and specialization just as in the market. However, more importantly we can articulate the coordination problem in the same way as in the case of catallaxy, as proposed by Sautet and Foss (1999).

[24] The deep investigation of how coordination is achieved in long-term contracts between firms is beyond the scope of my present paper. Whereas this organizational form is becoming the "swollen middle" (Hennart 1993); an extensive literature has accumulated on the topic. For an overview see Ménard (2004).

4.1 The knowledge problem within the firm

Just as in the market, each agent in a firm possesses knowledge that is local, subjectively held and partly tacit. There can always be knowledge possessed by the employees, which will depend on a particular "place and time" that the management cannot know. This knowledge is about how to improve allocation inside the firm or how to seize profit opportunities in the marketplace. That is, the Hayekian knowledge problem exists within firms, too, and the CEO, like the central planner cannot centralize the employees' knowledge. This knowledge problem can be partly solved within the firm just as in the market, by entrepreneurship.

Central management must rely on the entrepreneurial process within the firm to discover new profit opportunities. For this, managers must give employees discretion and responsibility to induce them to make use of their tacit knowledge.[25] For this, firms must deliberately create or let spontaneously emerge within their boundaries such institutions that serve to promote the effective use of individuals' knowledge. One conclusion from all this is not only that firms cannot rely on central planning[26], but that the firm must let the knowledge decentralized, as in the market. To put it differently, the centralization of individuals' knowledge is impossible within the firm just like in the market; instead both markets and firms are systems for economizing on knowledge (Langlois 1995).

All this has an implication for the third dilemma involving the question of whether type I coordination can be solved exclusively by spontaneous order. My argument is that while admitting that members of a firm are aware of the fact that they participate in a coordination game, because of the Hayekian knowledge problem that occurs within the firm too, in some respects they are not able to identify the details of this coordination game. When this latter situation prevails, type I coordination occurs. Nevertheless, the firm is a solution to a mixture of type I and type II coordination problems: the more complex the firm is, the more the details of the coordination game are ambiguous for firm

[25] A good example is found in the so-called project-based firms which proliferate in today's economy. These firm organizations infuse more entrepreneurship into firms by organizing work cross-functionally around a well-defined task, or project and by giving the employees the right to decide in many important questions. See Kapás (2004).

[26] As argued by Langlois (1995) it is a false conclusion that planning (conscious, rational, forward-looking) is what a firm is about. Firms plan in a sense quite different from the meaning usually given that term in discussions of central planning. Planning can mean some sort of policy, however broadly defined.

members, and consequently the more the coordination acquires a type I coordination character. That is, the spontaneous order is not the only solution to type I coordination; on the other hand, although type I coordination occurs in firms, it does not exclusively characterize firms. This being said, how is coordination achieved within firms?

4.2 The role of incentive institutions within the firm

As I have argued, to a significant extent, the employees of a large firm, just like the actors in the market, are not able to consciously coordinate their activities because they cannot identify the details of the multipersonal coordination game inside the firm; very often they are not aware of each other's existence. The coordination is achieved by inducing individuals to make use of their local, tacit knowledge. For this, no doubt, an effective incentive system is needed which, in addition, must be carefully designed (Sautet and Foss 1999). That is, the reason why employees' actions become coordinated is not only that they consciously do so, but the incentive system designed by the management "enforces" them to behave in a particular way. Management should provide a framework or environment in which internal entrepreneurial processes can best function (Cowen and Parker 1997). It must be noted that despite the fact that particular institutions emerge spontaneously within the firm, the overall character of the institutions of the firm remains designed. When the management lets the new institutions emerging from employees' interactions survive, this is part of the "design" too. These spontaneously evolved institutions entail a lot of tacit and shared knowledge, which coordinates activities within the firm in the same way as in the market. Another important aspect of the similarity between the incentives of the firm and the market lies in the fact that firms like markets are based on property rights, the rule of law and trust (Cowen and Parker 1997).

Clearly, the incentive system must be designed in such a way as to produce a "pleasant arrangement", a result which is also produced by the institutions of the market, as shown above. However, the institutions of the market (e.g., price system, property rights, etc.), which serve to align incentives[27] just as incentives used within the firm are mostly not designed, unlike the firm's incentive system. But the crucial thing is that both the market and the firm use a particular incentive system (institutions) for the coordination of dis-

[27] "[T]he incentives offered by market prices during this competitive process are the key elements in motivating competitive entrepreneurial entry and discovery" (Kirzner 1992:150).

persed knowledge. In the market the price system and the other coordinating institutions are able to coordinate individuals' acts without referring to a central mind. Contrary to this, the incentive system that operates within the firm must be designed by humans, but once it is designed, it drives the individuals' acts in the same way as the incentive system of the market: the individuals may only pursue their own interest.

4.3 The pragmatic versus organic character of the firm

Let me turn to the question of whether the firm has an exclusively pragmatic character. Firms are of pragmatic origin in the sense that an individual starts a firm with some concrete purpose in mind. But this does not mean that firms do not contain organic elements; on the contrary, firms may develop strong organic elements, such as a corporate culture.

Hayek has put a special emphasis on the crucial relationship between the character of the rules of individual conduct and the character of the resulting order (Vanberg 1994): the spontaneous order rests on abstract rules while the firm rests on concrete ones.[28] To the extent that firms develop abstract rules the originally pragmatic character of the firms may change and acquire a partly spontaneous character.[29] Ioannides (2001) has shown how this process operates.

The growth of the firm inevitably leads to this process because the complexity of the firm increases as it becomes larger; and complex orders rely on abstract rules (Hayek 1973).[30] As Hayek suggested, the more abstract the rules of a system are, the better that system is able to coordinate a diversity of concrete purposes. Large firms, by becoming more complex, entail a wider diversity of individual goals, and accordingly the perspicuity of the coordination game the firm members face degrades. This brings about a situation in which individuals become no more able to identify all the details of the

[28] For a critique of Hayek's theory on the relationship between the kinds of rules and the kinds of orders, see Garrouste (2001).

[29] Note that even if rules are deliberately designed, an order may partly acquire the characteristics of spontaneous order provided these rules have all the following attributes: abstractness, generality, and independence of purpose (Ioannides 2001). This means that it does not matter whether abstract rules are deliberately designed or they emerge spontaneously, the firm may acquire to a certain extent the character of spontaneous order.

[30] Of course, catallaxy is far more complex than the firm can ever become. For the reasons, see Ionannides (2001).

coordination game, which in turn requires more abstract rules (institutions). That is, in the evolution of the firm, more commands will tend to acquire a character of generality. Further, the introduction of abstract rules affects the character of the firm by gradually changing the nature of the firm itself. Moreover, the extent to which the firm can acquire an organic character depends upon particular characteristics of the firm itself (e.g., history, informal rules, corporate culture), that of the industry in which it operates and that of the whole economy.

In this evolutionary process the fact that the proportion of abstract rules among the rules of the firm increases and the firm becomes more complex and to a certain extent acquires the characteristics of the market is reflected in significant changes in firm organization.[31] The original highly centralized hierarchical organization that characterized firms in the period before the Second Industrial Revolution rested almost exclusively on concrete rules (commands).[32] From the 1920s the large vertically integrated multidivisional firms, for various reasons, gave decision rights to lower levels and stimulated entrepreneurship within their boundaries, something which was made possible, in fact, by letting more abstract rules operate. And today the project-based firms, as already mentioned above, are built upon the entrepreneurial acts of their employees, which results in a shift in the mix of concrete and abstract rules towards more abstract rules. That is, to some extent, firms exhibit an organic character too, similar to catallaxy. However, the "constitution" of the firm surely differs from that of the market: commands (authority) remain of primary importance. In fact, the firm can be seen as a hybrid order, i.e., a mix of the man-made and spontaneous orders since it entails many elements of both (Ioannides 2003).

What was said above allows us to analyze the character of the coordination problem the firms deal with. Of course, type II coordination predominates within firms since most aspects of the coordination game are well-known to the employees as well as to the management, who, basically, consciously coordinate their activities with those of others. What was stressed above is that type II coordination is not exclusive within firms, the type I problem occurs too, but to a lesser extent. The more the firm acquires an

[31] For an overview on the evolution of firm organization, see Kapás (2006).

[32] Even in the highly centralized hierarchy the members of the firm build up some fund of ideas in common (Sugden, 1989), which belongs to the corporate culture and which will allow them to coordinate their actions without any conscious communication.

organic character, the more type I coordination becomes relevant. And type I coordination is solved, as argued above, by referring to the incentive institutions designed by the management.

5 Conclusions

By analyzing coordination problems my aim was to better understand the firm and the market. The starting point was a distinction between two kinds of coordination problems and two kinds of solutions to these, proposed by Sautet (2002) and Klein (1997). The significant critique I have leveled against their views was that they suggest a one-to-one correspondence between the two kinds of coordination and the solutions: the type I coordination problem is solved by catallaxy, while type II by rules and conventions (the firm being of primary importance). I have formulated three dilemmas stemming from Sautet's and Klein's framework that needed further investigation. My argument was that answering these dilemmas requires two kinds of distinction: on the one hand between the nature of coordination problems and the solutions to these, and on the other hand, between coordinating institutions and the solutions to coordination problems.

Through an analysis of (1) the coordinating institutions of the market and of the firm and of (2) the character of the rules on which the market and the firm rest, the major conclusion was that both the market and the firm could be seen as particular solutions to both kinds of coordination problems, provided that we distinguish between two meanings of the market. Since I have focused on the first meaning of the market, namely the market economy, the emphasis was on the similarities and the differences in how market and firms resolve the type I coordination problem.

Coordinating institutions play a crucial role in solving the type I coordination problem both in the spontaneous order and within the firm. My conclusion was that (1) coordinating institutions provide incentives for individuals both in the market and inside firms, and (2) both the institutions of the market and that of the firm are the product both of deliberate and spontaneous investments, but (3) the institutions of the firm have an overall designed character, while to a certain extent also relying on abstract rules, and finally (4) the institutions of the market have an overall undesigned character, while to a certain extent also relying on deliberately designed coordinating institutions.

That is, how coordination is achieved within the firm is fundamentally similar to how it is assured in the catallaxy: through coordinating institutions which induce individuals to use their local, partly tacit knowledge. My argument is that the coordinating institutions both in the catallaxy and within the firm drive the individuals' acts in the same way: the individuals may only pursue their own interest. Nevertheless, what makes the difference is that the institutions of the firm are designed by the management, while those of the catallaxy have an overall undesigned character. That is, the difference between catallaxy and the firm lies in the extent to which they are the result of design (Loasby 1999). And this is a difference of degree, and not of kind. Accordingly, "the well-managed firm is more similar to the market than different from it" (Cowen and Parker 1997:60).

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