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THE COMPETITIVE PARADIGM IN SPATIAL ECONOMICS

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The competitive paradigm in spatial economics

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Abstract

This paper discusses the reasons for the *spatial impossibility theorem*, which states that the competitive paradigm cannot explain the formation of large urban agglomerations and trade flows. This result is especially meaningful insofar as it is internal to the theory itself. We then briefly explores different solutions to remedy to this methodological failure.

Keywords: space, transport costs, land rent, general equilibrium

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Introduction

The history of the relationship between spatial economics and general equilibrium theory is both complex and obscure. It is complex because it is fraught with difficulties that have been put aside for simplicity. It is obscure because the several attempts made over the last 50 years to clarify this relationship have befuddled the debate with confusing answers. This state of affairs is all the more surprising given that *trading commodities is spatial by its very nature*. People get involved in trade because they want to consume goods and services that are not produced within their reach. Under these circumstances, agents must bear *transport costs*, which correspond to the expenditures needed to coordinate transactions with suppliers or customers.

The definition of "transport costs" includes all costs generated by distance and borders: the costs of shipping goods per se, but also tariff and non-tariff barriers, communication impediments, cultural differences, and the time needed for the transaction to occur. As a result, transport costs should play an important role in economic theory as they are inherent attributes of exchanges among agents dispersed across locations. Yet, it is fair to say that space is ignored by the vast majority of economists. Neither land nor distance is mentioned. Rather, textbooks give the impression that production and consumption take place on the head of a pin, as if space had no dimension.

One would expect trade theory to be the economic field where transport costs occupy center stage. Until the emergence of the "new trade theories," international trade economists dismissed transport costs and privileged the differences of technologies or factor endowments between dimensionless countries. According to Deardorff (1984: 470), "transport costs are almost universally ignored in trade models in the sanguine hope that if included they would not materially affect the results," while Panagariya (1998) views them as "unnecessary complications." As observed by Leamer (2007), all of this implies an intriguing geography: Countries are close enough for the cost of shipping goods internationally to be zero, but far enough apart that no workers and capital-owners can find their way from one country to another. The development of this research strategy is especially surprising since, as stressed by Ohlin (1933; 1968: 97) more than 80 years ago, international trade and location theories are not independent of one another:

> "international trade theory cannot be understood except in relation to and as part of the general location theory, to which the lack of mobility of goods and factors has equal relevance."

The most common explanation for this negligence is that the value of transport costs has declined considerably since the middle of the 19th century. Even though transport costs must be positive for space to matter, one should not infer from this observation that location matters less when transport costs decrease. Quite the opposite, by making them more footloose, lower transport costs make firms more sensitive to minor differences between places. As a result, a tiny difference may have a big impact on the geographical distribution of economic activity. Moreover, the cost of shipping some goods remains high. The puzzle that constitutes the gravity equation confirms the idea that distance still matters (Anderson, 2011): on average, *doubling distance halves trade flows.* Consequently, the lack of attention paid to space in economic theory cannot be justified by the fall in transport costs.

Krugman (2007: 33) summarizes this neatly:

> "one vision [is] the traditional vision of international trade theory, in which countries are discrete economic points, whose location in space is irrelevant. Another [is] the pure geography vision, in which location in space is all and borders are irrelevant. Finally, there [is] the vision of a spaceless, borderless world in which distance had been abolished – not a world that yet exists, but possibly one just over the horizon. What seems to have emerged from the empirical work of the past dozen years is a compromise vision. Distance matters a lot, though possibly less than it did before modern telecommunications. Borders also matter a lot, though possibly less than they did before free trade agreements. The spaceless, borderless world is still a Platonic ideal, a long way from coming into existence."

This is not yet the end of the story. Despite Econ 101 leading off with the claim that land, labor, and capital are the three main factors of production, land is largely forgotten. Nevertheless, empirical evidence reveals that a growing share of high-value activities is concentrated in large metropolitan areas (Moretti, 2012). As Lucas (1988: 39) put it, "What can people be paying Manhattan or downtown Chicago rents for, if not for being near other people?" Otherwise, how can such high rents in cities be explained? In most habitable regions of the globe, the supply of land vastly exceeds the demand for land. Therefore, absent the need for proximity, land should (almost) be a free good. This makes the case for proximity very strong, at least for some activities. Contrary to the opinion widely spread in the media, even with Internet and other new communication devices, face-to-face contacts remain important. To understand why this is so, one must keep in mind that the information transferred by means of modern communication tools must be structured according to schemes and codes that are clearly defined and known to all. Only formal and precise information can be transmitted in this way. On the other hand, information that is difficult to codify can often be transmitted only through face-to-face contacts. For example, the preliminary stages in the development of a new technology or product require repeated contacts among those involved and such contacts are much easier and less costly when these people are in close proximity.

Given the importance of the above-mentioned issues, the following question comes to mind: *Why is space peripheral to economic theory?* Since the optimal location of an agent depends on the locations chosen by the agents it interacts with, locational decisions are "interdependent" and consequently, must be studied within a general equilibrium framework encompassing the whole range of choices made by firms and households. As the competitive model is the starting point of any study in which the market plays an important role, one should naturally try to understand what can be accomplished in spatial economics by using this paradigm.

The essence of the competitive model lies in the impersonal nature of exchanges: when agents make decisions regarding production or consumption, the *only* information they need is the price system given by the market, something over which they have no influence. The most elegant and general model of a competitive economy is undoubtedly that developed by Arrow and Debreu (1954). It can be briefly described as follows. The economy is formed by agents (firms and households) and by commodities (goods and services). A firm is characterized by a set of production plans, each production plan describing a possible input-output relation. A household is identified by a relation of preferences, a bundle of initial resources, and some shares in firms' profits. When both consumers' preferences and firms' technologies are convex, there exists a price system (one price per commodity), a production plan for each firm, and a consumption bundle for each household. These satisfy the following three conditions: at the prevailing prices, (i) markets clear, (ii) each firm maximizes its profit subject to its production set, and (iii) each household maximizes its utility under the budget constraints defined by the value of the household's initial endowment and shares in firms' profits.

In the Arrow – Debreu model, a commodity is defined not only by its physical characteristics, but also by the *place* where it is made available. For example, in *Theory of Value*, Debreu (1959: 30) insists that "a good at a certain location and the same good at another location are different economic objects, and the specification of the location at which it will be available is essential." Given this convention, the choice of a commodity must also entail the choice of a location. For example, when individuals choose a consumption good or a type of work, they also choose where to consume or where to work. Within the Arrow – Debreu model, spatial interdependencies are integrated in the same way as other market interactions. In other words, this model seems able to cope with the formation of a space-economy without having to consider additional specificities.

However, things are not that simple. The essential question is whether the competitive price mechanism is able to explain the large disparities that arise at different spatial scales – the continent, the country, the city, or the neighborhood. According to Lösch, Isard, and others, new models – fundamentally different from those found in standard general equilibrium – are needed when the spatial distribution of activities becomes itself a variable. However, these authors do not explain why more general models are needed and fail to develop such alternative models.

In this respect, Starrett (1978) has made a fundamental but – strangely enough – almost unnoticed contribution by showing that the introduction of space in the Arrow – Debreu model has a crucial implication:[1] *total transport costs in the economy must be zero for a competitive equilibrium to exist.* This in turn means that the competitive framework cannot explain the formation of big cities and large trade flows. Phrased differently it seems that the competitive model cannot be used to study a spatial economy. Of course, very much like in standard trade theory, inhomogeneities across space may save the competitive

[1] The low impact of Starrett's paper in spatial economics is shown by the fairly small number of citations by scholars working in this field.

model. Nevertheless, most of these inhomogeneities are *not* exogenous. Instead, they are the outcome of market and non-market interactions among agents and must be explained rather than assumed.

The remainder of this paper is organized as follows. In Section 2, the inadequacy of the competitive assumption for economic geography is illustrated by means of a simple example. The robustness of the conclusions drawn from this example is then examined in Section 3 where the *spatial impossibility theorem* – stating that no competitive equilibrium involving trade exists when shipping goods across space is costly – is discussed. Note that this result is especially meaningful insofar as it is internal to the theory itself. Section 4 briefly explores the role of spatial inhomogeneities. Section 5 concludes.

The Quadratic Assignment Problem

We begin the discussion by considering the *quadratic assignment problem* introduced by Koopmans and Beckmann (1957). Assume that m firms are to be assigned to m locations. Every firm must be assigned to a single location and every location can accommodate only one firm. Each firm produces a fixed amount of good and uses one unit of land as well as fixed amounts of goods produced by the other firms. Suppose further that the technology used by each firm is not affected by the chosen location. Finally, shipping a good from a location to another location involves a positive cost.

We now show that any feasible assignment cannot be sustained as a competitive equilibrium. In order to illustrate the nature of the difficulties encountered, we restrict ourselves to the simple case of two firms, denoted $i = 1, 2$, and two locations, denoted $\ell = A, B$. Without loss of generality, we may assume that firm 1 is assigned to location A, and firm 2 to B. Firm i produces q_i units of good i and purchases q_j units of good j from firm $j \neq i$, regardless of its own location. It also receives a revenue $a_i > 0$ from other activities with the rest of the world, which does not depend on its location. Finally, each good i can be shipped from its place of production to the other location at a given cost $t_i > 0$.

Let $p_{i\ell}$ be the price of good i at location $\ell = A, B$ and R_ℓ be the land rent to be paid by a firm for using land at location ℓ. Firm 1's profit in location A is thus defined as follows:

$$\pi_{1A} = a_1 + p_{1A}q_1 - p_{2A}q_2 - R_A,$$

while a similar expression holds for firm 2 at location B. If this price system sustains the foregoing configuration, then the equilibrium prices $p_{i\ell}$ must satisfy the following conditions (Samuelson, 1952):

$$p_{1B} = p_{1A} + t_1, \tag{1}$$

$$p_{2A} = p_{2B} + t_2. \tag{2}$$

These equalities mean that the price of good 1 (2) in location B (A) is equal to its price in location A (B) plus the corresponding unit transport cost $t_1(t_2)$. Accordingly, total profits are equal to

$$\pi_{1A} + \pi_{2B} = a_1 + a_2 - (t_1 q_1 + t_2 q_2 + R_B + R_B),$$

which are always positive when a_1 and a_2 are sufficiently large.

We now show that it is impossible to find values of R_A and R_B such that both firms 1 and 2 maximize their own profit at locations 1 and 2, respectively. Without loss of generality, assume that $R_A \geq R_B$. Then, if firms behave competitively, it is readily verified that firm 1 would earn a strictly higher profit by setting up at location B. Indeed, if firm 1 sets up at location B, its profit is

$$\pi_{1B} = a_1 + p_{1B} q_1 - p_{2B} q_2 - R_B.$$

Using (1) and (2), it is then readily verified that:

$$\pi_{1B} - \pi_{1A} = t_1 q_1 + t_2 q_2 + R_A - R_B > 0. \tag{3}$$

In other words, firm 1 would be better off at location 2 and, therefore, has an incentive to move. In other words, *in the quadratic assignment problem, no feasible location pattern of firms can be sustained as a competitive equilibrium.* Observe that, in the above argument, firms are price-takers and, therefore, they believe that "changing place" does not affect the prevailing prices of goods and land rents.

It is tempting to attribute this negative result to the many specificities of the quadratic assignment problem, especially the assumption that firms cannot be located in the same location. In the next section, we show that a breakdown of the competitive price mechanism holds for a general spatial economy.

The Spatial Impossibility Theorem

Consider now a spatial economy formed by a finite number $m \geq 2$ of locations. Each location is endowed with a positive amount of land and can accommodate a large number of firms and households. The economy involves n mobile goods and one immobile good, land. Shipping goods requires the use of resources. Specifically, the transport of a good between any two locations is performed by a profit-maximizing carrier, who purchases this good in a location at the market price prevailing there and sells it in the other location at the corresponding market price. To do so, it uses goods and land in the in-between locations.

A typical firm produces in a small number of places. Likewise, a household has a very small number of residences. It is, therefore, reasonable to assume that each firm (household) chooses a single location and engages in production (consumption) activities there. This means that *agents are not ubiquitous* and, therefore, have an "address" in space. Although firms may run several production plants, armchair evidence shows that they concentrate their production at a few sites only. Observe that this assumption is tantamount to what Koopmans (1957: 154) wrote long ago:

> "without recognizing indivisibilities – in human person, in residences, plants, equipment, and in transportation – urban location problems, down to those of the smallest village, cannot be understood."

Such indivisibilities are needed for the existence of firms, and even of trade. However, both firms and households are free to choose the location in which they want to conduct their activities and the amount of land they use.

Last, space is said to be *homogeneous* if (i) the utility function of each consumer is identical no matter what her location and (ii) the production set of each firm is independent of its location. In other words, firms and households have no intrinsic preferences over locations. The reason for making such an assumption is that we aim to identify pure economic mechanisms that generate cities and trade, independently of any natural endowment of locations. This was the starting point of Lösch (1940: 105 English translation):

> "Among all the factors that can create an economic region we shall select the economic. We shall consider market areas that are not the result of any kind of natural or political inequalities but arise through the interplay of purely economic forces, some working toward concentration and other toward dispersion. In the first group are the advantages of specialization and of large-scale production; in the second, those of shipping costs and of diversified production.
>
> In the following derivation we start from radical assumptions in order that no spatial differences may lie concealed in what we assume: that economic raw materials are evenly and adequately distributed over a wide plain. Our area shall be homogeneous in every other respect as well, and contain nothing but self-sufficient farms that are regularly distributed. How can this starting point lead to spatial differences?"

Following a line of reasoning similar that used in Section 2, Starrett (1978) has shown that, for any allocation involving costly trade across space, the global incentives to move across agents are always strictly positive. Therefore, we may conclude as follows:[2]

The spatial impossibility theorem. *Assume a spatial economy with a finite number of locations. If space is homogeneous, transport is costly and preferences are locally nonsatiated, then there is no competitive equilibrium involving transportation.*

What is the meaning of this *a priori* unexpected result? Whenever economic activities are perfectly divisible, the spatial impossibility theorem implies that the mobility of production factors is a perfect substitute for trade. Such a result is hardly surprising because every

[2] See Fujita and Thisse (2013) for more details.

activity can be carried out on an arbitrarily small scale in every possible place, without any loss of efficiency. Firms and households are then induced to suppress all distance-related costs by producing exactly what they need where they are. Mills (1972: 4) very suggestively described the "world without cities," which would result from an economy operating under constant returns and perfect competition:

> "each acre of land would contain the same number of people and the same mix of productive activities. The crucial point in establishing this result is that constant returns permit each productive activity to be carried on at an arbitrary level without loss of efficiency. Furthermore, all land is equally productive and equilibrium requires that the value of the marginal product, and hence its rent, be the same everywhere. Therefore, in equilibrium, all the inputs and outputs necessary directly and indirectly to meet the demands of consumers can be located in a small area near where consumers live. In that way, each small area can be autarkic and transportation of people and goods can be avoided."

Clearly, such a space is the quintessence of autarky.

However, as observed by Starrett (1978: 27), when economic activities are *not* perfectly divisible the transport of goods or people between some places becomes unavoidable:

> "as long as there are some indivisibilities in the system (so that individual operations must take up space) then a sufficiently complicated set of interrelated activities will generate transport costs"

In this case, the spatial impossibility theorem tells us something really new and important: whenever agents are mobile, there is no competitive equilibrium (hence "impossibility" in the name of the theorem) such that goods are traded between locations. In other words, *factor mobility and trade are incompatible in a pure competitive setting*. This is clearly a surprising result that requires more explanations.

When locations are not in autarky, some goods must be traded across locations. By implication, the price system must perform two different jobs simultaneously: (i) support trade between locations (while clearing markets in each location), and (ii) prevent firms and consumers from relocating. What the spatial impossibility theorem says is that it is impossible to hit these two birds with one stone. The equilibrium prices supporting trade carry the wrong signals from the viewpoint of locational stability. In the quadratic assignment problem, when a good is exported from A to B, then the associated positive price gradients induce the producer located in A (who seeks higher revenue) to relocate to B, while the firm already in location B (who seeks lower prices) want to relocate to A. The transport of goods from B to A encourages such "cross-relocation." The land rent differential can discourage the relocation in one direction but not in both.

Thus, as long as trade incurs positive transport costs, some agents will always want to relocate. As a consequence, the price system does not convey all the information needed by agents because they must also know where those it interacts with are located. This situation bears some resemblance to that encountered when externalities prevent agents from taking efficient price-guided decisions. The spatial impossibility theorem shows that the same holds in a spatial economy. In a more formal way, the reason for the spatial impossibility theorem lies in the non-convexity of the set of feasible allocations caused by the existence of transport costs and the fact that agents are mobile but not ubiquitous. Given the role played by the competitive model in economic theory, there can be little doubt that the difficulties highlighted by the spatial impossibility theorem acted as an impediment to the development of spatial economics until the monopolistic competition revolution of the 1980s.

In contrast, as illustrated by the literature developed in spatial price theory, standard general equilibrium remains relevant and useful for the study of commodity flows across space when both firms and households have *given* locations (Labys and Yang, 1997). To the best of my knowledge, the first spatial price equilibrium model was developed by Cournot (1838, chap. X), which was rediscovered and extended by Samuelson (1952). There are several sources and destinations – which need not be different – that are connected by an interregional transport network. Firms' and consumers' choices are aggregated into elastic demand and supply functions, while shipping the good from a source to a destination is costly. The issue is to determine simultaneously the quantities supplied and demanded at each region and the local prices at which the good is supplied by firms and bought by consumers. Trade being driven here by spatial arbitrage, in equilibrium the price of a good in one region depends on the price for the same good in other regions as arbitrage limits the price difference to the shipping cost of the good. To be precise, the equilibrium is reached when the consumer price equals the producer price plus the transport cost for all positive flows; if the consumer price is less than the producer price plus the transport cost, then no trade flow occurs.

When transport costs are high, each region operates under autarky. Once transport costs have decreased sufficiently, trade across regions comes into play. As the integration process gets deeper, some regions stop producing the good to become importers because the domestic producers are less efficient than their foreign competitors. In other words, these firms are driven out of business because they have lost "the most effective protection of all tariff protections, namely, that provided by bad roads" (Launhardt, 1885: 150 English translation). Thus, market integration, technological progress in transport, or both, redraw the geography of production with some regions producing more and the others less.

This simple model highlights the importance of the three major forces stressed in modern trade literature: (i) the size of markets through regional demand schedules; (ii) their accessibility through the transport cost matrix; and (iii) the heterogeneity of producers through the regional supply schedules. This model could have been used to develop a trade theory with transport costs, which came into being much later on with the new trade theories.

It is, therefore, the combination of two assumptions – *trading goods involves positive transport costs while producers and consumers are mobile but not ubiquitous* – which leads to the breakdown of the competitive paradigm in a homogeneous space.

Spatial Inhomogeneities

The main critical assumption in the spatial impossibility theorem is the homogeneity of space. Relaxing this assumption may help restore the existence of a competitive equilibrium involving the transport of goods.

Exogenous inhomogeneities. In order to gain insights about the effect of spatial inhomogeneities, consider the 2 firm-2 location example of Section 2. More specifically, we assume that location A is now endowed with an exogenous attribute beneficial to firm 1 only (whereas firm 2 experiences a similar advantage in the sole location B). Whatever the reason for it, this attribute gives rise to an additional earning equal to $b_A > 0$ when firm 1 is at A. Under these circumstances, firm 1's profit at location A is as follows:

$$\pi_{1A} = a_1 + b_A + p_{1A}q_1 - p_{2A}q_2 - R_A$$

whereas π_{1B} is unchanged. Measuring again the incentive to move from A to B by the difference in profit at A and B, we obtain:

$$\pi_{1B} - \pi_{1A} = t_1q_1 + t_2q_2 + R_A - R_B - b_A$$

which is always negative when b_A is sufficiently large. If the same holds for firm 2, we may conclude that *a competitive equilibrium involving trade may exist when firms have strongly diverging preferences for location attributes.* However, this does not really save the competitive paradigm. Indeed, as Hamilton (1980: 38) put it:

> "Stability is lent to the system by having plants differ from one another in their preferences for the sites *qua* sites, and instability arises from a large volume of trade among plants."

Though analytically convenient, this approach does not help us to understand why firms 1 and 2 have divergent preferences about locations. Modern economies are replete with footloose firms connected by large trade and communication flows. Therefore, although exogenous inhomogeneities and historical circumstances may explain *where* large cities are built, but they do not say *why* cities exist.

There has been a revival of the Ricardian approach in the form of spatial quantitative models (Diamond, 2016; Redding, 2016). These models account for various types of mobility costs, but assume that locations are endowed with given reduced forms of comparative advantage.

Endogenous inhomogeneities. The assumption of a homogeneous space may also be relaxed when firms, say, benefit from agglomeration economies. Ever since the work of Marshall (1890, chap. X) and Hoover (1937, chap. VI), it is has been documented that the spatial concentration of firms in cities generates various benefits that are not mediated by the market (Duranton and Puga, 2004). One of the most illustrative examples of this is provided by Ogawa and Fujita (1980) who show that, in an otherwise homogeneous space and perfectly competitive economy, the presence of informational spillovers among firms leads to the emergence of a central business district when commuting costs are low, information spillovers are strong, or both. In this case, *there exists a competitive equilibrium involving workers' commuting.* At the other extreme of the spectrum, when commuting costs are high, information spillovers are weak, or both the market outcome involves a complete integration of business and residential activities. In other words, there is *backyard capitalism.* Of course, the presence of externalities implies that the market outcome is inefficient: firms are insufficiently concentrated because they care only about their role as "receivers" and neglect their role as "transmitters."

A new strand of literature focuses on heterogeneous workers whose combinations generate different types of agglomeration economies (Behrens *et al.*, 2014; Eeckhout *et al.,* 2014). However, by assuming that cities produce the same good or, equivalently, different goods traded at zero cost, these models fail to recognize that cities are anchored in specific locations and embedded in intricate networks of trade relations.

Concluding Remarks

When producers and consumers are free to choose their locations, the price system must (i) clear markets in each location, (ii) support trade between locations, and (iii) prevent firms and households from relocating. The spatial impossibility theorem tells us that, in a homogeneous space, the price system is unable to satisfy all these requirements. Absent external factors that drive firm and household locations, such as a strong preference for particular locations or the presence of spatial externalities, a sound spatial economic theory cannot be built by differentiating goods through their locations and adding land as a new commodity. If firms interact together and those interactions are costly, a firm's profits depend on not just its own location, but also on the location decisions made by the other firms. As a consequence, the relative advantage of a location for a given firm depends on the locations of other firms. In such a context, each one must know (or guess?) where the firms it interacts with are located. Adding such an requirement violates the competitive assumption. This issue may be tackled from a different angle: *Is a market coping with the accessibility across agents missing?* Since the land rent reflects the accessibility to suppliers and/or customers, one could imagine a competitive economy in which agents would know the land rents associated with all possible location patterns of activities. But such an information is *not* provided by the market. Hence, there seems to be "missing" markets.

By contrast, the presence of exogenous inhomogeneities provide agents with the signal that is missing in a homogeneous space. An illustrative and powerful example of this is provided by the canonical model of land use. Insofar as goods and transactions must take place in a market town, as in the von Thünen model (Launhardt, 1885; Samuelson, 1983), or jobs are concentrated in the central business district, as in the monocentric city model (Alonso, 1964; Fujita, 1989), the competitive paradigm permits the development of a rich analysis of the spatial distribution of activities when *the location of the center is given.* This is because the interdependence between producer or worker locations is replaced by their accessibility to an exogenous center whose impact can be captured unequivocally by a competitive land rent profile.

All of this has a major implication. If we want to explain the formation of cities or the existence of large differences between regions or nations in an otherwise homogeneous space, we must explicitly consider *externalities* or *imperfect competition.* In other words, to explain the most salient feature of the space-economy, that is, the presence of a large variety of agglomerations of economic agents, we have to appeal to non-market interactions among agents or to imperfectly competitive markets (Fujita and Thisse, 2013). The choice of a particular modeling strategy depends on the spatial scale under consideration. Because their extent is geographically limited, spatial externalities are mainly relevant for studying issues arising on a small scale. As for issues arising on a large scale, market-based approaches are more appealing. They range from general equilibrium models with monopolistic competition to partial equilibrium models with oligopolistic competition. In both cases, increasing returns and imperfect competition are integrated within a single framework.

Somewhat ironically, this state of affairs is reminiscent of the main difficulty encountered in the standard model of growth, as summarized by Romer (1992: 85–86):

> "The paradox...was that the competitive theory that generated the evidence was inconsistent with any explanation of how technological change could arise as the result of the self-interested actions of individual economic actors. By definition, all of national output had to be paid as returns to capital and labor; none remained as possible compensation for technological innovations. ... The assumption of convexity and perfect competition placed the accumulation of new technologies at the center of the growth process and simultaneously denied the possibility that economic analysis could have anything to say about this process."

To sum up, the modeling constraints have led economists to concentrate – probably for too long – on the combination involving constant returns and perfect competition. In a sense, it does not seem to be an exaggeration to say that the ability of the general equilibrium setting to tackle various issues and, especially, the absence of alternative models have generated a lock-in effect that economists had a lot of trouble escaping. It is, therefore, not surprising that the renewed interest in spatial economics brought about by Krugman (1991) is concomitant to the monopolistic competition revolution. Trading in Hotelling's (1929) footsteps, several authors have used space as a metaphor to study heterogeneous agents in game-theoretic terms in domains as different as industrial organization and political science. Thus, space seems to have moved from the periphery to the center of economy theory.

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