TOWARDS AN EFFICIENT CITY: THE CASE OF SANTIAGO, CHILE

Pedro Melo*

ABSTRACT

Cities are the outcome of processes of economic maximization where not all requirements of perfect competition are given (there are externalities, transaction and information costs, and market power), and where the past does have a bearing.

"Real" prices of public services and especially of transport are essential to achieve an efficient city. When differential costs by location are not adequately charged and there are externalities not internalized, regulations for city size and stable administrative restrictions on land use can correspond to an economically sustained solution, of the "second best" type.

Government policies and actions regarding housing are not neutral to a city's efficiency.

These elements are analyzed from the outlook of the facts that seem to stem from the evolution experienced by Chile's capital city over the last 50 years.

SINTESIS

Las ciudades son el resultado de proceso de maximización económica en que no todos los requisitos de una competencia perfecta se dan (hay externalidades, costos de transacción e información, y poder de mercado) y en que el pasado si tiene una gravitación.

Los precios "reales" de los servicios públicos y en especial los de transporte son esenciales para lograr una ciudad eficiente cuando los costos diferenciales por ubicación no se cobran en forma adecuada y existen externalidades no internalizadas, las regulaciones relativas al tamaño de la ciudad y las restricciones administrativas estables relativas al uso del suelo pueden corresponder a una solución económicamente fundamentada, del tipo *second-best*.

Las políticas y acciones gubernamentales no son neutrales en relación a la eficiencia de una ciudad.

Estos elementos se analizan desde la perspectiva de los hechos que parecen desprenderse de la evolución experimentada por la ciudad capital de Chile durante los últimos cincuenta años.

* **Jefe División Informática, Technology Division, Ministry of Housing and Urban Development.**

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1. INTRODUCTION

This paper aims at deducing some policy recommendations to improve the efficiency and competitiveness of a city like Santiago on the basis of the theory of the city and the facts that seem to stem from the evolution experienced by Chile's capital city over the last 50 years. In the light of these facts it can be concluded that many of the regulations that were introduced in the city, such us actions to facilitate the access to housing, are responsible for distortions in the urban land market. This is the case of public transportation and government housing programs.

Section I examines the origin of the city, with special reference to its growth process. Such phenomenon is illustrated within the frame of the explotation of a mining field, that builds the intrinsic conditions for urban concentration. Section II reviews the behavior of land pricing, and the justification for a regulatory institutional array to harmonize private costs and benefits with social costs and benefits. Finally, Section III dwells on the case of the city of Santiago.

2. THE BIRTH OF THE CITY

Our starting point will be to imagine the city as an "enterprise" that produces goods and services in an extensive sense (from simple caramel or high technology services to intangible goods and "Z-goods" of the type defined by Gary Becker: for example, a beautiful architectonical view). It can be said that such enterprise is a "bad goods" producer too. It produces congestion and pollution.

It is obvious that population agglomeration is a spontaneusly generated phenomenon, since the production of many goods has economies of scale. As in the

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real world there are transportation costs, the city is a "market resultant" of society's economic organization.

In general, we can ascertain that behind what we economists call "economies of scale" in an activity, there is to be found the existence of indivisible material resources (as for instance, a machine) or other indivisible resources (as is the psychical and physical capacity of man), the existence of informational transaction costs, which though displaying decreasing average costs relative to their volume within a firm, and transport costs for primary and intermediate goods, which decrease with geographical concentration of the productive process[1].

Nevertheless, the existence of innumerable separate agglomerations is an evidence that those economies of scale have limits and/or that other important costs are naturally generated. These could be negative externalities associated with agglomeration (congestion, pollution) and/or increases in production costs due to greater costs associated with transport (in terms of material inputs, products and people) as the city becomes more extended. In this case, we consider "production" as a very wide concept, not only that of goods and services to be sold, but also of other "products", such as, quality of life.

To sum up; three basic elements can be said to be caracteristic features of a city: economies of scale in production, positive direct transportation costs and negative externalities of congestion and pollution.

Now let us imagine a city as a small settlement originating from a mining camp where workers manning a mine live. It is possible to envisage the city as part of the firm's production function. Or better still, it is possible to envision the city as a "major" firm or an "horizontal and vertical geographic integration" of multiple products, of which some are self-consumed and others, visualizing the mine's output as one of the products, are "exported" outside from there.

When the mine is first started, obviously on the site there would be no production of other elements, with the exception of those of a more domestic nature, produced by the miners themselves. As the mine grows (and with it the number of workers increases), probably offices would be opened and firms selling clothes, food and sundry entertainments, would crop up, which could belong or not to the same owner. Krugman (1991) models this process by resorting to the existence of economies of scale, transaction costs and the posibility of production that only can be located at (two) alternative sites. There will be geographical concentration of production if transport costs are relatively low and the economies of scale are relatively important. That is to say, when the demand associated with the mine is

[1] The literature speaks of "economies of agglomeration" when there exist cost advantages associated with positive technological externalities (Tolley and Crighfield, 1987).

on the increase, there comes a point when it begins to be convenient to produce some goods next to it, taking advantage of their economies of scale in production (for positive transport costs).

With respect to spatial distribution of the mining camp, how will this growth be organized? If all the sector belongs to the mine's owner, we can trust it will be a relatively efficient process[2].

The location of houses will probably be concentrated close to the mine's entrance, due to the existence of transport costs. The existence of economies of scale in spatially concentrated housing and mine-related services will possibly induce the location of the mine's administrative offices and maintenance at another not very distant area, but in another direction.

Owing to the existence of transport costs, which are reduced through investment in roads, surely the same road which connects the mine to other cities will be used to decide on the location of new buildings. As the town grows, it will most certainly do so in terms of the road itself and of the historical distribution of space, in addition to other factors, such as geographic ones (which include land quality and topography, availability of water, and so forth) and ownership rights on neighboring land.

Here two concepts not very usual in Economic texts come to bear, that is, History and Geography, close to a more usual concept: Property Rights.

History's importance can be ascribed not only to the "specific capital" associated with physical investments made at a place, but also to the fact that in a world with imperfect information, history is a source of information.

In this regard, there is full validity to the finding made by Brezis and Krugman (1993) in the sense that a revolutionary technological breakthrough offers the possibility of relocating "the industry", whereas a "normal" technological progress tends to preserve the leadership of the established centers. In fact, any such revolutionary change would bring about an accelerated economic depreciation of assets, making it probably more costly to replace all the old structure than to build it from scratch elsewhere. This can be an element to be considered in accounting for observed residential depopulation of historical centers in cities[3].

[2] Of the efficiency of one case in particular we should not be that sure, since we most certainly know that there are firms which are not efficient and may go bankrupt. Do inefficient cities go bankrupt?

[3] This rigidity of the already built and used areas, added to high prices due to the expectation to use the lands, associated with the proximity of the business center (and the savings in associated transport costs) would lead to depopulation while, at the same, it would make an easy redestination more difficult.

The above mentioned phenomenon is also related to the third concept stated above: property rights. When a firm grows, at least part of the physical space is redistributed for efficiency's sake, which in itself does not entail a great difficulty, considering that everything belongs to the same owner. On the other hand the geographical reorganization of the city generally takes place in a fragmented manner, as it is not carried out by an entity which receives all of the benefits derived from its action and because there are non-negligible costs in transactions of properties among different owners. If there were neither transaction costs nor market power, and perfect information, surely the "invisible hand" would bring about those same changes (for instance, to minimize transport costs).

The great difference between a city and a firm seems to be that the former has a disgregated ownership and management where important objectives are not articulated and even at odds with each other.

It is possible that industrial and business organization theories can be useful to understand and improve cities, though the diversity of theories is a difficulty. At least all theories could coincide that there should be a clear leader (the Manager), though there may be separate officials responsible for different matters. In the city, then, it would seem reasonable to have a "Main Major" to see to the "efficiency" of the city as a whole (a concept within which we want to include the production of "quality of life").

3. OPTIMAL EXTENSION OF THE CITY AND ZONING PLANS

When a firm grows at a given location, it plans its expansion and the use of space so as to use land optimally. In the same way, the existence of zoning plans is justified so as to rationalize the use of space in the city. This rational process of urban expansion will have a natural limit given by economies of scale, transport and other associated costs and land prices that can be incorporated. Clearly, the land surface occupied is a production factor. Theoretically, it could be incorporated in infinitesimal portions as needed at its alternative production cost (for instance, in agricultural use), within a competitive setting. Nevertheless, the number of owners of surrounding land usually do not tend to the infinite. Rather, it is possible to have a situation of monopolistic or oligopolistic power.

On the other hand, fixed costs associated with the current location of a firm in a process of growth make land become a limiting factor for which one is willing to pay up to the totality of the surplus of a projected higher production, associated with a larger piece of land, with the limit set by the costs involved in relocating that firm.

We must note that at least in this case, the activities carried out at one place bring about a "pecuniary externality"[4] on the price of the adjoining site, as the value of the alternative use of that lot of ground increases.[5]

In the urban periphery this effect could generate the abandonment of agricultural production if it requires investments (with specific components) with a delayed period of recovery. Moreover, it must consider the greater probability of thefts and other production losses due to the vicinity of the urban population.

Let us think of an efficient agricultural and industrial firm which owns a big farm where the land occupied by the plant would be the optimum one in terms of size and distribution. The adjoining land would obviously be used for agricultural production. If we identify the optimum as the use of land under one owner, and if the speculative increase of land prices in the limits of the city entails changing the productive destination of the land (to simple tenancy, due to the shorter term required for the return on agricultural investments) this result would neither be economically nor socially correct.

The sole owner could plan agricultural and industrial investments with greater certainty and efficiency than a market with scattered ownership and its consequent uncertainty with respect to the spatial direction of the industry's growth.

If it is not possible to correct the externality associated with the expectations of a greater demand for new uses of the land through signals in price, the alternative of Zoning Plans that define city limits (setting the separation between urban and rural areas) could be an optimum "second best" solution.

If then the definition of an urban limit could be economicaly justified, it must be mentioned that the growth of the city does not have *per se* a negative connotation, except when there are negative externalities associated with this growth that cannot be conjured by an "invisible hand".

A second economic justification for Zoning Plans deals with the possibility that not all prices are the correct ones (including as prices the ones needed to internalize situations such as the externalities inflicted upon neighbors by the installation of

[4] Since the famous theorem of Coase, the existence of an externality is not enough to make the intervention of the authority advisable. Also some lack of definition in ownership rights and/or transaction costs are needed to make agents involved reach an agreement. The real world features the latter, at least, which makes it necessary that externalities be very strong and the involved very few, to render public action not convenient.

[5] The expectation regarding the prices of neighboring land can be reinforced due to the phenomenon of progressive concentration, on the same street, of sales outlets and services which are competitive with respect to each other. This phenomenon seems to occur due to the fact that it would save information costs to customers and shared transport costs to suppliers, gains which are transferred to all agents due to the competition of those businesses. Another factor to be considered should be what Mills and Nijkamp (1987) have pointed out: "The risk of a price fluctuation of assets is positively correlated to the longevity of the assets." Which asset could be older than land?

commerce, skyscrapers, etc., in the neighborhood). Again, it is possible to think of these Zoning Plans as a "second best" solution, to give boundaries to these externalities, creating exclusive areas, among others. This, even if the information required is not optimum, considering the role that history has in the normal development of a city. And, by affording the concentration of certain activities, there will be potential cost savings in passenger and merchandise transportation.

Third, when all prices are the correct ones, it can be expected that the population density is adequate for each sector of the city. But, for instance, if the price paid for urban transport is lower than the socially correct one, the use of land for housing and business will be less intensive than desired. From the point of view of the city's efficiency it is fundamental to charge for all costs associated with transportation.

Ades and Glaeser (1994), quoting Krugman and Shleifer and Vishny, point out that population concentration reduces transport costs, encouraging industrial expansion. Lower costs involve lower prices (in competition) in the city center attracting workers and strengthening the process. Generally, infrastructure costs can be shared among more firms (relating economies of scale to such investments) and such concentration allows for a greater specialization.

Economies of scale in transport, which can be resorted to as population density increases (explained by the indivisibility of investments), make urban transport costs endogenous (Krugman, 1991). Besides, they are endogenous as an outcome of congestion costs, which act in the opposite sense. Krugman indicates that when transport is expensive, activities are grouped to save travel costs. On this basis, he predicts that urban concentration will be greater when transport is more expensive. Then, if technologies gradually reduce transport costs (goods, data, voice, etc.), a reduction in urban concentration can be expected in the future. In fact, information technology can reduce the advantage of either geographic concentration or economies of scale in the city and, through it, the expansion of the latter.

4. THE CASE OF SANTIAGO

The transport system market solution was not efficient in the eighties: on the one hand, there was no awareness that streets are a scarce good and had the characteristics of a "public good" and, on the other hand, public transport entrepreneurs neither totally internalized the cost of congestion and pollution which they caused. Regulation and bidding of routes is more efficient, but an adequate policy to charge all costs associated with urban transport should include the use of the street infrastructure, cost of congestion and air pollution. Moreover, it will be efficient to charge for the length of each travel, as otherwise the extension of the city is encouraged in a distorted manner. Even a charge should be made for the use of land devoted to streetways. In this subject, a technological problem must be

recognized: it is still dificult to obtain comparatively low costs in the administration of transport charges at least for non structural and multiple access roads.

In the same way as bands for radios are regulated and bids are called for t.v. channels, because there is not enough space for all, it is also necessary to regulate urban transport streets.

Public or concessionned streetway investment is important, as it reduces externalities due to congestion (and pollution) while, by having economies of scale in transport, it improves the productivity of the city as a whole.

As up to now, it has not been possible to charge all associated costs to transport and, assuming that it will continue to be so in the close future, it would be efficient to seek their reduction through indirect methods. For instance, by fomenting the provision of the most diverse urban services and work in sub-centers integrated to residential zones, by defining them in Zoning Plans and supporting them by public investment. It also can be obtained by defining minimum densities in Zonning Plans.

Between 1940 and 1960, urban density remained practically unaltered in the order of 84 inhabitants per hectare. With the beginning of the sixties, important legislation regarding urban planning was enacted in Chile[6]. The censuses conducted in 1970 and 1982 reported an increase to 94 and 103 inhab/ha., respectively. However, at the end of the seventies the Government gave the market a "free hand", making legislation on urban issues flexible to the greatest extent (including areas suitable for urban development and the public transport system)[7]. The 1992 Census shows a density of only 101 inhab/ha., with more than 46,000 hectares (which represents an increase by two times in less than 32 years).

Land use restrictions are not necessarily independent of all the justifications for the use of urban planning instruments for the sake of the efficiency of the city. Economic considerations geared to this social perspective should be given a prominent position. These and other considerations should be submitted directly by

[6] In 1959, Executive Decree Law (DFL) 2 was enacted and subsequently Decree Law 158, which regulates the operation of DFL 2 in relation to low cost dwellings. These laws made projects of urban redevelopment possible, such as, for instance, the San Borja Towers. It was then also when the first Intercommunal Plan for Santiago was approved, though it was never applied due to excessive legislation, as was the case regarding the way it defined industrial areas.

[7] In what respects housing, in 1978, a new Intercommunal Plan was approved, creating an "Urban Expansion Zone" nearly as large as the size itself of the consolidated intercommune. In it, private individuals could propose "Sectionals" (that is, amendments to the Intercommunal Plan enabling them to carry out any project). It must be pointed out that, in some cases, this entailed tragic consequences, owing to the fact that "sectionals" did not adequately consider exclusions for residential use in areas involving risk (due to landslides and river floods). In 1979, the National Policy for Urban Development was approved; in its first Declaration it stated that "urban land is not a scarce resource"; it further stated that: "procedures shall be defined and restrictions eliminated so as to allow for the natural growth of urban areas, following market trends."

representatives from all relevant areas without yielding to statu quo and a lack in leadership. These Plans are an interdisciplinary task and it is by virtue of this that they will attain a greater stability and command more respect without losing the necessary flexibility[8].

The proximity to the primary source of information makes it advisable that Zoning Plans should originate in geographic units as small as possible (neighborhoods). It is also advisable to consider greater levels of spatial aggregation allowing for periodical reviews.

Based on Alonso's (1964) model of land market (1964), land values are assumed to be negatively related to the distance from the center of the city, as transport costs increase with distance. In the case of Santiago, empirical information has clearly shown the diminishing value of land at a greater distance from the center making the Ministry of Housing and Urban Development (MINVU) to localize subsidized social housing programs in the periphery, thus progresivelly expanding the city.

The design of Government Housing Programs in Chile has not varied substantially since the end of the seventies, and they consist in direct subsidies to low cost dwellings: the lower the cost of the house, the higher the subsidy. The government subsidizes dwellings of up to US$45,000, approximately, through a system of certificates which enable beneficiaries of subsidies to choose the housing unit they will buy from those available in the market[9]. On the other hand, beneficiaries of housing programs of less than US$7,000 are obliged, except under the schemes designated as "private", to choose between accepting or not a dwelling in low cost housing projects which MINVU has had built specifically for them. Within the frame of private schemes, beneficiaries are responsible for carrying out their own housing project, but up to now they only stand for a small fraction of total beneficiaries due to the greater responsibilities that affect applicants who generally belong to the second and third income quintiles.

Housing programs generally involve low cost housing projects built by private companies under a bidding system. The outcome is that dwellings are always located where land is cheaper and distant from the Center of Santiago. These low values are precisely the result of the distance from urban facilities[10].

[8] Tolley and Crihfield (1987) point out: "In a "second best" world, where externalities are not completely internalized, something can be done in principle by indirectly dealing with externalities by attempting to exert an influence on the activity's location. If non-internalized externalities are greater at one place than another, there is a potential net gain by fomenting a change of location". But it is necessary to choose its location well.

[9] These dwellings usually do not exceed 80 square meters built. At the other end, the smallest housing solution provided by MINVU consists of a sanitary unit with a multi-purpose room (12 square meters approximately).

[10] The remaining dwellings with State financing (without any bid called by MINVU for their construction) have more heterogeneous or scattered locations.

On the other hand, approximately one third of the jobs are located in the Central Business District (municipality of Santiago) which, in addition to the above, exerts a strong pressure on the transport system, with the well-known consequences of pollution and smog[11]. In fact, while the municipality of Santiago concentrates 31 percent of jobs in Greater Santiago[12] it only has 4.3 percent of its population. The more distant municipalities have a very low density of jobs and a significant participation of working people and the four municipalities which showed greater increases in their population between 1982 and 1992, only record 5 percent of jobs within their territory.

The housing policy also contributed to the concentration of poverty. Cummings and DiPasquale (1994) point out that only five municipalities, primarily in the southern or eastern limits of the town concentrated 50 percent of the city's poor, and that families' income level was highly related to the municipality where they lived. This is serious since studies in the U.S.A.[13] report important negative externalities associated with the concentration of poverty. On the one hand, patterns of anti-systemic behavior come to be socially accepted (delinquency in general), while, on the other hand, poor children's performance at similar schools but with heterogeneous population is significantly better than if all pupils were poor. Aditionally, spatial segregation generates a high travel rate of the poor to render services to the households of the more affluent.

These results of excessive urban expansion and social spatial segregation are explained not only by housing policy, but also by the strong growth experienced by the population of Santiago since 1940. This has grown 5 times to 5 millions to the present day. The Capital city moved up from a concentration in the order of 10 percent of national population in 1950 to over 15 percent in 1960 and 38 percent in 1970. Though the city has continued to increase its population, concentration went down to 32 percent in 1992[14]. This situation is aggravated by the process of massive eradication of populations without sanitary services during the military regime.

To avoid low and middle income housing programs from contributing to the expansion of the city, the State must ensure that MINVU considers the cost which localizing these new housing programs in the periphery have for the country. The evaluation of the social gain that can be obtained by forcing some social heterogenity in the composition of the housing sectors must be included in this cost/benefit consideration.

[11] Santiago is surrounded by hills, so that it is particularly sensitive to air pollution.

[12] Greater Santiago is administratively divided into 37 local administrations or municipalities.

[13] References in Glaeser (1993). For instance, "The Truly Disadvantaged: The Inner City, The Underclass and Public Policy", Wilson (1986), University of Chicago Press.

[14] The years 1952, 1960, 1970, 1982 and 1992 correspond to those in which the National Institute of Statistics (INE) conducted national censuses of population and housing.

An indirect way to start the implementation of the latter is the recent improvement of the application of housing subsidies which are now also directed to used houses, as a way to restrain the production of low standard houses and ease housing mobility. This represents the first revolutionary change in the Chilean Housing Policy over the last two decades.

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