Is Small Towns Financing by Means of Land Sales Sustainable ?

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The conversion of agricultural land into urban land is presently an important source of revenue for Chinese local governments. Its importance varies greatly from place to place, but 50%-100% of tax resources seems a reasonable order of magnitude. The mechanism is quite simple. Local governments purchase land from farmers at the fringe of the urban expanding area at a price f per m2. They service the land (road, water, sewers) at a cost i. They sell it at a price p to industrial enterprises or to housing developers. The price p for industrial enterprises seems to be about equal to f+i. But for residential housing, it is much higher, and the difference r=p-f-i is a profit or a rent for local government. This profit is shared between towns and counties in various, often complicated, ways. It is not as open and as properly recorded as one might want. But this is not the focus of this note, which is whether, particularly in small towns, this source of revenues is likely to be sustainable.

The No-Rent Model

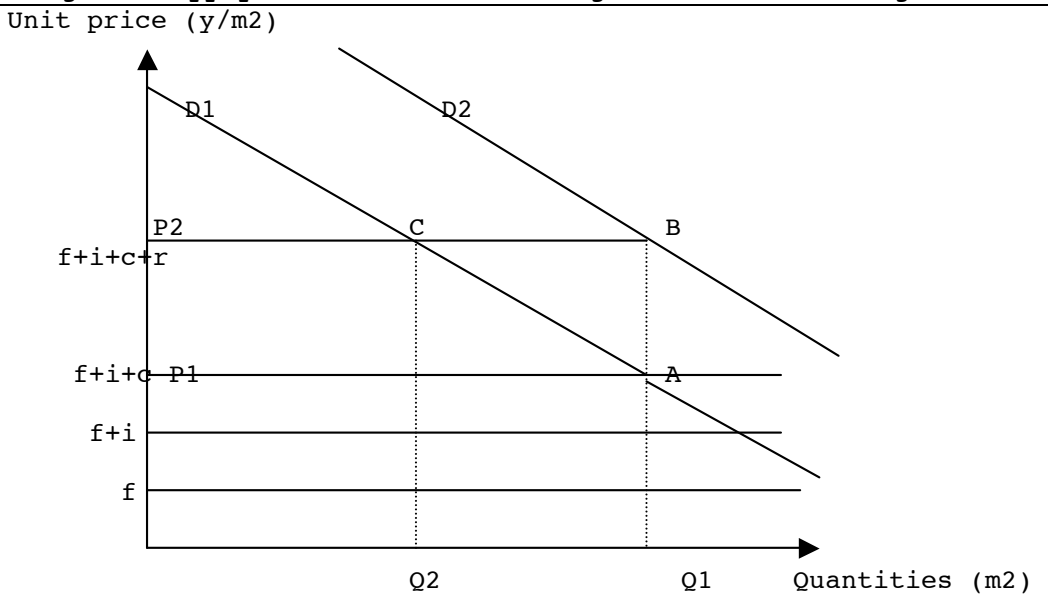
The starting point of the analysis is that in a purely free-market system, there should not be any such land rent or profit. As a town expands, it needs land at its fringe for residential or industrial purposes. But there should be farmers ready to supply that land, a price slightly higher than the price for farm land, that is at f. This seems to be what is happening for industrial land in Chinese towns.

There is no rent involved in this process. A rent appears when the utility attached to a piece of land in A is higher than in B, when U(A)>U(B). Let us assume that A is in the town center and B is in the periphery. Because people and enterprises prefer to be in A than in B, land prices in A will be higher than in B (in theory by the money and time cost of transportation from B to A), and this difference can be called a rent. When the city expands, and its fringe moves from B to C, U(A)-U(C)

increases, the rent in the city center A increases, and a rent in B appears. This raises the interesting question of whether this rent should and could in part be captured by government rather than accrue to the lucky owner of land in A (and in B). But, nearly by definition, there is no rent at the fringe, and land prices there remain farm land prices. Assuming floor-space ratios of 1[1], housing prices per m2 at the fringe should therefore be equal to f+i+c, with c equal to construction costs per m2.

This is illustrated by Figure 1, that represent unit housing prices (in y/m2) on fringe areas of a growing city as a function of quantities of housing built in a given year (number of m2 of housing and of land). The supply curve is assumed to be horizontal, because infrastructure costs, farm land costs, and construction costs are independent of quantities built. D1 is the "normal" demand created by households growth in the year considered. The equilibrium point is A, with Q1 m2 of land converted and a same number of housing built, and purchased at a price equal to f+i+c.

Fig 1 – Supply and Demand of Housing at the Urban Fringe



Given some simple information on the growth of population, on wages, and on the ratio of the value of house to income, one can estimate the average size of

[1] This assumption simplifies the presentation, because with it the number of m2 built is equal to the number of m2 of land converted. It is not unreasonable. It would correspond to five stories housing buildings with five times more space in roads, gardens public space, etc. than in buildings. But this assumption is not essential to the argument. Relaxxing it would complicate the model but not alter substantially the findings.

houses and the consumption of farm land for housing. Let H be the number of households, g the growth rate of population and households, W yearly wages, z the ratio of house value to yearly income, s the size of houses and S the size of farm land consumed for housing, we have:

$$s = z*W/(f+i+c)$$

$$S = s*g*H$$

The case of a small town like Linpu (Zhejiang province) can illustrate this simple model. The farm land price f seems to be about 50 y/m2 (30,000 y/mou). Infrastructure costs are said to be about 100 y/m2 (70,000 y/mou). Construction costs are reported (in the city brochure) to be about 500 y/m2. In the absence of land rent, the unit price of housing will therefore be about 650y/m2. The town (built up area) is about 50,000 people large, with H the number of households equal to about 30,000, and the rate of population/households growth is about 5% per year, meaning a doubling in 15 years. Wages W are reported (in the city brochure) to be 9,000 y/year for workers and 12,000 y/year for college graduates. Let us assume that in a system in equilibrium z, the ratio of housing value to income is equal to 3, that is that people live in houses that represent 3 times their annual income, a fairly standard ratio in a well functioning system. It follows that the size of houses should be about 42 m2 for workers and 55 m2 for college graduate, and that the total area converted from farm land to housing every year should be around 75,000 m2 (or 110 mous). In this system, rent r is zero.

Three Explanations of Present Land Rents

Yet, this is not what happens in Chinese towns (nor in many other countries). Final users of fringe or marginal land are ready to pay much more than f+i, the farm land prices plus infrastructure expenditures, and local governments pocket the difference. In Limpu, for instance, land for residential housing is auctioned at about 1500 y/m2 (1 million y/mou), which implies of rent of 1,350 y/m2. One can think of three explanations.

The first one is a backlog effect or supply lag. It is likely that, particularly in East China, there has appeared an emerging upper middle class that presently lives in houses « below its income ». They consist of households with incomes in the 40,000-60,000 yuans range, that would want to live in houses or flats in the 120,000-180,000 yuans range (assuming the standard ratio of 3)

that have not been much available until now. For a 60 m2 flat, they are ready to pay about 2,000 y/m2.

In a 50,000 inhabitants town, with about 30,000 jobs, there might be presently 2,000 or 3,000 such households. Assuming houses or flats of 60m2, and a floor-space ratio of 1, this creates of demand of 120,000-180,000 m2 of land (180-270 mous), in addition to the demand generated by population and households growth. The market cannot supply at once that amount of land and housing, and only the richest households obtain what they want —at a higher than necessary price. A temporary scarcity rent is created by the upward rigidity of land and housing supply. Housing prices are higher than « equilibrium » prices, and the difference is reflected in land benefits, which can be calculated to be 1,350 y/m2. In the language of Figure 1, this can be analyzed as a shift in the demand curve from D1 to D2. Since supply cannot go much beyond Q1, the representative point of the new situation is B, with a much higher —by r, the land rent— unit price than before. The total rent pocketed by the local government is P1P2BQ1.

The second one is planning. In China (as in other countries) not all rural land at the fringe is offered for housing development. Only a part of it is. Not Q1, but Q2. A new equilibrium is found in point C. It commands a unit price of f+i+c+r, that includes a land rent r pocketed by the planning authority that has restricted (perhaps for good reasons) land supply for that year. The total rent pocketed by local governments is P1P2CQ2.

The reduction in housing quantities implied in this scenario is likely to be substantial. A precise knowledge of the shape of the demand curve (or its elasticity) would be necessary to estimate it. In the case of our hypothetical small town based on Limpu data, with a point elasticity in C equal to —0.8, it can be calculated that the quantity of housing (or land conversion) reduction associated with the auction prices of 1500 y/m2 (1 million y/mou) is 54% or 26,000 m2 (37 mous). In other words, to create the 1,350 y/m2 rent that is observed, the local government must restrict to 49,000 m2 the land conversion —to be compared with the 75,000 m2 that a free market system would select.

The local government is in the position of a monopolist and one can estimate the land conversion quantity that would maximize its rent, somewhere between zero land conversion (zero rent) and the free market

amount of land conversion (also zero rent). The equation of the demand curve AB is

$$p=4550-52{,}000*q$$

The total rent R is equal to

$$R=(p-650)*q = 3900q-52{,}000q^2$$

This function is maximized when its derivative is equal to zero, that is when q=37,500 m2. For this quantity, the housing unit price would be 2,600 y/m2, and the unit land rent 1,950 y/m2 (1.3 million y/mou). This is not very far from the auctioned price observed and suggests that the local government is indeed a rent maximizer.

A third reason is expectation of rises in land prices (not to use the word speculation). It can happen that prospective housing buyers are ready to pay more than the equilibrium price f+i+c because they believe that housing prices will appreciate over time. This by itself shifts the demand curve (from D1 to D2).

Obviously, the three phenomena can occur simultaneously.

This analysis makes it easier to show that the land rent of local government is neither very desirable nor very sustainable. To the extent that it comes from a temporary backlog of accumulated demand for housing, it should not last for ever. Over time, this backlog will be eliminated, and the demand curve will shift leftward, from D2 to D1, and with it equilibrium price will decline, from P2 to P1. An artificially created housing scarcity by means of planning restrictions can indeed last for a longer period of time, and create more lasting rents. But it is done at a high social cost. It functions as a tax on new housing, one which is not particularly efficient and one which is most probably regressive. Finally, to the extent that the land rent is based on expectations of a rise in housing prices, it is fragile. Bubbles always burst eventually.

Obviously the numbers given, based on data collected in one small town only, are very fragile, and only serve to illustrate the model and the argument. Data would be different in other places, and it would be very useful to collect it. But it is very likely that the argument would not be altered.