A view on optimal urban growth controls

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Abstract. Sasaki (1998) generalizes the urban-growth-control model developed by Brueckner and Lai (1996) (B-L, hereafter) and concludes that the optimal urban-growth control is less (more) stringent than the B-L model when an agglomeration effect (public-good-provision effect) is considered. However, this paper here proves that the optimal urban-growth control may or may not be more stringent than the B-L model when the agglomeration effect or (and) the public-good-provision effect is (are) considered. This result sharply differs from that of Sasaki's model. The intuition behind it is that the increase in commuting costs for landowners due to renter-immigration is overlooked in Sasaki's model.

JEL classification: R11, R13, R14, R23

1. Introduction

The theory of urban growth controls has been developed by many economists in the last two decades, such as Cooley and La Civita (1982), Engle et al. (1992), Helsley and Strange (1995), Brueckner (1990, 1995), and Brueckner and Lai (1996) (B-L or B-L model, hereafter). The study of urban growth control initially began from the observation that land (housing) rents increase in many cities after growth controls are enacted. In the literature this land rent increase can be attributed to two effects: one is the supply-restriction effect and the other is the amenity-creation effect (Engle et al.; Brueckner; Helsley and Strange; B-L). A two-group model based on the supply-restriction view was first developed in the B-L model whereby a group of landowners enacts growth controls to maximize their utility; at the same time, renters migrate
among cities searching for a higher utility location. The B-L model concludes that an optimal growth control of a controlling city would exclude 1/3 of renter-residents.

In the B-L model, each resident’s income is exogenously determined and some renter-residents are excluded by growth controls that can raise the land rent for developers’ profit (for convenience, this is defined as the “land-rent effect”, hereafter). In reality, a city’s residents may be the labor supply for the city’s production, and thus the number of residents may affect the residents’ income level. Sasaki (1998) recently incorporates an over-simplified production function into the B-L model and developed a general-form framework. Following his production function, total urban production and per-capita profit distribution among landowners is decreased if a stringent growth control is enacted. In other words, the more renter-residents agglomerate in a city and commute to the CBD for their jobs, the more urban production and the more contribution to the developers’ profit there will be. For convenience, it is then defined as “agglomeration effect” in the current paper.

Aside from the agglomerate effect, Sasaki’s model also considers the provision of local public goods, such as water supply, sewage, education, and fire protection. This is because they will affect the utility level of residents with the provision costs to be shared among developers. Similarly, this is defined as “public-good-provision effect” in this paper.

Sasaki’s contribution is of course indeed prominent, because he not only considers the supply-restriction effect (including the agglomeration effect), but also the amenity-creation effect (including the public-good-provision effect) in a general-form model. Although all these effects are separately considered, the whole effect of all these factors is still open in Sasaki’s model. This is perhaps due to the mathematical complexity, especially in Sasaki’s general-form framework and the current paper tries to fill such a theoretical gap.

Sasaki concludes that the optimal urban-growth control will be less (more) stringent than the B-L model when considering the agglomeration effect (public-good provision effect). His intuition is straightforward: The more renters agglomerating in the central city makes for more production as well as more per-capita profit for the developers. Thus, the optimal urban-growth control must be less stringent than the B-L model (where only the land-rent effect is considered) in order to keep the benefit of the agglomeration effect. Similarly, if the provision level of public goods is based on social standards (that is, the provision cost of public goods increases with an increased population) and the cost of the public-good provision is shared by landowners, then a city will enact a more stringent growth control than the B-L model in order to save the expense on the public-good provision.

Some insights are missing in Sasaki’s argument: if more immigrants are attracted by the agglomeration effect or provision of public goods, then landowners should move out to the suburbs and pay higher commuting costs.

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1 This is because labor is the only input.

2 The reason is that the urban production function is \( f(P_i) \), \( f' > 0 \), where \( P_i \) denotes the number of renter-residents in city \( i \), and \( dx/dP_i > 0 \), where \( x \) denotes per-capita profit distribution among landowners in city \( i \). See Sasaki (1998), p. 478.

3 This is because the central city may be over-congested and polluted in the real world. However, landowners moving outwards is because land consumption is assumed fixed in the B-L model, Sasaki’s model, and the current paper.