Optimal Density Restrictions in the Los Angeles-Long Beach CSA

PI: Andrii Parkhomenko
University of Southern California
parkhome@usc.edu

Co-PI: Matthew J. Delventhal
Claremont McKenna College
mdelventhal@cmc.edu

Project Objective

The goal of this project is to identify zoning policy adjustments which could improve access to jobs and quality of life for the residents of the Los Angeles-Long Beach Combined Statistical Area. An important auxiliary goal is to make neighborhood-by-neighborhood projections for how changes to policy would affect a broad range of variables, including commuting flows, urban congestion, and property values, in order to guide the design and implementation of policy adjustments.

Problem Statement

Density-limiting zoning is a pervasive force shaping the American urban landscape. As pundits talk of a housing affordability crisis and proposals to limit or eliminate single-family zoning circulate among city councils and state capitols, the importance of understanding the consequences of constrained urban density is as high as ever.

Research Methodology

To this end, we build a quantitative general equilibrium model of internal city structure. Locations differ in local productivity, employment and residential amenities and are linked by a transportation network that determines commuting times. Zoning policies increase the cost of building in some locations, constraining the equilibrium supply of floor space. We model density restrictions as an endogenous function of existing density.

We use our model to back out local characteristics for the nearly 4,000 census tracts of the Los Angeles-Long Beach Combined Statistical Area, given data on the price of floorspace, wages at place of employment, the density of employment and residence, and commuting times.

We then conduct two counterfactual experiments. In the first experiment, we reduce density zoning restrictions to the level of downtown L.A. in all urban tracts in the metropolitan area. The second experiment simulates a tremendous improvement in transport infrastructure: we suppose that all commuters can drive directly to their destination at 65 miles per hour without slowing down either for traffic or for curves in the road.

Results

Counterfactual 1. Up-zoning We find that relaxing zoning increases output per worker by 35% and welfare by 57% (Table 1, second column). At the same time, it reduces residential and commercial floor prices by 54% and 60%, respectively, on average. It also slightly reduces the average daily commute--presumably because increased concentration means there is less need to commute long distances. Figure 1 illustrates how the relaxation in density limits changes residential and employment density in the metro area.

Counterfactual 2. Increase Speed Improving automobile infrastructure to the maximum--indeed, probably an impossible or impossibly costly project in practice--increases output per worker by 2.2%, and nearly halves the average daily one-way commute to just 19 minutes. Average welfare goes up by 30% (Table 1, third column). At the same time, it slightly raises the mean costs of residential and commercial floorspace by about 1% and 9% respectively--presumably because improved transportation increases the demand for floorspace in the most attractive tracts pushing the density there to the limit. Figure 2 illustrates how the increase in speed changes residential and employment density.

Policy Implications The results of these two experiments suggest that the potential productivity and housing affordability gains from re-zoning may be more substantial. They also suggest that gains from improving transport infrastructure may have an upper bound, as even the best possible automobile-based improvement had limited impact on variables other than time spent commuting.

	Benchmark	Counterfactual 1: Upzoning	Counterfactual 2: Increase speed
Output per worker	100.0	135.4	102.2
Employment	100.0	100.0	100.0
Welfare	100.0	156.6	130.1
Mean wages	100.0	135.4	102.2
Mean residential floorspace price	100.0	45.6	101.2
Mean commercial floorspace price	100.0	40.1	109.4
Mean commuting time, min	36.1	35.6	19.4
Mean commuting distance, km	26.7	24.6	33.9
Median tract density	1.34	1.39	1.34
Mean house size	100.0	264.6	101.6

Table 1. Counterfactual Result

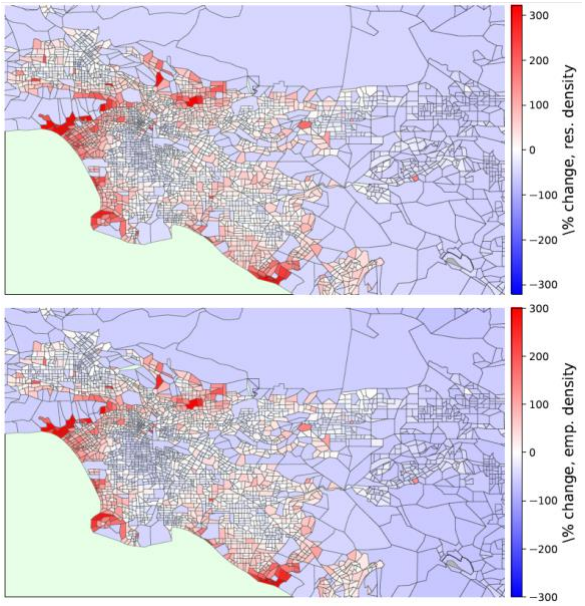

Figure 1. Impact of the increase density limits to the level of DTLA in all urban tracts on residential density (upper) and employment density (lower).

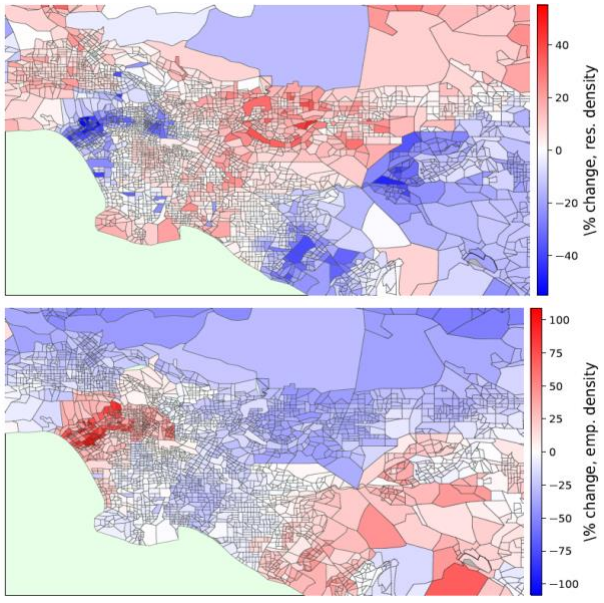

Figure 2. Impact of the increase commuting speed to 65 miles per hour on residential density (upper) and employment density (lower).