Public transport infrastructure and home price stability

Gregory Macfarlane and Juan Moreno-Cruz

macfarlaneg@pbworld.com | juan.moreno-cruz@econ.gatech.edu

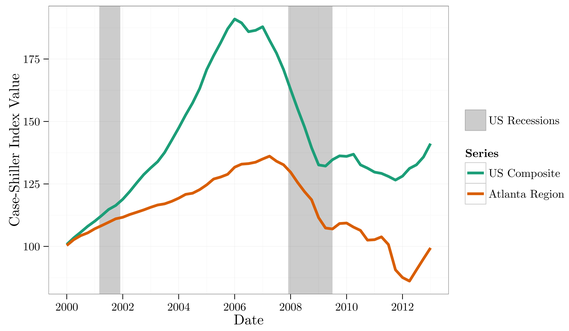
Georgia Institute of Technology

Findings

We find that homes located closer to MARTA heavy rail stations **held their value** during the housing price cycle of 2002-2012, when controlling for other factors. In doing so, we find support for theories of *spatial gentrification* and *elastic housing markets*.

Background

Home prices are volatile, particularly in the last ten years.



Theory 1: Spatial Gentrification Guerrieri et al. (2013): during demand shocks, wealthy will displace poor *next to* existing wealthy neighborhoods. Suggests the model should control for income growth.

Theory 2: Elasticity of Construction Glaeser et al. (2008): during a housing boom, dense areas will increase in price because supply cannot expand. When demand subsides, areas that built new housing will experience a price crash.

Hypothesis

Homes nearer transit stations will show higher prices over time, but might show greater volatility in price than homes further away.

Data and Modeling Framework

We obtained assessed property values on 5,000 randomly selected homes in Fulton County, Georgia from 2002-2013, with house and property data. Calculated the three statistics for each home:

- Mean value:

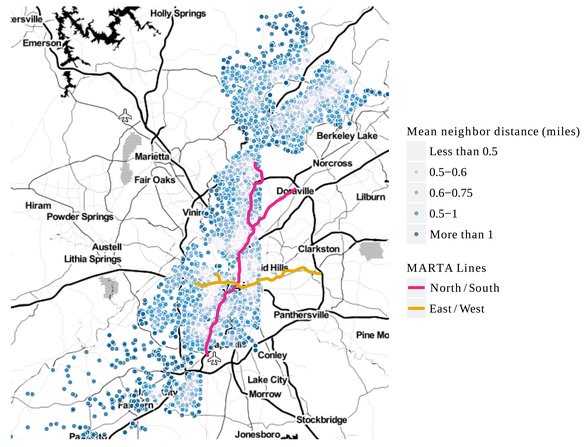
$$\mathrm{E}\left[V_i(t)\right]$$

- Mean growth rate:

$$\mathrm{E}\left[\Delta V_i(t)\right] = \mathrm{E}\left[\frac{V_i(t+1) - V_i(t)}{V_i(t)}\right]$$

- Standard deviation of growth rate:

$$\mathrm{Var}\left[\Delta V_i(t)\right]$$



To test our hypothesis, we consider two approaches:

Univariate spatial Is transit accessibility a significant predictor of the above statistics when controlling for spatial effects and gentrification? Measured with spatial Durbin model (SDM; `R:spdep`)

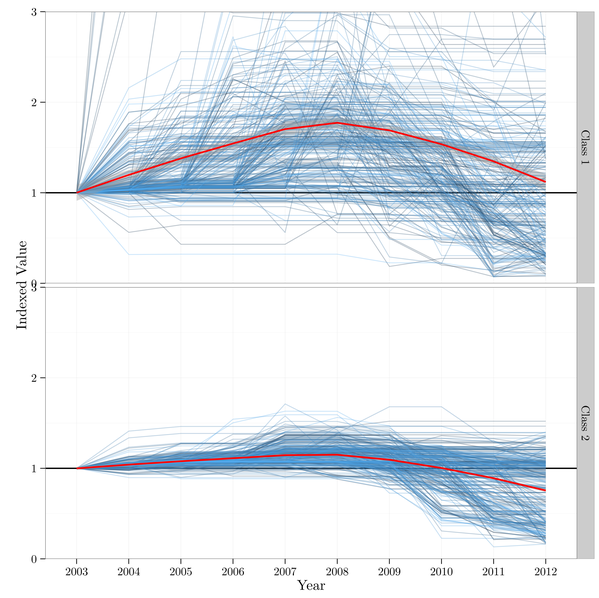
$$y = \rho W y + X\beta + WX\gamma + \epsilon \tag{1}$$

Multivariate latent class Does transit accessibility significantly discriminate between homes with good or poor price performance? Measured with a latent class mixture model (`R:flexmix`).

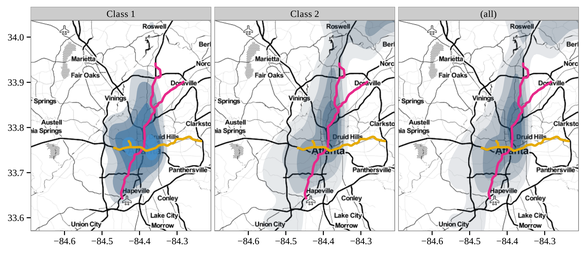
$$H(Y|X, w, \psi) = \sum_{k=1}^{K} \pi_k(w, \alpha_k) \prod_{d=1}^{D} f_{kd}(Y_d|X_d, \theta_{kd}) \tag{2}$$

Market Segmentation

Homes in Class 1 grew in value during the boom, and returned to their pre-boom level after the bust. Homes in Class 2 did not grow in value, but lost substantial value when the market crashed.

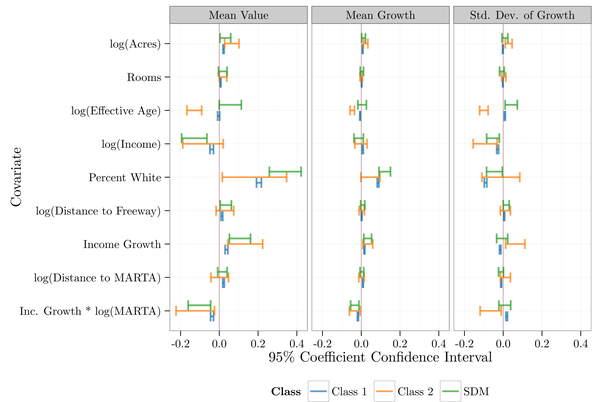


Controlling for other attributes of the home, as a home moves closer to MARTA it is significantly more likely to be in Class 1. This supports the theory of Glaeser et al. (2008).



Measured Effects

We cannot readily control for spatial effects in a multivariate model. So are the latent class estimates affected by spatial endogeneity, etc? Or does the spatial model inappropriately aggregate markets?



Future Work

- A mixture model that allowed spatial dependence in the response function as well as the response functions.
- A way to discriminate between MARTA access and a general "urbanness."

References:

1. Guerrieri, V., Hartley, D., and Hurst, E. (2013) Endogenous gentrification and housing price dynamics. *Journal of Public Economics*, 100, pp. 45âĂŞ60.
2. Glaeser, E. L., Gyourko, J., and Saiz, A. (2008) Housing supply and housing bubbles. *Journal of Urban Economics*, 64(2), pp. 198âĂŞ217.