Commercial Gentrification Analysis: Methodology

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Our analysis of commercial gentrification stems from a study how commercial gentrification is related to transit-oriented development and traffic safety, prepared for UC CONNECT (with funding from Caltrans).

We began by defining the commercial districts where gentrification may occur. We defined commercial districts as census tracts with either a density of commercial establishments greater than the regional median (definition a), or a commercial lot area ratio greater than the regional median. This definition encompasses districts in different settings, from city to suburb (definition b).[1]

Drawing on the literature about indicators of commercial gentrification, we created a composite 'commercial gentrification index' for each commercial census tract, which captured both business longevity and upscaling, and considered the census tracts at the top 20% of this index to be commercially gentrified. The commercial gentrification index was the sum of four sub-indices (for more detail on their construction, see Appendix A):[2]

1. Infrequent establishment churn index: the rate at which infrequently patronized businesses move into and out of the census tract. Higher churn rate denotes more commercial gentrification.
2. Discretionary establishment churn index: the rate at which discretionary businesses move into and out of the census tract. Higher churn rate denotes more commercial gentrification.
3. Minority-owned establishment share difference index: the change between 1990-2000 and 2000-2013 in the share of minority-owned businesses in the census tract. A loss of minority-owned businesses indicates commercial gentrification.
4. Non-chain small business share difference index: the change between 1990-2000 and 2000-2013 in the share of non-chain small businesses in the census tract.[3] A loss of small businesses indicates commercial gentrification.

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[1] Commercial establishment density was calculated by dividing the total commercial establishments in each census tract by the tract's land area. Commercial lot area ratio was defined as the census tract's commercial lot area divided by the census tract's total lot area. This was calculated using DataQuick assessor data, which totals each tract's lot area by use. The commercial establishment density (definition a) seems to favor small lot, commercial corridors. A good example of this is the Ventura Blvd. corridor in the San Fernando Valley. This corridor has high establishment density but may not have as high commercial lot acreage relative to total lot acreage. Definition (a) picked up this whole corridor, while definition (b) did not. On the other hand, definition (b) seems to favor large lot commercial development, like malls and big box stores. This type of development has a high commercial footprint, but may not have as many establishments per area. It is also worth noting that this definition seems to pick up a more dispersed set of tracts. In an effort to produce an inclusive definition of commercial districts, we considered a census tract as commercial, if it satisfied *either* of the two definitions described above.

[2] We used the NETS database to calculate the number of establishments in each census tract in each study period year (1990-2013), as well as births, deaths, moves in, and moves out of each census tract in each year of the study period. The count of establishments that moved in or out of a tract in a given year was normalized over the total number of tract establishments in the tract.

[3] An establishment was considered a non-chain small business if it had fewer than 20 employees and fewer than five related establishments.

We chose to weight the last two indices three times higher than the first two indices, given the prominent place that minority-owned and chain businesses hold in most contemporary conceptions of commercial gentrification. Such weighting is supported by the gentrification literature that emphasizes the salience of race/ethnicity in commercial neighborhood change and the strong role that chain businesses play in commercial district change.

Using the above definitions and commercial gentrification index, we yielded 131 commercially gentrified census tracts from 1990 to 2013 in the Bay Area, which amounted to about 8% of all tracts, and 227 commercially gentrified census tracts in the same time period in Los Angeles, or approximately 10% of all tracts.

APPENDIX A

Infrequent & Discretionary Establishment Churn

This indicator combines two concepts from Meltzer and Capperis (2016): establishment churn and signal establishments. In order to measure establishment churn, Meltzer and Capperis took the sum of establishment moves into and out of a neighborhood and divided it by the midpoint number of establishments over the time period (Ibid.). They used North American Industry Classification System (NAICS) codes to define infrequent (not shopped at often) and discretionary (optional spending for consumers) business establishments (Ibid.). For our study, we measured the churn of both infrequent and discretionary establishments, which we have identified as signals of commercial gentrification. As with our other indicators, this signal establishment churn was measured at the census tract level for both 1990-2000 and 2000-2013. The formulas for these indicators are summarized in Figure 1 below.

Figure 1: Equations for Discretionary Establishment Churn (C_{DE}) & Infrequent Establishment Churn (C_{IE})

$$C_{DE} = \frac{B_{DE} + IM_{DE} + D_{DE} + OM_{DE}}{(D_{DE*} + OM_{DE*})/2}$$

$$C_{IE} = \frac{B_{IE} + IM_{IE} + D_{IE} + OM_{IE}}{(D_{IE*} + OM_{IE*})/2}$$

*At start of decade

B_{DE} = Births of Discretionary Establishments
IM_{DE} = In-Migration of Discretionary Establishments
D_{DE} = Deaths of Discretionary Establishments
OM_{DE} = Out-Migration of Discretionary Establishments
X_{IE} = X of Infrequent Establishments

To calculate infrequent and discretionary establishment statistics for each census tract, this research uses the NETS six-digit NAICS variables, which provide classifications for each year of an establishment's existence. Infrequent and discretionary establishments were defined using the same NAICS codes used in Meltzer and Capperis (2016). We used these definitions to create an inventory of the number of infrequent and discretionary establishments per tract per year (See Appendix B for a full list of NAICS codes included in this definition). We then rescaled the signal establishment churn indicators on 0-100 indices and added them to the composite gentrification index.[4]

Minority-Owned Establishment Share Difference

Because race is central to many theories of gentrification, we included a race-based parameter in our definition of commercial gentrification. To calculate minority-owned establishment share difference for each census tract, we used the NETS dummy variable for a

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[4] For example, the churn of discretionary establishments in the Bay Area from 1990-2000 was re-scaled to a 0-100 index with minimum value 0, maximum value 100, mean of 8.1, and standard deviation of 5.9.

minority-owned establishment.[5] To create a minority-owned establishment rate, counts of each census tract's minority-owned businesses were normalized over the number of establishments in the census tract. Next, the study period's end year rate was subtracted from its start year rate. If minority-owned establishments are disappearing at a greater rate in one tract than in others, then this may indicate commercial gentrification. The formula we used is summarized in Figure 2 below.

Figure 2: Equation for Minority-Owned Establishment Share Difference ($Diff_{MOE}$)

$$Diff_{MOE} = (ED_{MOE}/ED_{TE}) - (SD_{MOE}/SD_{TE})$$

ED_{MOE} = End of Decade Count of Minority-Owned Establishments
ED_{TE} = End of Decade Count of Total Establishments
SD_{MOE} = Start of Decade Count of Minority-Owned Establishments
SD_{TE} = Start of Decade Count of Total Establishments

We next rescaled the minority-owned establishment share difference parameter on a 0-100 index, with higher index values denoting a lower share change over time (the highest value share change being given score 100, the lowest value change being given score 0). When adding the indexed parameter to the composite gentrification index, we chose to weight it three times as high as each of the signal establishment indicators, in order to stress the racial component of commercial gentrification, which we feel is of elevated importance in the California metropolitan context. This is supported by gentrification literature arguing on behalf of a salient racial element in commercial neighborhood change (Center for Community Innovation, 2014; Ong et al., 2014; Sutton, 2010).

Non-Chain Small Business Establishment Share Difference
To calculate non-chain small business establishments for each census tract, this research used the number of employees and the NETS variable 'related', which provides a count of associated establishments. An establishment was considered a non-chain small business if it had fewer than 20 employees and fewer than five related establishments. This definition ensures a small establishment size but allows for a handful of related businesses. We allowed small chains to be included in this definition because regional businesses with multiple establishments are sometimes characterized as local businesses and are not considered chains in the same way that a larger corporate chain might be. The formula we used is summarized in Figure 3 below.

Figure 3: Equation for Non-Chain Small Business Establishment Share Difference ($Diff_{SB}$)

$$Diff_{SB} = (ED_{SB}/ED_{TE}) - (SD_{SB}/SD_{TE})$$

ED_{SB} = End of Decade Count of Non-Chain Small Businesses
ED_{TE} = End of Decade Count of Total Establishments
SD_{SB} = Start of Decade Count of Non-Chain Small Businesses
SD_{TE} = Start of Decade Count of Total Establishments

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[5] The extent to which business respondents identify as a minority-owned business is not known. For example, it is not know what percentage of white Latino business owners identify as a minority-owned business. This is one problem with using this method.

Once created, we rescaled the non-chain small businesses share difference indicator on a 0-100 index with higher index values denoting a lower share difference. When adding the indexed indicator to the composite index, we chose to weight it three times as high as each of the signal establishment indicators. This weighting was based on gentrification literature arguing on behalf of the strong role that chain businesses play in both perceived and real commercial district change (Basker, 2005; Haltiwanger et al., 2010; Meltzer, 2016; Meltzer and Capperis, 2016; Neumark et al., 2008; Zukin, 2009).

An example of the practical application of this definition is illustrated below for the Oakland neighborhood of Temescal (census tract 4011), which, when measured from 2000-2013, had an infrequent establishment churn[6] rate of 3.79, a discretionary establishment churn rate of 2.83, a -.033 change in the share of minority-owned establishments, and a non-chain establishment share difference of -0.12. This gives the Temescal neighborhood a total index score – after weighting of individual parameters - of 216.93. Because we identify commercially gentrified neighborhoods as the top 20% of tracts on our commercial gentrification index, this tract is defined as commercially gentrifying (it is in the 80th percentile). Table 1 shows the indexing and weighting scheme for Temescal.

Table 1: Creating Composite Commercial Gentrification Index for Temescal

Variable	Raw Value	Re-Scaled to 1-100 Index	After Weighting
Infrequent Est. Churn	3.79	14.59	14.59 *(x1)*
Discretionary Est. Churn	2.83	10.87	10.87 *(x1)*
Minority-Owned Est. Diff.	-0.033	46.17	138.51 *(x3)*
Non-Chain Est. Diff.	-0.12	17.65	52.94 *(x3)*
Sum Total			216.93

Using this definition, we yielded 131 commercially gentrifying census tracts in each time period for the Bay Area. These amounted to roughly eight percent of all tracts. For Los Angeles County, this definition yielded 227 commercially gentrifying census tracts in each time period, or approximately 10% of all tracts. This definition was used throughout this report to investigate commercial gentrification's relationship with transit proximity and ridership, traffic crashes, and transit ridership.

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[6] Churn is defined as number of establishments that move into, move out of, die in, or are born in, a census tract, divided by total number of establishments. Average churn for infrequent establishments in the Bay Area is 3.37.

APPENDIX B

NAICS Codes Used for Identifying Infrequent Establishments

NAICS Code	Business Type
441110	New Car Dealers
441120	Used Car Dealers
441210	Recreational Vehicle Dealers
441221	Motorcycle, ATV, and Personal Watercraft Dealers
441222	Boat Dealers
441229	All Other Motor Vehicle Dealers
441310	Automotive Parts and Accessories Stores
441320	Tire Dealers
442110	Furniture Stores
442210	Floor Covering Stores
442291	Window Treatment Stores
442299	All Other Home Furnishing Stores
443111	Household Appliance Stores
443112	Radio, Television, and Other Electronics Stores
443120	Computer and Software Stores
443130	Camera and Photographic Supplies Stores
444110	Home Centers
444120	Paint and Wallpaper Stores
444130	Hardware Stores
444190	Other Building Material Dealers
444210	Outdoor Power Equipment Stores
444220	Nursery, Garden Center, and Farm Supply Stores
446199	All Other Health and Personal Care Stores
447190	Other Gasoline Stations
448310	Jewelry Stores
448320	Luggage and Leather Goods Stores
451110	Sporting Goods Stores
451120	Hobby, Toy and Game Stores
451130	Sewing, Needlework, and Piece Goods Stores
451140	Musical Instrument and Supplies Stores

453310	Used Merchandise Stores
453920	Art Dealers
453930	Manufactured (Mobile) Home Dealers
453991	Tobacco Stores
453998	All Other Miscellaneous Store Retailers (except Tobacco Stores)
541940	Veterinary Services
713120	Amusement Arcades
713950	Bowling Centers
812910	Pet Care (except Veterinary) Services

NAICS Codes Used for Identifying Discretionary Establishments

NAICS Code	Business Type
441110	New Car Dealers
441120	Used Car Dealers
441210	Recreational Vehicle Dealers
441221	Motorcycle, ATV, and Personal Watercraft Dealers
441222	Boat Dealers
441229	All Other Motor Vehicle Dealers
441310	Automotive Parts and Accessories Stores
441320	Tire Dealers
442110	Furniture Stores
442210	Floor Covering Stores
442291	Window Treatment Stores
442299	All Other Home Furnishing Stores
443120	Computer and Software Stores
443130	Camera and Photographic Supplies Stores
444110	Home Centers
444120	Paint and Wallpaper Stores
444130	Hardware Stores
444190	Other Building Material Dealers
444210	Outdoor Power Equipment Stores
444220	Nursery, Garden Center, and Farm Supply Stores
445291	Baked Goods Stores
445292	Confectionery and Nut Stores

445299	All Other Specialty Food Stores
445310	Beer, Wine, and Liquor Stores
446120	Cosmetics, Beauty Supplies, and Perfume Stores
446191	Food (Health) Supplement Stores
447190	Other Gasoline Stations
448310	Jewelry Stores
448320	Luggage and Leather Goods Stores
451110	Sporting Goods Stores
451120	Hobby, Toy, and Game Stores
451130	Sewing, Needlework, and Piece Goods Stores
451140	Musical Instrument and Supplies Stores
451211	Book Stores
451212	News Dealers and Newsstands
451220	Prerecorded Tape, Compact Disc, and Record Stores
452111	Department Stores (Except Discount Department Stores)
452112	Discount Department Stores
453110	Florists
453210	Office Supplies and Stationery Stores
453220	Gift, Novelty, and Souvenir Stores
453310	Used Merchandise Stores
453910	Pet and Pet Supplies Stores
453920	Art Dealers
453930	Manufactured (Mobile) Home Dealers
453991	Tobacco Stores
453998	All Other Miscellaneous Store Retailers (Except Tobacco Stores)
532230	Video Tape and Disc Rental
541940	Veterinary Services
713120	Amusement Arcades
713940	Fitness and Recreational Sports Centers
713950	Bowling Centers
722110	Full-Service Restaurants
722211	Limited-Service Restaurants
722212	Cafeterias, Grill Buffets, and Buffets
722213	Snack and Nonalcoholic Beverage Bars

722410	Drinking Places (Alcoholic Beverages)
812113	Nail Salons
812199	Other Personal Care Services
812910	Pet Care (except Veterinary) Services

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