Why Are Big Box Stores Moving Downtown?

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Abstract

One of the most notable changes in the U.S. retail market over the past twenty years has been the rise of Big Box stores, retail chains defined by physically large stores and (often although not always) low-to-mid priced goods. Big Boxes originally developed in suburban and exurban locations, taking advantage of cheap land costs for their large footprint single-story buildings surrounding by oceans of surface parking. However, in recent years Big Box stores, including Target, Wal-Mart and Home Depot, have undertaken concerted strategies to open establishments in downtown locations. The arrival of low-cost chain stores in central cities has important implications for urban consumers, -and- retailers, and the physical landscape of downtown. In this paper, I examine the determinants of Big Box location choice in general. Results suggest that new Big Box stores are more likely to open in low population density neighborhoods far from the CBD, and with higher non-retail employment. Further, new Big Box stores are more likely to choose sites near existing Big Box and chain retailers. This may reflect zoning or political constraints on the set of feasible Big Box locations, rather than inherent site productivity.

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Section 1) Introduction

One of the most notable trends in the U.S retail industry over the past twenty years has been the growth of Big Box stores, characterized by large-footprint buildings selling a wide variety of products, often at discount prices. These firms originally grew around a suburban or exurban development model, relying on large quantities of relatively cheap land and close proximity to highways. However in recent years several notable Big Box chains including Target, Wal-Mart, and Home Depot have announced strategies to open new stores in central urban locations (Boyle 2009; Stych 2011; Wall Street Journal 2011). The arrival of Big Boxes downtown has potentially important implications for a number of affected parties. Retail establishments in urban neighborhoods and particularly low-income areas have been predominantly small, independently- -and- prevalence of chain stores in more affluent suburbs (Schuetz et al 2012). Traditional economic development policy has often favored mom-and-pop businesses as a means of wealth building for business owners. Some Big Box stores (notably Wal-Mart) have faced pressure from local

On the other hand, research has indicated that mom-and-pop stores typically offer a narrower range of goods and lack the economies of scale and potentially lower prices of larger firms (Hausman and Leibtag 2005). Low income households in urban areas may not benefit from proximity to Whole Foods, but the arrival of relatively low cost groceries, clothes and household items could be a broader gain of residential gentrification. Large retailers may also impact the amount of local sales tax or property tax revenues collected by local government. And urban planners worry that the traditional design of Big Box stores will be out of context in densely built, architecturally varied urban environments.

Previous research has considered the impacts of Big Box entry on smaller stores, overall retail employment and consumer welfare (Basker 2005, Haltiwanger et al 2010, Hausman and Leibtag 2005). But to date no research has examined what factors affect the location choice of new Big Box stores. In this paper, I explore the determinants of Big Box site selection, focusing especially on differences across urban and suburban sites. Using the National Establishment Time Series (NETS) data for California, I identify newly opened Big Box stores from 1992-2009, as well as the composition of baseline retail employment. I examine changes in retail employment shares by firm type over time, across MSAs and across retail categories. Merging the NETS retail data with Census data, I test which demographic and economic characteristics are associated with new Big Box store openings, downtown and in the suburbs.

Results indicate that Big Box stores form a small but growing segment of the downtown retail market. The retail employment share of these firms varies substantially across California cities, and across different retail categories. Analysis of the determinants of Big Box location choice find evidence consistent with the traditional business model: new Big Box stores are more likely to choose tracts with lower population density, farther from the CBD, with higher non-retail employment density and higher household income. However, these factors appear to be less important in site selection than proximity to existing retail centers. There is a strong positive correlation between new Big Box location and existing retail density, including out-of-sector and in some cases, in-sector Big Box and chain stores. Results on the determinants of location choice are generally consistent for downtown and suburban tracts.

The remainder of this paper is organized as follows. Section 2 reviews the theoretical and empirical literature on retail location choice in general and Big Box locations in particular.

Section 3 describes the data sources and empirical strategy. Section 4 presents results, while Section 5 outlines next steps and concludes.

Section 2) Retail location choice and Big Box stores

Three strands of previous literature are informative to understanding Big Box location choices: theoretical models of store location, empirical research on the link between retail location and population characteristics, and optimal development models in real estate.

A large theoretical literature offers two competing models for where stores will choose to locate, relative to other stores. The localized spatial monopoly model suggests that stores that sell standardized products and compete primarily on the basis of price will seek to avoid proximity to stores selling a similar product line (Capozza and Van Order 1978; Stern 1972). This model appears appropriate for many Big Box retailers, who sell essentially the same goods and use discount pricing as a main advertising strategy. Alternatively, models of agglomeration economies in retail suggest that certain types of retailers may cluster near other retailers. One form of agglomeration economies results from clustering of stores that sell high specialized, quality differentiated goods, such as furniture, jewelry or original art (Berry 1967; Fischer and Harrington 1996; Picone et al 2009; Schuetz and Green 2013). By co-locating with similar retailers, these stores can reduce consumer search costs and attract greater volume of potential consumers, but because consumers choose these products based on idiosyncratic matching of preferences rather than price, co-location does not undermine pricing power of individual retailers. The other form of agglomeration in retail refers to the optimal mixture of stores, by product type, within a shared retail space such as a mall. Proximity to complementary store types can increase revenue for individual stores, such that a single landowner (mall owner or

developer) can maximize profits from the entire space by controlling the store mix (Benjamin et al 1992; Brueckner 1993). The first form of agglomeration economies, clustering with non-price competition, does not appear to fit the Big Box business model, but the second form of agglomeration, optimal store mix, may be a factor in Big Box location choice. The combination of spatial monopoly and optimal store mix yield some straightforward predictions for optimal location of Big Box stores. For example, Target and Walmart offer similar products and compete primarily on price, therefore should avoid locating near one another. But Target may be complementary to specialized Big Box chains, such as Home Depot or Crown Books, and so may wish to locate near them. (Target and Walmart are likely to serve as anchor tenants in regional power-centers, generating additional customer traffic for adjacent stores.)

A number of empirical studies have documented associations between the number, size, and type of retail establishments in a given neighborhood and population characteristics. Much of this literature has focused on the relative dearth of healthy food in low-
Supporting this hypothesis, studies have found that low-income, predominately black and Latino neighborhoods have fewer supermarkets while restaurants are mostly unhealthy fast food eateries (Alwitt and Donley 1997; Meltzer and Schuetz 2012; Powell 2007; Sloane et al 2005; Zenk 2005). Waldfogel (2008) finds that heterogeneity in consumer preferences for retail goods and household services are strongly correlated with observable population characteristics, such as educational attainment and race/ethnicity. Schuetz et al (2012) find that income and poverty rates are strongly correlated with the establishment size and industry structure of retail; low income neighborhoods have a large number of small, mom-and-pop stores, while more affluent neighborhoods have fewer, larger stores that are more likely to be part of chains. Collectively, these studies suggest that urban neighborhoods have fewer retailers than suburban ones,

especially in the segments dominated by Big Box stores: general merchandise, home furnishings, electronics, and home improvement. The existing urban stores are mostly small, offer a narrow range of goods, and lack the discounted purchasing power enjoyed by larger chains. In short, central cities may be relatively untapped markets for new Big Box stores.

Finally, the optimal development model (Munneke 1994; Rosenthal and Helsley 1994) yields somewhat ambiguous predictions for why Big Box firms might choose urban sites. The model indicates that a retail firm will open a store in a given location if the expected net present value of future revenues from operating that store exceeds net present value of development and operations. Both development and operations costs at urban locations likely exceed costs at suburban sites.[1] Assuming a downward sloping rent gradient, per-unit land costs will be higher in central cities. Many U.S. cities have complex, lengthy and uncertain entitlement processes, resulting in high soft costs of development, while direct costs of construction are typically higher in infill sites than in greenfields. Big Box stores face additional complications in adapting to multi-story structures, such as the need for escalators that accommodate shopping carts and structured parking (Loper 2012). Some operating cost components of Big Box stores are likely to be higher in cities. Access for trucks delivering goods will be more complicated, given longer distances from freeways and city traffic; business taxes are often higher in large cities; and some Big Box stores (notably Wal-Mart) have faced pressure from local politicians and unions to offer

If both development and operating costs favor suburban locations, this implies that Big Box firms would only open urban stores if they anticipate substantially higher revenues. Both

[1] In greenfields locations typical of suburban or exurban areas, opening a new store likely implies ground-up development. In already developed urban locations, retailers more frequently choose between reconfiguring an existing space or redeveloping from another use. Many Big Box chains also operate in rural areas, but this paper focuses on within-metro area location decisions.

local population characteristics and a favorable competitive environment in central cities could justify such a prediction. During the second half of the 20th century, traditional downtown shopping areas lost many of their large, diversified retailers to the suburbs (Fogelson 2001). Cities have higher population densities, leading to a larger customer base within a given radius of the store. Central cities have experienced gentrification over the past two decades, implying that urban locations might offer retailers access to more affluent and educated consumers (Bostic and Martin 2003; 2008). Demand for specific products might also vary by location; for

higher profit margin items than raw materials for construction (Collins 2004). Despite the potential market, however, retailers may delay entry into complex urban markets due to uncertainty about demand, at least until a first mover has proven that a given site can be profitable (Caplin and Leahy 1998).

Section 3: Methodology and data description

This project seeks to understand what factors affect Big Box location choices, and whether the location choice model varies across urban and suburban sites. From the literature discussed in Section 2, four main hypotheses explaining site selection emerge. First, Big Box firms should prefer locations with higher potential productivity for retail activity; for instance, with access to a larger number of consumers, more desirable consumer characteristics, or better access to transportation infrastructure. Second, Big Box firms should avoid proximity to direct competitors, stores that sell similar type and quality of products and could therefore create downwards pressure on prices. Third, Big Box firms may seek to open new stores near existing stores that create agglomeration benefits those that sell complementary product lines and might

generate additional consumer traffic. Fourth, Big Box firms are likely to face political and institutional constraints on otherwise desirable locations. Although most theoretical models of store location do not discuss such constraints, one of the fundamental functions of zoning is to limit commercial uses, such as retail, in primarily residential areas. Even when retail is permitted under existing zoning, Big Box retailers often face political opposition from nearby residents, small business owners, and unions.[2] The analysis will attempt to distinguish which of these hypotheses explain the observed location patterns of newly opening Big Box stores across large California metropolitan areas.

Data description

The primary dataset used for this analysis is the California subset of the National Establishment Time Series (NETS) database from 1992-2009. The NETS is a longitudinal, establishment-level database constructed by Walls and Associates from the Dun & Bradstreet business register, and covers nearly all business establishments in the U.S. The NETS provides full street address information for each establishment, which have been geocoded to link with census tracts and latitude-longitude coordinates. Industry is reported at the 6-digit NAICS level, and a headquarters identifier permits matching of establishments within the same firm, and more generally classification of establishments according to firm size and structure (i.e. single-establishment versus chains). The dataset also reports names of establishments and parent firms.

For this study, Big Box stores were identified by matching parent firm names to a master list of Big Box firms specified in a variety of sources (Haltiwanger et al 2010; Columbia Graduate School of Architecture; National

widely recognized colloquial term, there is no formal stores, and the

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neighborhood. The targeted site had been built for a traditional supermarket and so was zoned for the proposed use, yet a coalition of opponents held up the store opening for nearly a year (see Healey 2012).

criteria specified by other researchers have varied based on the available data and research question.[3] The list of Big Box establishments in this study should broadly match those used in other studies, while remaining agnostic on what criteria define this type of store. Moreover, identifying stores based on parent firm rather than establishment size (square footage or employees) allows me to include stores that may be smaller than traditional Big Boxes but are part of well-known Big Box corporations. For instance, Walmart Corporation owns and operates at least five different store types: Walmart Discount Stores,
Neighborhood Markets, and Walmart Express. The first three store types would fit nearly any definition of Big Box, with traditional format buildings larger than 100,000 square feet, more than 200 employees per store, and offering a wide array of general merchandise goods. However the Neighborhood Markets and Express sores which are targeted at urban areas have smaller footprints (15,000-40,000 square feet) and have a product mix closer to a supermarket-pharmacy combination, but still benefit from the cost and logistical advantages of the Walmart firm.[4] These smaller format stores (similar to the City Target store line) are of particular interest in understanding the urban location strategy of the parent firms, and so are included in my definition of Big Box. Appendix Table 1 lists trade names of all firms identified as Big Boxes, grouped by three-digit NAICS code.

All retail establishments (NAICS codes 44 and 45) that are not affiliated with a Big Box parent company are clas -and- . Chain establishments belong to firms with two or more establishments in the same year, identified by shared parent

[3] The Columbia Graduate School of Architecture focuses on physical characteristics, such as building footprint and lot size, variables that are not available in my data. The current approach most closely resembles Haltiwanger et al (2010), who define Big Box firms by firm and establishment size and industry classification. Because Haltiwanger et al are constrained in their ability to reveal firm names, it is not possible to directly compare the list of firms, but I rely on the three sources they list as primary references.

[4] Descriptions of store types and product ranges were obtained from http://corporate.walmart.com/our-story/our-stores/united-states-stores.

company ID, while mom-and-pop stores are single-establishment firms.[5] Future robustness checks could be estimated using a narrower definition of chains, or categorizing chains as large or small by the number of establishments per firm.

Data on tract-level demographic and economic characteristics are taken from the census. For 1990 and 2000, variables are drawn from the Neighborhood Change Database (NCDB), which reports decennial census data for all years standardized to 2000 census tract boundaries. The most recent tract-level census data use the American Community Survey five-year estimates from 2005-2009, also using the 2000 census tract boundaries. (This is currently the only source for tract-level estimates using the constant tract boundaries.)

Empirical strategy

To explore the determinants of Big Box store location choice, and particularly to estimate the impact of proximity to competitor and complementary stores, I borrow the analytical framework from Haltiwanger et al (2010). The general form of the regression is shown below:

(Eq. 1) $NewBB_{ijt,t+2} = f(BB_{ijt-1}, Chain_{ijt-1}, MomPop_{ijt-1}, OthRetail_{it-1}, X_{it-1}, Year, County)$

where i, j and t index the census tract, retail sector and year, respectively. *NewBB* is a binary variable indicating the presence of at least one newly opened Big Box establishment within the tract over each of three time periods (1993-1995, 2001-2003, 2007-2009). *BB, Chain* and *MomPop* are retail employment densities (per square mile) by firm type, at the beginning of each period (1992, 2000 and 2006). Existing Big Box and chain establishments within the same retail sector are posited as the most likely direct competitors for newly opening Big Box stores (mom-and-pop stores, even in the same sector, are less likely to offer the same range of products or benefit from scale economies). *OthRetail* is the employment density in retail sectors that do not

[5] The NETS data flag each establishment-year as single-establishment, headquarters or branch. Both HQ and branch are here included as chain establishments. A firm may change chain status over time, if the number of establishments operating under the same parent company expands or contracts.

match the sector of *NewBB*; this proxies for the quantity of complementary retail. *X* is a vector of variables measuring the inherent retail productivity of the tract, including distance to CBD, population density, non-retail employment density, as well as demographic & economic population characteristics.[6] Full definitions and data sources for all variables are shown in Table 1, summary statistics are shown in Table 2. All regressions include year and county fixed effects, to control for time-varying factors such as macroeconomic trends and time-invariant county characteristics, which could include local business regulations or other policies.

The analysis also seeks to determine whether Big Box location choices vary across traditional suburban sites and the more recent foray into urban areas. Therefore the regression in Equation 1 is estimated jointly for all tracts in the sampled MSAs, and separately for tracts in three geographic groupings: downtown, central cities and suburbs. Central cities within each metropolitan area are classified according to the 2000 OMB MSA definitions; all tracts that fall outside the designated central cities but within the PMSA/MSA boundaries are classified as

neighborhoods that are similar to suburban neighborhoods, along characteristics such as population density or residential-commercial mix. For instance, the San Fernando Valley area of Los Angeles, because it be

having a highly suburban built environment. Therefore I also create more limited definitions of

First, each designated central city within each PMSA is assigned a CBD by identifying the census tract with the highest overall employment density, using the NETS data. Second, all tracts with centroid within two miles of the CBD tract centroid are classified as

[6] Data collection is currently underway to add variables on proximity to transit infrastructure (highways and rail stations), as well as proxies for political opposition to Big Box stores (union membership, partisan voting records).

[7] Robustness checks were estimated using one mile and three mile definitions of downtown, with substantially similar results. A list of MSAs and central cities used for the analysis is shown in Appendix Table 2.

The analysis to date allows me to test the first three hypotheses outlined on Big Box location choice: site productivity, proximity to competitors and complements. No data has yet been assembled to proxy for the political or institutional constraints on Big Box stores. It is infeasible to collect zoning data for the approximately 1000 jurisdictions with zoning authority (incorporated cities and towns, as well as unincorporated area within counties). Moreover, anecdotal evidence suggests that official zoning will provide an incomplete explanation for where Big Boxes can feasibly locate; neighborhood opposition can effectively limit access to areas with ostensibly friendly zoning, while localities seeking to court commercial activity can issue variances. Possible proxies for the friendliness of underlying business climate include union membership (Walmart and Target in particular have drawn criticism for maintaining non-union workforces) or voting records in partisan elections and/or on statewide ballot measures. Data collection of these metrics is currently underway and will be incorporated into future analysis.

Section 4) Results

Descriptive statistics: Big Box as share of retail employment

Big Box stores form a relatively small share of overall retail employment, but their employment share has been growing steadily over the past two decades (Figures 1 and 2). As expected, Big Box holds a smaller share of retail in downtown areas than all geographies, although the time trends are similar. Perhaps more surprisingly, mom-and-pop stores form the largest share of retail employment by firm type, not just in downtown areas, but for all

[7] Although employment density within tracts varies over time, the highest density tract flagged as the CBD is highly robust over the study period. For two PMAs (Oakland and San Jose), downtown is defined as the area within 1.5 miles of the CBD, to avoid creating overlapping downtowns.

metropolitan areas. The prevalence of downtown Big Box stores across metropolitan areas varies considerably (Figures 3a and 3b). In the combined downtowns in the Los Angeles consolidated MSA (which includes the PMSAs of Los Angeles-Long Beach, Orange County, Riverside-San Bernadino and Ventura County), Big Box employment share grew from about six percent in 1992 to about 12 percent in 2009. In the San Francisco consolidated MSA (including San Francisco, Oakland, and San Jose PMSAs), Big Box stores initially accounted for only 1.5 percent of retail employment, but grew to nearly 16 percent by 2009. Mom-and-pop retailers form the majority of downtown retail employment in the Los Angeles CMSA, while non-Big Box chain stores dominate retail employment in the San Francisco CMSA. Future analysis will explore reasons behind the cross-city variation in Big Box employment shares, to help ascertain the relative roles of economic fundamentals (market size and demographics) and political and institutional factors (zoning, business regulation, political climate).

Big Box employment shares also vary across retail sectors (Table 3). By far the largest presence of Big Box stores is among general merchandise stores, with nearly 23 percent of downtown retail employment and over one-third of suburban employment. Sectors with the next largest Big Box employment shares are sporting goods, hobbies, books and music; building materials; motor vehicle parts; and miscellaneous store retailers, with Big Box employment shares ranging between two and four percent in each sector. Note that although Big Box stores have a very small employment share in the clothing sector (less than one percent), and no Big Box stores are classified primarily as food and beverage stores (NAICS 452, not shown), Big Box retailers in the general merchandise sector carry substantial offerings of clothing and food.

Regression results: Big Box location choice

Before analyzing how Big Box site selection responds to proximity to competitor or complementary stores, I begin by estimating a series of regressions on the relationship between Big Box presence and economic fundamentals (the vector of X variables from Equation 1). As shown in Table 4, the economic fundamentals that affect site selection for Big Box stores appear similar to those for non-Big Box chains, but differ in several ways from preferred locations of mom-and-pop stores. A probit model estimating presence of new Big Box stores as a function of baseline tract characteristics suggests that Big Box stores seeks out lower population density tracts farther from the CBD, consistent with the traditional Big Box business model being oriented towards low-density development in the suburbs (Column 1). The probability of new Big Boxes increases with non-retail employment density, which could reflect benefits from locating employment centers as potential consumers or ease of opening stores in commercially oriented areas. Results on population characteristics offer somewhat of a mixed picture. The estimated coefficient on income is positive and weakly significant, as might be expected if Big Box stores seek out consumers with higher disposable income. Estimated coefficient on college-educated population share is negative, as is the coefficient on Hispanic population share and share over age 65, all consistent with previous studies on general retail location (see Schuetz et al 2012). To check whether the characteristics of newly opening Big Box locations differ substantially from existing Big Box sites, Column 2 shows results of an OLS estimate using (logged) baseline Big Box employment density as the dependent variable. Results are generally similar in sign and significance levels for most variables.

The remaining three columns in Table 4 compare the determinants of Big Box locations to those of non-Big Box retailers, estimated separately for chains and mom-and-pop stores, as well as to retail employment density overall. The factors that predict density of chain store

employment are quite similar to those results on Big Box employment (Column 3). Density of chain retail employment also increases with non-retail employment and distance to CBD, and decreases with population density. The estimated coefficient on income is still positive but not statistically significant, while coefficients on educational attainment, race/ethnicity, and population age are quite similar to those in Columns 1 and 2. Comparing determinants of Big Box and chain employment to employment density among mom-and-pop retailers reveals several interesting differences, however. Notably, mom-and-pop employment density increases with population density and decreases with median household income. These results are consistent with prior research that low-income neighborhoods are dominated by small, mom-and-pop stores, while more affluent areas tend towards large chain stores (Schuetz et al 2012). The final column in Table 4 shows estimated determinants of overall retail employment density; these are quite similar to results on mom-and-pop retailers, which is the largest component of overall retail employment. This simple model of retail employment density as a function of economic fundamentals has much more explanatory power for mom-and-pop stores than for chains or Big Boxes; looking at the R-squared values, the model explains over three-fourths of the variation in mom-and-pop employment density but less than 40 percent of variation in chain employment and less still for Big Box stores. Although purely descriptive, this suggests either than Big Box location is highly idiosyncratic or that something other than population characteristics is at work.

The analysis now shifts to examine whether Big Box firms consider proximity to existing stores when selecting sites for new stores, and whether this differs by intra-metropolitan location. Table 5 estimates probit models on the likelihood of new Big Box stores (grouping all retail sectors) as a function of the density of existing Big Box, chain, and mom-and-pop stores. The estimated coefficients suggest that new Big Box stores are more likely to open in tracts with a

higher density of existing Big Box and chain stores, while density of mom-and-pop stores is not an important factor. Estimated coefficients are highly similar across tracts in the entire MSA (Columns 1-2), suburbs (Column 3), central cities (Column 4) and downtown (Column 5). Because these regressions group all retail sectors, these results do not distinguish between the potential pull of complementary stores and the potential push of competitors, but the overall positive sign suggests a net positive influence of prior retail on new store location. The strong positive relationships could also be indirect evidence that Big Boxes face a constrained set of feasible sites: neighborhoods with many existing Big Box stores are presumably zoned to allow such stores, and opening an additional store in an existing retail corridor may face less opposition from neighbors than being the first mover. Adding the full set of controls for population characteristics has little impact on the coefficient estimates on prior retail density (moving from Column 1 to 2). The minimal model with only prior store density (Column 1) has roughly twice the explanatory power of the full set of population controls (Table 4, Column 1).

To try to tease out the separate influences of competitor and complementary stores, the next set of regressions are estimated for new Big Box stores in each of the main retail sectors, controlling for in-sector employment density by firm type, as well as density of non-sector retail employment (Table 6). The hypotheses described in Section 3 suggest that new Big Box stores should be less likely to open in tracts with higher density of same-sector Big Box and chains, conditional on other characteristics, but should be more likely to open in tracts with higher density of complementary (non-sector) retailers. Results vary somewhat across the retail sectors, overall supporting the complementary store hypothesis but showing no evidence of deterrence from in-sector competitors. Across all columns, the estimated coefficients on non-sector retail are positive and strongly significant. However, coefficients on density of existing in-sector Big

Box employment the most direct measure of competitors are positive in all but one sector (automobiles) and statistically significant in several sectors (furniture/home goods, building materials, hobbies, general merchandise and miscellaneous retailers). Similarly, coefficients on in-sector chain retail density is positive in all specifications and statistically significant in several. Similar regressions estimated separately for intra-metropolitan location (downtown, central city and suburb) yield largely similar results.[8] These results would again be consistent with an explanation that Big Box stores face strong location constraints, and so follow existing stores. One limitation of the data that could lead to these results is that 3-digit NAICS sectors are still quite broad, so that some in-sector stores could in reality be complementary. For instance, the hobbies sector (NAICS 451) includes sets of stores that should be direct competitors (Barnes and Noble s stock of books likely overlaps with Borders) as well as potential complements (Barnes and Noble may benefit from proximity to Toys R Us or Sports Authority). Unfortunately using a finer level of industry classification yields very small numbers of new Big Box stores per tract-year-sector, but future robustness checks will explore such analysis.

Section 5) Discussion and next steps

Big Box and chain stores, which have traditionally been thought of as primarily suburban retailers, are increasingly expanding into downtown markets. This expansion has potentially important implications for independent retailers, urban consumers, local tax revenues and the downtown built environment. Although the trend is receiving considerable media attention, to date no academic research has studied the reasons behind Big Box store location choices. In this paper, I

[8] Results available upon request from author.

Descriptive statistics indicate that Big Box stores form a small but growing share of the retail market, downtown and across MSAs more broadly. The prevalence of Big Box stores varies widely across metropolitan areas and retail sectors. Regression analysis on the basic determinants of new Big Box locations find evidence consistent with the traditional business model: new Big Box stores are more likely to choose tracts with lower population density, farther from the CBD, with higher non-retail employment density and higher household income. However, these factors appear to be less important in site selection than proximity to existing retail centers. There is a strong positive correlation between new Big Box location and existing retail density, including out-of-sector and in some cases, in-sector Big Box and chain stores. Results on the determinants of location choice are generally consistent for downtown and suburban tracts.

The results of this preliminary analysis yield an interesting puzzle: why do Big Box firms, which should compete primarily on price, appear to open new stores in close proximity to competitor stores? Do the agglomeration benefits from locating near other retailers outweigh the potential harm from proximity to competitors? Besides the potential measurement error created by using broad retail sectors, discussed above, there are several possible explanations. The basic model estimating retail site productivity (Table 4) could be enhanced by including direct measures of transit accessibility, as proximity to highways should be important for both suppliers and consumers (at least in suburban areas). These data are being collected and will be added to the analysis. However the larger concern of omitted variable bias is that zoning, political or institutional factors may effectively rule out some otherwise desirable locations for Big Box stores. If the practical set of potential locations is quite limited, or there is a strong disadvantage in being the first mover to break in a neighborhood to Big Box stores, then we would expect to

see strong clustering of new and existing stores. Future analysis will try to include proxies for local preferences over Big Box stores or commercial activity more generally.

Although the analysis is too preliminary to draw clear policy implications, two main results are relevant for urban planners or policymakers concerned with central city retail. First, when Big Box stores do locate in urban neighborhoods, they are not moving into retail deserts , but rather are locating near existing commercial corridors. If policymakers view Big Box stores as part of the solution to alleviating the absence of retail in targeted neighborhoods, a better understanding of the underlying location choice will be necessary. Second, there is little evidence that Big Box stores are moving into urban neighborhoods with particularly strong presence of mom-and-pop stores. That may suggest that fewer mom-and-pop businesses will be directly affected by Big Box entry into urban markets.

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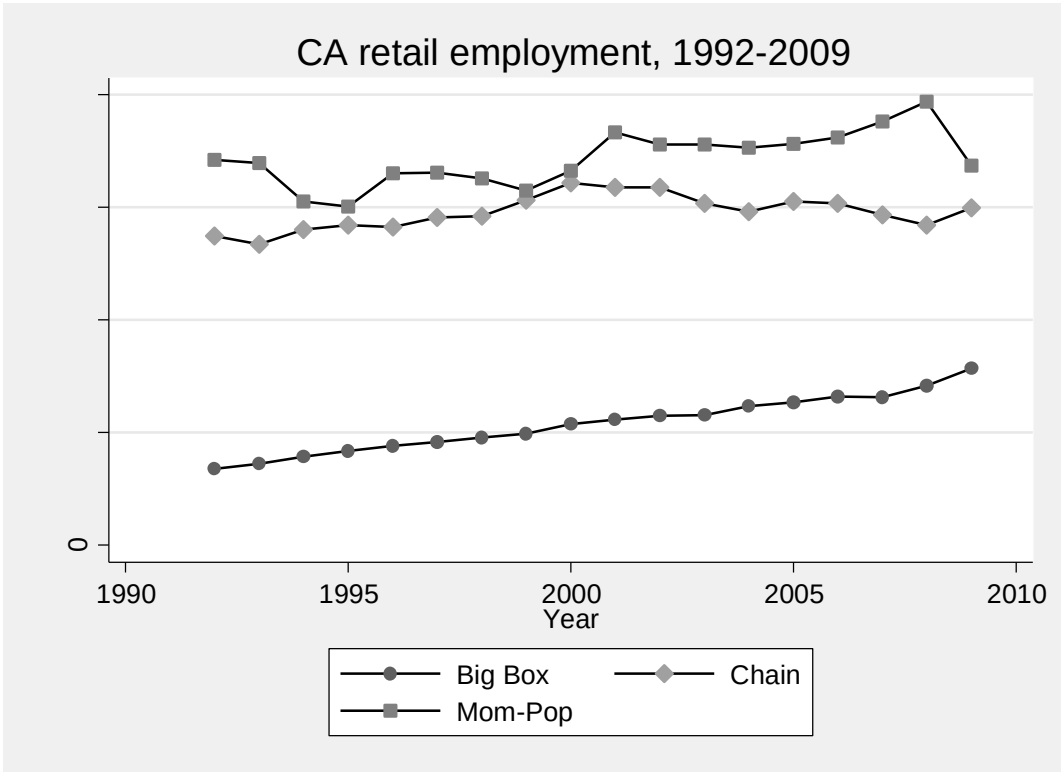
Figure 1



Source: NETS 1992-2009

Figure 2

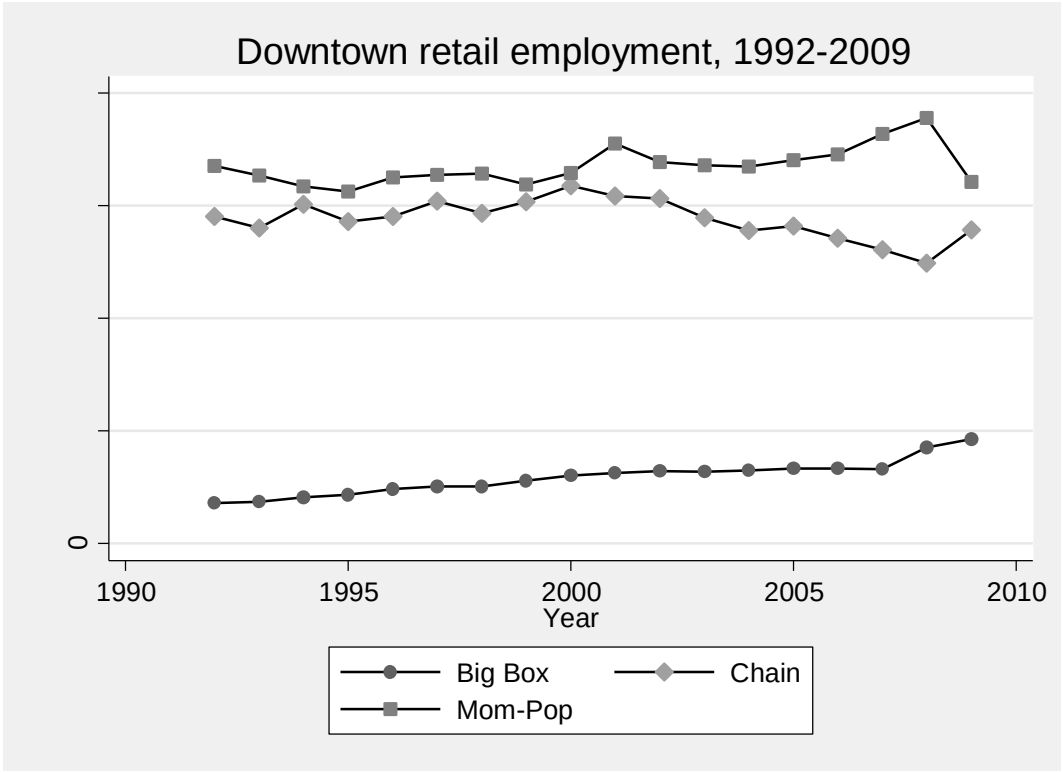


Figure 3a

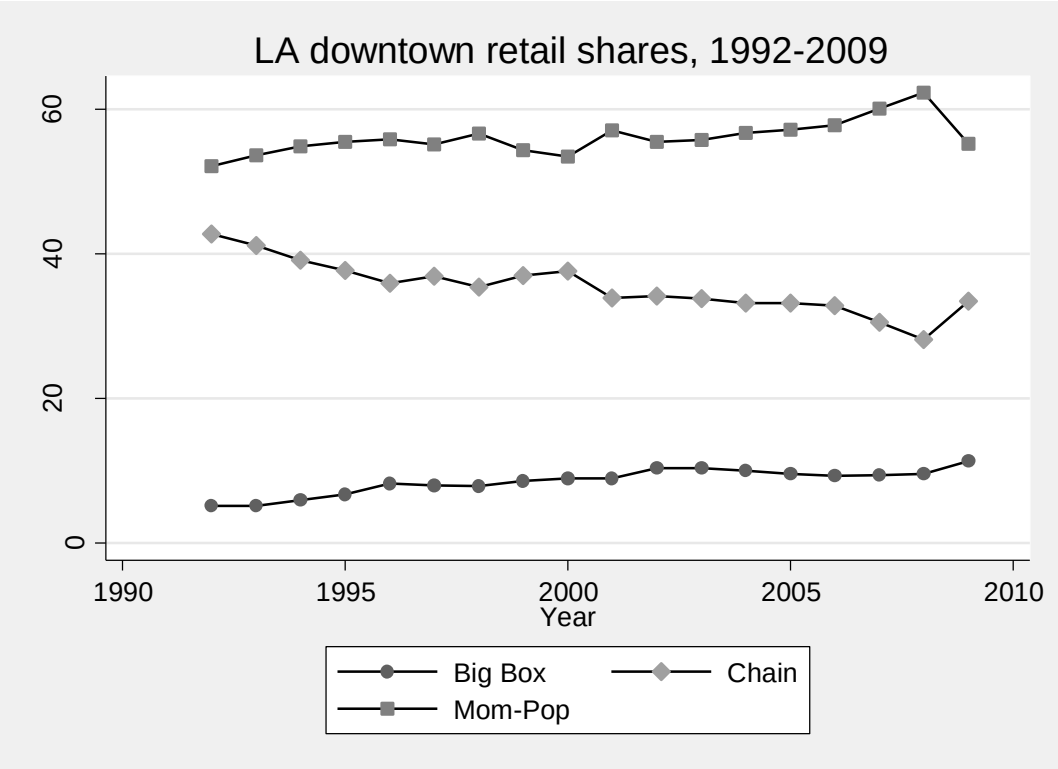


Figure 3b

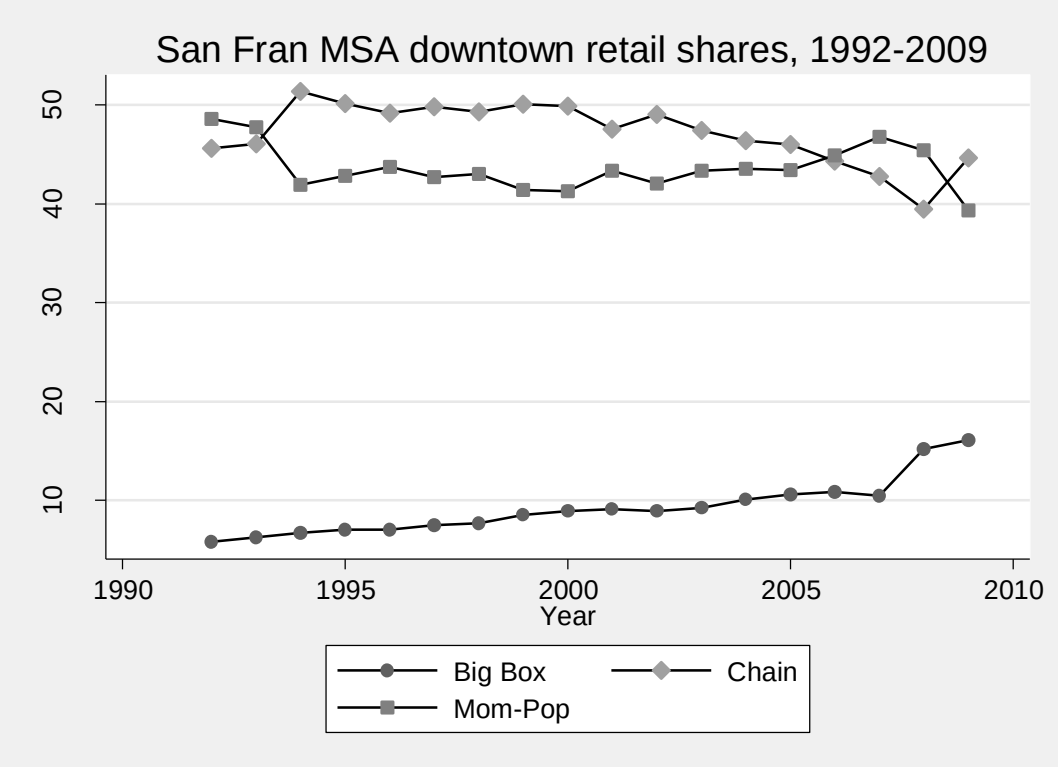


Table 1: Variable sources and definitions

Variable name	Definition	Source
Retail employment density/presence		
Any new BB	= 1 if any new BB, = 0 ow	NETS 1993-95, 2001-03, 2007-09
BB emp/sqmi	# employees in Big Box estabs/sq mi	NETS 1992, 2000, 2006
Retail/sqmi	# retail employees/sq mi	
MP emp/sqmi	# employees in mom-pop retail estabs/sq mi	
CH emp/sqmi	# employees in chain retail estabs/sq mi	
Other tract characteristics		
popland	# pop/sq mi	Census 1990, 2000, ACS 2005-2009
emp/land	# non-retail employees/sq mi	NETS 1992, 2000, 2006
dist	distance (miles) to CBD	Calculated from NETS 2000
inc	Median HH income	Census 1990, 2000, ACS 2005-2009
baplus	% pop w/ BA, grad or professional degree	
black	% pop African-American	
hisp	% pop Hispanic	
popkids	% pop < 18 years	
age65pl	% pop > 65 years	
forborn	% pop foreign-born	
ownocc	% hsg units owner-occupied	
Intra-MSA location		
Downtown	Tract centroid < 2 miles of CBD*	Calculated from NETS 2000
Central city	Tract w/in central city defined by OMB	OMB 2000 MSA definitions
Suburb	Tract not in OMB-defined central city	

* For Oakland and San Jose MSAs, downtown includes tracts within 1.5 miles of CBD.

Table 2: Variable summary statistics

Variable name	Mean	Std. Dev.	Min	Max	N
Retail employment density/presence					
Any new BB	0.09	0.29	0.00	1	17,490
BB emp/sqmi	40.54	151.61	0.00	3,146	17,490
Retail/sqmi	415.25	964.66	0.00	45,449	17,490
MP emp/sqmi	213.28	469.44	0.00	22,272	17,490
CH emp/sqmi	161.47	602.07	0.00	36,958	17,490
Population characteristics					
popland	8,840	9,222	0.05	99,099	17,490
totemp	2,126	4,686	0	108,569	17,490
dist	14.13	13.27	0.00	176	17,490
inc	69,180	31,619	0.00	263,429	17,465
baplus	27.59	18.97	0.00	100.00	17,419
black	7.57	13.03	0.00	97.64	17,420
hisp	30.07	25.68	0.00	100.00	17,420
popkids	23.45	7.87	0.00	77.74	17,420
age65pl	11.00	7.18	0.00	100.00	17,420
forborn	26.23	15.96	0.00	100.00	17,420
ownocc	57.16	24.95	0.00	100.00	17,387
Intra-MSA location					
Downtown	0.06	0.24	0.00	1.00	17,490
Central city	0.41	0.49	0.00	1.00	17,490
Suburb	0.59	0.49	0.00	1.00	17,490

Table 3: Big Box employment share, by retail sector and intra-MSA location

	Retail segment	Downtown	Suburbs	All tracts
452	General merchandise	22.61	34.73	30.05
451	Sporting goods, hobbies, books and music	3.72	4.20	4.05
444	Building material & garden equipment	1.21	3.96	3.52
441	Motor vehicles and parts	2.20	2.66	2.73
453	Miscellaneous store retailers (office supplies)	2.26	2.60	2.33
443	Electronics & appliances	1.00	1.62	1.50
442	Furniture & home furnishings	2.06	1.41	1.42
448	Clothing, shoes and accessories	0.13	0.14	0.14
	All retail segments	4.44	6.21	5.53

Table 4: Determinants of retail employment density, by firm type

Dependent var:	ln(Emp/sqmi)	ln(MP emp/sqmi)	ln(CH emp/sqmi)	ln(BB emp/sqmi)	Any new BB
Variable:	(1)	(2)	(3)	(4)	(5)
lpopland	0.296***	0.347***	-0.163***	-0.307***	-0.218***
	(0.018)	(0.017)	(0.026)	(0.030)	(0.018)
lempd	0.700***	0.540***	1.016***	0.629***	0.389***
	(0.018)	(0.016)	(0.032)	(0.029)	(0.021)
ldist	0.0971***	0.0297*	0.271***	0.226***	0.203***
	(0.021)	(0.018)	(0.071)	(0.052)	(0.031)
linc	-0.154	-0.274**	0.156	0.476***	0.147*
	(0.095)	(0.109)	(0.160)	(0.115)	(0.088)
baplus	-0.00671***	-0.002	-0.0158***	-0.0197***	-0.00921***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
black	-0.00833***	-0.00729***	-0.0213***	-0.003	-0.002
	(0.001)	(0.001)	(0.003)	(0.002)	(0.002)
hisp	-0.00342***	-0.00169**	-0.00871***	-0.00754***	-0.00520***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
popkids	-0.00505**	-0.00450***	-0.00935***	0.000	0.001
	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
age65pl	0.003	0.004	0.003	-0.006	-0.00919***
	(0.002)	(0.003)	(0.003)	(0.004)	(0.003)
forborn	-0.001	-0.001	-0.001	0.003	0.00348**
	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)
ownocc	-0.00441***	-0.00401***	-0.0127***	-0.00421**	0.001
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
County FEs?	Y	Y	Y	Y	Y
Year FEs?	Y	Y	Y	Y	Y
Observations	17,383	17,383	17,383	17,383	17,383
R-squared	0.717	0.774	0.379	0.131	0.0947

Columns 1-4 are OLS estimates, Column 5 is a probit estimate. Robust standard errors, clustered by city, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 5: New Big Box location and existing retail density

Dependent var:	Any new BB				
	(1)	(2)	(3)	(4)	(5)
Sample	All tracts	All tracts	Suburbs	Central city	Downtown
ln(BB emp/sq mi)	0.185***	0.165***	0.171***	0.153***	0.188***
	(0.009)	(0.009)	(0.010)	(0.016)	(0.028)
ln(CH emp/sq mi)	0.162***	0.152***	0.157***	0.148***	0.207**
	(0.011)	(0.012)	(0.016)	(0.019)	(0.088)
ln(MP emp/sq mi)	-0.0522***	0.036	-0.007	0.103**	0.229
	(0.018)	(0.033)	(0.032)	(0.049)	(0.192)
Other controls?	N	Y	Y	Y	Y
County FEs?	Y	Y	Y	Y	Y
Year FEs?	Y	Y	Y	Y	Y
Observations	17,490	17,383	10,181	7,202	1,077
Pseudo R-squared	0.1895	0.2133	0.2143	0.2107	0.3142

All columns show results from probit estimates. Robust standard errors, clustered by city, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Table 6: New Big Box location and proximity to competitor, complementary retail

Dependent variable:	Any new BB							
Retail sector:	Autos	Furniture	Electronics	Bldg/garden	Clothes	Hobbies	Genl merch	Misc
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
In-sector BB	-0.046	0.119***	0.053	0.0912***	0.096	0.127***	0.133***	0.0722***
	(0.064)	(0.035)	(0.035)	(0.023)	(0.066)	(0.015)	(0.011)	(0.024)
In sector CH	0.013	0.126***	0.0979***	0.039	0.260***	0.0923***	0.019	0.0329*
	(0.020)	(0.025)	(0.027)	(0.025)	(0.029)	(0.017)	(0.013)	(0.018)
In-sector MP	0.0420**	-0.0606**	-0.020	0.031	-0.039	-0.021	-0.004	-0.041
	(0.017)	(0.028)	(0.028)	(0.029)	(0.033)	(0.020)	(0.021)	(0.030)
Non-sector retail	0.193***	0.368***	0.351***	0.137***	0.121**	0.299***	0.269***	0.332***
	(0.031)	(0.051)	(0.050)	(0.036)	(0.058)	(0.035)	(0.031)	(0.029)
Other controls?	Y	Y	Y	Y	Y	Y	Y	Y
County FEs?	Y	Y	Y	Y	Y	Y	Y	Y
Year FEs?	Y	Y	Y	Y	Y	Y	Y	Y
Observations	17,383	17,383	17,383	17,383	17,383	17,383	17,383	17,383
Pseudo R-squared	0.1476	0.2226	0.1921	0.1344	0.2555	0.2115	0.1751	0.177

All columns show results from probit estimates. Robust standard errors, clustered by city, in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Appendix Table 1: Big Box firms by retail sector

NAICS 3	Description & firm names
441	Motor vehicle and parts dealers AUTOZONE
442	Furniture & home furnishings stores ASHLEY, COST PLUS, LAZBOY, BED BATH & BEYOND, CONTAINER STORE, HOME GOODS, PIER ONE
443	Electronics & appliance stores BEST BUY, CIRCUIT CITY, FRYS
444	Building material & garden equipment dealers HOME DEPOT, LOWES
445	Food and beverage stores NONE - part of standard supermarket chains
447	Gasoline stations NONE
446	Health & personal care stores ULTA
448	Clothing, shoes and accessories stores BABIES R US, BURLINGTON COAT, DRESS BARN, PUMA, DSW, VALUE CITY
451	Sporting goods, hobbies, book and music stores BASS, DICKS SPORTING, GUITAR CENTER, MICHAELS, SPORTS AUTHORITY, TOYS R US, BARNES NOBLE, BOOKS A MILLION, BORDERS, CROWN BOOKS
452	General merchandise, (Discount department stores & warehouse stores) ASSET MAXIMIZERS, CENTURY 21, CURACAO, DOLLAR JOES, DOLLAR WAREHOUSE, EL PROGRESO, INTL DISCOUNT, JC PENNEY, KMART, KOHLS, LUCKY BUY, MARMAXX, MARUKAI, MERVYNS, ROSS, SEARS, TARGET, WALMART, BARGAIN WHOLESALERS, BIG LOTS, COSTCO, DOLLAR TREE, PRICE CLUB, XTRA
453	Miscellaneous store retailers OFFICE DEPOT, OFFICE MAX, STAPLES, PETCO, PETSMART
454	Nonstore retailers NONE

Sources: The list of firm names was compiled from Columbia University Graduate School of Architecture, National Federation of Retailers, and Wikipedia. Trade names and NAICS codes taken from NETS 1992-2009.

Appendix Table 2: Metropolitan areas and CBD locations

MSA/PMSA	MSA name	City names
4480	Los Angeles-Long Beach, CA (P)	Los Angeles city, Long Beach, Pasadena, Lancaster
5775	Oakland, CA (P)	Oakland city, Alameda city, Berkeley
5945	Orange County, CA (P)	Anaheim, Irvine, Santa Ana
6780	Riverside-San Bernardino, CA (P)	Hemet, Palm Desert, Palm Springs, Riverside, San Bernadino, Temecula
6920	Sacramento, CA (P)	Sacramento city
7320	San Diego, CA	San Diego city, Escondido*
7360	San Francisco, CA (P)	San Francisco city
7400	San Jose, CA (P)	Gilroy, Palo Alto, San Jose, Santa Clara, Sunnyvale
7485	Santa Cruz-Watsonville, CA (P)	Santa Cruz, Watsonville
7500	Santa Rosa, CA (P)	Petaluma, Santa Rosa
8720	Vallejo-Fairfield-Napa, CA (P)	Fairfield, Napa city, Vallejo
8735	Ventura, CA (P)	Oxnard city*
9270	Yolo, CA (P)	Davis, Woodland

Notes: Because of overlap with the largest central city, I do not classify either Coronado (San Diego) or Ventura city (Ventura) as central cities.