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## Internalizing Agglomeration Economies: The Pricing of Space in Shopping Malls

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**INTERNALIZING AGGLOMERATION  
ECONOMIES: THE PRICING OF SPACE IN  
SHOPPING MALLS**

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**INTERNALIZING AGGLOMERATION ECONOMIES:**

**THE PRICING OF SPACE IN SHOPPING MALLS**

**by**

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Economists seldom have market measures of externalities. When developing models, they inevitably are forced to make unverifiable judgments on the importance of externalities. In rare circumstances, economists observe market data that allow them to measure the quantitative importance of externalities directly. In principle, it is possible to determine how air quality affects housing prices if, under ideal conditions, the effect of other influences on housing prices are controlled for. Sometimes, we are able to investigate how imperfect information and information asymmetries prevent externalities from being internalized as Wiggins and Libecap (1985) did in their study of oil field unitization. Rarely are we favored with market prices that show externalities being internalized as in Cheung's (1973) celebrated paper on internalizing externalities between apple growers and beekeepers. In this paper, nearly a quarter of century after the publication of Cheung's paper, we use store rent data to demonstrate the importance of externalities within shopping centers and to determine which mall stores create and which benefit from externalities.

Consumer search costs are lower when stores are located in proximity as they are in shopping malls. However, agglomeration of stores produces conflicts because proximity creates free rider problems. An often repeated claim is that the success of an individual mall store depends, in part, on the presence of other stores within the mall, especially on the presence of the mall's anchor stores.<sup>1</sup> The contention is that consumers shop at malls because well-known anchor stores are present -- typically department stores with recognized names. By generating mall traffic, anchors create external economies by indirectly increasing sales and/or reducing promotion and other costs of clothing stores, hobby and gift shops, jewelry stores, food service stores and a host of other mall stores. Lesser-known stores can free ride off their reputations of better-known stores. If these externalities are large, mall developers will internalize these demand spillovers by giving rent subsidies to anchors and by charging rent premiums to mall tenants that benefit from spillover effects. Proximity within the mall is also important to anchors who are particular about which stores are in the mall and which are near the anchor.<sup>2</sup> Using the trade vernacular, "adjacencies" are important to the success of a mall and to the individual stores in the mall because they prevent or attenuate potential free rider problems that emerge from an inappropriate placement of stores.

That consumers save on search costs by shopping at malls is not in dispute. It is surprising that at this late date the importance of free rider problems within malls remains a matter of dispute. There seems to be two reasons for this. The theory of store location in central places has stressed the benefits of attracting more consumers because of store agglomeration against the negative effects of increased competition among closely situated mall stores and subordinates the externality question altogether. Second, despite the many claims about important store externalities, we found a dearth of empirical studies that convincingly demonstrated the importance of externalities. This paper is one of the first to present systematic evidence about the size of these mall externalities and which types of firms create

externalities. We infer that anchors create substantial externalities from the significantly lower rent per square foot paid by mall anchors than by other mall stores. By extending the analysis, we show that anchors in super regional malls (those with several major department stores) pay significantly lower rents per square foot compared to anchors in regional malls (those with a two or fewer major department stores). We infer from this that the anchors in super regional malls are receiving a greater subsidy to compensate them for the larger externalities they are generating. We then show that they generate greater externalities by looking at the rent per square foot paid by other malls stores. We find that other mall stores have higher sales psf and pay higher rents per square foot in super regional than in regional malls.

### **I. Shopping Mall Contracts and A Literature Review of Mall Externalities**

Before examining the relevant literature on shopping malls, it is useful to review several commonly observed features of shopping mall contracts. Mall lease contracts have two components, a base (fixed) monthly rent and an "overage" component. The overage component equals a share of the difference between store sales and a threshold value for sales. If sales exceed the threshold level, then a store's total rent exceeds its base rent. If sales are less than the threshold level, then the tenant only pays the base rent. These and other features of each contract such as lease length are negotiated by the developer and tenant and differ across malls, types of tenants, and across product categories.

There are two main strains to the literature on shopping mall contracts and rent determinants. One strain, largely theoretical, models the benefits and costs of locating a store in a mall versus at a stand-alone location (Dudey 1990). In these models, a mall store benefits from store agglomeration because more consumers are attracted to the mall while the disadvantage is that each mall store is subject to more direct competition from competing stores within the mall. Somewhat surprisingly, this literature has largely ignored the externality effects among stores, presumably because these authors consider them to be insignificant. Because our focus is on the externality question, we will not provide a detailed review of this literature.

The second strain includes a mixture of theory and empirical papers that focuses on how contract provisions and externalities affect store rent. The most comprehensive theoretical treatment of externalities is found in Brueckner (1993). He considers a mall where there are pervasive demand externalities among all mall stores. Each store's total revenue depends directly on the total space allocated by the developer to this store and on the total space allocated to every other store in the mall. The developer's problem is to allocate space to each store after taking account of the externalities so that the developer's profits are maximized. The only costs in the model are the developer's constant marginal cost of space. To maximize profits, the developer allocates space to a store so that net

marginal revenue, which takes account of all external effects from a marginal increase in store i's space on the rents paid by other stores, equals the marginal cost of space. For two stores with the same rent elasticity of demand, the theory implies that the store that creates a greater (positive) net externality will pay a lower rent per unit of space. If the rent elasticity of demand is less elastic for a store that creates a larger net externality, the developer may charge a higher rent per unit of space to the store that creates a large net externality. Therefore, the theory does not unambiguously predict that the store that creates the largest net externality will pay the lowest rent per unit of space. In the appendix, we specialize the model by considering a mall with an anchor that conveys demand externalities on a mall store.

In an interesting extension, Brueckner allows store revenue to depend not only on the space of the store but also on the store manager's effort which is unobservable by the developer. He analyzes the implications for contract design when both the store and the developer are risk adverse and where each maximizes expected utility. The optimal contract can be approximated by a fixed base rent and a percentage of sales component. Unfortunately, as Brueckner notes, the optimal contract in this extended model does not conform to the commonly observed mall contract where the tenant is obligated to pay an overage rent once sales exceed a pre-specified threshold level. Existing theoretical models have not successfully explained why thresholds commonly appear in mall rental contracts.

Turning to the empirical literature, a few papers have investigated the tradeoff between different contract features, e.g., does a higher sharing fraction (for sales above the threshold) result in a lower base rent? In an often-cited paper, Benjamin et al. (1990) examined 103 leases in 5 neighborhood and community shopping centers located in Greensboro, North Carolina. These strip centers, where the anchor is usually a super store or a supermarket, are much smaller and include many fewer stores than the malls that we will study where the anchors are well-known department stores and where there are many more mall stores so the scale of potential externalities is much larger. In their study, the authors found that base rent was inversely related to the sharing fraction and the lease term, directly related to the threshold, and lower if the store was a member of a national chain. They did not find significant effects if the landlord has an option to cancel the lease. These findings suggest that differences in rent per unit of space between anchors in large enclosed and smaller enclosed shopping malls could be explained by differences in contract features and not by differences in the magnitude of the externalities created. While we will concentrate more on the externality issue, we hope to convince the reader that differences in rent paid by anchors are not explained by systematic differences in contract features between anchors in super regional versus regional malls. We return to this issue later and determine what differences, if any, exist between the contract characteristics of anchors in the two types of malls.

In another paper, Benjamin et. al. (1992) use the same data to determine the relative importance of contract features versus tenant and shopping center characteristics in explaining expected rent paid by tenants. While the authors did have data on contract characteristics for each store such as the threshold value, the sharing fraction, lease length, etc., they did not have a store's actual sales or rent per square foot (psf hereafter). They were forced to substitute the medians sales and rent psf reported in a national study of malls (without any adjustment for the regional or location specific effects) for each store's sales and rent psf after taking due account of the product sold by store, the type of store (local versus member of national chain), etc. One of their interesting findings is that tenant and shopping center variables such as shopping center size, store size, estimated sales per square foot and other characteristics of the tenant explained much more of the variation in estimated rent paid than do the contract provisions such as term of lease, cancellation clause, etc. To test for externalities, the authors use estimated store sales per square foot as a proxy for the presence of positive externalities -- arguing higher estimated sales psf generate more store traffic that, in turn, creates positive externalities for other stores in the mall. They predict that store sales psf should be inversely related to store rent psf if there are positive externalities. They find that sales psf are inversely related to rent psf but the significance level of the estimated coefficient of the sales psf variable depended on which of two dependent variables was used as proxy for expected rent psf.

While their results provide some support for the externality hypothesis, they are suggestive, not definitive. Generally one expects the largest stores with the better reputations to create the greatest externalities, no matter what type of mall. A possible reason for the observed inverse relationship is that supermarkets are among the largest stores in community malls and often have higher sales psf and pay a lower rent psf than do many other stores in community malls. So, higher sales psf and store size can be positively correlated in community malls. However, using store sales psf to proxy for the size of the externality created by a store has less justification when stores are located in the larger super regional or regional shopping malls. Although total sales are much higher, sales psf are lower for anchors than for many other mall stores in super regional and regional malls. In these larger malls, store size and sales psf can be inversely related in any cross section. Smaller stores such as cookie shops, doughnut shops, Mexican fast food shops, etc., have much higher sales psf than do department stores. Yet, these are not the types of stores that would be expected to create important externalities. Rather, these stores free ride on the customers who come to the malls to shop at anchor stores. Because of these objections, we do not use sales psf as a proxy for the externalities created by a store but rather we use sales psf to measure the external benefits received by a store.

This literature review indicates that papers on shopping mall externalities is surprisingly sparse. While some writers claim that externalities are important, the evidence upon which these claims are based is fragmentary. The existing empirical literature has not investigated let alone

quantified the externalities created by anchors in general or whether anchors in the super regional malls convey differential benefits on other mall stores than do anchors in regional malls.

## II. Publicly Available Data on Mall Stores

The Urban Land Institute (ULI hereafter) publishes shopping center data at three year intervals in a report entitled Dollars and Cents of Shopping Centers. Our analysis uses data published in "Dollars and Cents of Shopping Centers, 1993" which reports 1992 operating data for stores located in malls. In each report, ULI classifies the larger shopping centers into two groups: super regional and regional centers. A *super regional* shopping center has three or more full line department stores and has more than 600,000 square feet of gross leasable space. Super regional shopping centers range from 600,000 to 1,500,000 square feet. A *regional* shopping center has one or two full line department stores and has not less than 100,000 square feet and typically range from 300,000 to 850,000 square feet.<sup>3</sup>

Based on information supplied by mall operators, ULI classifies each tenant into one of three types based on the reputation or brand name of the store: 1) member of a *national chain*; 2) member of a *local chain*, and 3) *independent* store.<sup>4</sup> Each tenant is also classified into a product category based on the product that it sells. Therefore, operating data are available by type of store for each product category, e.g., stores that are members of a national chain selling women's specialty clothing. ULI aggregates product categories into more broadly defined product groups, e.g., shoes group includes men's and women's shoes. To preserve confidentiality, ULI reports medians for gross leasable space, sales psf, rent psf, etc., for each category, e.g., median sales psf of all national chain-department stores located in super regional malls or of all independent furniture stores located in regional malls. Because each median is calculated independently, the store with the median rent per square foot in a product category is not necessarily the same store with the median sales per square foot in the same category.

To illustrate the different classifications used by ULI, Table 1 shows some illustrative information for one of the thirteen categories within the clothing and accessories group. It shows pertinent information for the women's ready-to-wear category within the clothing group. In super regional malls, 940 stores are members of national chains in the women's ready-to-wear category and are located in a super regional mall. Among the stores that submitted information, the median store GLA was 3,905 square feet with median sales of \$202 per square foot and reported rent psf of \$15.<sup>5</sup> Similarly, women's ready-to wear stores that are members of local chains numbered 115 with a median GLA of 3,214 square feet, median sales psf of \$210, and median rent psf of \$15. The bottom half of Figure 1 gives comparable data for stores in the women's ready-to-wear category located in



regional malls.

ULI treats department stores differently. Sometimes, the property is owned by the mall owner and sometimes by the department store. In the former case, the department store leases space and pays a monthly rent, however low (the so-called "owned" department stores that pay rent). In the latter case the department store usually does not pay any rent or a nominal rent (so-called unowned department stores). Department stores in the owned category differ in several dimensions from the unowned department stores. For example, department stores that own their buildings are physically larger and have higher sales psf than those that lease their property. In our analysis we only use data for department stores that lease and therefore pay rent. Virtually all anchors and non-anchors pay separate charges for the maintenance of common and parking areas. Nevertheless, subsidies can take other forms and may not necessarily appear in the ULI accounts. For example, developers do often subsidize a department store's building improvements, the department store's mall advertising, or maintenance expenditures, etc. ULI data for owned department stores probably under-estimates the total subsidy given by developers to anchors.<sup>6</sup>

ULI solicits its members to participate in their survey but the response rate varies from year to year and is higher for super regional than regional malls. In the 1993 survey, ULI canvassed 99 super regional malls and 118 regional malls. We use the 1993 survey because it includes far more anchors that lease than in earlier surveys. In the 1993 report, the number of anchors that lease was 213 in super regional malls and 139 in regional malls for a total of 352 anchors. This is a far larger number than the total of 231 anchors that leased in 1990, 208 in 1987 and 226 in 1984. Apparently, ULI made a more concerted effort to solicit mall responses in 1993. While the ULI survey has several limitations, it includes a more geographical balance of malls, a large sample of malls and anchors, and the most detailed category operating data for mall stores than any other publicly available data source. These advantages must be balanced off by the non-random sample of malls.

### III. Rent Subsidies for Anchors

If anchors are conferring positive externalities onto the other mall stores by generating mall traffic, then the ULI data should reveal that they are being treated very differently than all the other types of stores. In this section, we will demonstrate that department stores receive substantial rent subsidies, and that the magnitudes of the subsidies are so large that they strongly suggest the existence of agglomeration economies.

Table 2 presents summary rent and sales data for selected product groups across regional and super-regional malls. The third column clearly shows that department stores pay dramatically less

rent per square foot than all the other groups, regardless of the mall classification. For example, we take the clothing product group as a natural comparison since they generally account for the majority of stores and occupy the most non-anchor space in any given mall. In super-regional malls, the median rent psf for owned department stores (\$1.95) is 90 percent less than the median rent psf for clothing stores (\$18.58). The discount is larger for “unowned” department stores (95 percent) and would be still larger if department store rents were compared with any of the other broad product groups, since clothing stores seem to pay the least of any type of non-anchor store. The corresponding discounts in regional malls are 81 percent for “owned” department stores and 89 percent for “unowned” department stores. In the next section we discuss why the discounts seem to be greater in super-regional malls versus regional malls, but for now it is clear that department stores pay substantially less rent psf than other mall stores.

However, Table 2 also reveals in the fourth column that department stores generate a lot lower sales psf than the other types of stores. In super-regional malls, the sales psf of “owned” department stores (\$131.40) is 44 percent lower than the sales psf for clothing stores (\$236.56). In regional malls, they generate 38 percent less in sales psf. Do department stores pay less rent psf because of their lower sales psf? To answer this question, the last column in Table 1 presents the ratio of rent psf to sales psf. In super-regional malls, clothing stores pay 7.9 percent of their sales revenue in rent while “owned” department stores pay only 1.5 percent. In regional malls, the corresponding figures are 7.5 percent for clothing stores and 2.4 percent for “owned” department stores. Again, the discounts are even greater for “unowned” department stores (0.5 percent in super regionals and 1.3 percent in regionals) or when another product group is used for comparison. These results clearly indicate that department stores are getting much more favorable terms than other mall stores even after controlling for their lower sales. To see if these differences are statistically significant, we turn to the regression results in Table 3.

In Table 3, we run a regression of the average rent psf for a given store category on its corresponding average sales psf. The “categories” here are more narrowly defined than the ones used in Table 1. For example, instead of using summary data for all clothing stores, the clothing store group is broken down into smaller categories such as women’s clothing, men’s clothing, children’s clothing, etc. We estimate an average rent psf for each of these categories by taking a weighted average of the median rent psf that ULI presents for both the super-regional and regional malls. We use the total space that is taken up for each category in each type of mall (number of stores multiplied by median gross leasable area (GLA)) as the weights. This weighting strategy was designed to give greater weight to those medians which came from samples that occupy a larger amount of mall space since we were trying to capture a measure for average rent psf. We use a similar procedure to create a weighted sales psf across the two types of malls for each category.

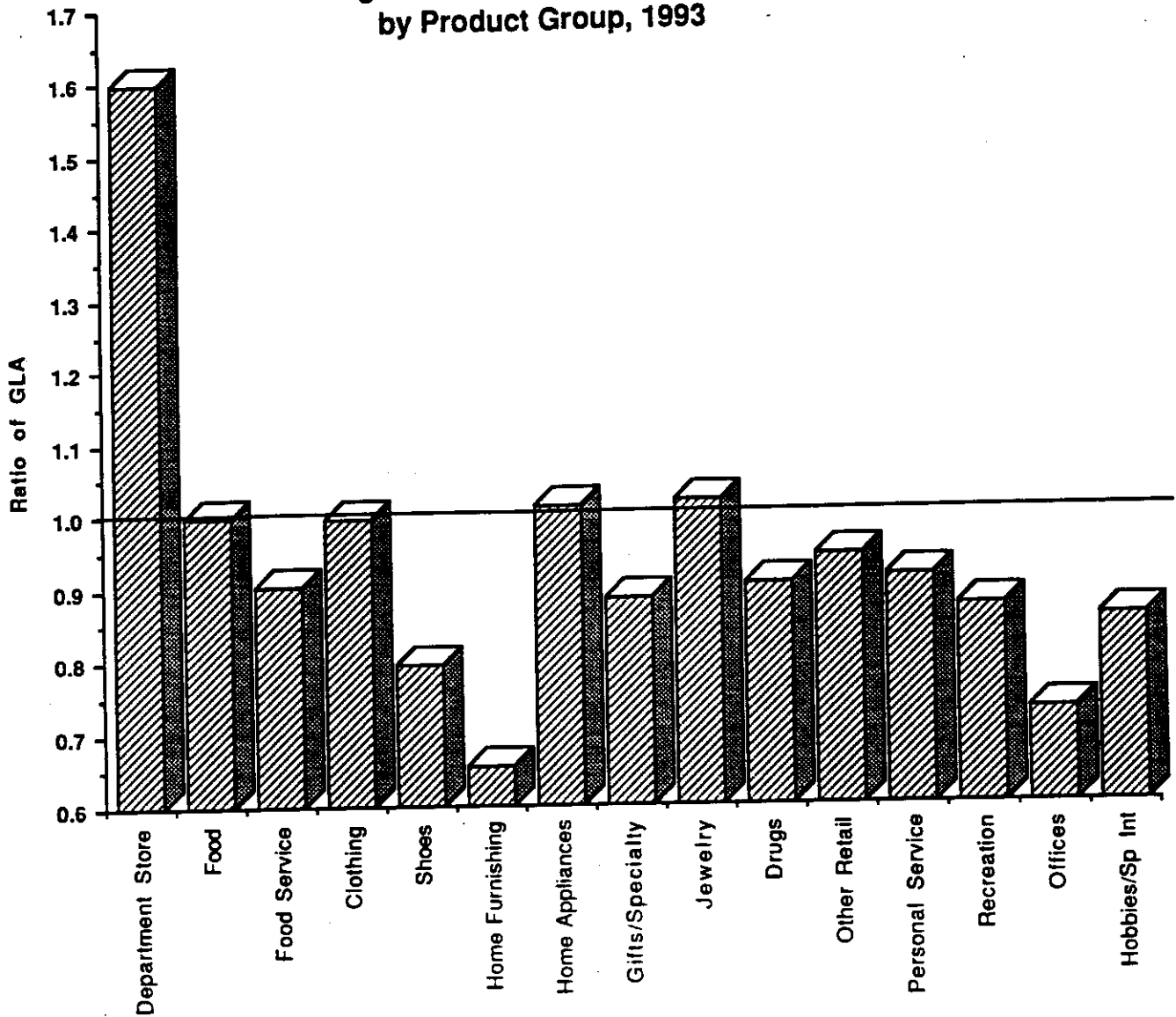
The weighted mean rent psf for each category is then regressed on the weighted mean sales psf and a dummy variable that is equal to one if the category is a department store and is zero otherwise. Only "owned" department stores are used in this analysis. The regression is also a weighted regression using the total number of stores in each category as weights. This procedure places greater weight on those category means that were estimated with greater accuracy. As shown in Table 3, the average sales psf for a category explains much of the variation of the average rent psf. For each dollar of sales psf, the rent psf of a store rises by a statistically significant \$0.08. In addition, the coefficient on the dummy variable indicates that department stores pay \$9.57 less than other types of stores after controlling for sales psf. This coefficient is statistically significant at the 5 percent significance level. In economic terms, this \$9.57 represents a 66 percent reduction from the weighted mean rent psf computed for women's ready-to-wear clothing stores (\$14.64). Also, if we impute what a non-anchor store would pay with an equivalent sales level of an anchor store (the weighted average sales psf for anchors is \$129.94), the imputed rent level would be \$11.91. The actual average rent level for anchors (\$2.24) is 81 percent less than this imputed level. That is, anchors are paying over 80 percent less than what a developer would normally charge any other store with a similar level of sales. One has to wonder why a developer would give such a large discount rather than fill the mall with specialty stores which generate more sales psf and pay more rent psf than department stores. This paper suggests that developers are behaving rationally by offering these discounts to anchor department stores because they are responsible for generating the sales figures for the other stores, which is then transferred back to the developers through higher rents.

#### **IV. Differential Store Performance in Super Regional and Regional Malls**

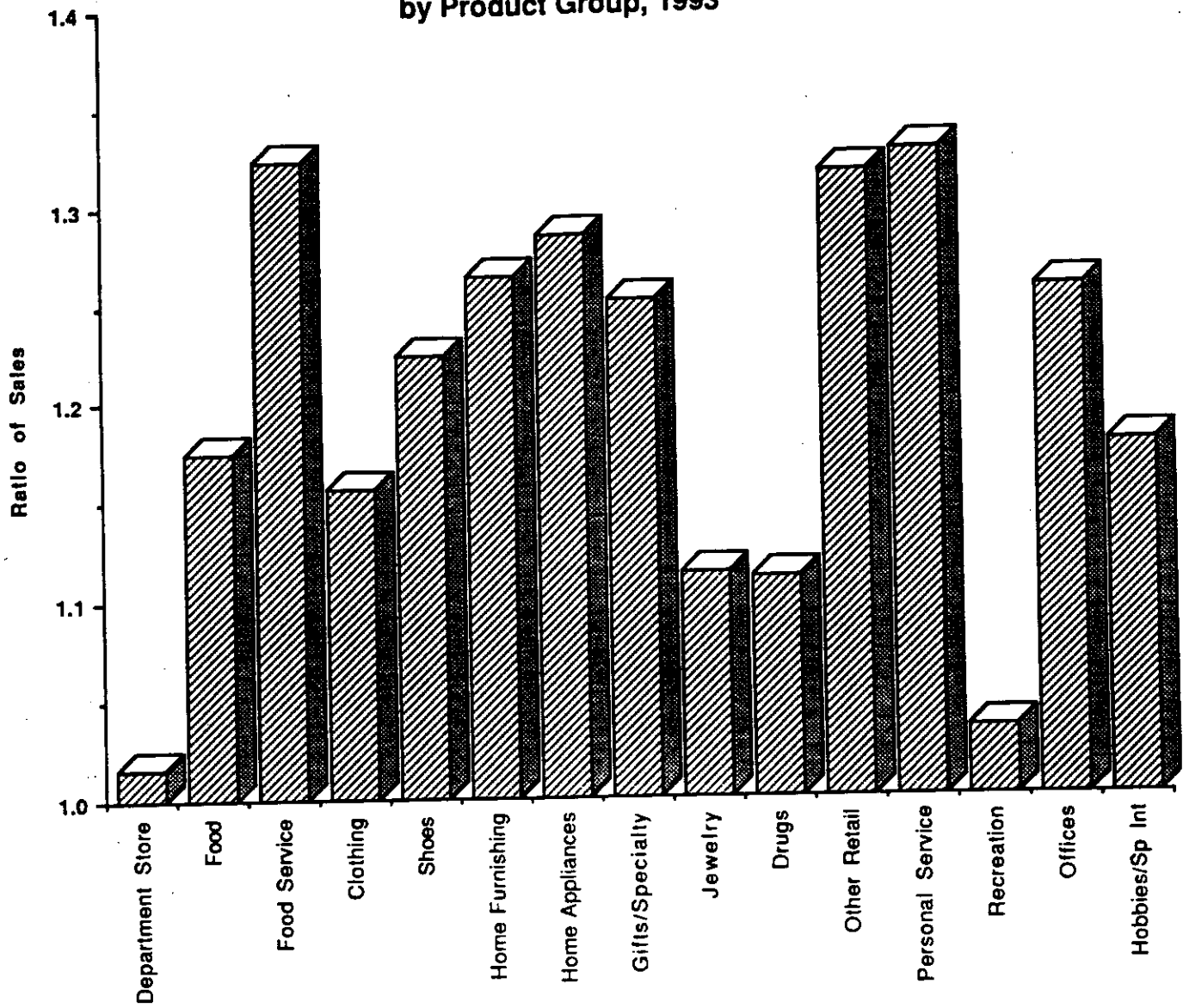
We extend our analysis of anchor rents by determining if demand externalities created by anchors are greater in super regional than regional malls. First, we compare store size in super regional and regional malls by product group. Figure 1 shows the ratio of median gross leasable space (GLA) of stores in super regional compared to regional malls by product group. Owned department stores are considerably larger in super regional than in regional malls. In the 1993 survey, the GLA of owned department stores (stores that lease space) was 135,586 square feet in super regional and only 80,000 square feet in regional malls. In contrast, the size of tenants in most of the product groups is either the same or smaller in super regional malls than in regional malls.<sup>7</sup>

Figure 2 shows that sales psf are higher for stores in super regional than in regional malls in virtually all product groups except for the department store product group where there is no significant difference. In 1992 the median department store sales psf is \$131 in super regional malls and only slightly lower at \$126 psf in regional malls. In sharp contrast, the median sales psf of other mall tenants is higher in the remaining fourteen product groups in super regional than in

**Figure 1: Store Gross Leasable Area in Super Regional Relative to Regional Malls by Product Group, 1993**



**Figure 2: Sales per Foot in Super Regional  
Relative to Regional Malls  
by Product Group, 1993**



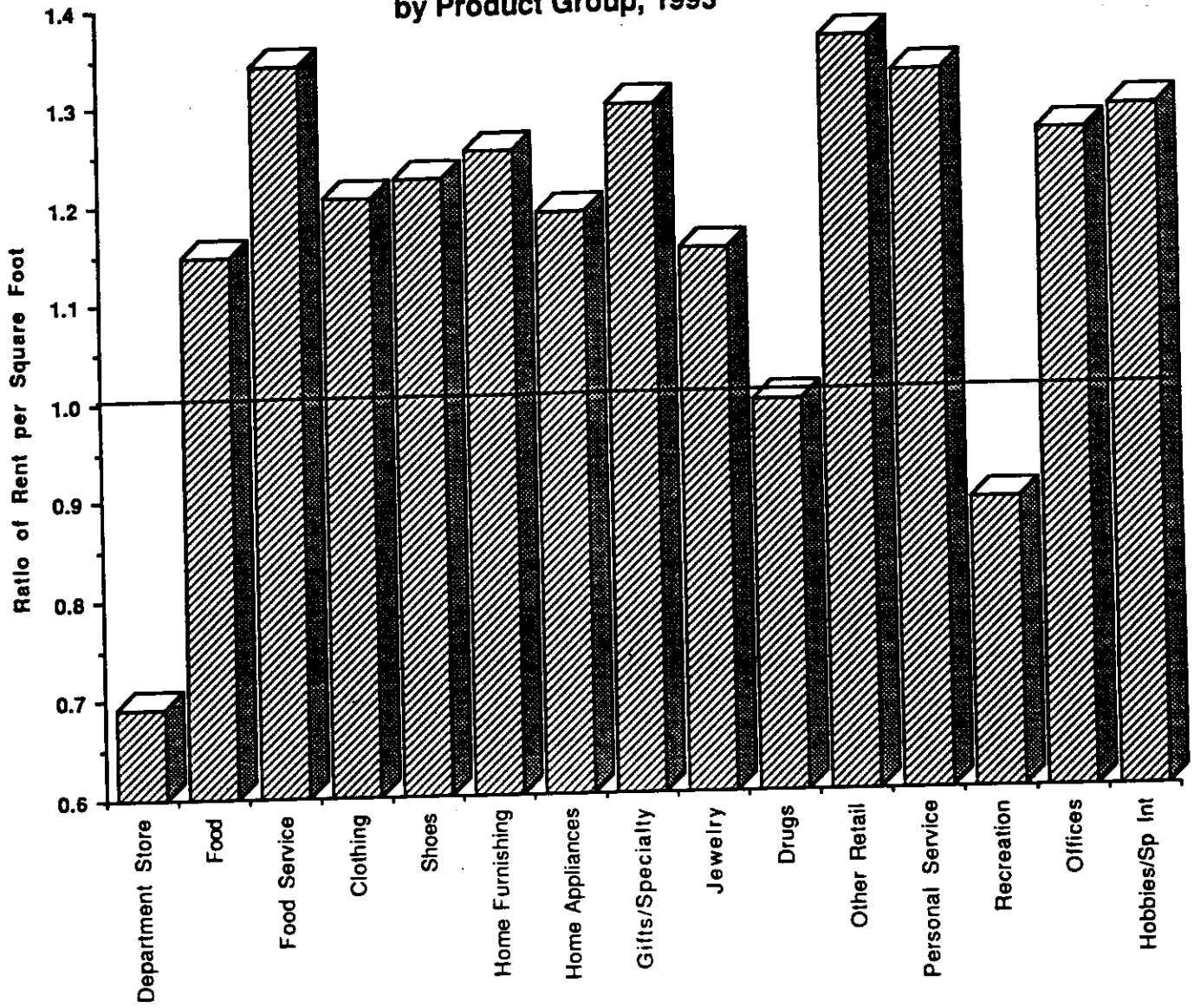
regional malls even though the median sales psf of department stores is approximately the same in the two types of malls.<sup>8</sup> One interpretation of these results is that anchors in super regional malls are more successful in increasing sales psf of other mall stores than are anchors in regional malls.<sup>9</sup> It is unlikely that demographic or locational differences are driving these results because that cannot explain why anchor sales in super regional malls are also not higher. However, other scenarios are possible. Perhaps the higher sales psf of other mall stores in super regional malls is due to the better known brand names that they carry. We can distinguish between these alternative explanations by examining rent per square foot paid by anchors. If the sales psf of other mall stores in super regional malls are higher because of their own individual efforts and not because anchors attract customers to these mall stores, we should not expect the anchors in super regional malls to receive larger rent discounts relative to anchors in regional malls.

On the other hand, anchors in super regional malls should receive larger rent subsidies psf if they create larger net spillover effects than anchors in regional malls. In super regional malls, owned department stores pay a median rent psf of \$1.95 which is about 70% of the median rent psf of \$3.00 paid by owned department stores in regional malls. In contrast, Figure 3 shows that the rent psf equals or is higher in super regional than in regional malls for mall stores in all other product groups except the recreational group. If super regional malls are located in lower rent locations than regional are, the rent psf paid by anchors and other mall stores in super regional malls should be lower. This evidence suggests that greater external economies are created by anchors in super regional malls than in regional malls. Anchor department stores in super regional malls receive larger rent subsidies while other mall tenants in super regional malls have higher sales psf and pay rent premiums. In summary, the sales and rent patterns in the data are consistent with the externalities hypothesis.

#### **V. Differential Anchor Rent Subsidies in Super Regional and Regional Malls**

The comparisons in Figure 2 suggest that sales psf of mall stores located in super regional malls are higher in many product groups relative to their counterparts in regional malls. In this section, we perform a regression to see if these differences are significant and to determine if the mall stores that have significantly higher sales psf in super regional malls also pay significantly higher rent psf in super regional malls. Such an association would suggest that the stores that receive larger externalities in super regional malls pay for these benefits through higher rents. If the reason that sales psf were higher in stores located in super regional malls was due to greater effort by managers, then there would be no reason for these stores to pay higher rent psf to developers. If, in addition, we find that anchors pay a lower rent psf in super regional malls when there is no corresponding decrease in their sales psf, this would be confirming evidence that anchors in super regional malls create positive externalities for at least some stores and that these anchors are compensated accordingly.

**Figure 3: Rent per Square Foot for Super Regional Relative to Regional Malls by Product Group, 1993**



We use the following procedure to test for significant differences in rent psf and sales psf across the two types of malls for each product group. As the dependent variable, we use either rent psf or sales psf. The specification for the independent variables is a series of dummy variables. We have 15 broad product groups and we created dummy variables for each one. We then interacted these dummy variables with dummy variables for whether the store is in a super regional or a regional mall. It is the 30 interacted dummy variables that we use as the independent variables in our regression. Using the clothing group as an example, we have a dummy variable for whether any given store is a clothing store in a super regional mall and another dummy for whether a clothing store is in a regional mall. The goal here is to test if there are significant differences between the coefficient on any particular group's dummy variable for being in a super regional mall and the coefficient on that group's dummy variable for being in a regional mall.

To avoid any confusion, we describe the units of observations and our estimation procedure in detail. Those readers who are primarily interested in the findings may wish to skip to the last two paragraphs of this section. As described in Section II, we have summary data for stores in narrow product categories broken down by the type of mall and whether they are part of a national, local, or independent chain store. These narrow categories (like women's ready-to-wear clothing) can be classified into broader product groups (like clothing). In this regression analysis, we use the summary data for the narrow categories broken down by type of mall and their national, local, or independent status as the unit of observation. Consequently, we have three observations for women's ready-to-wear clothing stores in a regional mall, and along with the other observations for clothing stores in regional malls, these three observations are all coded with a one for the dummy variable corresponding to the broader product group of clothing stores in regional malls.

With these units of observations in mind, our regression must take into account three potential problems:

(1) Differences in the number of stores ( $N_i$ ) that went into computing the summary data for observation  $i$ . For example, the median rent psf for national chain women's ready-to-wear stores in super regional malls came from a sample size of 940 while the sample size for local chain women's ready-to-wear stores was only 115. Since there are large differences in  $N_i$  across observations, there may be very large differences in the accuracy of these median figures.

(2) Differences across groups in the variance of rent psf or sales psf within each group. Let  $V_{jk}(\text{sales})$  be the variance of sales psf for all the units of observation falling into the broad product group  $j$  in mall type  $k$  ( $k =$  super regional malls or regional malls).  $V_{jk}(\text{sales})$  for the clothing group in super regional malls is 6,454 while it is only 209 for the jewelry group in super regional malls.



These large differences in variability of the dependent variable between groups represent a large departure from the basic OLS assumptions and need to be addressed with a GLS procedure.

(3) When correcting for the problem in (2), we will need to estimate the variance of the dependent variable in group  $j$  in mall  $k$ . Let  $M_{jk}$  be the number of observations in product group  $j$  in mall  $k$ . The value for  $M_{jk}$  is 51 for the food service product group in super regionals and only 12 for the shoe store product group in super regional malls. These differences are going to lead us to large differences in the accuracy in which we estimate the variation of the dependent variable within each product group and each mall. We want to be careful not to attribute small variation to something meaningful when it really only means that we had few observations in that group.

We adjust for these three problems by using a two-stage regression procedure. This procedure is similar for both the rent psf and sales psf analyses. In the first stage, we regress our dependent variable on the 30 dummy variables described above, adjusting only for issue (1) by weighting each observation by the square root of  $N_i$ . We use the results of this regression to estimate the within product group variation of the dependent variable for each type of mall. For example, we take the sum of squared residuals for stores in product group  $j$  in mall  $k$  and divide it by  $M_{jk}$  to estimate  $V_{jk}(\text{sales})$ . Let  $v_{jk}(\text{sales})$  be the estimate for  $V_{jk}(\text{sales})$ . In the second stage, we weight the data after accounting for all three potential problems described above. We do this for the sales psf regression by weighting observation  $i$ , which falls into product group  $j$  and mall  $k$ , by the following:

$$\text{Square Root } \{(N_i * M_{jk} / v_{jk}(\text{sales}))\}$$

We adopt a similarly analogous procedure for the rent psf data. The second-stage coefficients and  $t$  ratios for all 30 dummy variables described above are presented in Table 4 for both the rent psf and sales psf regressions. The null hypothesis that the coefficients from the sales regression are equivalent across mall types for all 15 product groups is easily rejected at the 5% significance level. The same is true for the rent psf regression. We then identify those groups that have significant differences between the coefficient estimates across types of malls for sales psf and whether there is a corresponding difference in rent psf for that group as well. The stars in Table 4 indicate groups where there are significant differences across types of malls. The results are conveniently summarized in Table 5.

In first eight product groups in Table 4, no significant difference is found in the sales psf between super regional and regional malls. For the remaining groups there are significant differences in sales. What is of special interest is that among the first eight groups, only the anchors have a significantly lower rent psf in super regional malls than in regional malls. This finding suggests that anchors in super regional malls are performing some role more effectively than anchors in regional

malls. The lower rent psf for anchors in super regional malls is probably due to the greater externalities they create. We can see these externalities by looking at the stores in the lower right quadrant of Table 5. These product groups represent the stores that have significantly higher rent psf and sales psf in super regional malls than in regional malls. For these product groups, stores in super regionals are receiving greater external benefits as illustrated by their higher sales psf. Consequently, they are also paying for these benefits through higher rents. These results make sense when you look at the type of stores that are in the lower right quadrant in Table 5. Stores like food service and gift shops are very typical candidates to free ride off the traffic generated by other stores. Few people go to a mall just to buy a card, but they may stop to buy a card while they are in the mall to visit the main mall anchor store.

These findings suggest that anchors create externalities for at least some types of stores and that those stores pay higher rents in return. Those stores that don't receive significantly greater benefits do not appear to pay significantly higher rents (the upper left quadrant of Table 5). The two anomalies in Table 5 are those in the upper right and bottom left quadrants. We already explained why the presence of the anchors in the upper right quadrant is significant. Anchors don't receive higher sales psf in super regionals so the fact that they pay lower rent indicates they are being compensated for the externalities they generate. The two groups in the lower left quadrant are clothing and shoe stores. It is possible that some stores in these groups are beginning to resemble mini anchors and that is why their rent psf is not significantly higher even though their sales psf are. We believe this hypothesis merits more investigation because some women's specialty stores have developed such strong national reputations, e.g., The Limited. But, the regularities in the data on the whole support the hypothesis that anchors in super regional malls create more externalities than anchors in regional malls.

## VI. Other Evidence and Alternative Explanations

Other less systematic evidence also suggests that anchors create within-mall spillovers. Stillerman Jones & Company, Inc., a consulting firm, interviews shoppers as they leave regional and super regional shopping malls. Table 6 shows sixty-six percent of all mall shoppers visited at least one department store.<sup>10</sup> Shoppers who visited a department store spent \$63 per visit to the mall while those who didn't visit a department store spent \$33 (91% higher) per visit. Department store visitors spent 85 cents per minute while at the mall compared to 59 cents per minute for shoppers that did not visit a department store (44% higher). What is more important is that department store shoppers visit more specialty and food stores than shoppers who do not visit a department store. Shoppers who visited at least one department store visited an average of 1.4 other non-department stores during their mall visit while shoppers who didn't visit a department store visited on average only one other non-department store. It appears that department store visitors are more valuable customers and

patronage more non-department stores. While this shopping evidence does not show what would happen to shopping behavior in the absence of anchors, it is consistent with our thesis that department store shoppers visit more stores than non-department store shoppers.

Other behavior by developers suggests anchors create externalities. No developer will first sign up speciality stores for a new mall and later sign anchors to long term contracts. A developer's first step in creating a new mall is the signing of the mall anchors to long term contracts typically with duration of 25 or more years. Developers benefit in two ways from signing anchors first. They obtain lower cost financing and second, they can charge other mall tenants higher rents if the mall tenants know that well-known anchors will be in the mall. The other mall tenants know that their sales psf depend on the drawing power of the anchors. Because anchors do most of the advertising done by all stores in a mall, a mall store also knows that its promotional budget will be lower if it locates within rather than outside a mall. Finally, malls that lose anchors because of a merger among companies usually fail a short time later unless a replacement anchor is found.<sup>11</sup>

If department store sales generate more important positive spillovers for other mall stores than do the sales of other mall stores, the developer has a greater incentive to offer lower sharing fractions to department stores than to other mall stores. A developer has less of an incentive to tax anchor sales if the sales of an anchor create externalities for other mall stores since sales proxies for customer traffic. Table 7 shows the median sharing fraction for total sales above the threshold is substantially lower for department stores than for mall stores in all other product groups. This evidence is also consistent with the externalities hypothesis.

While other hypotheses can be advanced to explain some of the results presented in this paper, we believe they are less plausible. One such alternative is the financing hypothesis. As noted above, the developer's cost of financing will be lower if a well-known anchor has made a long term commitment to the mall. Under the financing hypothesis, the developer is willing to offer the anchor a lower rent psf to obtain lower cost financing. This hypothesis might explain why anchors receive rent subsidies but it neither explains the size of the subsidy received by anchors in shopping malls nor why the subsidy should be lower for anchors in regional malls. Developers of office buildings also offer rent subsidies to well-known tenants. However, such tenants are seldom offered long term leases either rent-free or at nominal rents as is commonly seen in shopping malls.<sup>12</sup> Why such large subsidies are offered to anchors in shopping malls requires some other explanation. Furthermore, the financing hypothesis does not explain why the rent psf or sales psf of other mall stores is higher in super regional than in regional malls. In light of this evidence, we do not believe the financing hypothesis to be a viable candidate to explain the pricing of space in shopping centers.

Another hypothesis is that anchors in super regional malls receive a quantity discount since an anchor in a super regional mall occupies a larger area than an anchor in a regional mall. While this hypothesis probability has some merit, it again fails to explain the magnitude of anchor subsidies versus non-anchors, or why sales psf and rent psf of mall stores are higher in super regional than in regional malls.

Another explanation for the differences in rents paid by anchors (or mall stores) located in super regional versus regional malls is that the contract features of the stores are different in the two types of malls. As noted above in Section I, most mall rental contracts contain a base monthly rent and an overage component that equals a share of the difference between sales and threshold sales. For a given level of expected rent, several tradeoffs exist between the different contract features. Hypothetically, anchors in super regional malls might have higher sharing fractions in return for lower monthly base rents than anchors in regional malls. If sales psf were unusually low in 1992 because of a depressed economy, many stores will not pay overage. If anchors in super regional malls have higher sharing fractions, they will pay a lower rent psf in 1992 than anchors in regional malls because of differences in contract specifications and not because of differences in the scale of externalities generated. Another scenario could have anchors in super regional malls paying a lower base rent psf because they sign longer leases than anchors in regional malls. If so, our findings may merely represent differences in contract design between anchors in super regional and regional malls and not differences in the importance of spillovers.<sup>13</sup>

We have already presented some evidence in Table 7 that indicates our results are not caused by differences in contract design. Table 7 shows the median sharing fraction in 1992 for department stores in super regional malls is zero while the median sharing fraction for anchors in regional malls is .0175. Anchors in regional malls have a higher median sharing fraction and therefore would be expected to have a compensating lower base rent. At the very least, we can say that the median sharing fraction of anchors is not lower in regional than in super regional malls. If anything, these findings suggest that we are probably underestimating the effect of spillovers since anchors in regional malls should have lower base rents relative to the base rents paid by anchors in super regional malls. Turning to possible differences in lease length, we determined if anchors in super regional malls sign significantly longer leases than anchors in regional malls and whether this could explain the lower rent psf paid by anchors in super regional. We have obtained lease length data in 1994 for stores in various super regional and regional malls. We are fortunate to have a sample of malls that is much larger than the samples used in previous studies of malls, some of which were referred to in Section I. Table 8 shows average lease length for anchors and for other mall stores. For neither anchors nor other mall stores is there a significant difference in average lease length between stores in super regional versus regional malls. Consequently, the observed differences in rent psf of anchors are probably not due to

differences in length of contract.

While this preliminary investigation into contract design is not meant to be comprehensive, these results suggest that our main results are not being driven by significant differences in contract design between stores in super regional versus regional malls.

## VII. Conclusions

Malls resemble mini-economies with the developer internalizing externalities among mall stores. Our evidence indicates that the external economies created by anchors are reflected in store rents paid by anchors and mall stores. Department stores have a demonstrated capability of attracting consumers to a mall and pay a lower rent psf while stores that receive free rider benefits from the externality pay a higher rent psf. Anchors as a group pay significantly lower rent psf, about 81% lower than a non-anchor with the same sales psf. These discounts are substantially more than what large tenants receive in commercial buildings. One wonders why developers grant such large discounts to anchors. The results of this paper suggest that developers are behaving rationally in the sense that they realize anchors are responsible for attracting customers to the mall and increasing the sales of other mall stores. Moreover, we found evidence that the size of the subsidy is related to the size of the externality. Anchors in super regional malls seem to be generating higher sales psf for the other mall tenants. These anchors, in turn, are compensated for these greater externalities as evidence by their lower rent.

The results of this study leave an important question unanswered. Before malls appeared on the retailing scene, the locus of retailing activity in major American cities was the central business district, populated by well-known department stores. Presumably, department stores created demand externalities then as they do now. Some externalities were already internalized within a conventional department store since the department store is a collection of smaller stores offering a variety of goods and services under single ownership. Also, department stores in central business districts were multi-floor structures so the shopping cost of going from one store to another was higher than is cross-store shopping in a typical shopping mall. Nevertheless, some externalities between firms remained untapped because of diseconomies to department store size. Consequently, a lesser known store benefited by being near a well-known major department store. Was the major department store in central business districts compensated for the externalities it created and, if so, what form did the compensation take? Did specialized developers purchase large blocks of central city land and then offer leases to department stores and other stores at differential rents? Were zoning provisions or local tax rates adjusted to compensate department stores for the externalities that they created? If the externalities were not internalized by the well-known department stores, did imperfect information or

information asymmetries about the extent of externalities prevent the internalization of these externalities as Wiggins and Libecap found in their study of oil fields? If this is the obstacle, we need to know why these informational problems were more of an obstacle in central business districts than in malls. These interesting questions deserve further study.

The displacement of the central business district in major American cities by the suburban mall was hastened by increased automobile ownership, expanded expressways, and growing suburban markets. If externalities were not be priced in central business districts but were priced in the new malls located outside the central business of cities and in the suburbs, then major department stores would be more eager to leave the central business district for malls located elsewhere in the city or in the suburbs. Although we do not know its quantitative importance, we suggest that the inability to internalize externalities may have contributed to the decline of the central business district. There may be a familiar lesson here in thinking of ways to improve the viability of central business districts in most American cities. While this is not a new idea, giving developers the opportunity to develop blocks of condemned space instead of individual parcels has much to recommend itself because developers will take account of the externalities among stores.

Finding market data that measures the importance of externalities is a rare happenstance in economics. In this paper, we are able to show how externalities are internalized within the mini-economy of a shopping mall. The value of associations among stores within malls is reflected in market prices, in this case, rents paid per unit of space. While our paper demonstrates the importance of mall externalities, it merely scratches the surface of the subject by only comparing anchors vis a vis other mall stores. Yet, systematic patterns in the geographic placement of store types within a mall suggest the presence of other externalities. Documenting and explaining these patterns is an interesting future research project.

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Table 1: Illustrative Statistics for Women's Ready-to Wear Category within the Clothing Group						
Mall Type and Group	Category	Type	# of Stores	Median GLA	Median Sales psf	Median Rent psf
Super Regional Malls, Clothing Group	Women's Ready-to-Wear	All Stores	1156	3,750	\$203	\$15.56
		National Chain	940	3,905	202	15.00
		Local Chain	115	3,214	210	15.00
		Independent	70	2,026	215	25.00
Regional Malls, Clothing Group	Women's Ready-to-Wear	All Stores	651	3,750	175	13.00
		National Chain	483	4,000	175	12.50
		Local Chain	80	3,060	196	15.00
		Independent	56	2,524	161	15.00

Source: Urban Land Institute, Dollars and Cents of Shopping Centers, 1993

Table 2: Comparison of Rent and Sales between Store Groups and Mall Types

Super Regional Malls					
Group	# of Stores (1)	Median GLA (2)	Median Rent psf (3)	Median Sales psf (4)	Median Rent psf/Median Sales psf (5)
Department Stores (Owned)	213	135,586	1.95	131.40	0.015
Department Stores (Unowned)	147	162,790	0.87	178.34	0.005
Clothing and Accessories	3,098	2,828	18.58	236.56	0.079
Shoes	1,142	1,684	22.00	258.77	0.085
Food Service	1,230	810	32.41	341.68	0.095
Gift/Specialty	895	2,272	22.00	250.07	0.088
Jewelry	623	1,200	42.00	555.48	0.076
Regional Malls					
Department Stores (Owned)	139	80,000	3.00	126.15	0.024
Department Stores (Unowned)	85	118,000	1.70	134.19	0.013
Clothing and Accessories	1,566	2,853	15.42	204.67	0.075
Shoes	594	2,123	18.00	211.51	0.085
Food Service	800	899	24.18	258.25	0.094
Gift/Specialty	477	2,574	17.00	200.00	0.085
Jewelry	376	1,182	36.60	499.30	0.073

Source: See Table 1

Table 3: Estimating the Rent Subsidy for Anchors	
Variable	Est. Coefficient (t)
1. Intercept	1.46 (0.7)
2. Mean Sales psf	0.08 (11.6)
3. Anchor Dummy	-9.57 (-2.1)
Sample Size	82
Standard Error	19.59
Adj. R2	.652

	Regression Results for Sales psf		Regression Results for Rent psf	
	Coefficient of Super Regional Dummy Interacted with Group Dummy (1)	Coefficient of Regional Dummy Interacted with Group Dummy (2)	Coefficient of Super Regional Dummy Interacted with Group Dummy (3)	Coefficient of Regional Dummy Interacted with Group Dummy (4)
1. Anchors	130.71 (5.86)	123.03 (14.97)	1.94 (13.46)*	3.04 (10.30)
2. Food	315.19 (9.11)	240.58 (5.08)	30.28 (7.00)	25.88 (7.73)
3. General Merchandise	103.59 (7.80)	129.64 (1.64)	6.23 (1.69)	5.96 (1.00)
4. Home Furnishings	264.33 (7.43)	191.96 (5.55)	26.15 (6.88)	19.10 (2.98)
5. Appliances	338.30 (10.65)	282.93 (4.35)	20.16 (9.25)	18.10 (4.90)
6. Hobby	280.64 (4.89)	218.84 (5.78)	21.68 (5.91)	16.38 (4.75)
7. Recreational	84.96 (3.68)	84.71 (2.14)	13.75 (2.59)	13.40 (2.46)
8. Drugs	187.94 (34.02)	189.86 (1.28)	7.22 (2.13)	8.65 (1.27)
9. Jewelry	559.76 (82.14)*	485.50 (15.08)	41.65 (15.23)*	35.73 (30.09)
10. Gift	251.09 (22.41)*	195.67 (15.63)	22.71 (21.27)*	17.87 (11.72)
11. Other Retail	286.75 (18.91)*	210.57 (15.78)	24.81 (17.88)*	17.90 (13.05)
12. Food Service	380.93 (28.21)*	269.92 (20.34)	35.99 (22.06)*	25.49 (16.94)
13. Personal Services	266.47 (15.91)*	192.83 (13.75)	24.69 (13.27)*	18.22 (12.42)
14. Clothing	240.48 (38.04)*	209.91 (16.90)	19.34 (33.91)	16.84 (11.30)
15. Shoes	270.73 (21.51)*	22.63 (13.60)	21.83 (21.38)	19.23 (12.50)
Sample Size	402		402	
Standard Error	23.45		23.23	
Redefined R <sup>2</sup>	.97		.94	

t statistics in brackets

\* denotes significant difference in sales psf or rent psf between stores in super regional versus regional malls at 5% probability level.

Table 5: Testing for Significant Differences Between Estimated Coefficients of Sales psf or Rent psf, Super Regional Malls Compared to Regional Malls			
		Rent psf	
		Difference in Estimated Coefficients of Rent psf Not Significant at 5% Probability Level	Difference in Estimated Coefficients of Rent psf Significant At 5% Probability Level
Sales psf	Difference in Estimated Coefficients of Sales psf Not Significant at 5% Probability Level	<ol style="list-style-type: none"> <li>1. Appliances</li> <li>2. Home Furnishings</li> <li>3. Drugs</li> <li>4. Food</li> <li>5. General Merchandise (except department stores)</li> <li>6. Hobby/Sp. Int.</li> <li>7. Recreational</li> </ol>	<ol style="list-style-type: none"> <li>1. Anchors</li> </ol>
	Difference in Estimated Coefficients of Sales psf Significant at 5% Probability Level	<ol style="list-style-type: none"> <li>1. Clothing</li> <li>2. Shoes</li> </ol>	<ol style="list-style-type: none"> <li>1. Food Service</li> <li>2. Gifts/Specialty</li> <li>3. Other Retail</li> <li>4. Personal Service</li> <li>5. Jewelry</li> </ol>

Table 6: Shopping Behavior of Visitors to Regional and Super Regional Malls,  
1993 - 1994

	Visited At Least One Department Store	Did Not Visit Department Store
1. Sample Size(shoppers)	16,119	8,472
2. Average Length of Visit (minutes)	74	56
3. Average Expenditure per Visit	\$63	\$33
4. Average Number of Stores Visited	2.9	2.0
5. Average Number of Other Department Stores Visited	.5*	0.0
6. Average Number of Non- Department Stores Visited (includes food and food court stores)	1.4	1.0**

\* Other than first department store visited.

\*\* Other than first non-department store visited.

Source: Special Tabulation, Stillerman Jones & Company, Inc.

Table 7: Median Sharing Fraction of Stores Located in		
Product Group	Super Regional Malls (1)	Regional Malls (2)
1. Department Stores (owned)	.00	.0175
2. Clothing and Accessories	.05	.05
3. Shoes	.06	.06
4. Home Furnishings	.06	.06
5. Home Appliances	.05	.05
6. Gifts/ Specialty	.06	.06
7. Jewelry	.06	.06
8. Food	.06	.07
9. Food Services	.08	.07
10. Hobbies, Special Int.	.06	.06
11. Drugs	.03	.0225
12. Other Retail	.06	.06
13. Personal Services	.06	.06
14. Recreation, Community	.10	.10
15. Offices (other than financial)	.06	.07

Source: See Table 1

Table 8: Estimated Lease Length for Anchors and Other Mall Stores, 1994				
	Super Regional Malls		Regional Malls	
	Mean Estimated Lease Length	Standard Deviation of Estimated Lease Length	Mean Estimated Lease Length	Standard Deviation of Estimated Lease Length
Anchor Department Stores	27.8 years	14.2 years	28.5 years	12.8 years
Other Mall Stores	13.4 years	8.7 years	13.7 years	9.8 years

Source: Length of contract data supplied by private developer



### Appendix

In this appendix we present a model to explain optimal rent paid by an anchor and another mall store when the anchor creates a demand externality. The model is for a simple two store mall with an anchor and a non-anchor independent store. The retail demand functions for the products sold by an anchor and the other mall store are

$$P_a = D_a(q_a, B) \quad (A1)$$

$$P_o = D_o(q_o, q_a)$$

where  $P_a$  is the price charged by the anchor,  $P_o$  is the price charged by the other retailer,  $q_a$  is the quantity demanded of the anchor's product and  $q_o$  is the quantity demanded of the other retailer's product, and  $B$  is a parameter to denote the reputation of the anchor.<sup>14</sup> The anchor is distinguishable from the independent store because an increase in the anchor's quantity creates a demand externality that shifts the independent's demand function to the right,  $\frac{\partial P_o}{\partial q_a} > 0$ .<sup>15</sup> A demand externality occurs because some of the consumers that shop at the anchor store also shop at the independent store after entering the mall. In our model the independent store does not create a reciprocal externality with the anchor. Our assumption of a positive demand externality does not mean that all externalities between stores are necessarily positive but is made because the major externalities appeared to be created by anchors.

Each retailer's total cost equals a cost that is proportional to quantity and the rent per square foot times the number of feet leased.

$$C_a = c_a q_a + R_a v_a q_a \quad (A2)$$

$$C_o = c_o q_o + R_o v_o q_o$$

where  $c_a$  denotes marginal cost of buying and selling the product,  $R_a$  is the rent per square foot and  $v_a q_a$  is the required space to sell  $q_a$  units where  $v_a$  is a parameter.<sup>16</sup> In our model we assume that rent is a fixed amount per period even though most rental contracts include a fixed component and a component that depends on a fraction of sales above a pre-specified threshold sales per period. For each retailer we assume a constant returns to scale relationship between quantity sold and the space required. A similar interpretation can be given to the equation for the costs of the independent store.<sup>17</sup>

We assume that neither the anchor nor the independent store has monopoly power in the retail market so retail price equals marginal cost even though each store faces a downward sloping market demand function. This result could occur if there are many potential anchors or independent stores that

could serve as substitute tenants. In our formal derivation we assume that the developer is independent of the anchor and has monopoly power and can charge different rents to tenants. An alternative specification would give the anchor monopoly power. In this case the developer maximizes the developer's profits but then transfers the profits to the anchor through either lump-sum grants or through construction and other forms of subsidies. Under either specification the developer maximizes profits but in the latter case the anchor, not the developer, receives any profits. Which specification is more appropriate depends on whether the scarce factor is the reputation of the anchor or the developer's differential ability to identify and obtain a choice mall location, to assemble and to manage a compatible collection of stores.

If retail prices are competitive, then the anchor's retail price equals its marginal cost and the independent's retail price equals its marginal cost.

$$D_a(q_a, B) = c_a + R_a v_a \quad (A 3)$$

$$D_o(q_o, q_a) = c_o + R_o v_o$$

Solving the first equation for  $q_a$  and the second equation for  $q_o$ , we derive expressions for  $q_a$  as a function of  $R_a$  and  $q_o$  as a function of  $R_a$  and  $R_o$ .

$$q_a = g(R_a, B) \quad (A 4)$$

$$q_o = h(R_o, q_a) = h(R_o, g(R_a, B))$$

The developer selects  $R_a$  and  $R_o$  to maximize the developer's profits while taking account of equation 4. The developer's profit function is

$$\pi_d = (R_a - R)v_a q_a + (R_o - R)v_o q_o \quad (A 5)$$

where  $R$  is the shadow price per square foot for land and structures that the developer pays to construct the shopping mall.

The first order conditions for a maximum can be written as

$$R_o \left(1 + \frac{1}{E_{q_o R_o}}\right) = R \quad (A 6)$$

$$R_a \left(1 + \frac{1}{E_{q_a R_a}}\right) = R - (R_o - R) \frac{v_o}{v_a} \frac{\partial q_o}{\partial q_a} \quad (A 7)$$

The left hand sides of equations A6 and A7 are marginal revenues with respect to rent where  $E$  denotes the elasticity between the variables identified by the respective subscripts. For example,  $E_{q_o R_o}$

( $< 0$ ) denotes the elasticity of  $q_0$  with respect to the rent  $R_0$ . Equation 6 simply states that  $R_0$  is selected so that marginal revenue of the independent's rent demand function equals the marginal cost of space. The right side of equation A7 indicates that the anchor's marginal cost of space is adjusted downward to increase  $q_a$  and, through the externality, to increase the demand function of the independent store.

If equations A6 and A7 are solved for  $R_a$  and  $R_0$ , we can determine the conditions under which the developer will offer a lower rent to the anchor than to the independent store, i.e.,  $R_a < R_0$ . The following inequality must be satisfied if the anchor pays a lower rental rate than the independent store.

$$\left( \frac{E_{q_0 R_0}}{E_{q_a R_a}} - 1 \right) \frac{v_a q_a}{v_0 q_0} < E_{q_0 q_a} \quad (\text{A 8})$$

Equation A8 is a modified version of the standard condition for price discrimination.<sup>18</sup> The right hand side of 8 is assumed to be nonnegative.<sup>19</sup> If the rhs is zero, we have the well-known condition that  $\frac{R_a}{R_0} < 1$  if  $E_{q_a R_a} < E_{q_0 R_0}$ .  $R_a$  will be less than  $R_0$  if the anchor's rent elasticity of demand,  $E_{q_a R_a}$ , is more elastic than the independent's as long as  $E_{q_0 q_a}$  is nonnegative. On the other hand, if  $\frac{E_{q_0 R_0}}{E_{q_a R_a}} > 1$  at the profit maximizing rents, then the externality must be large enough so that inequality A8 is satisfied and, therefore, the rent psf is lower for the anchor than the independent. If the anchor's rent elasticity of demand is more elastic than the independent's, the developer offers a lower rent to the anchor because a lower  $R_a$  increases the developer's rental revenue received from the anchor by more than a comparable rent reduction given to the independent and the rental revenue received from the independent increases because of the externality. When the independent's rent elasticity of demand is more elastic, the developer may still prefer to offer the anchor a lower rental rate so that the anchor increases its quantity providing that the size of the externality is large enough. Finally, the anchor will always pay a lower rent when the rent elasticities are equal and  $E_{q_0 q_a}$  is positive. This result suggests that the anchor pays a lower rent when the retail demand functions become very elastic. If the retail demand functions become virtually horizontal so that both retailers approximate price takers, the developer will offer a lower rental rate to the anchor to take advantage of the externality.

In summary, a developer offers a lower rent to the anchor if the anchor's rent elasticity is greater than the independent's and may offer a lower rent if the anchor's rental elasticity is less elastic than that of the independent's providing that the size of the externality is large enough.

Reputation capital differs among anchors and so their abilities to attract customers to malls differ. We assume that an anchor with a better reputation (a larger  $B$ ) because of past advertising or

because it offers higher quality products attracts more consumers to the mall. Because an increase in  $B$  shifts the position and possibly the shape of the demand function facing the anchor and consequently affects the size of the anchor relative to the independent store, the theory does not make an unambiguous prediction of how an increase in  $B$  changes  $\frac{R_a}{R_o}$ . An increase in  $B$  could increase  $q_a$  but still reduce  $\frac{\partial q_o}{\partial q_a}$  so that  $\frac{R_a}{R_o}$  might increase. Nevertheless, we can rely on inequality 8 to discuss some possible effects of an increase in  $B$ . If an anchor with a reputation for supplying higher quality or more fashion goods has a less elastic rent elasticity of demand (compared to the rent elasticity demand of an anchor with a lower  $B$ ), then the externality elasticity must be still larger if the theory is to explain why an anchor with a higher  $B$  pays a lower rent than an anchor with a lower  $B$ . Equation 8 also indicates that an anchor with a larger  $B$  that pays a lower rent psf while occupying a larger fraction of total space in the mall, represented by the fraction  $v_a q_a / v_o q_o$ , must be creating a still larger externality. If an anchor with a better reputation has a less elastic rent elasticity and still pays a lower rent psf, the theory suggests that this occurs because the anchor is creating greater externalities since the share of space occupied by the anchor with a higher  $B$  is likely to be higher. In contrast, the standard price discrimination result would suggest that the anchor with a better reputation would pay a higher rent because the rent elasticity is less elastic for an anchor with a higher  $B$ . Finally, we might expect the rent psf paid by a mall store will be relatively higher when the mall store is located near an anchor with a higher  $B$ .

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<sup>1</sup>See, Gary S. Becker and Kevin M. Murphy, (1993).

<sup>2</sup>In an earlier study Clarkson and Muris (1981) note that prior to the early seventies leases constrained the types of stores that could appear in a mall, e.g., discount stores were prohibited, as well as the types of goods that could be sold and many other activities of mall stores. They argue that the Federal Trade Commission effort to eliminate certain lease covenants makes it more difficult to achieve agglomeration economies.

<sup>3</sup>Still smaller malls such as community centers and neighborhood centers are not considered in this paper.

<sup>4</sup>ULI defines a national store as a business that operates in at least four metropolitan areas that are located in three or more states. An independent store is a business operating in two or fewer outlets in only one metropolitan area. A local chain is a business that does not fall in the other two categories.

<sup>5</sup>Unfortunately, not all stores complete the questionnaire in its entirety. Some may report GLA but not sales or rent. ULI does not always have enough information to classify a store into one of the three store types. This explains why the sum of the stores across store types does not add to the total number of stores in the category.

<sup>6</sup>While our regression results are for rent psf, we also ran regressions where the dependent variable is total charges psf where total charges include rent and all other common area charges. Similar results were obtained and are not presented in this paper.

<sup>7</sup>Department stores account for a somewhat larger percentage of total leasable space in super regional than in regional malls. In 1993 owned and unowned department stores accounted for approximately 64% of leasable space in super regional malls and only 57% in regional malls.

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<sup>8</sup>There has not been much published research on the effect of anchors on the sales of other mall stores. Anderson (1985) found the number of anchors did not have a significant effect on the sales per square foot for mall stores of a specialty apparel retailer. However, she did find that apparel sales per square foot were lower when a Penneys or a Sears store was an anchor in the mall thus providing evidence that reputation is an important determinant of externality size.

<sup>9</sup>As the GLA of a mall increases, the composition of anchors changes. The fraction of malls with discount department stores decreases, the fraction with conventional department stores increases, and the fraction with a fashion orientation increases, see "International Council of Shopping Centers, The Score, 1993, pp. 119 and 121.

<sup>10</sup>Interviews were conducted at sixty malls located throughout the country.

<sup>11</sup>We are assuming the merger is exogeneous and is not correlated with a negative shock to the demand for stores in the mall.

<sup>12</sup>One participant in the office market estimated the per foot subsidy for a large tenant in a new class A building could be in the 20 to 30% range depending on the location of the tenant in the building.

<sup>13</sup>It is also possible that anchors in super regional malls pay less rent psf because the variance in their sales psf is larger. For any given contract, the expected rent paid by the anchor would be higher the larger is the variance of sales. Hence, the base rent of an anchor might be lower when the variance of sales is larger. The ULI data allow us to perform some crude checks of whether the size distribution of sales psf differ between anchors in super regional and regional malls. ULI presents the value of sales psf for the upper 10% and 2% of the 1992 sales distribution. The ratio the sales psf at the upper 10% or 2% of the distribution to the median value of sales psf can be used as a crude approximation for the dispersion in sales psf. The ratio is 1.71 (10%) and 2.89 (2%) for anchors in super regional malls and 1.84 (10%) and 2.72 (2%) for anchors in regional malls. From these results it is not possible to say that the dispersion in the sales psf distributions is different.

<sup>14</sup>The model could be formulated differently by having B be another or the sole source for the externality so that the quantity demand of the independent store depends on  $q_a$  and/or B. B could represent advertising by the anchor but more generally can be thought of as the reputation of the anchor for high quality and/or fashion products.

<sup>15</sup> The theory of central places has pointed out the advantages for independent stores of locating in centers with more anchors that generate traffic. One limitation of this research is that it only concentrates on the economies of purchasing dissimilar goods at a central location without investigating

the problems that arise from free rider issues. In an earlier study Clarkson and Muris (1981) note that prior to the early seventies leases constrained the types of stores that could appear in a mall, e.g., discount stores were prohibited, as well as the types of goods that could be sold and many other activities of mall stores. They argue that the Federal Trade Commission effort to eliminate certain lease covenants makes it more difficult to achieve agglomeration economies. Two exceptions to this neglect are Jan K. Brueckner,(1993) and John D. Benjamin, Glenn W. Boyle and C.F. Sirmans,(1992). Our model is a special case of a more general analysis developed by Brueckner who considers an n store shopping mall with pervasive externalities between all stores.

<sup>16</sup>The model could be generalize by allowing the space required to sell  $q_a$  units to vary with  $q_a$ . We ignore the common area maintenance costs that all tenants contribute to or the rent could include all rent and other assessments paid by the anchor and the independent store.

<sup>17</sup>If the independent store is located outside the mall, it would pay a lower rent but would incur higher promotion and other costs to sell the same number of units. Therefore, the price that can be charged would be determined by the marginal cost of operating outside the mall. The demand function of the independent store in the mall is derived given the price charged by independent stores outside the mall. The demand function of the independent store is downward sloping because the store attracts consumers from more distant locations.

<sup>18</sup> This inequality (8) is obtained by first solving one of the initial first order conditions for  $R$ , substituting  $R$  into the other first order condition, solving the resulting equation for  $\frac{R_a}{R_o}$  and then imposing the condition that  $\frac{R_a}{R_o} < 1$ . The inequality assumes that  $E_{q_a R_a} < -1$  at the profit maximizing rents. The profit maximizing price policy could result in  $E_{q_a R_a} > -1$ . Then, conditions 6 and 7 imply that  $1 + \frac{v_o q_o}{v_a q_a} E_{q_o q_a} > -E_{q_o R_o}$ . This condition is more likely to be satisfied when the externality elasticity is large relative to the price elasticity and/or the independent store must be large relative to the anchor store.

<sup>19</sup>Even if  $\frac{\partial q_o}{\partial q_a}$  became negative when  $q_a$  became large, a profit maximizing developer would never set  $R_a$  and  $R_o$  so that it is negative. In other words, if the anchor's output increased by enough so that it began to shift the demand function of the independent store to the left, the anchor would avoid placing

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itself in that position by setting  $R_a$  sufficiently high to limit the size of the anchor so that  $\frac{\partial q_0}{\partial q_a} > 0$ .