The Impact of Anchors Stores in the Perform of Shopping Centers

João Chang Junior (chang.joao@gmail.com) – Centro Universitário da FEI
Claudia Aparecida Mattos – Centro Universitário da FEI
Marcos Palaia Cassas – Centro Universitário da FEI

Abstract

This work determines the impact of anchor stores in the performance and results of eight Brazilian malls between 2007 and 2009 as well as its influence on the results of satellite stores, through panel data. The work demonstrates that satellite stores rental price is influenced by anchor stores rental price.

Keywords: Shopping Centers' Performance, Anchor Stores, Panel Data

Introduction

According to ABRASCE - Brazilian Association of Shopping Centers, are considered shopping centers the projects with a total area available for installation of stores, more than 5 thousand square meters. This area is called GLA - Gross leasable area. They consist of several business units, with single, centralized administration and practicing fixed and percentage rent on sales. These developments have anchor stores and parking spaces compatible with the laws of the region where it is installed.

There are many definitions for anchor stores. According to ABRASCE are stores with more than 1,000 m² and attracting flow of people to the mall. Anchors are retail operations of the department stores, hypermarkets, electronics and more. It promotes, through the reputation of his name, buyers flow which are attracted to visit the site and therefore sales of other stores and the profits of the enterprise increase by their presence. Planned malls have one or more anchors and several specialty retail stores in each product category, called satellite stores.

According to the Brazilian Census of Shopping Centers 2013/2014, prepared by ABRASCE, there are currently 495 malls in Brazil with a total GLA of 12.94 million square meters while in 2006 this sum was 7.5 million square meters, with 351 malls. Therefore, in eight years there was a growth of 41% in number of projects and 72.5% in GLA, which shows the great dynamism of this sector of the economy that represents 21% of the national retail and 2% of the Brazilian GDP.

Thus, in view of the strong growth of competition in this market, there is concern in the shopping center industry in planning new developments so that are attractive under the investors point of view ensuring its competitive position and therefore its profitability.

Objectives

The objective of this study is to determine the impact of anchor stores on the financial performance of shopping centers as well as its influence on rents of satellite stores.

Considering that the anchor stores are favored with lower rents due to the benefit of promoting the attraction of consumers. Thus, the satellite stores must absorb this subsidy through higher rents.

Theoretical Reasoning

Panel Data Definition

According Fávero et al. (2009), this technique prepares a combination of two approaches for data analysis: cross-section and time series.

The data in cross-section, to the same variable are from the same point in time, i.e. the time does not affect the behavior of the variable.

A time series, on the other hand shows the evolution of the variable over time for a given observation. That is, while the cross-section studies the behavior of a variable with the fixed time, the time series studies the evolution of the variable over time.

As Torres-Reyna (2007), Panel Data lets you control variables that are not observable or measurable, such as cultural factors, differences in management practices by companies, or variables that change over time, but not between entities such as national, federal regulations, international agreements etc.

Panel Data Analysis Models

As explained by Fávero et al. (2009), there are three common models for data analysis in panel: Pooled independent cross-section (or POLS – Polled Ordinary Least Squares); Fixed Effects; Random Effects.

Pooled independent cross-section (POLS)

This is a multivariate regression in its most conventional form. It is given by equation (1).

$$Y_{it} = \propto\ + \beta_1 X_{1it} + \beta_2 X_{2it} \ldots \beta_k X_{kit} + e_{it} \qquad (1)$$

Where: Y_{it} = dependent variable; i = number of entities; t = number of periods; α = intercept equal for all entities; β_k = slope of the independent variable X_k same for all entities; k = number of independent variables; X_k = independent variables; e_{it} = error, also known as residue, represents possible independent variables that were not included in the model and would be good candidates for explaining the dependent variable.

This approach considers the intercept α and β_k coefficients of the variables X_k identical for all observations (entities) and throughout the period, not taking into account the nature of each entity and the influence of the variation over time. It is as if all entities were one and its variables referring to a single period.

Fixed Effects Model

Contrary to POLS model, this approach considers the individual nature of each entity by varying the intercept, but with equal angular coefficients of all observations (entities) and throughout the review period. In equation (2) can observe the subscript i in α intercept term thus reflecting the specific characteristics of each entity.

$$Y_{it} = \alpha_i + \beta_1 X_{1it} + \beta_2 X_{2it} \ldots \beta_k X_{kit} + e_{it} \tag{2}$$

The word "fixed" refers to the fact that α is different for each entity, but is fixed in relation to time.

Random Effects Model

In this model, the individual effects are treated, not deterministically but randomly with all entities having the same average value $\overline{\alpha_i}$ for the intercept. Equation (3) represents this approach.

$$Y_{it} = \overline{\alpha_i} + \beta_1 X_{1it} + \beta_2 X_{2it} \ldots \beta_k X_{kit} + e_{it} \tag{3}$$

Definition of the Most Appropriate Model

According Fávero et al. (2009) are used the following tests to evaluate which is the most appropriate model to explain the relationship between variables: CHOW test: compares the model POLS with Fixed Effects; BREUSCH-PAGAN test: compares the model POLS with Random Effects; HAUSMAN test: compares the model Random Effects with Fixed Effects

Serial Autocorrelation

Serial autocorrelation occurs in time-series studies when errors associated with a certain period are reflected in future periods.
According Gujarati (2000), the principal autocorrelation occurrence ratios are:
- Inertia: event occurring at a certain point in time influences the values in future time;
- Specification bias: exclusion of independent variables or incorrect functional form;
- Gaps: influence of the dependent variable at a time on the same variable in the following period;
- Data manipulation may introduce a systematic pattern: use of interpolation, set monthly amounts as annual values divided by 12 etc.

To identify the existence of autocorrelation in time series Pesaran test is used. As for the Pooled Model independent cross-section (or POLS - Polled Ordinary Least Squares) is used the Durbin-Watson test.

Importance of Anchor Stores in the Shopping Center Performance

The literature review revealed that several authors has been developing research showing the importance of anchor stores as the main factor of consumers power attraction in a shopping mall.
Finn and Louviere (1996) demonstrated the strong impact of the anchor stores presence in the image that the consumer form to establish your criteria for choosing to attend these shopping

centers. Since Gatzlaff et al. (1994) demonstrated that the loss of an anchor store affects the ability to attract consumers and results in a decline of the area occupied by the other stores. According to these authors, the revenue from rent is reduced by 26.14% for the loss of the occupied area.

Sirmans and Guidry (1993) suggest that rental revenue levels respond to variations of the following factors: consumer power attraction, architectural design, location, and market conditions. With respect to the consumer power attraction, authors define as variables: the total area shopping, age and the anchor type. With regard to age, the authors state that older malls can undergo maintenance neglect and tenant mix - that is the balanced distribution of kind of stores in leasable shopping space - inappropriate due to marketing changes and competition from new developments resulting in expectation of lower rents.

You et al. (2001) showed that anchor stores pay lower rents, while satellites pay higher rents as cost per enjoying the effects of positive influence generated by anchors.

Damian et al. (2010), through research, show that a greater presence of anchor stores in a mall directly increases their sales and consequently the satellite stores sales in a mall. The authors also show that the anchor stores increase the consumers' attraction power, which is measured by the number of people who visit shopping at a particular time. The study concludes that the anchors number directly influences the total malls sales and the area allocated to them is a strategic tool. Their research included 35 shopping centers in Portugal and Spain, totaling 111,480 square meters of Gross Leasable Area, and they found that the anchor stores occupied about 40% of the total Gross Leasable Area.

Moreover, as emphasized Mejia and Benjamin (2002), the literature supports the argument that malls with similar spatial characteristics such as target market, construction and location do not necessarily generate similar sales and the difference can be explained by not spatial factors; the two most cited are the tenant mix and the image of the stores.

Hypothesis

Given the described literature, this work was structured to test the hypothesis that the rent is moved from the anchor stores for satellite stores because the owners give discounts in rents of anchors because of the benefits they produce to the mall. Thus, the satellite stores, which benefit from the influences generated by anchor stores, should actually pay for these benefits through higher rents. Thus, the hypothesis can be formulated as follows: **The increased presence of anchor stores in a mall generates collection of rents/m² higher for satellite stores.**

Methodology

This work was carried out, as the way to address the problem, based on quantitative research methods and the use of statistical techniques.

As to the objectives, it is an exploratory research in order to build hypotheses and involves the literature, interviews and data analysis. As for the methods it is a survey research involving interviews with people who are directly involved with the phenomenon being studied.

Data collection refers to the performance and features in eight shopping centers, covering about 90,000 square meters in size, located in the Brazilian states of Alagoas, Minas Gerais, Amazonas, Pará, Bahia, Pernambuco, São Paulo and Paraná. The reason for the choice of enterprises located in several different states lies in the fact of not getting addicted data malls in the same area of consumer market influence.

The database contains the data of the eight malls, month by month, three consecutive years (2007-2009). The period of 3 years is necessary in order that the shopping center composition changes over time due to expansions and to natural stores turn over. The data cover monthly periods with a view to strong seasonal characteristic of retail operations, such as the months of May and December have the highest sales peaks during the year.

The data of the following variable were collected for each shopping: ABL, age, NOI - Net Operational Income, rent of anchor stores, rental of satellite stores and the relationship between the area occupied by anchor stores and the total area of the mall.

All malls have at least one anchor store (usually a department store), and they typically occupy between 35% and 65% of total analyzed GLA. On average, anchor stores, in our study, only pay about 20% of total rents received by the entrepreneur.

The analysis was based on considering the database as Panel Data and analysis of the results was based on statistical analysis techniques of multivariate linear regression, ANOVA (analysis of variance), correlation tests and heteroskedasticity tests using the program STATA 13.0.

Results

Following Data Panel theory, the data were analyzed using three models (FÁVERO et al., 2009) using the STATA 13.0.

POLS *(Polled Ordinary Least Squares)*

It can be seen from Table 1 that the adjusted R^2 is 54.46%, which represents how much of the variance of the dependent variable was explained by the independent variables. This means that 45.54% of the variance of the dependent variable is explained by error; so the model is not well formulated.

The Prob associated with the F test shows a value below 0.05 (0.0000), which attests to the significance of the model, because it rejects the H_0 hypothesis of the regression absence (all $\beta_k = 0$).

We notice also that the p values associated with the independent variables angular coefficients (NOI, AlAnc, Age and AAncXATot) are below 0.05 confirming their statistical significance, except for the intercept with p of 0.330 which leads to acceptance of the hypothesis H_0 of non-existence of this coefficient. Reinforcing this conclusion, the standard deviations of the independent variables coefficients are small when compared to their respective means which confirms their validity statistics, except for the intercept.

Table 1 – Regression Coefficients and POLS Model Summary

```
. regress AlSat NOI AlAnc Idade AAncXATot

      Source |       SS       df       MS              Number of obs =     288
-------------+------------------------------           F(  4,   283) =   86.79
       Model | 29452.6053       4  7363.15132          Prob > F      =  0.0000
    Residual | 24009.8392     283  84.8404211          R-squared     =  0.5509
-------------+------------------------------           Adj R-squared =  0.5446
       Total | 53462.4444     287  186.280294          Root MSE      =  9.2109


       AlSat |      Coef.   Std. Err.       t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
         NOI |   1.097843   .0872465     12.58   0.000     .9261082    1.269577
       AlAnc |   .6266009   .1407271      4.45   0.000     .3495961    .9036056
       Idade |  -.6334253   .2266411     -2.79   0.006    -1.079541   -.1873091
    AAncXATot |   .2668288   .0473266      5.64   0.000      .173672    .3599857
       _cons |   2.715629   2.785213      0.98   0.330    -2.766735    8.197992
```

Thus, inserting table 1 coefficients in the model of Equation (1), we obtain:

$$\text{AlSat}_{it} = 1,097\,\text{NOI}_{it} + 0,627\,\text{AlAnc}_{it} - 0,633\,\text{Idade}_{it} + 0,267\,AAncXATot_{it} + e_{it} \quad (4)$$

The coefficients of the equation (4) confirm the hypothesis that the rent/m² of satellite stores increase with the increased presence of anchors. Also confirm the findings in the literature review, that is, with regard to age the oldest malls carry expectation of lower rents, which is observed by the negative sign of the coefficient of the independent variable age (-0.633). But the positive coefficient of NOI variable indicates that the better the shopping result, the higher the rent/m² charged the satellite stores, which increases the interest of retailers from installing in a successful venture; but space is limited and therefore, rent tends to grow.

Multicollinearity Test

There is a weak correlation (not significant) between the independent variables throughout the study period, preventing the existence of multicollinearity.

Heteroskedasticity Test

There is a weak heteroscedasticity given the low value of adjusted R² (0.222398), indicating no significant dependence between the stochastic error and Alsat variable.

Durbin-Watson Test (Serial Autocorrelation)

There is a positive autocorrelation, given the statistical value of Durbin Watson reached 0.861 far from the reference 2.0.

Fixed Effects Model

In this approach the characteristics of each shopping are taken into account in the model establishment.

Table 2 shows that the overall R² is 33.61%, representing how the independent variables explain the variance of the dependent variable. This means that 66.39% of the dependent variable variance is explained by error, so the model is not well formulated.

The Prob associated with the F test shows a value below 0.05 (0.0000), which attests to the model significance, because it rejects the H_0 hypothesis of the regression absence (all $\beta_k = 0$).

It also highlights the p values associated with the angular coefficients of the independent variables (NOI, AlAnc and age), less than 0.05 confirming their statistical significance, including the intercept of the equation. Reinforcing this conclusion, the standard deviations of the independent variables coefficients are small when compared to their respective means which confirms their validity statistics, including the intercept. The AAncXATot variable was omitted from the model due to collinearity finding.

Table 2 - Regression Coefficients and Fixed Effects Model Summary

```
. xtreg AlSat NOI AlAnc Idade AAncXATot, fe
note: AAncXATot omitted because of collinearity

Fixed-effects (within) regression              Number of obs     =        288
Group variable: CompanyCode                    Number of groups  =          8

R-sq:  within  = 0.6963                         Obs per group: min =         36
       between = 0.0252                                        avg =       36.0
       overall = 0.3361                                        max =         36

                                                F(3,277)          =     211.67
corr(u_i, Xb)  = -0.5565                        Prob > F          =     0.0000


      AlSat |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

        NOI |   1.284399   .0836379    15.36   0.000     1.119752    1.449045
      AlAnc |   .3522691   .1659026     2.12   0.035      .025679    .6788591
      Idade |  -2.850186   .5533825    -5.15   0.000    -3.939556   -1.760817
  AAncXATot |          0  (omitted)
      _cons |   24.20602   3.381153     7.16   0.000        17.55   30.86204

    sigma_u |  11.491506
    sigma_e |  6.7233355
        rho |   .7449861   (fraction of variance due to u_i)

F test that all u_i=0:      F(7, 277) =     44.83             Prob > F = 0.0000
```

Thus, inserting the table 2 coefficients in Equation (2) model, we obtain:

$$AlSat_{it} = 24,20 + 1,284\ NOI_{it} + 0,352\ AlAnc_{it} - 2,850\ Idade_{it} + e_{it} \qquad (5)$$

Random Effects Model

As can be seen in Table 3, the overall R² is 46.35% representing how the independent variables explain the variance of the dependent variable. This means that 53.65% of the variance of the dependent variable is explained by error, so the model is not well formulated.

The Prob associated with the Wald test shows a value below 0.05 (0.0000), which attests to the significance of the model, because it rejects the H_0 hypothesis of the regression absence (all $\beta_k = 0$).

It also highlights the p values associated with the angular coefficients of the independent variables (NOI, AlAnc and age), less than 0.05 confirming their statistical significance, except for

AAncXATot and for the equation intercept. Reinforcing this conclusion, the standard deviations of the independent variables coefficients are small when compared to their respective means, which confirms their validity statistics, except for the AAncXATot variable and the equation intercept.

Table 3 - Regression Coefficients and Random Effects Model Summary

```
Random-effects GLS regression                Number of obs      =        288
Group variable: CompanyCode                  Number of groups   =          8

R-sq:  within  = 0.6956                       Obs per group: min =         36
       between = 0.1307                                      avg =       36.0
       overall = 0.4635                                      max =         36

                                              Wald chi2(4)       =     629.54
corr(u_i, X)   = 0 (assumed)                  Prob > chi2        =     0.0000

        AlSat       Coef.    Std. Err.      z    P>|z|     [95% Conf. Interval]

          NOI    1.275519    .0832696    15.32   0.000     1.112314    1.438724
        AlAnc    .4232297    .1605622     2.64   0.008      .1085336    .7379257
        Idade   -2.427318    .5035659    -4.82   0.000    -3.414289   -1.440347
     AAncXATot    .4324492     .264643     1.63   0.102     -.0862415     .9511398
        _cons     1.30669    12.94282     0.10   0.920    -24.06078    26.67415

      sigma_u   9.0629585
      sigma_e   6.7233355
          rho    .64502059   (fraction of variance due to u_i)
```

Thus, inserting the table 3 coefficients in Equation (3) model, we obtain:

$$\text{AlSat}_{it} = \mathbf{1,276 \ NOI}_{it} + \mathbf{0,423 \ AlAnc}_{it} - \mathbf{2,427 \ Idade}_{it} + \mathbf{e}_{it} \tag{6}$$

Hausman Test

As shown in Table 4 Prob with the value of 0.0989, which is higher than 0.05, leads us to accept the hypothesis H_0 that the Random Effects Model is the most appropriate to represent the Panel Data.

Table 4 – Hausman Summary Test

```
. hausman Fixed .

                 ---- Coefficients ----
                    (b)          (B)          (b-B)      sqrt(diag(V_b-V_B))
                   Fixed        Random      Difference          S.E.

        NOI      1.284399     1.275519       .0088794         .0078407
      AlAnc       .3522691     .4232297      -.0709606         .0417548
      Idade     -2.850186    -2.427318       -.422868          .2294636

                        b = consistent under Ho and Ha; obtained from xtreg
         B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

              chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                      =        6.28
            Prob>chi2 =      0.0989
```

Breusch e Pagan Test

As shown in Table 5 Prob was 0.0000, which is less than 0.05, leads us to reject the H_0 hypothesis that the model POLS is the most appropriate to represent the Panel Data. Therefore, the Random Effects Model is the most appropriate. In addition, of all models was the one with the highest R^2 overall (46.35%).

Table 5 - Breusch and Pagan Summary Test

```
Breusch and Pagan Lagrangian multiplier test for random effects

        AlSat[CompanyCode,t] = Xb + u[CompanyCode] + e[CompanyCode,t]

        Estimated results:
                                    Var       sd = sqrt(Var)

                    AlSat |     186.2803         13.64845
                        e |     45.20324         6.723335
                        u |     82.13722         9.062958

        Test:   Var(u) = 0
                                    chibar2(01) =    863.18
                                Prob > chibar2 =    0.0000
```

Pesaran Test for the Random Effects Model

Table 6 shows the value of Pr (0.0000) indicating that the H_0 hypothesis, that no autocorrelation is to be rejected, and therefore it can be concluded that there is autocorrelation.

Table 6 – Pesaran Summary Test

```
. xtcsd, pesaran abs

Pesaran's test of cross sectional independence =      8.976, Pr = 0.0000

Average absolute value of the off-diagonal elements =      0.372
```

The tests indicate that the Random Effects Model is more appropriately to the Panel Data, it nevertheless presents autocorrelation demonstrating that the model is not well formulated, need add other variables that allow a greater percentage of dependent variable explanation, and as eliminate the pointed autocorrelation.

Final Considerations

The POLS model cannot be accepted because it considers the eight malls as if they were a single enterprise and according to Mejia and Benjamin (2002), there are significant differences in each shopping with respect to its performance due to factors such as the tenant mix (organization of the stores in the mall) and the image of these stores.

The coefficients of the multivariate regression confirm the hypothesis formulated in this work that the rent/m² of satellite stores rise with the increased presence of anchors, this fact is evidenced by the positive sign of the coefficient of the variable representing the ratio of the area occupied by anchors in relation to the total area.

The coefficients also confirm, with regard to age, the older lead malls expected lower rents which is observed by a negative sign of the coefficient of the independent variable age. The positive coefficient of NOI variable indicates that the better the result will be the largest mall in the rent/m² charged the satellite stores, which increases the interest of retailers settling in a successful venture, but space is limited and therefore the rent tends to grow.

The Hausman test and Breusch and Pagan test indicated the Random Effects Model as the best to represent the database structured in Panel Data. However, the dependent variable explanation of observed percentage was only 46.35% and the Pesaran test showed the existence of autocorrelation. Both results show that the model is not well formulated, need add other variables that allow a greater percentage of explained variance of the dependent variable and dispose of the autocorrelation.

Therefore, so that the model presents a higher statistical significance is necessary the introduction of new variables that affect performance of the malls, besides the anchor stores. As described by the literature reviewed in this paper, the model requires the inclusion of qualitative variables to be transformed into quantitative by Likert scales (1932). They are: Parking spaces; Tenant Mix; Stores image; Ease of access; Location; Service level: cleaning, security and maintenance; Quality of leisure and food.

References

ABRASCE, Associação Brasileira de Shopping Centers (2013), *Censo Brasileiro de Shopping Centers 2013/2014*, Padrão Editorial, São Paulo.

Damian, D. S., Curto, J. D. and Pinto, J. C. (2011), "The impact of anchor stores on the performance of shopping centers: the case of Sonae Sierra", International Journal of Retail & Distribution Management, Vol. 39, No. 6, pp. 456-475.

Fávero, L. P. et al. (2009), Análise de Dados: modelagem multivariada para tomada de decisões, Elsevier, Rio de Janeiro.

Finn, A. and Louviere, J. J. (1996), "Shopping center image, consideration, and choice: anchor store contribution", Journal of Business Research, Vol. 35, No. 3, pp. 241-251.

Gatzlaff, D. H., Sirmans, S. G. and Diskin, B. A. (1994), "The effect of anchor tenant loss on shopping center rents", Journal of Real Estate Research, Vol. 9, No. 1, pp. 99-110.

Gujarati, D. N. (2000), Econometria Básica, 3ª. Ed, Makron Books, São Paulo.

Likert, R. (1932), "A Technique for the Measurement of Attitudes", Archives of Psychology, Ed. 140, pp. 1-55.

Mejia, L. C. and Benjamin, J. D. (2002) "What do we know about the determinants of shopping center sales? Spatial vs. Non-spatial factors", Journal of Real Estate Literature, Vol. 10, No. 1, pp. 1-26.

Sirmans, C. F. and Guidry, K. A. (1993), "The determinants of shopping center rents", Journal of Real Estate Research, Vol. 8, No. 1, pp. 107-115.

Torres-Reyna, O. (2007), Panel Data Analysis Fixed and Random Effects using Stata (v. 4.2), Data & Statistical Services, Priceton University.

You, T. S., Crosby, N., Lizieri, C. and McCann, P. (2001), "The management of positive inter-store externalities in shopping centers: some empirical evidence", European Real Estate Society Conference, Helsinki, pp. 1-22.