Is the Traditional Retailing disappearing? Some evidences from Brazil.

Guilherme Fowler de Ávila Monteiro[1]

Abstract

This article carries out an investigation regarding the behavior of prices and the competition patterns between two basic forms of retailing equipments: traditional retail (bakery, butcher shop and fair-free) and self-service (chains of supermarkets and independent supermarkets).

The 90's were characterized by the fast transformation of the Brazilian supermarket sector. The economic panorama represented a great incentive to the entrance of foreign companies in the national market, as well as contributed to the expansion of the big national supermarket chains. This process has inspired the argument by which the traditional retailing would tend to disappear, it because either the supermarket's prices were lower, or the costs of traditional retailing were higher. Many paper works have adopted this result as an assumption but we have not found one that has tested this hypothesis. Is it true that the traditional retailing charges higher prices than supermarket? Is it true that because (if) they charge higher prices they have disappeared?

The paper's objective is to analyze the behavior of food prices at different kinds of stores and to test the hypothesis that traditional retailers have higher prices compared to supermarkets.

The accomplishment of the research involved the construction of a database for food prices collected in the municipal district of Sao Paulo, Brazil. The analysis of these data took place through cointegration tests and Granger causality tests. The obtained results turn possible to argue about the existence of long-period equilibrium among the series of prices collected in the Supermarket (in general) and in the Traditional Retail. This equilibrium is characterized by a non-null difference among the prices (excepted meats and cheese). In addition, the results also reveal the existence of an effective double causality among the prices.

Considering that the disappearance of the small and medium retail is not confirmed by empirical data in Brazil, the traditional forms of retailing keep operating and growing in absolute number (Farina & Nunes, 2002), and once the econometric tests confirmed the hypothesis on relative prices, the implication is straightforward: consumers are willing to pay for some specific attributes provided by traditional retailers. This result has important implications for strategic decisions of both retailers and food processing companies that will be discussed as conclusion of the paper.

Key Word: food retailing, self-service, traditional, price, cointegration.

1. Introduction

The Brazilian post-stabilization discussion, when it relates to the evolution of the food price level in the retailing sector, describes, above all, an aggregate portrait.

Underlying such discussions, as well as based in the common sense, one is able to recognize the idea that the prices of the supermarket chains are always smaller than those practiced by other retailing equipments (Bakery, Butcher shop …).

It is interesting to highlight, however, that in spite of countless implicit references concerning price behavior among different retailing equipments, the theme itself has not been object of academic studies in Brazil. The literature concerning the behavior of prices

[1] Student in economics at the University of Sao Paulo and research assistant at the Food and Agribusiness Program (PENSA) at the same university. e-mail: guilhermefamonteiro@yahoo.com.br. The author thanks Professor Elizabeth Farina and Professor Vera Fava;

in retailing lacks of a comparative analysis whose focus is the price differences among different existing equipments. Given this panorama, the paper's objective is to analyze the behavior of food prices at different kinds of stores and to test the hypothesis that traditional retailers have higher prices compared to supermarkets.

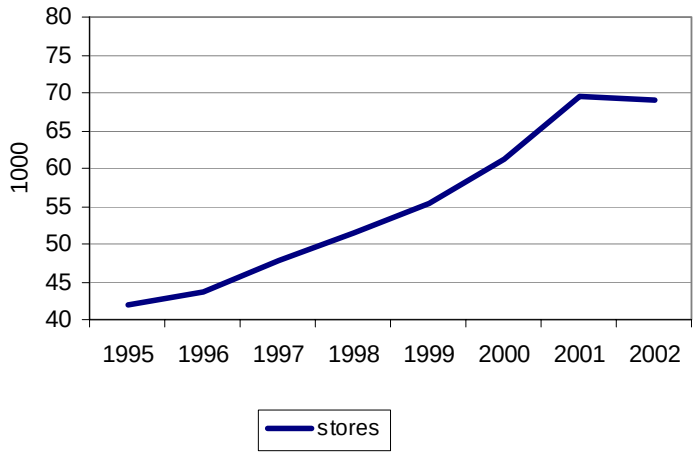
In the subsequent section a theoretical panorama is presented; a model of monopolistic competition is analyzed. After, the reader will find a section dedicated to the econometric analysis. The achievement of the present research built up from the construction of a database, to its analysis through quantitative mechanisms. The final conclusions represent the last section.

2. The Received Knowledge

2.1 The Retailing Sector

The 90's were characterized by the fast transformation of the Brazilian supermarket sector. The control of the inflationary process (which elevated the potential of national consumption), along with the amplification of the trade liberalization and the saturation of the European markets, represented a great incentive to the entrance of foreign companies in the national market. On the other hand, the economic stabilization also contributed to the expansion of the big national supermarket chains. The result refers to a substantial growth in the number of supermarkets' stores operating in the country (graph 1).

Graph 1: Number of Supermarkets' stores – Brazil, 1994 – 2002.



Source: DE ALMEIDA, S. F. (2003).

Nevertheless, the process of companies' concentration intensified. As one can find out in table 1, which presents the Herfindahl-Hirschman Index (HHI) and the Concentration Ratio (CR4) for the Brazilian supermarket sector, the concentration has increased during the 90's. The HHI has risen from 439 in 1994 to 1005 in 2002. In addition, the CR4 rose from 34 % in the opening year of the period to 54 % in 2002.

Table 1: Degree of Concentration: Supermarket Sector – Brazil, 1994 – 2002.

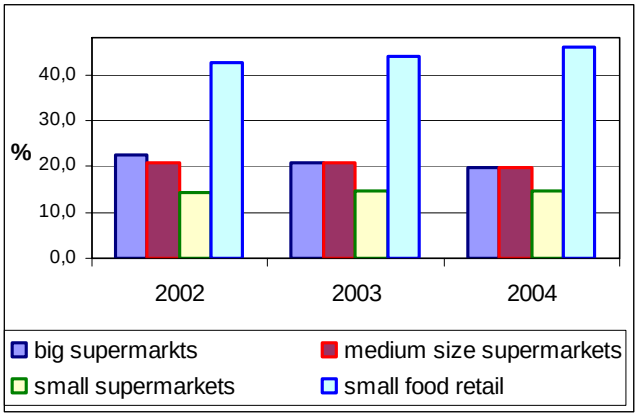
Year	HHI (300 biggest companies)	CR4(%)
1994	438,82	34,26
1995	532,21	38,05
1996	455,80	35,34
1997	471,69	37,09
1998	663,14	44,10
1999	957,68	53,90
2000	1033,59	55,47
2001	971,74	54,21
2002	1005,48	54,31

Source: ABRAS – The Brazilian Supermarket Association

It is important to stand out, however, that the concentration process did not represent the disappearance of the small and the medium retail. In effect, one can argue that the economic stabilization of the 90's, when reducing the tendency of product storage as a protective mechanism against the inflationary process, contributed to a frequency increase in the purchase of food products. This frequency increase connects to higher consumer's considerations regarding the convenience of the purchase, what allows that smaller neighborhood stores survive (Farina & Nunes, 2002).

In fact, one is able to account for the participation rise of the Small Retailing (traditional retail and small self-service stores) in the total revenue of the Retail Food Sector (graph 2).

Graph 2: Retail Food Sector: percent revenue by retailing category, 2002 - 2004; Brazil[2].



Source: ACNielsen - Consumer Study, 2005

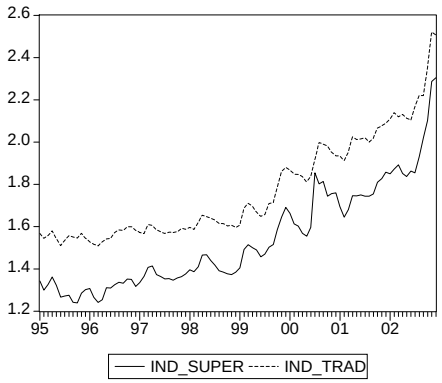
2.2 Competition and Differentiation of Products

The assumption of the existence of a great number of consumers and producers, together with (a) perfect information, (b) free market entrance and (c) purchasing of

[2] Small Food Retail =Traditional stores + self-service 1 to 4 check-outs; Small supermarkets= self-service 5 to 9 check-outs; Medium size supermarkets = self-service 10 to 19 check-outs; Big Supermarkets = self-service 20 and more check-outs.

homogeneous products, drives us to conclude that the prices should be the same among all firms that operate in a market (condition of perfect competition). However, the preliminary analysis of the data demonstrates little or any equivalence among the prices collected from different equipments (graph 3)[3].

Graph 3: Supermarket and Traditional Retailing: evolution of prices (R$) – bundle of products – Municipal District of Sao Paulo – jan/95 to dec/02.



In effect, Farina, Nunes and Monteiro (2004) characterized the Food Retailing as an oligopoly with competitive fringe.

It is assumed that:

(1) The firms of the dominant nucleus, big supermarket chains, in conformity with the Bertrand's Model, compete for prices. The traditional retail and the independent supermarkets form the competitive fringe.

(2) Consistently with Favaro and Spiller (1984)'s model, each supermarket chain, when altering its price decisions, expect that the reaction of another chain is to retaliate and of the fringe is to accommodate, in the model of dominant firm.

(3) From a certain volume of sales, the big supermarket chains' marginal costs are constant. The competitive fringe (traditional retail and independent supermarkets) presents growing marginal costs, which are, besides, always higher than the one of the dominant nucleus.

(4) It is admitted that supermarket chains are characterized by little differentiation to each other (for each firm of the dominant nucleus, the demand is highly elastic to prices); on the other hand, the great differentiation comes out between (a) the supermarket chains and (b) the traditional retail and independent supermarkets.

[3] For a description of the database see section 3.1

About the differentiation

It is assumed that the consumer can purchase two perfect substitutes goods, one of them sold exclusively in the stores of the dominant nucleus and the other only available in the stores of the competitive fringe.

To buy in each type of retailing equipment, the Dominant Nucleus (D) or the Fringe (F), the consumer incurs in different *purchasing costs*, τ_D and τ_F. Such costs are (a) independent of the amount of the purchasing and (b) not similar among consumers. It is admitted that the dominant nucleus' purchasing costs are, per se, higher.

There is in the model a trade-off between the price (which are lower in the supermarkets chains) and the cost of purchase (which are lower in the traditional retail and in the independent supermarkets).

Once the consumers have different preferences in relation to price and convenience, and as even a same consumer, in different circumstances, can choose different distribution channels, it exists, in the market, space for the traditional retail and the independent self-service stores.

The model foresees that the small food retailers, because of offering larger convenience to the consumer, survives despite presenting higher costs and higher prices than the big supermarket chains. The model also predicts that the equilibrium of the food retailing market results in a positive price difference between the traditional retailers and the independent supermarkets in relation to the supermarket chains.

3. Empirical Evidence

3.1 Cointegration Analysis

The price competition in the food retailing will be analyzed through cointegration. The cointegration analysis represents a methodical formulation which aims to identify long run equilibrium relationships among the examined variables.

In a formal approach we can define cointegration just as Engel and Granger (1987) do in their original work:

Be Xt a vector Nx1.

The components of Xt are said cointegrated of order (d,b) if:

1) All the components of Xt are integrated of order d,

2) A vector $\beta \neq 0$ exists, such that $\boldsymbol{\beta' X_t = Z_t}$, where Zt is integrated of order (d–b), b>0.

β is the cointegration vector.

The concept of *long run equilibrium* links to the conception of equilibrium in the economic analysis, what means, a condition that ultimately is not disturbed by short run shocks that reach the system of analyzed variables. Regarding this aspect, one is able to state that the equilibrium equation's error term does not present a stochastic tendency, as well as, it is stationary.

Concerning a group of non-stationary, integrated of same order variables, the error stability implies that we will seek to identify cointegrated variables that are characterized by a stationary linear combination among it (stationary long run balance relationship). In mathematical terms one can affirm that the cointegration order of the components of Xt should be (d,d), once the long run relationship among the variables is represented by β'Xt, while the error corresponds to Zt[4].

The data from the Foundation Institute of Economic Research (FIPE)[5] represented the primary source for the construction of a specific database in order to make possible the analysis of price evolution among different retail equipments.

The generated database presented a total of 80 varieties of products. Two categories were then created: Supermarket and Traditional Retail, this last one including three equipments: Bakery, Butcher shop and Fresh-market. Each category presents a group of price series that extends from January of 1995 to December of 2002. The data are organized in monthly base.

In the present investigation the analyzed products are: Alcatra (high quality beef), Acém (low quality beef), Chicken, Ham, Cheese, Bread, Milk (special), Milk (long life), Tomato, Carrot, Banana, Potato, Lemon and Grape.

These analyzed products were then bundled in three groups, to know: Meats (Alcatra, Acém and Chicken), Daily Products (Ham, Cheese, Bread, Milk - special and Milk - long life) and Fruits, Vegetables and Greens (FLVs), which includes: Tomato, Carrot, Banana, Potato, Lemon and Grape.

It is important to highlight that the choice of the above-mentioned products concerned the conciliation of two factors: the existence of price series of the same product in both categories, and the search for representative products.

We accomplished the cointegration analysis based in pairs of series, which is to say that we seek to determine an equilibrium relationship between, for example, the price of cheese in the supermarket and the price of cheese in the bakery. Thus, each analyzed product formed a vector Xt, which was composed by two variables: supermarket price (X1) and traditional price (X2).

[4] Since the error stability presupposes that the error integration order is null, one can state that (d-b) =0 ➔ d=b.

[5] This institution is responsible for the preparation of the Consumer Price Index for the Municipal District of Sao Paulo.

Considering that the cointegration's definition establishes that every component of vector Xt should be integrated of order d, the verification of the integration order of the price series represents the fundamental analytical step. One can note that once considered the error stability, just the variables whose integration order is higher than zero will be analyzed[6].

The table below presents the unity root test for each one of the price series; we carried out the Augmented Dickey-Fuller test, as well as the Dickey-Pantula test for 2 unit roots.

Table 2: Unit Root Tests

AUGMENTED DICKEY–FULLER				DICKEY–PANTULA†		
Series	Model	lags	t-statistic	1st STAGE	2nd STAGE	
					1° coefficient	2° coefficient
Acem_super	-	2	2,0377	-5,9409*	-3,3843	-1,9653
Acem_trad	-	1	2,1	-7,3682*	-6,6553*	-2,2375
Alcatra_super	-	1	1,6952	-6,9617*	-4,0754*	-2,2794
Alcatra_trad	-	6	3,0579	-5,5773*	-4,3987*	-1,7497
Banana_super	Constant	1	-4,2482*	-8,9294*	-5,0214*	-6,7904*
Banana_trad	-	-	-0,4976	-9,932*	-9,2959*	-2,3939
Potato_super	Constant	1	-3,9653*	-8,3497*	-7,2125*	-3,9653*
Potato_trad	-	-	-0,1414	-7,9329*	-6,256*	-2,547
Carrot_super	Constant	1	-5,0429*	-8,2101*	-7,1257*	-5,0429*
Carrot_trad	Constant	3	-3,3703*	-9,0854*	-6,3377*	-3,3703*
Bread _super	-	1	2,8382	-10,7887*	-10,693*	2,0877
Bread _trad	-	-	2,978	-9,2506*	-9,1711*	1,5385
Chicken_super	-	6	1,7396	-7,077*	-2,4741	-1,4414
Chicken_trad	-	1	0,8899	-6,89*	-4,0305*	-0,3352
Milk_super	-	6	1,9282	-3,8175*	-3,663*	0,0392
Milk_trad	-	-	2,5636	-8,9784*	-8,8767*	-0,8593
Long Life_super	-	1	-4,3694*	-6,4872*	-4,7303*	-0,9646
Long Life_trad	-	6	1,5015	-6,3609*	-5,399*	0,4401
Lemon_super	Constant	2	-5,7453*	-6,3922*	-0,1608	-5,0535*
Lemon_trad	Constant	3	-5,7568*	-6,5011*	-0,8439	-4,4826*
Ham_super	-	2	-0,3265	-6,9669*	-3,9434*	-2,0982
Ham_trad	-	-	0,7032	-9,4183*	-8,8873*	-0,9202
Cheese_super	-	6	1,7504	-6,6955*	-5,4016*	0,6642
Cheese_trad	-	1	1,5125	-7,8118*	-7,2534*	0,0405
Tomato_super	Constant	-	-4,3319*	-9,5891*	-5,0285*	-3,7548*
Tomato_trad	Constant	-	-4,9817*	-9,1811*	-3,998*	-4,0897*
Grape_super	Constant	1	-7,7413*	-8,0391*	-1,316	-3,8712*
Grape_trad	Constant	-	-3,4771*	-9,4588*	-4,8348*	-2,0603*
* denotes rejection of Ho at the significance level of 5%.						

[6] Since, by definition, b>0 and assuming b=d, it implies that d>0

† Dickey-Pantula Test
Obs1.: 1st stage refers to the estimated coefficient (β1_estimated) of the equation:
$\Delta^2Yt = \beta1.\Delta Yt\text{-}1 + \Sigma\delta i.\Delta^2Yt\text{-}i + \varepsilon t$
(εt = white noise)

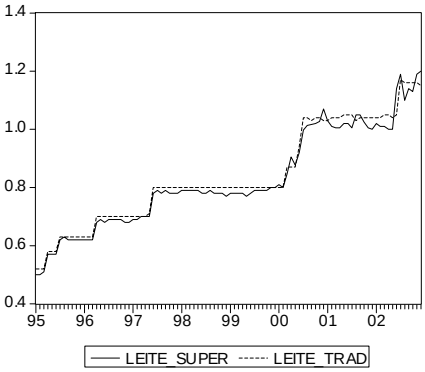
Obs2.: In relation to 2nd Stage, 1st coefficient and 2nd coefficient refer, respectively, to the estimated coefficients ($\alpha1$_estimated and $\alpha2$_estimated) of the equation:
$\Delta^2Yt = \alpha1.\Delta Yt\text{-}1 + \alpha2.Yt\text{-}1 + \Sigma\delta i.\Delta^2Yt\text{-}i + \mu t$
(μt = white noise)

The first conclusion that can be reached refers to the non existence of a unit root for at least one of the series of each pairs of series that form the FLVs group; as a result, it disables the application of the cointegration analysis in the terms of this study.

On the other hand, we can detect that all the price series that compose the Meat group (Acém, Alcatra and Chicken) present a unit root.

Regarding the Daily Products group, one can verify that Ham, Cheese and Bread present a unit root. Concerning the other products that compose this group one should be aware that the price series for milk (special) are characterized by long periods of stability, followed by abrupt elevations in the prices. This behavior of prices resembles to a model of structural break (graph 4).

Graph 4: Milk (special) – Supermarket and Traditional Retailing – Price evolution (R$), jan/95 to dec/2002.



In contrast, it is important to highlight that the unit root test accomplished for the supermarket price of milk (long life) presents an inconsistency: we accept the null hypothesis of a unit root for the Dickey-Pantula test, but we reject the existence of a unit root for the Dickey-Fuller test. Such inconsistency can derive from seasonal effects. Although the econometric literature is advanced enough to allow the accomplishment of a test of seasonal unit root, this it out of the purpose of the present analysis.

Analytic procedures

The cointegration analysis can be carried through two different analytic procedures, to know: the Engle-Granger procedure and the Johansen procedure.

The Engle-Granger procedure consists of the application of the unit root test in the residue obtained from a hypothetical price equilibrium equation. If the hypothesis of the

existence of a unit root in the residues is not confirmed there is strong evidence that the tested variables present a cointegration relation[7].

The procedure of Johansen explores the Error Correction Model. The analysis is based in an autoregressive vector (VAR) and in the *Granger Representation Theorem*, which states that every vector Xt cointegrated of order (1,1) can be expressed by means of an Error Correction Model.

Error Correction Model

When a group of variables cointegrates, one can state about the existence of an error correction mechanism which makes it impossible for short run deviations to affect the long run tendency of the variables. Through the error correction model the variables' short run dynamics are influenced by the deviations from the balance.

Mathematically, the error correction model can be accessed as following:

$$\Delta Xt = \alpha.\beta'.Xt + \Sigma Ai.\Delta Xt\text{-}i + \mu t$$

Where:

ΔXt = variation of Xt

α = matrix of the adjustment coefficients

β = matrix that contains in its columns the cointegration vectors.

$\beta'.Xt$ = Term of Error Correction

$\Sigma Ai.\Delta Xt\text{-}i$ = relationships of short run (unbalances of short run)

μt = white noise

Analytic procedure of Johansen

When applying the analytical procedure of Johansen, we first assume a model VAR(k) generically defined:

$$Xt = \pi 1.Xt\text{-}1 + \pi 2.Xt\text{-}2 + ... + \pi k.Xt\text{-}k$$

Through algebraic transformations applied to the generic model we can write that:

[7] The rejection of the hypothesis of the existence of a unit root in the residues implies that the error is stationary.

$$\Delta Xt = \Pi.Xt\text{-}1 + \Sigma\gamma i.\Delta Xt\text{-}i + \varepsilon t$$

Where:

$\Pi = \Pi 1 + \Pi 2 + ... + \Pi k - I$

(I = identity matrix)

$\gamma i = -\Sigma \pi j;$ $_{j=1+i}$

Σ = sum from (t-1) to (k-1)

Regarding the Error Correction Model as well as the equation above transcribed, we can affirm that: when $\Pi = \alpha.\beta'$ the estimated model represents a Model of Error Correction, and, from the Granger Representation Theorem, cointegration exists.

It is important to highlight that the analytical mechanism itself, through the Granger Theorem, imposes an analytical focus, to know, the series that compose Xt must be integrated of first order. In other words, a unit root exists for each of the analyzed price series.

Actually, the unit root tests accomplished above indicate that the following products present one unit root: Alcatra, Acém, Chicken, Ham, Cheese and Bread.

The final result of the Johansen procedure, applied to the price series of the above-mentioned products, can be observed below in the table:

Table 2: Johansen Cointegration Test.

	Ho: it exists r cointegration vectors	**Eigenvalue**	**Trace Statistics (†)**	**Critical value at 5%**
meat	**Alcatra** (model with constant inside and outside the cointegration vector)			
	r = 0	0,245056	26,81484*	15,41
	r > or = 1	0,004144	0,390333	3,76
	Acém (model with constant inside and outside the cointegration vector)			
	r = 0	0,187596	20,00819*	15,41
	r > or = 1	0,005083	0,47901	3,76
	Chicken (model with constant inside the cointegration vector)			
	r = 0	0,33149	39,10263*	19,26
	r > or = 1	0,013194	1,248467	9,24

daily products	**Bread** (model with constant inside the cointegration vector)			
	r = 0	0,175992	25,2959*	19,96
	r > or = 1	0,072748	7,099798	9,24
	Ham (model with constant inside the cointegration vector)			
	r = 0	0,206278	22,67545*	19,96
	r > or = 1	0,010154	0,959359	9,24
	Cheese (model with constant inside the cointegration vector)			
	r = 0	0,271357	32,97746*	19,96
	r > or = 1	0,033673	3,219783	9,24
* denotes rejection of Ho at the significance level of 5%.				
† Trace Statistic = $\eta(r) = -T.\Sigma\ln(1-\lambda\hat{\imath})$, where: Σ = sum from (r+1) to n $\lambda\hat{\imath}$ = eigenvalue				
Obs.: Specifically in terms of this study, it fits to observe that the only acceptable result corresponds to the verification of only one cointegration vector. That because, for a vector Xt with 2 elements (supermarket price and traditional price), the highest cointegration order is (1,1). In this study we used the test of the trace statistics.				

We can conclude that all 6 pairs of price series cointegrate. This turns possible to argue positively about the existence of an equilibrium relationship between supermarket's prices and traditional retailing prices for each one of the analyzed products.

Below we present the estimations for the cointegration vectors, normalized for the supermarket price (table 3).

Table 3: Cointegration Vectors (normalized for the supermarket price).

Alcatra		
Alcatra_super	**Alcatra_trad**	**constant**
1	-0,991206	-0,38238
	(-35,4256)* $(0,31429)_{\varsigma}$	
Acém		
Acém_super	**Acém_trad**	**constant**
1	-1,033669	0,039267
	(-37,81) $(1,2315)_{\varsigma}$	
Chicken		
Chicken_super	**Chicken_trad**	**constant**
1	-0,802375	-0,07151
	(-20,1134)	

	(-4,95399)	
Bread		
Bread_super	**Bread_trad**	**constant**
1	-0,643828	-0,00284
	(-9,42044) (-5,21148)	
Ham		
Ham_super	**Ham_trad**	**constant**
1	-0,53494	-1,53288
	(-3,47785) (-3,02)	
Cheese		
Cheese_super	**Cheese_trad**	**constant**
1	-0,907999	1,557194
	(-11,1282) (-1,12754)ς	
* t-statistics inside the parentheses		
† denotes no rejection of Ho at the significance level of 5%, where Ho:α=0		
ς denotes no rejection of Ho at the significance level of 5%, where Ho:α=1		

For all the products (except Alcatra, Acém, and Cheese) one fails in rejecting the null hypothesis that the estimated coefficients for traditional retailing price are equal to unity, and, therefore, the difference between the prices can be analyzed as a non null, constant difference.

A subsequent analytical step represents the estimation of the Error Correction Model. It is important to highlight that the current work involves the estimation of a two-equation model: one equation for the supermarket price and other for the traditional retailing price, for each product.

One can note that the significance of the model's adjustment coefficient provides subsidies to the economic analysis: considering the same variable, for example price of cheese, if both adjustment terms (from the estimated equations) are significant, we can conclude that the price adjustments between the equipments involve a simultaneous movement.

On the other hand, when one of the adjustment terms is not significant we can argue that the adjustment just happens through the action of one of the equipments, the equipment whose adjustment term is significant.

In the table below the estimation for the adjustment coefficients ($\alpha 1$ and $\alpha 2$) are presented, along with t-statistics in parentheses.

Table 4: Adjustment Coefficients

Alcatra	
D(Alcatra_super)	**D(Alcatra_trad)**
-0,271158	0,204637
(-2,08027)	(+2,322235)
Acém	
D(Acém_super)	**D(Acém_trad)**
-0,163258	0,282022
(-1,03017)*	(+2,61781)
Chicken	
D(Chicken_super)	**D(Chicken_trad)**
-0,484552	0,057861
(-2,88753)	(+0,39435)*
Bread	
D(Bread_super)	**D(Bread_trad)**
0,076851	0,341231
(+0,89163)*	(+4,1359)
Ham	
D(Ham_super)	**D(Ham_trad)**
-0,322723	0,050154
(-4,42326)	(+1,06625)*
Cheese	
D(Cheese_super)	**D(Cheese_trad)**
-0,414036	0,048635
(-4,31487)	(+0,89611)*
* non rejection of Ho at the significance level of 5%, where Ho:α=0	

We can verify three different situations: for Alcatra the adjustment happens through the action of the supermarket, along with the action of the traditional equipment. On the other hand, Acém and Bread show an adjustment pattern based on the Traditional Retail's action. Finally, Chicken, Ham and Cheese are characterized by the adjustment through the action of the Supermarket.

3.2 Causality

Considering two variables X1 and X2, we say that *X1 granger-cause X2* when the forecasts accomplished for X2 considering all available information (including X1) are more efficient than the forecasts based on a set of information that does not take account of X1.

The Granger Causality Test involves the estimation of two equations:

Where:

$$X2t = \Sigma\gamma i.X2,t\text{-}i + \Sigma\delta i.X1,t\text{-}i + \mu t$$

$$X2t = \Sigma\gamma i.X2,t\text{-}i + \varepsilon t$$

X1, X2 = variables

γi, δi = parameters

μt = white noise

Σ = sum from 1 to n

The null hypothesis is Ho: $\delta 1=\delta 2=\delta 3=\ldots=\delta n=0$, what means, Ho: X1 does not granger-cause X2.

We accomplished an F-test as a way to measure the relevance of the exclusion of X1 for the explanation of X2.

Causality and Error Correction Model

As we saw, the Error Correction Model represents a mathematical constitution that associates the variation of the variable to the term of error correction through the adjustment coefficient (α). As a result, we can argue that, a priori, past values of X1 and X2 affect the current variation of X1 and X2.

As a consequence, we can state that:

- When $\alpha 1 \neq 0$ and $\alpha 2 \neq 0$, double causality exists
- When $\alpha 1 = 0$ and $\alpha 2 \neq 0$, X1 granger-cause X2.
- When $\alpha 1 \neq 0$ and $\alpha 2 = 0$, X2 granger-cause X1.

The adjustment coefficients, as well as the t-statistics, were presented previously (table 4).

It is important to stress, however, that the non significance of a certain adjustment term does not necessarily imply that the associated variable is not granger-caused by the other variable. The significance analysis of the adjustment terms just informs the existence of causality, but never its absence.

As a consequence, we cannot conclude that the supermarket price does not granger-causes the traditional retailing price in what it concerns Chicken, for example. In this case, as well as in all the others, it is necessary to accomplishment the Granger Causality Test.

We present the Granger Test for Acém, Chicken, Bread, Ham and Cheese in the table below:

Table 5: Granger Causality Test: Acém, Chicken, Bread, Ham and Cheese

Hypothesis	Lags	Statistics-F	Prob.
Acém_trad doesn't granger-cause Acém_super	2	7,62252	0,00088
Frango_super doesn't granger-cause Frango_trad	3	7,73135	0,00012

Francês_trad doesn't granger-cause Francês_super	2	5,11363	0,00790
Presunto_super doesn't granger-cause Presunto_trad	3	3,45109	0,02005
Queijo_super doesn't granger-cause Queijo_trad	2	17,1096	5,2E-07

In all the above estimations, we failed to reject the null hypothesis of non granger-causality. As an effect, joining the results obtained from the analysis of the adjustment term's significance and the Granger Test, we can conclude that the prices, for the analyzed products, are characterized by a double causality (table 6).

Table 6: Causality direction

Alcatra		
Supermarket	⇔	Traditional
Acém		
Supermarket	⇔	Traditional
Chicken		
Supermarket	⇔	Traditional
Bread		
Supermarket	⇔	Traditional
Ham		
Supermarket	⇔	Traditional
Cheese		
Supermarket	⇔	Traditional

4. Conclusion

The Retail Food Sector can be analyzed in terms of a model of oligopoly with competitive fringe. In this model two main results are reached: first, considering the consumer preference for convenience, the traditional retail does not tend to disappear in face of the big supermarket chains' expansion. Second, the market equilibrium is characterized by a positive price differentiation between the traditional retail (and independent supermarkets) and the big chains.

Actually, in recent times, Small Retailing (traditional retail and small self-service stores) has increased its participation in the Brazilian retail food's total revenue. The reaction of the big supermarket chains is characterized essentially by price promotions. Nevertheless, recent evidence points out that the consumer looks upon proximity (convenience) in detriment of price when taking his purchase decisions[8].

On the other hand, when analyzing the price data for the Municipal District of Sao Paulo, one can find evidences that the prices present a double causality, what reveals a non-trivial interaction between the supermarkets and the traditional stores. The analysis also indicates that the supermarket's and the traditional retailing prices establish a long-run

[8] ACNielsen - Consumer Study, 2005

equilibrium, which is characterized by a non null difference[9]; the traditional retailing price being higher than the supermarket's price.

The implications are straightforward: consumers are willing to pay for some specific attributes provided by traditional retailers. This result has important repercussions for strategic decisions of both retailers.

Primary, one can mention the recent trend of the big supermarket chains in direction to a bigger proximity with formats of small stores[10]. Such strategic actions, regarding the analyzed model, as well as considering the econometrical evidences, can only generate an effective gain of competitive advantage in case of the new emergent formats reveal an actual capability of competing in the grounds of perceived purchase convenience (*convenience competition*).

On the other hand, the increasing number of convenience stores associated to big chains can represent a threaten to the traditional stores if the convenience stores present a more efficient cost structure, which can be originated in both (a) the adoption of more effective operation techniques already working in the big stores, and (b) the buying-power of the big chain.

5. Bibliographical reference

ALMEIDA, S. F.de. (2003) **Impactos da Concentração do Setor de Varejo de Alimentos sobre o Consumidor** [Consumer impacts from food retailing concentration]**.** Monografia. Departamento de Economia. Faculdade de Economia, Administração e Contabilidade – Universidade de São Paulo, 2003.

ENDERS, W. (1995). *Applied Econometric Time Series*. John Wiley & Sons

ENGLE, R. F. & GRANGER, C. W. J. (1987**) Cointegration and Error Correction: Representation, Estimation and Testing**. Econometrica 55(2): 251 – 287.

FARINA, E.M.M.Q e NUNES, R. (2002) **A Evolução do Sistema Agro-alimentar no Brasil e a Redução de Preços para o Consumidor: os efeitos da atuação dos Grandes Compradores**, relatório de pesquisa [The evolution of the food system in Brazil and the reduction of prices for the consumers: The effects of the performance of the big purchasers, research survey]. CEPAL / IPEA. Disponível em: www.cepal.org/brasil

FARINA, E.M.M.Q, NUNES, R, MONTEIRO, G.F.A. (2004). **Modeling Produce Procurement And Merchandising Strategies Of Traditional Retailers In The Face Of**

[9] excepting Acém, Alcatra and Cheese

[10] An important, recent example is the acquisition by Sainsbury of a chain of small convenience stores, Bells Stores: *As the fervor for convenience stores continues in the UK, Sainsbury has announced that it is acquiring Bells Stores, a 54-store convenience chain in northeast England. Terms of the acquisition were not released. Sainsbury currently operates some 80 c-stores…* (www.morningnewsbeat.com/archives/2004/02/18.html, June 1st, 2004).

Competition With Supermarkets In The São Paulo Region – working paper presented at the 88th European Association of Agricultural Economists, Paris, May 2004.

FAVARO and SPILLER (1984). **The effects of entry regulation on oligopolistic interaction: The Uruguayan banking sector**. RAND Journal of Economics, 15, 244-254

VARIAN, H.R. (2003). *Microeconomia: Princípios Básicos*. Elsevier Editora Ltda.