EMPIRICAL ANALYSES OF THE DETERMINANTS OF COMPETITIVE MARKET PRESSURES

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Abstract

The objective of this paper is to discuss the empirical evidence on the link between the policy changes which led to a greater competitive pressure. This works explores the relationship between Brazilian sectoral export and the increase of competitive pressures. We focus on sectors that experienced structural reforms caused by trade liberalization.

This paper is organized as follows. After these introductory remarks, Section 1 contains a discussion of the data used, its limitations and consequences upon the results. As noted below, the fact that we do not have data at the firm level represents a serious limitation. In Section 2 we test the hypothesis whether there is a robust correlation between export performance and competitive pressures over time. We also check for changes in policy that enhance greater competition within an industry. Section 3 concludes this chapter.

1. The data: sources and limitations

The main source of the reported data is IBGE (Brazilian Institute for Geography and Statistics), through the following institute databanks: System of National Accounts (SCN) and Central Cadastral of Firms (CEMPRE). Besides IBGE, we collected data from FUNCEX (External Trade Foundation).

The data for number of firms are from CEMPRE. Output and employees are gathered from SCN. Import and export figures are from FUNCEX, whose databank is supplied by the Ministry of Development, Industry and External Trade (MDIC). Profit margins were calculated using SCN figures.

All data periodicity are suited for panel analyses, due to constant methodology changes and to incompatible series. Nevertheless, the existence of longer series

permitted to study how some variables behaved in the long run, as in exports and added value.

Data gathering in Brazil is a hard task. Most information used in this chapter is presented at the sectoral level, and not at the firm level. Although there are some sources that publish firm level data (usually statistics provided by private agents) we opted for government sources due to the larger scope and reliability. Unfortunately, the data published by those bodies are only sectoral, which explains its use in all estimations of this chapter.

Even though there may be a loss in degrees of freedom, the high variety of sub sectors allows the use of econometric methodologies to exam the issue. We investigate 30 sectors from 1996 through 2004 in panel studies. This permitted an exam of the productive sectors responses to the policy changes throughout those years.

2. Export performance

This section explores the relationship between Brazilian sectoral export and the increase of competitive pressures. We focus on sectors that experienced structural reforms caused by trade liberalization.

In the last fifteen years the Brazilian productive framework suffered enormous transformation. These changes include price stabilization, floating exchange rate regime implementation, privatizations and deregulation in important sectors. We assess the impact of such changes over international competitiveness and over some industrial trade openness indexes.

a. Trade Liberalization and Investment

Trade liberalization was a chief process of the structural reforms executed in the nineties. Between the years 1988 and 1993 the average tariff applied to imports was cut from 50% to 13.2%, while the top tariff fell from 105% to 40% and the modal tariff went from 40% to 20%. In addition, most of the non-tariff barriers were eliminated, pointing out a shift from protectionism to an increasingly open economy. Two main consequences were the import increase and trade balance deficits. Between 1991 and 1997 imports went from US$ 21.0 billions to US$ 59.7 billions, a 19% annual growth

rate. However, the average investment rate fell from 17.7% in the eighties to 15.9% in the nineties (Markwald, 2001).

Chart 1 shows that between 1996 and 2002 the manufactures industry lost share on investment (96.6% to 92.6%), when extractive industry grabbed 3.6 p.p. more (3.8% to 7.4%). Several other segments in manufacturing industry had their shares reduced. Similarly, there has been a slight loss of this industrial segment on absolute added value.

Beverages and food investments went from 17.5% to 13.8%, and its added value decreased from 17.6% to 16.8%. Petroleum refinement and alcohol had increases in investment and added value share, a reflection of the 85.9% increase in petroleum extraction in Brazil during the examined period (IBGE, 2004).

The automotive segment reflects a more liberalized and price-stable sector, which attracted various new enterprises. Investments made in 1996 (13.4%) were above added value participation (8.6%). The so-called automobile regime was important to attract investment.

Chart 1 - Investment Structure and Added Value in the Brazilian Industry -1996 - 2002 (%)

Industrial Sectors	Investments		Added Value	
	1996	2002	1996	2002
Food and Drinks	17.53	13.82	17.64	16.77
Tobacco	0.66	0.7	1.21	0.93
Textile	3.01	2.26	3.18	2.3
Clothing items and accessories confection	0.79	0.57	1.81	0.98
Hide items manufacturing and footwear	0.95	0.82	2.15	2.04
Wood	0.97	1.73	0.84	1.15
Cellulose, paper and graphic	9.3	8.59	3.79	4.64
Edition, printing and recording	2.73	1.49	4.77	2.97
Petroleum and Alcohol refining	8.46	18.03	7.62	13.95
Chemicals	10.29	9.56	13.04	11.24
Plastic and rubber	3.55	2.57	3.91	2.63
Non Metallic mineral	4.66	3.17	3.31	3.71
Metallurgy of iron	7.91	7.19	5.42	7.28
Metallic products	2.54	2.21	3.26	2.86
Machines and equipments	3.81	4.19	6.81	5.61
Office machines and informatics equipments	0.23	0.29	0.44	0.83
Machines and electrical material	1.64	1.49	2.54	2.27
Electronic material and communication equipments	1.6	1.48	3.79	2.93
Medical, precision, optic and watch making equipments	0.39	0.71	0.83	0.73
Motor Vehicles	13.43	9.58	8.63	7.26
Other transportation products	0.35	0.74	0.74	2.22
House Furniture	1.36	1.3	2.04	1.65
Others	0.06	0.08	0.04	0.06
Total of Transformation Industry	**96.23**	**92.57**	**97.8**	**96.99**

Extractive Industry	**3.77**	**7.43**	**2.2**	**3.01**

Source: IBGE (2004). Adapted from Nassif and Puga (2004)

A CNI-Cepal (2001) research finds a qualitative change on investment characteristics. This study shows an increase of projects aimed at expanding production capacity and launching new products. Intermediary sectors, like paper and cellulose, petroleum, chemical and rubber and plastic were those that received most of the investments. Labor-intensive sectors such as furniture, lumber, leather and footwear and clothing received fewer investments. Machines and equipments, electronic material and communication equipments and motor vehicles were in an intermediate position.

b. International Competitiveness and Trade Indexes

This subsection analyzes how structural changes, implemented during 1996 and 2004, impacted on the industrial productive framework and in its international competitiveness. For that, we use a *revealed comparative advantage* index, developed in Lafay (1990). In addition, we calculate two indexes of trade openness for the Brazilian manufacturing industry: *import coefficient* (IC) and *export coefficient* (EC).

We calculated IC dividing import by apparent consumption, examining if import substitution is present or not. An IC reduction indicates substitution. EPI is built dividing export by output, and points out if sectoral output is destined to domestic or foreign market.

i. Revealed Comparative Advantage

The revealed comparative advantage indicator (RA) parameters are shown in Equation 2. The first term of the equation shows the effective trade balance. The second member gives the expected trade balance for sector *i*, given its share on the absolute trade balance. Dividing the equation by GDP attenuates the monetary devaluation effect over domestic production. The country has comparative advantage in sector *i* if RA is positive.

$$RA = \frac{1000}{GDP}\left[\left(X_i - M_i\right) - \left(\frac{X_i + M_i}{X + M}\right) * \left(X - M\right)\right] \qquad (1$$

Where:

M = absolute import;
M i = import sector *i*;
X = absolute export
Xi = export sector *i;*
GDP = gross domestic product.

Chart 2 shows the evolution of RA to the 1996 – 2004 period. Brazil possesses comparative advantage in beverages and food, and have comparative disadvantage in extractive industry and manufacturing industry. In manufacturing industry, the country is more competitive on labor intensive or natural resources intensive sectors.

Chart 2 - Revealed Comparative Advantage, by the Industrial Sector (1996-2004)

Industrial Sectors	1996	1997	1998	1999	2000	2001	2002	2003	2004
Food and Drinks	30.1	26.4	20.7	23.6	19.6	26.5	24.8	29.5	31.2
Tobacco	2.5	2.7	2.5	0.7	0.5	0.5	0.5	0.5	0.5
Textile	1.3	0.1	0.1	0.3	0.2	0.6	0.4	0.8	0.3
Clothing items and accessories confection	(0.1)	(0.4)	(0.3)	0.0	0.4	0.3	0.2	0.3	0.2
Hide items manufacturing and footwear	8.5	7.9	6.2	6.2	7.0	7.1	6.5	6.6	6.6
Wood	4.2	4.3	3.4	4.7	4.6	4.4	4.8	5.4	5.8
Cellulose, paper and graphic	4.4	4.3	3.6	4.8	5.1	4.2	3.6	5.3	4.3
Edition, printing and recording	(7.6)	(7.2)	(4.6)	(5.2)	(8.7)	(4.3)	(3.1)	(2.6)	(2.4)
Petroleum and Alcohol refining	(18.5)	(18.2)	(17.6)	(20.9)	(20.2)	(22.5)	(24.2)	(30.6)	(30.6)
Chemicals	(1.3)	(1.4)	(1.4)	(1.0)	(1.3)	(1.4)	(1.9)	(2.3)	(2.4)
Plastic and rubber	1.1	1.1	1.1	1.4	1.4	1.1	1.3	1.3	1.3
Non Metallic mineral	22.9	18.1	13.2	13.4	14.0	9.8	11.8	14.0	14.4
Metallurgy of iron	(1.3)	(0.8)	(0.9)	(0.7)	(0.5)	(0.9)	(1.4)	(1.4)	(1.7)
Metallic products	(12.3)	(16.7)	(13.0)	(12.4)	(9.0)	(11.8)	(11.6)	(10.8)	(10.1)
Machines and equipments	(3.5)	(4.7)	(4.9)	(5.3)	(4.2)	(6.7)	(8.1)	(7.3)	(7.8)
Office machines and informatics equipments	(15.0)	(16.2)	(12.2)	(13.2)	(14.9)	(13.2)	(7.3)	(11.1)	(12.6)
Motor Vehicles	(1.1)	0.6	0.9	1.6	3.4	2.4	4.1	6.9	5.9
Other transportation products	0.1	(0.8)	0.2	0.6	5.8	5.3	3.2	0.6	2.0
House Furniture	0.3	0.2	0.4	0.9	1.3	1.3	1.2	1.5	1.5
Total of Transformation Industry	**1.7**	**(12.9)**	**(13.2)**	**(9.5)**	**(5.6)**	**(8.8)**	**(6.6)**	**(5.1)**	**(6.3)**
Extractive Industry	**(5.9)**	**(3.9)**	**2.1**	**(1.1)**	**(3.7)**	**(3.2)**	**(4.1)**	**(7.4)**	**(10.6)**

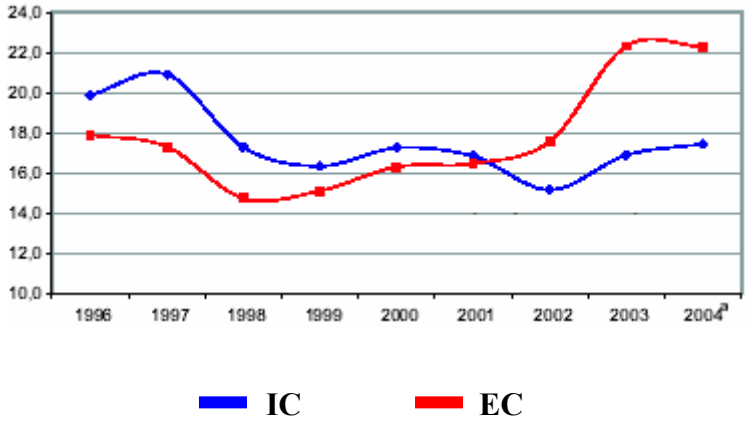
Source: Adapted from Nassif e Puga (2004)

Results also show gains in comparative advantage on motor vehicles, house furniture and other transportation products[1], and losses on chemical. Besides, the chart reports that Brazil has comparative disadvantages in technology intensive sectors, as machines and equipments, electronic material and communication equipments and electrical materials.

ii. Trade coefficients

Trade indexes fix purchase power parity between domestic output and import and export values. It does not consider import and export prices variations regarding its own segment. Chart 3 shows the evolution of IC and EC.

Chart 3 - Evolution of IC and EC (1996-2004)



Source: Nassif and Puga (2004)

We can note the IC falls in the analyzed period, which indicates import substitution. At other hand, the EC dynamics indicates the increase of production exports after 2001.

Chart 4 gives the sectoral IC. The sectoral coefficient evolutions show the diversified effect that the trade opening had on the Brazilian industrial structure. Import substitution is evident in almost all sectors of the manufacturing industry.

Sectors with the sharpest falls, as automotive vehicles, also had the largest increase in RA. However, chemical products and electric material sectors, which reduced their RA, increased IC.

[1] Aircraft, railroad, boats and motorcycles.

Chart 4 - Import Coefficient (1996-2004)

Industrial Sectors	1996	1997	1998	1999	2000	2001	2002	2003	2004
Food and Drinks	9.2	7.9	6.8	4.4	4.3	3.8	4.1	4.6	4.5
Tobacco	6.8	6.5	4.0	0.4	0.4	0.4	0.9	1.1	0.8
Textile	11.3	13.5	10.0	8.0	8.7	8.4	7.7	9.3	9.6
Clothing items and accessories confection	6.9	7.7	5.3	3.0	2.6	3.4	2.5	3.2	3.6
Hide items manufacturing and footwear	14.7	11.0	6.3	5.2	5.9	6.4	4.9	6.3	7.1
Wood	5.2	5.9	4.9	3.1	4.1	3.6	3.6	5.3	6.1
Cellulose, paper and graphic	9.5	9.7	10.1	10.9	9.8	6.1	6.0	6.5	6.2
Petroleum and Alcohol refining	13.1	12.2	9.1	12.4	15.6	10.4	8.6	9.0	7.9
Chemicals	20.6	22.0	20.2	20.7	21.1	22.1	21.1	25.1	25.0
Plastic and rubber	12.0	11.9	10.7	8.6	10.1	11.3	11.3	13.3	13.2
Non Metallic mineral	6.0	6.8	5.3	3.9	4.5	5.0	4.5	6.0	6.4
Metallurgy of iron	16.5	18.2	12.3	12.5	11.9	10.1	9.4	10.2	9.1
Metallic products	11.5	11.0	9.7	7.0	7.3	9.0	8.3	9.1	10.0
Machines and equipments	41.5	47.8	38.9	36.7	31.9	34.6	31.8	32.1	33.1
Machines and electrical material	23.8	28.1	25.7	24.1	23.1	27.3	28.6	26.8	29.4
Electronic material and communication equipments	46.6	43.0	30.1	37.3	39.4	38.6	24.6	26.4	32.4
Motor Vehicles	26.0	29.7	24.1	19.1	17.5	17.5	14.2	15.2	14.7
Other transportation products	12.2	27.7	33.5	55.4	61.0	35.9	20.2	16.9	21.6
House Furniture	12.0	11.1	8.0	6.0	6.1	6.6	6.0	6.2	6.9
Total of Transformation Industry	**18.4**	**19.6**	**16.5**	**15.4**	**16.1**	**15.6**	**13.8**	**15.1**	**15.3**
Extractive Industry	**75.8**	**72.5**	**62.0**	**58.7**	**66.7**	**70.7**	**71.2**	**83.0**	**90.4**

Source: Adapted from Nassif and Puga (2004)

Chart 5 shows the dynamics of the Export Coefficient. The growth of export participation over total production is clear. The chemical sector had a strong increase, confirming a comparative advantage reduction. According to Nassif and Puga (2004) an increase on EC not necessarily means improvement of the industry international scenario. It reflects that real devaluation led exports to the global market.

Chart 5 - Export Coefficient (1996-2004)

Industrial Sectors	1996	1997	1998	1999	2000	2001	2002	2003	2004
Food and Drinks	23.5	19.7	16.3	15.2	14.7	19.3	20.6	27.3	27.5
Tobacco	58.6	46.9	39.1	9.7	8.7	9.4	17.5	23.1	19.6
Textile	14.0	12.0	9.3	8.5	9.4	11.1	11.0	17.2	15.0
Clothing items and accessories confection	5.7	4.5	3.1	3.0	4.7	5.6	4.5	7.5	7.2
Hide items manufacturing and footwear	49.4	40.6	31.1	32.0	36.1	38.3	37.5	45.6	48.4
Wood	38.1	37.8	33.1	41.1	45.3	48.6	56.8	64.9	70.4
Cellulose, paper and graphic	16.8	16.7	17.3	24.0	22.2	15.6	18.0	25.8	21.4
Petroleum and Alcohol refining	4.9	4.3	3.5	5.9	6.8	7.2	7.6	10.3	8.8
Chemicals	9.3	9.8	8.3	8.3	9.0	8.4	9.2	12.5	11.9
Plastic and rubber	8.3	7.7	6.8	6.4	7.3	8.4	8.7	11.9	11.1
Non Metallic mineral	8.4	9.1	7.7	7.4	8.6	9.0	10.4	14.5	15.1
Metallurgy of iron	47.9	41.2	28.3	33.1	31.1	23.4	29.8	34.8	31.8
Metallic products	7.1	7.5	6.2	5.1	5.8	6.4	5.5	7.9	7.7
Machines and equipments	25.1	26.5	20.6	20.1	19.5	19.5	20.7	26.9	27.9
Machines and electrical material	12.5	12.1	9.7	9.0	10.3	10.3	11.1	13.9	14.7
Electronic material and communication equipments	10.7	10.1	6.8	11.0	16.4	18.1	15.8	15.0	16.5
Motor Vehicles	22.9	27.2	22.7	20.4	20.6	20.7	22.2	29.5	27.1
Other transportation products	11.4	22.1	31.7	57.0	74.3	51.7	34.3	25.3	35.0
House Furniture	12.1	10.6	8.9	9.6	11.6	13.0	14.1	18.1	18.9
Total of Transformation Industry	**17.0**	**16.4**	**13.8**	**14.3**	**15.4**	**15.5**	**16.3**	**20.7**	**20.5**
Extrative Industry	**66.1**	**63.7**	**63.4**	**55.9**	**60.3**	**66.9**	**71.2**	**83.7**	**89.8**

Source: Adapted from Nassif and Puga (2004)

c. Brazilian Export Performance Evaluation

The three variables obtained on the previous sections permit an evaluation of the export performance implemented after the Brazilian industry went through restructuring. Chart 6 synthesizes possible combinations between ΔRA e ΔIC.

Chart 6 - Export Competitiveness Performance

<table>
<tr><td>IC
RA</td><td colspan="2">Positive</td><td colspan="2">Negative</td></tr>
<tr><td rowspan="2">Positive</td><td>⌂EC>0</td><td>⌂EC<0</td><td colspan="2" rowspan="2">Gain</td></tr>
<tr><td>Win</td><td>Loss</td></tr>
<tr><td rowspan="2">Negative</td><td colspan="2" rowspan="2">Loss</td><td>⌂EC>0</td><td>⌂EC<0</td></tr>
<tr><td>Win</td><td>Loss</td></tr>
</table>

Source: The author

When export performance improves, ΔRA is positive, i.e. there is revealed comparative advantage gain, and if ΔIC is negative there was import substitution. The contrary (ΔRA<0 and ΔIC>0) indicates comparative advantage loss. A third possibility reflects gain in RA (ΔRA>0) with no import substitution (ΔIC>0). If ΔRA<0 and ΔIC<0, there is a revealed comparative advantage loss together with import substitution.

In the last two cases we must evaluate the EC behavior to check whether there is an increase (EC>0) or a decrease (EC<0) in exports. For example, if ΔRA>0, ΔIC>0 and EC>0, the revealed comparative advantage gain probably resulted in an increase of export, however there was no import substitution. Chart 7 shows the achieved results in the manufacturing industry for the analyzed period.

Chart 7 - RA, IC and EC Variations (1996-2004)

Industrial Sector	Revealed Comparative Advantage	Import Coefficient	Export Coefficient
Food and Drinks	1.1	(4.7)	4.0
Tobacco	(2.0)	(6.0)	(39.0)
Textile	(1.0)	(1.7)	1.0
Clothing items and accessories confection	0.3	(3.3)	1.5
Hide items manufacturing and footwear	(1.9)	(7.6)	(1.0)
Wood	1.6	0.9	32.3
Cellulose, paper and graphic	(0.1)	(3.3)	4.6
Petroleum and Alcohol refining	5.2	(5.2)	3.9
Chemicals	(12.1)	4.4	2.6
Plastic and rubber	(1.1)	1.2	2.8
Non Metallic mineral	0.2	0.4	6.7
Metallurgy of iron	(8.5)	(7.4)	(16.1)
Metallic products	(0.4)	(1.5)	0.6
Machines and equipments	2.2	(8.4)	2.8
Machines and electrical material	(4.3)	5.6	2.2
Electronic material and communication equipments	2.4	(14.2)	5.8
Motor Vehicles	7.0	(11.3)	4.2
Other transportation products	1.9	9.4	23.6
House Furniture	1.2	(5.1)	6.8
Total of Transformation Industry	**(8.0)**	**(3.1)**	**3.5**
Extractive Industry	**(4.7)**	**14.6**	**23.7**

Source: The author

Chart 8 synthesizes Chart 7 results. Sectors with ΔRA>0 and EC>0 might had competitiveness improvement. Although there has been an export increase in sectors

such as chemical, rubber and plastic and machines and electric material have lost international competitiveness. This was mostly because of the exchange rate devaluation sustained at the end of 2002, which reflected on 2003 and 2004 exports.

Chart 8 - Sectoral Effects Synthesis (1996 – 2004)

⌂ IC ⌂RA	Positive		Negative	
	⌂EC>0	⌂EC<0	⌂EC>0	⌂EC<0
Positive	Wood Other transportation products Non Metallic mineral	-	Food and Drinks Clothing items and accessories confection Petroleum and Alcohol refining Machines and equipments Electronic material and communication equipments Motor Vehicles House Furniture	-
Negative	Textile Chemicals Plastic and rubber Machines and electrical material	-	Metallic products Cellulose, paper and graphic	Hide items manufacturing and footwear Basic Metallurgy Tobacco

Source: The author

According to Haguenauer *et alii* (2001), the increase of the import coefficient in the metal-mechanical segment, as well as the increment in some segments of the chemical sector, was caused by the liberalization of some intermediate productive stages. That reduced the chain effect on early productive stages and increased the demand for final products on those segments.

Motor vehicles and electronic material and communication equipments presented strong competitiveness gains. In the automotive sector gains took place because of a automotive policy that stimulated establishment of new plants.

i. Econometric model estimation

We want to evaluate the relationship between sectoral competitiveness (proxied by the import coefficient and sectoral number of firms) with export. The analysis made on previous sections reported the effect of structural changes and the tightening of competitive pressures on sectoral export. Econometric modeling, on contrary, evaluates how the competitive pressure affected the manufacturing industry as a role, and not just as an isolated sectoral phenomenon.

Datasets cover the 1996 – 2002 period, and enfold 30 economic sectors. We use panel data methodology. The panel analyses consist on fixed effect and random effect panels.

Model specification is reported in Equation 2. Absolute number of firms is used to represent market entry difficulty level. The dataset source is CEMPRE. The degree of imported goods competitiveness variable was obtained from FUNCEX, and calculated as sectoral FOB import value.

$$EXP_{jt} = \alpha_j + IMP_{jt} + FIRM_{jt} + \delta_t + \varepsilon_{jt} \qquad (2)$$

Where,

EXP_{jt} is the export related on sector j and year t.

IMP_{jt} is the import penetration level on sector j and year t.

$FIRM_{jt}$ represents market entry difficulty level on sector j and year t.

α_j is the specific and constant in time effect, associated to each firm j, in a way where any stationary variable will be dominated by the specific effect.

δ_t is a time dummy. It reflects shocks and macroeconomic effects inflicted to all individuals in equal manner.

ε_{jt} is the random effect.

Considering the basic assumptions of the model (exogeneaity, homoskedasticity, and no autocorrelation between the error element and the specific element), the estimates are shown on Charts 9 and 10. We estimated a feasible GLS specification using cross-section residual variances, assuming the presence of cross-section heteroskedasticity. The time dummy δ_t was not significant under any model and was eliminated from all final estimations.

Chart 9 - Fixed Effect Model

Method: GLS (Cross Section Weights)

Total panel (balanced) observations: 210

Variable	Coefficient	Std. Error	t-Statistic	Prob.
IMP	6.972604	2.308429	3.020498	0.0029
FIRM	0.018272	0.003019	6.051526	0.0000
Fixed Effects				
01--α	2042.288			
02--α	1824.858			
03--α	-1160.519			
04--α	2363.542			
05--α	486.6117			
06--α	2142.331			
07--α	1939.684			
08--α	1501.410			
09--α	864.8306			
10--α	991.1426			
11--α	3311.048			
12--α	-3.741105			
13--α	632.2723			
14--α	-207.3168			
15--α	547.0367			
16--α	1798.410			
17--α	1135.839			
18--α	1935.085			
19--α	-9.176870			
20--α	2782.664			
21--α	-102.5716			
22--α	74.33707			
23--α	4916.069			
24--α	74.45454			
25--α	-128.0378			
26--α	613.3005			
27--α	2004.923			
28--α	3355.412			
29--α	670.7520			
30--α	2342.909			

Weighted Statistics

R-squared	0.964860	Mean dependent var	2982.115
Adjusted R-squared	0.958740	S.D. dependent var	1941.963
S.E. of regression	394.4612	Sum squared resid	27696742
F-statistic	4887.469	Durbin-Watson stat	1.332187
Prob(F-statistic)	0.000000		

Source: The author

Chart 10 - Random effect Model

Method: GLS (Variance Components)
Total panel (balanced) observations: 210

Variable	Coefficient	Std. Error	t-Statistic	Prob.
α	1425.329	261.6211	5.448065	0.0000
IMP	11.43833	4.185354	2.732942	0.0068
FIRM	0.004026	0.008854	0.454723	0.6498
01--α	664.6906			
02--α	397.2369			
03--α	-1629.172			
04--α	983.5862			
05--α	-925.7847			
06--α	734.7448			
07--α	751.7669			
08--α	514.9043			
09--α	-642.3840			
10--α	-725.9843			
11--α	1971.329			
12--α	-1404.477			
13--α	-880.9865			
14--α	-1494.741			
15--α	52.32747			
16--α	440.0064			
17--α	-327.7738			
18--α	474.3087			
19--α	-1021.622			
20--α	1328.660			
21--α	-897.1122			
22--α	-799.8274			
23--α	3400.621			
24--α	-1509.199			
25--α	-1415.286			
26--α	-808.3909			
27--α	518.8009			
28--α	1948.969			
29--α	-561.1023			
30--α	861.8908			

GLS Transformed Regression			
R-squared	0.894167	Mean dependent var	1643.886
Adjusted R-squared	0.893144	S.D. dependent var	1243.404
S.E. of regression	406.4537	Sum squared resid	34197360
Durbin-Watson stat	0.779092		

Unweighted Statistics including Random Effects			
R-squared	0.909276	Mean dependent var	1643.886
Adjusted R-squared	0.908399	S.D. dependent var	1243.404
S.E. of regression	376.3238	Sum squared resid	29315261
Durbin-Watson stat	0.908841		

Source: The author

From Chart 9 we can observe that the fixed effect model reported the best result, and that the random effect model presented a spurious regression (R2 > d) [2].

The estimated parameters presented intuitive results and correspond to the theory. Number of firms is significant only to FE model and is positive. The import

[2]The letter d stands for the Durbin Watson index.

variable is positive and significant, and can be regarded as a positive influence on competition over export.

Conclusions

We studied empirically how competitive pressures affect sectoral performance. Preliminary estimation results indicate deep transformations of market environment faced by firms operating in Brazil.

For that reason, this work analyzes variables such as number of firms, import competition and number of firms increase over output value, export volume and profit margins. Datasets comprehend industry absolute figures, fractioned in thirty sectors during 1996 and 2004.

We estimate the relationship between sectoral competitive pressures (proxied by import coefficient and sectoral number of firms) and sectoral exports. The study reports a positive effect of both proxies to export.

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