

# 24

**DISCUSSION PAPER**

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## **INVESTIGATING THE CAUSES OF THE RECENT BRAZILIAN TRADE SURPLUSES**

**João Victor Issler  
Ricardo Costa Gazel**





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## DISCUSSION PAPER

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INVESTIGATING THE CAUSES OF THE RECENT BRAZILIAN TRADE SURPLUSES\*

João Victor Issler\*\*

Ricardo Costa Gazel\*\*\*

1. INTRODUCTION
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3. THE MODEL
4. DATA ANALYSIS
5. EMPIRICAL RESULTS
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### ABSTRACT

This paper investigates the recent boom of the Brazilian trade surplus by estimating a partial adjustment model for exports and imports. The results indicate that the exports quantum is basically explained by the income of the rest of the world and by the gap of domestic output. The role of the exchange rate seemed to be negligible and sometimes contradictory vis-à-vis economic theory. The imports quantum depended solely on the evolution of the real exchange rate, and domestic output fluctuations did not impact imports.

## 1. INTRODUCTION:

The paper investigates the recent boom of the Brazilian trade surplus by estimating a partial adjustment model for exports and imports. Section 2 surveys the related literature for the Brazilian economy and presents the methodology used in estimating exports' and imports' equations. Section 3 explains the model used. Section 4 deals with the data to be used and section 5 presents the empirical results found. Finally, Section 6 presents the conclusions reached and indicates further research.

## 2. METHODOLOGY:

Before presenting the methodology used here, it would be useful to examine briefly previous studies done in this area. A first approach on modeling the external trade sector could be that of using a structural model, consisting of a demand and a supply functions for both imports and exports. In this case, prices and quantities are endogenously determined by a set of exogenous variables. If, say, the price of exports<sup>1</sup> is assumed to clear the market, one can estimate the reduced form for the quantity exported by OLS, or the demand and supply functions using instrumental variables or 3SLS. Zini (1988) used instrumental variables to estimate demand and supply elasticities of exports and imports. There are two possible objections to the assumption that prices clear the markets. The first is a general one: trade contracts usually guarantees long term supplies or even prices and breaking them is very costly in most cases. The second is a particular one to the Brazilian economy: the Central Bank of Brazil pegs periodically the nominal exchange rate of the domestic currency with respect to foreign currencies. If these objections are considered, an equilibrium system could not be estimated and the correct approach would be that of using a disequilibrium model where the researcher has restricted information on the quantity transacted ( $Q$ ) and on the evolution of prices ( $\Delta P$ ). For, say, exports, the researcher models  $Q$  as being the minimum of  $\{X^d, X^s\}$ , the demand and

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<sup>1</sup> We are referring here to the product of the foreign currency price of exports by the correspondent exchange rate.



supply quantum of exports. Rios (1987) uses a version of Fair and Jaffee's (1972) disequilibrium approach to estimate exports elasticities. Briefly, this disequilibrium approach uses the information contained in  $\Delta P$  to calculate the probability of being in an excess demand or an excess supply regime. Thus, for a given value of  $Q$ , one could say in which curve the economy is likely to be on: the supply curve or the demand curve. Since these two alternative regimes are being chosen based on prices fluctuations, it is important that this variable has no serious problem of measurement error. This however may not be the case.

Barbosa et alli (1988)<sup>2</sup> found statistical evidence of underinvoicing of exports for the Brazilian economy, since the gap between the official and the "Black Market" rates of the U.S. Dollar influences negatively the registered exports quantum. This suggests that fluctuations of the gap influence negatively the price of exports. Therefore, incorrect identification of regimes may occur simply due to variations of the gap of the US\$. This may be the case of Rios' disequilibrium model<sup>3</sup>.

Even though Barbosa et alli (1988) identified a statistical link between the gap of the U.S. Dollar and the exports quantum, they failed to consider the correct structural model for Brazilian exports. For example, in their estimated equation, they used as explanatory variable the real exchange rate, calculated using the price of Brazilian exports. Since the latter is an endogenous variable of the system and OLS was used, a problem of simultaneous equation bias is present.

The methodology used in this paper will consider the issues of market clearing and of the gap of the "Black Market" in the following way: given a structural model for the desired registered

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**2** The authors used the theory of choice under uncertainty to model the exporter's behavior when faced with the possibility of illegally underinvoicing a given registered export transaction. The counterpart of the underinvoicing is a "Hard Currency" unregistered revenue pay abroad to the exporter by the foreign importer. The transaction may be profitable since the exporter can sell the illegal unregistered "Hard Currency" revenue in the Brazilian "Black Market" of the Dollar. The risk involves that of paying a penalty for doing such an illegal transaction.

**3** In other words,  $P$  is a function of the gap of the U.S.\$ and so is  $\Delta P$ . Therefore, the researcher may conclude that prices are, say, rising due to a demand pressure when in fact they are rising due to a decrease in the gap.

exports (imports) quantum, we calculate its equilibrium using the hypothesis of partial adjustment. The desired registered exports (imports) quantum is modeled to depend, among other variables, on the gap between both U.S.\$ rates. This way of modeling, in our opinion, allows the hypothesis of disequilibrium while avoiding the possible bias incurred by Rios.

### 3. THE MODEL

The basic structural model for the desired registered exports quantum is<sup>4</sup>:

$$\log X_t^d = \alpha_0 + \alpha_1 \log \left( \frac{PX_t}{PW_t} \right) + \alpha_2 \log YW_t + u_t^d \quad (1)$$

$$\log X_t^s = \beta_0 + \beta_1 \log \left( \frac{PX_t \cdot E_t \cdot (1 + S_t)}{P_t} \right) + \beta_2 \log U_t + \beta_3 \log G_t + u_t^s \quad (2)$$

$$\log X_t^d = \log X_t^s \quad (3)$$

where:

$X^d$  = Desired registered exports quantum demand;

$X^s$  = Desired registered exports quantum supply;

PX = Dollar price index of Brazilian exports;

PW = Price index of World exports;

YW = Income of the rest of the world;

E = Nominal exchange rate of the Brazilian currency (CZ\$/US\$);

S = Exports subsidy rate;

P = Domestic price index for the Brazilian economy;

U = Gap of domestic output for the Brazilian economy (actual vs. potential);

G = Gap of the US\$ (Black vs. official rates);

and the u's are random shocks.

Solving the reduced form for the desired registered exports quantum ( $X^*$ ) yields:

$$\log X_t^* = \gamma_0 + \gamma_1 \log \left( \frac{PW_t \cdot E_t \cdot (1 + S_t)}{P_t} \right) + \gamma_2 \log U_t + \gamma_3 \log YW_t + \gamma_4 \log G_t + v_t \quad (4)$$

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<sup>4</sup> Extracted in part from Rios (1987).

where the  $\gamma$ 's are functions of the  $\alpha$ 's and  $\beta$ 's and  $v$  is a composite random shock.

Using the following adjustment equation<sup>5</sup>:

$$\log X_t = \log X_{t-1} + \lambda(\log X_t^* - \log X_{t-1}) \quad (5)$$

where  $0 \leq \lambda \leq 1$ ,

and combining (4) and (5) we finally get:

$$\begin{aligned} \log X_t = & \lambda \left( \gamma_0 + \gamma_1 \log \left( \frac{PW_t E_t (1 + S_t)}{P_t} \right) + \gamma_2 \log U_t + \gamma_3 \log YW_t + \gamma_4 \log G_t \right) + \\ & + (1 - \lambda) \log X_{t-1} + \lambda v_t \end{aligned} \quad (6)$$

where equation (6) is the reduced form for the registered exports quantum, which is, of course, observable<sup>6</sup>.

For the Desired registered imports quantum we will not use a structural model, since it is reasonable to assume that Brazil is a small country in the World imports' market<sup>7</sup>. Therefore, the desired registered imports equilibrium will always be on the basic demand curve, assumed here to be:

$$\log M_t^d = \delta_0 + \delta_1 \log Y_t + \delta_2 \log \left( \frac{PM_t E_t}{P_t} \right) + \delta_3 \log G_t + e_t \quad (7)$$

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<sup>5</sup> See Ramanathan (1989) p. 390.

<sup>6</sup> There may exist simultaneity between  $X$  and  $G$  if exporters sell part or all their illegal US\$ in the Brazilian "Black Market." This possible problem may be negligible if exporters are "small" vis-a-vis the total supply of US\$ in this market. We are grateful to Jose Guilherme A. Reis in calling our attention to this point.

<sup>7</sup> As noted by Rios (1987) and confirmed by other independent studies this is not a realistic hypothesis for Brazilian exports.

where:

$M^d$  = Desired registered imports quantum;

$Y$  = Domestic income;

$PM$  = Price index for Brazilian imports;

and  $e$  is a random shock.

Using the logical counterpart to (5) we can solve for the Registered imports quantum ( $M$ ):

$$\log M_t = \theta \cdot \left( \delta_0 + \delta_1 \log Y_t + \delta_2 \log \left( \frac{PM_t \cdot E_t}{P_t} \right) + \delta_3 \log G_t \right) + (1 - \theta) \cdot \log M_{t-1} + \theta \cdot e_t \quad (8)$$

Summarizing, the estimated exports equation and expected coefficients' signs are:

$$X = X \left[ X_{-1}, YW, U, \left( \frac{PW \cdot (1+S) \cdot E}{P} \right), G \right]$$

$$\frac{\partial X}{\partial YW} > 0$$

$$\frac{\partial X}{\partial U} < 0$$

$$\frac{\partial X}{\partial \left( \frac{E \cdot (1+S) \cdot PW}{P} \right)} > 0$$

$$\frac{\partial X}{\partial G} < 0$$

For the imports equation we have:

$$M = M \left[ M_{-1}, Y, \left( \frac{PM \cdot E}{P} \right), G \right]$$

$$\frac{\partial M}{\partial Y} > 0$$

$$\frac{\partial M}{\partial \left( \frac{PM \cdot E}{P} \right)} < 0$$

$$\frac{\partial M}{\partial G} > 0$$

A final qualification is appropriate about the methodology to be used in the estimation of the equations described above. The structural forms together with the partial adjustment equation are nested on a general type of Autoregressive-Distributed lag [AD(.)] equation as exposed by Hendry et alii (1984):

$$d_0(L)y_t = \sum_{j=1}^k d_j z_{jt} + \varepsilon_t \quad (9)$$

which, in its simplest version with one lag and one explanatory variable {AD(1,1)} is:

$$y_t = \beta_1 z_t + \beta_2 z_{t-1} + \beta_3 y_{t-1} + \varepsilon_t \quad (10)$$

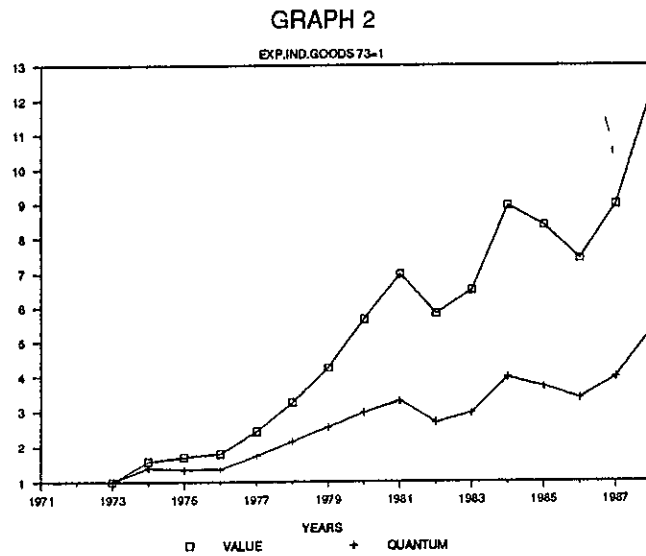
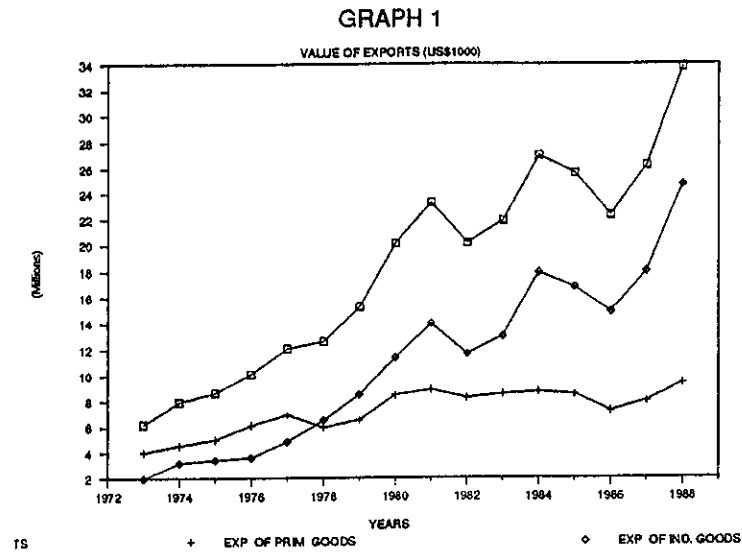
where the error term  $\varepsilon_t$  is iid  $N(0, \sigma^2)$  and  $|\beta_3| < 1$ .

#### 4. DATA ANALYSIS:

Graph 1 below shows the recent evolution of the value of Brazilian exports. It is clear that the magnitudes of increase in all three series are much higher in the 1980's than they were in the 1970's. Moreover, most of the increase in total exports is due to the increase in the exports of industrialized goods (X). It is clear a high correlation among exports value and quantum (see Graph 2)<sup>8</sup>. Hence, most fluctuations on the value of exports are not price related and any attempt to explain value fluctuations should do it by explaining quantum fluctuations. Since the exports of industrialized goods is the "dynamic" component of total exports we will limit our analysis to its variations (appearing as X in the graphs below).

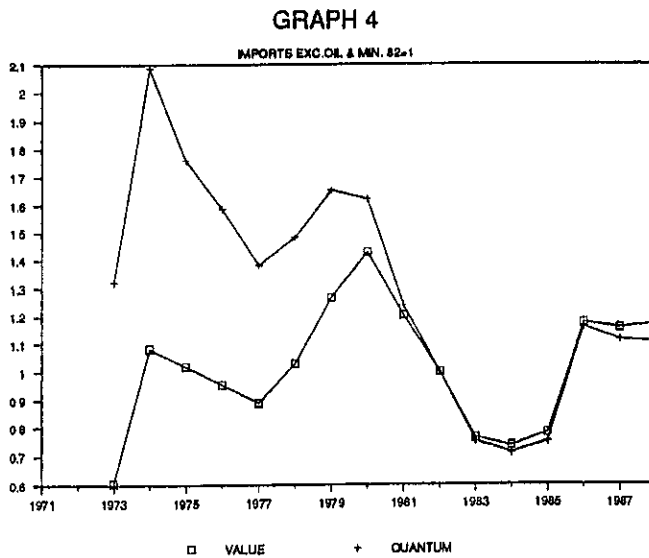
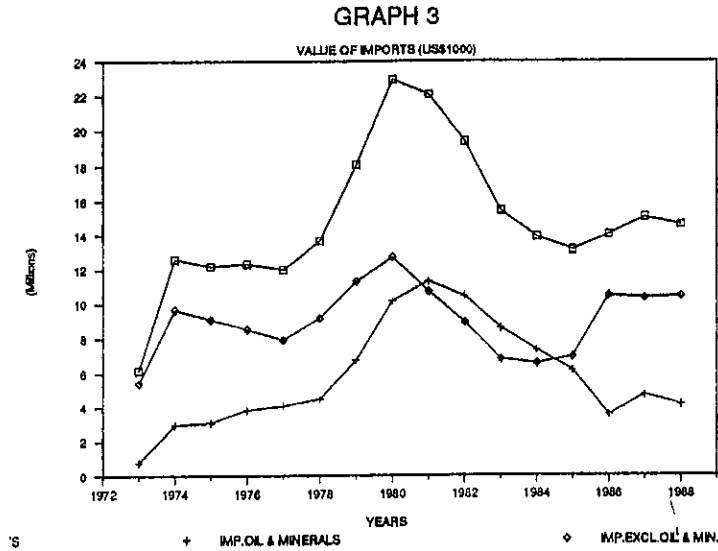
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<sup>8</sup> For exports, as well as for imports, quantum series were obtained using the U.S. wholesale price index as deflator. This was done because of the lack of reliable price series for Brazilian trade.

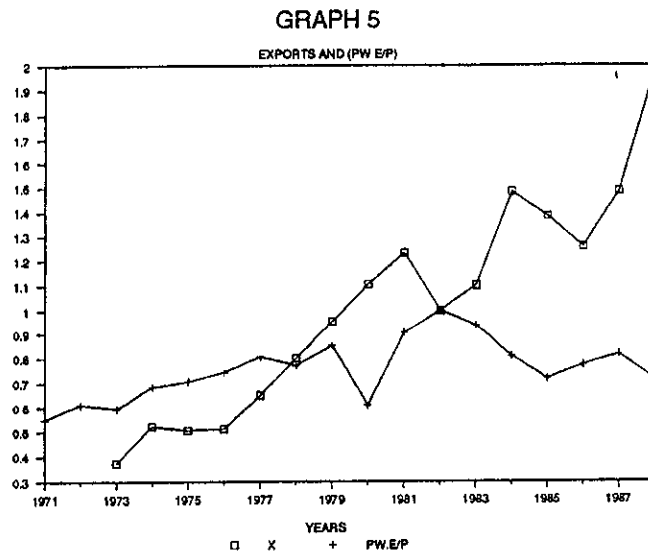


The imports series are shown below in Graph 3. A major decrease can be observed after 1980 in total imports. This is due to a reduction in imports of the two categories: oil & minerals (mainly oil and coal) and the sum of consumption goods, capital goods and raw materials. The successful reduction on the value of imports of oil & minerals was mainly due to governmental policies that were not market oriented. As commented by several authors none of these policies could have been carried out successfully without massive subsidies. Therefore, analyzing the reduction of imports of oil & minerals cannot be accomplished using ordinary trade theory. Moreover, trying to model

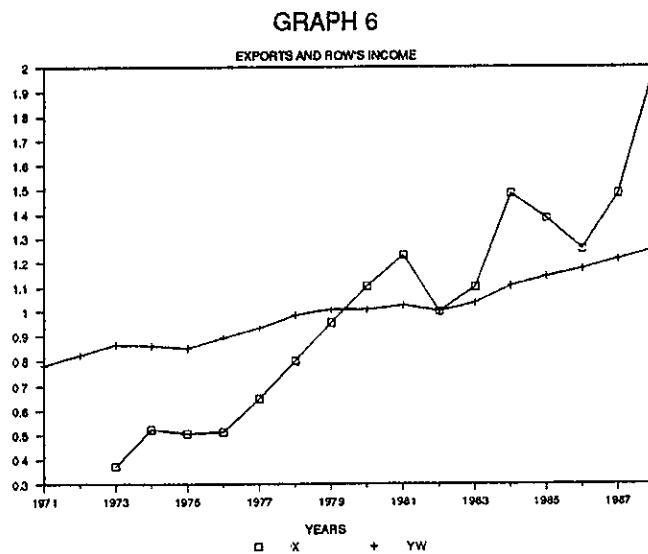
econometrically this phenomenon would certainly require data that is not available today. Therefore, we will analyze only the behavior of the quantum of imports of consumption goods, capital goods and raw materials (appearing as M in the graphs below).



The policy of mini devaluations of the domestic currency in Brazil has been used since the end of the sixties, however, since 1979, this policy was used in conjunction with major devaluations (December-1979, February-1983, etc.). Despite these continuous devaluations, the Cruzado remained overvalued in some periods included in our sample (see Graph 5).

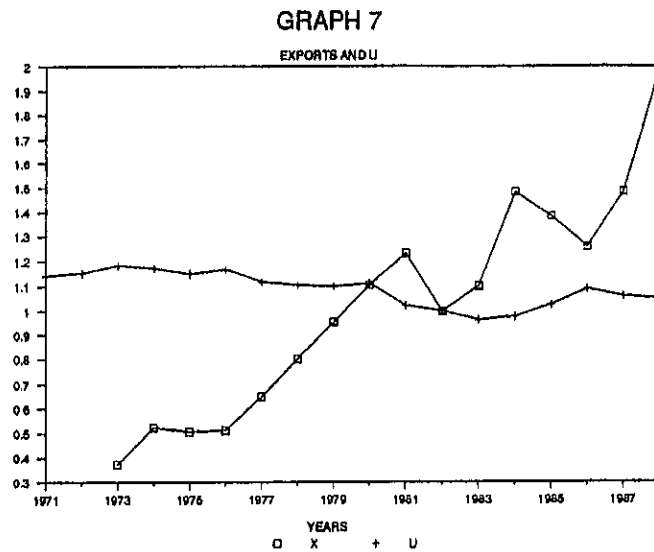


A very important variable in any analysis of the recent Brazilian trade surplus is the world's income (YW). The expansion of the international trade in 1984 as well as its reduction in the previous years may have had influenced Brazilian exports (see Graph 6).



It is important to note that the domestic output played an interesting role in explaining the trade surplus. Graph 7 shows how exports and gap of domestic output (U) varied in opposite directions most of the time, suggesting that in order to increase exports it is necessary a reduction in the domestic demand.



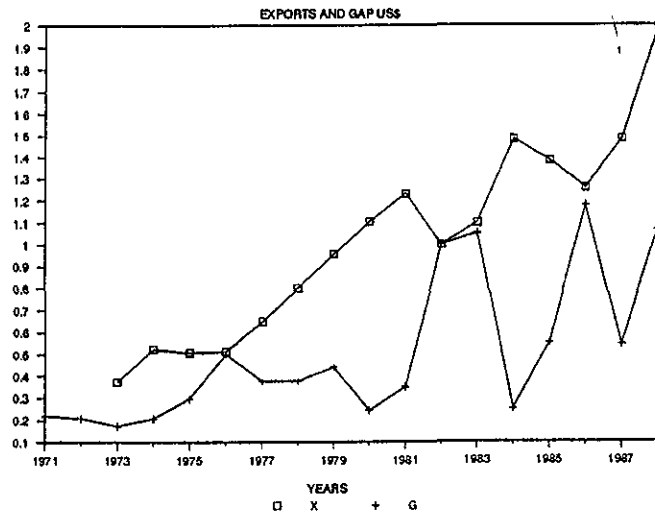


Two other variables - the gap between official and black-market values of the American dollar (G) and the value of the American dollar vis-a-vis other foreign currencies (B) - have not received special attention on the trade literature in Brazil. Graph 8 suggests that the gap of the U.S.\$ and exports may be negatively related. The same can be observed for the relationship between exports and the Dollar value of a basket of foreign currencies. This relationship suggests that international fluctuations of the American dollar have some impact on the performance of the Brazilian trade balance (see Graph 9).<sup>9</sup>

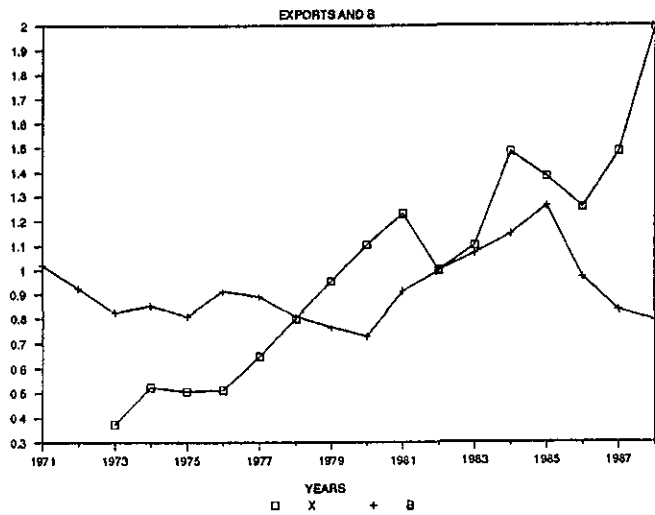
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<sup>9</sup> The reason may be related to the fact that most of the time the real Cruzado is pegged to the Dollar.

GRAPH 8

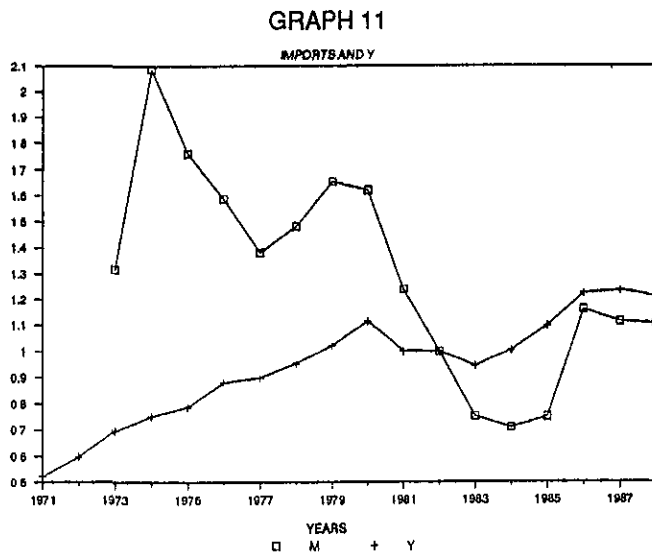
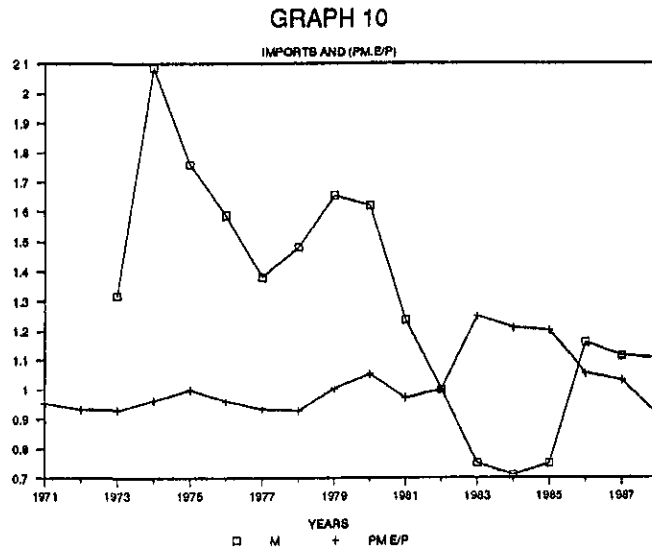


GRAPH 9



Graphs 10 and 11 show the relationship of the imports quantum and the real exchange rate<sup>10</sup> and domestic output respectively. It seems that the relationship of imports and the real exchange rate is negative, as expected, however, the relationship of imports and domestic output is not easily captured just by looking at Graph 10.

<sup>10</sup> Due to the lack of data, we could not include tariffs and financial taxes on the value of the real exchange rate.



## 5. EMPIRICAL RESULTS:

The first step in estimating the Autoregressive-Distributed lag equations described in Section 2 was to try to infer the adequate lag structure of each of them. With that purpose, a sequential F test was performed starting with an  $AD(m, m, \dots, m)$  specification. The F test consisted in testing the joint significance of all lag  $m$  regressors. If they were jointly equal to zero, the same test was performed using an  $AD[(m-1), (m-1), \dots, (m-1)]$  specification. Otherwise,  $m$  was considered the initial



*basic* lag structure and a finer search was done, where explanatory variables were allowed to have different lags, i.e., the specification  $AD(m_1, m_2, \dots, m_k)$  was allowed; where  $m_i$  ( $i=1, \dots, k$ ) represent the lag of the  $i$ th regressor on the estimated equation.

As a starting point, the initial value of  $m$  was set to eight and the sequential  $F$  tests indicated, at 5% of significance, that the basic lag structure of all equations was one, i.e.,  $AD(1, 1, \dots, 1)$ . Latter, a finer search indicated a different lag structures for the estimated regressions and these are reported in this Section.

The data availability proved to be a problem, especially in what concerns external sector price indices. There are no constructed price indices, as they are theoretically defined, and the existing ones are always constructed by dividing the total value of trade by the correspondent traded weight, what turns these variables unsuited for Time-Series analysis. Therefore, in these cases, and in others as well, proxies had to be used, what constitutes a second-best alternative.

The exports quantum equation used the following variables in quarterly data from 1971.I to 1988.II (data sources in parenthesis):

(i) The exports quantum was found by dividing the total exports of industrialized goods (Macrodados database) by the wholesale price index for the U.S. economy (Macrodados database); the latter was used here as a proxy for the price of Brazilian exports.

(ii) The income of the rest of the world used the real U.S. GNP (Citibank database) as a proxy.

(iii) The reduced form real exchange rate used the nominal exchange rate Cruzado-Dollar and the wholesale price index for the Brazilian economy (Macrodados database); the implicit deflator of U.S. imports (Citibank database) here as a proxy for the world's price of exports; the subsidy rate as calculated by Bauman (1989). Since the subsidy rate was only calculated in an annual basis, we had to impose their constancy during the whole year to fulfill the quarterly data requirement.

(iv) The gap of the Brazilian output was proxied by the research done using the industrial sector and published by Getulio Vargas Foundation (FGV database).

(v) The gap of the US\$ was calculated using official and "Black Market" rates (Macrodatos database).

Since the real Cruzado is usually pegged to the U.S. Dollar we introduced the nominal exchange rate Basket-Dollar<sup>11</sup> (Citibank database) to capture possible influences of international fluctuations of the US\$ on the exports quantum.

Seasonal quarterly dummies (D1,D2,D3) were also included as explanatory variables.

DEPENDENT VAR.: EXPORTS QUANTUM (X)			
EXPL. VAR.	EST. COEFF.	T-STAT.	BETA COEFFICIENT
INTERCEPT	- 2.31	- 0.89	Na
YW	1.24	5.66	0.27
PW.E(1+S)/P	0.40	2.33	0.10
G	- 0.05	- 2.75	- 0.06
U	- 1.84	- 3.82	- 0.21
B	- 0.20	- 1.98	- 0.05
X <sub>-1</sub>	0.62	10.26	0.64
U <sub>-1</sub>	1.35	2.79	0.15
D1	- 0.18	- 6.96	- 0.12

ADJ. RSQ. = 0.98  
 F STAT. = 396.50  
 DURBIN h = 1.76

<sup>11</sup> The basket of currencies included currencies of the following countries: UK, Germany, Japan, France, Canada, Italy, Netherlands, Belgium, Sweden and Switzerland and was measured as the basket value of the US\$, i.e., basket/US\$. Even though we could include this variable by calculating a composite exchange rate of the Cruzado and a basket of currencies including the Dollar, this way of modelling does not allow to separate effects of the exchange rate policy of the government and that of international fluctuations of the Dollar.

The estimated exports equation presented a very good statistical fit. Most estimated coefficients have the expected signs, and elasticities can be obtained using the estimated  $\lambda$ , which lies around 0.38. This suggests a slow velocity of adjustment towards equilibrium for desired exports. The Durbin-h statistic doesn't confirm any serious problem of first order serially correlated errors. The statistical significance of G and B are satisfactory, hinting that their inclusion is statistically adequate<sup>12</sup>.

An apparent problem of this regression is the signs of U and  $U_{-1}$ . A joint F test of significance for their sum indicated that it is equal to zero at 15%. However it is different from zero at 20% (P-value of 18%). This is only a weak indication of insignificance, since the same test accepted (at 1%) the hypothesis that this sum equals -0.5.

If the whole sample is considered, the magnitude of the sum of the beta coefficients indicates that the exports quantum variance is mainly explained by income of the rest of the world (ROW) and by the reduced form real exchange rate. These coefficients, however, measure only average impacts of explanatory variables on the variance of X.

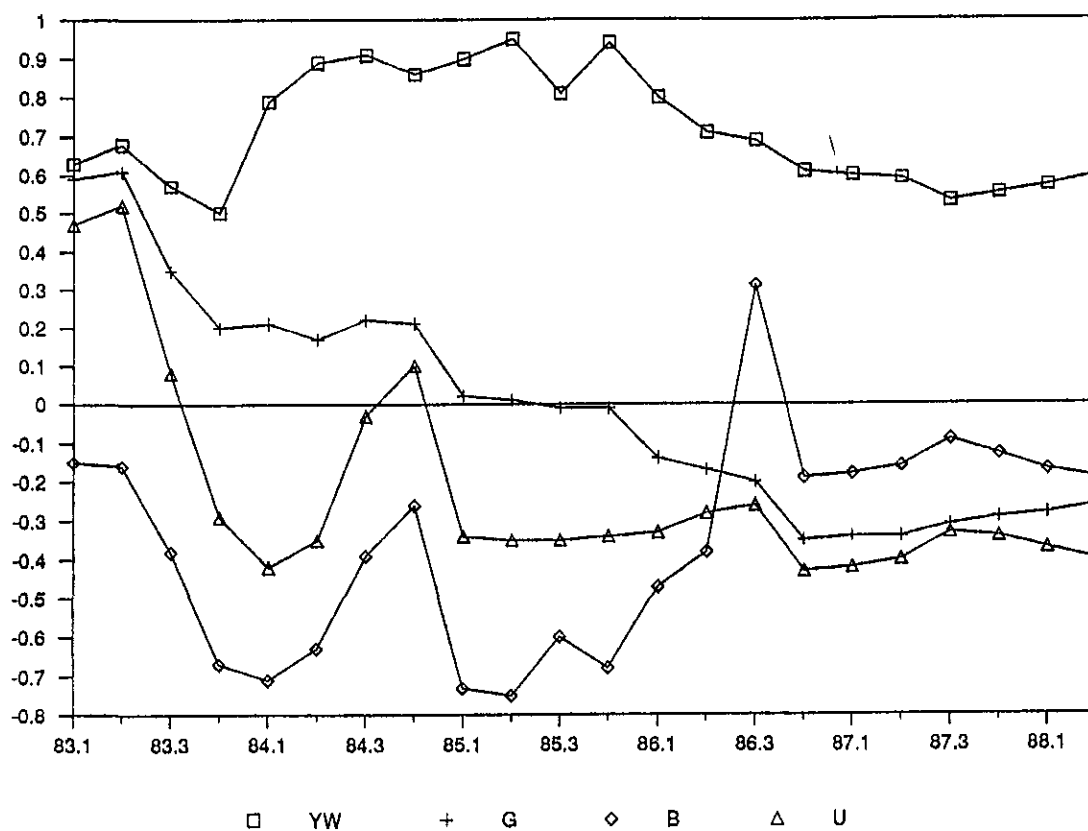
To measure explanatory variables effects on X from 1983 to 1988 a special technique was used: beta coefficients were estimated from 1983.1 to 1988.2, using a fixed sample begin (1980.1) and varying the sample end. The estimated beta coefficients may be interpreted as new sample impacts of the explanatory variables. A graph for the relevant beta coefficients of exports is shown below. Unexpectedly, the real exchange rate coefficients are all non-significant at 5%, indicating that this variable had no impact on X during 1983-88. The variables with greatest impacts on X for the whole 1983-88 period are, in that order, YW, U, G and B. However, from 1983 through 1985, B had the second largest impact on X. The global impact of U is felt strongly after 1987, contrasting

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<sup>12</sup> This may constitute a problem of omitted variables for exports equations using the same *basic* model and excluding G and B.

with its behavior during the initial years<sup>13</sup>. The final values for the beta coefficients can be interpreted as steady state influences during the 1983-88 period, since they are obtained using the whole sample period of 1980.I to 1988.II<sup>14</sup>.

### SUM OF BETA COEFFICIENTS FOR EXPORTS



The economic interpretation of the presented results for exports is as follows:

(i) If the 1971-88 period is considered, we can say that the exports quantum is basically determined by the behavior of the R.O.W.'s income and by the reduced form exchange rate. The gap of the US\$ has only a small effect on X, however significant. Also, we cannot reject the hypothesis that

<sup>13</sup> Surprisingly, the beta coefficient is positive for some initial quarters and only behaves as expected after 1985.I.

<sup>14</sup> It is interesting to see the degree of convergence of different beta coefficients for the 1983-88 period.

international fluctuations of the U.S. Dollar affects Brazilian exports, despite the small sum of beta coefficients.

(ii) If the recent past is considered (1983-88) the exports quantum is still heavily influenced by the R.O.W's income. This is specially true after 1984, reflecting the beginning of a boom of international trade for this year. The effect of a domestic recession is also negatively strong shows the evolution of the beta coefficient of U. This can be interpreted as market differentiation by domestic producers: the domestic market being privileged (customer market) whenever its demand is strong<sup>15</sup>. This was confirmed by the data during the Cruzado plan experience, since the beta coefficient of U increased in absolute value from 1986.III to 1987.I. Despite its small beta coefficient in the 1971-88 the gap of the US\$ had a large impact on X during recent years. This is especially true after 1985. Finally, the recent boom of exports cannot be explained by exchange rate devaluations, since the reduced form real exchange rate does not significantly influences X<sup>16</sup>.

The imports quantum equation used the following variables in quarterly data from 1972.I to 1988.II (data sources in parenthesis):

(i) The imports quantum was found by dividing the total imports of consumption goods, capital goods and raw materials (Macrodados database) by the wholesale price index for the U.S. economy (Macrodados database). The latter was used here as a proxy for the price of Brazilian imports.

(ii) The domestic income used the Brazilian industrial production (FIBGE database) as a proxy.

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**15** This probably can be modeled as a choice under uncertainty model in the following terms: due to consistent high inflation, agents tend to shrink contract tenures. External trade contracts are long term commitments that cannot be altered by Brazilian firms acting alone. Domestic contracts, on the other hand, tend to be much less short termed, especially under high inflation. So, to avoid long term deterioration of revenues, risk averse Brazilian firms would prefer the domestic market *ceteris paribus*. However, their ability to sell in the domestic market is bounded by output fluctuations and this explains this countercyclical exports dependency on output.

**16** Moreover, its beta coefficient sign is very erratic, what makes difficult any coherent economic analysis.



(iii) The real exchange rate used the nominal exchange rate Cruzado-Dollar and the wholesale price index for the Brazilian economy (Macrodados database); the implicit deflator of U.S. exports (Citibank database), which is used here as a proxy for the price of Brazilian imports.

Dummies (D1,D2,D3) to capture seasonal effects were also included.

DEPENDENT VAR.: IMPORTS QUANTUM (M)			
EXPL. VAR.	EST. COEFF.	T-STAT.	BETA COEFFICIENT
INTERCEPT	2.36	2.80	Na
Y	0.60	4.24	0.33
PM.E/P	- 0.36	- 2.43	- 0.11
M <sub>1</sub>	0.82	17.37	0.81
Y <sub>.7</sub>	- 0.57	- 5.15	- 0.41
D1	- 0.10	- 2.82	- 0.13
D2	0.07	2.04	0.10
D3	0.08	2.64	0.11

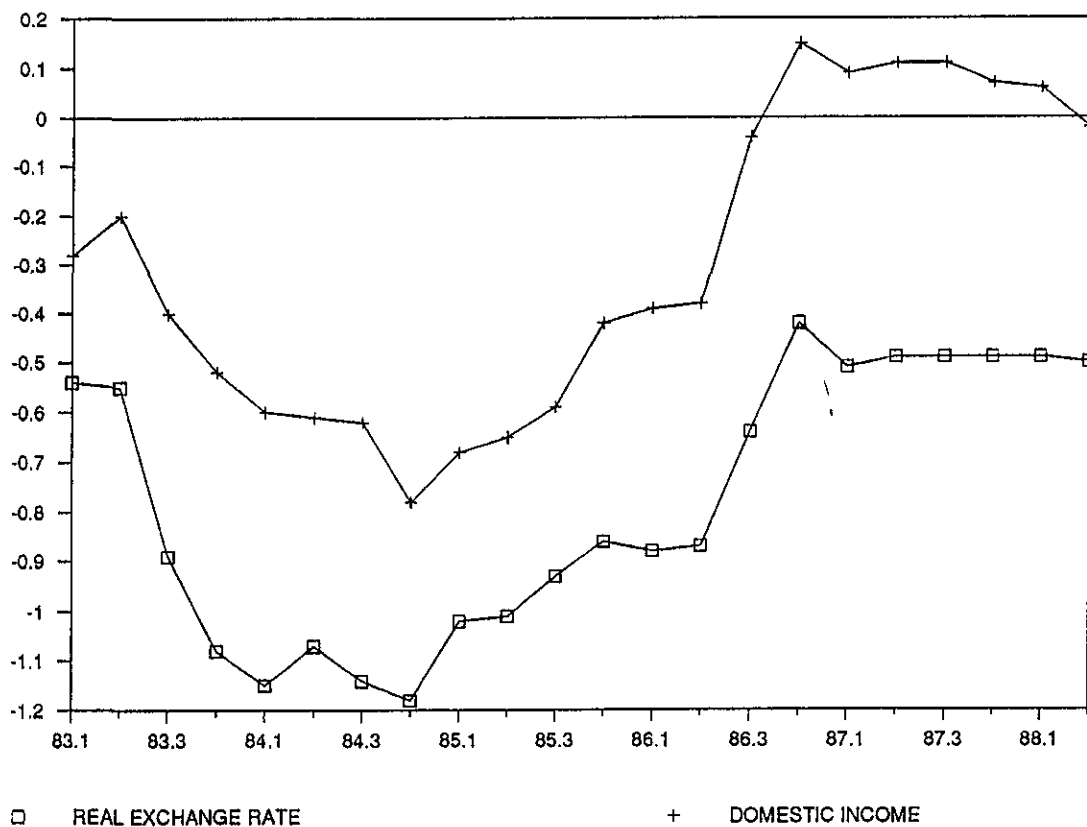
ADJ. RSQ. = 0.93  
 F STAT. = 123.10  
 DURBIN h = 0.66

The estimated imports equation presented a very good fit. The variables G and B didn't show significant coefficients as to justify their inclusion. The estimated  $\theta$  was around 0.18, indicating a slower adjustment towards desired imports than that of exports. The coefficient of the real exchange rate presented a high significance, however, the same cannot be said with respect to Y. The sum of Y to Y<sub>.7</sub> is statistically equal to zero, a fact that may be explained by the proxy used. The Durbin h statistic do not accept the hypothesis of first order serially correlated errors. If the whole period

1972-88 is considered,  $(PM.E/P)$  is the only exogenous variable that impacts the variance of  $M$ .

To investigate recent effects of  $Y$  and  $(PM.E/P)$  on the variance of  $M$ , we applied the same procedure done for the exports quantum, using 1981.I as initial sample. The beta coefficients calculated for these two variables appear below. The only coefficient with the correct sign is that of the real exchange rate. The beta coefficient for  $Y$  has most of the time the wrong sign and converges to zero at the end of the sample, showing only a small impact of  $Y$  on the variance of  $M$ .

### SUM OF BETA COEFFICIENTS FOR IMPORTS



The economic interpretation of the results presented above are: despite the sample period analyzed, the only variable that statistically influences  $M$  is  $(PM.E/P)$ . However, the "steady-state"

beta coefficient found for this variable during 1983-88 is higher than that found for 1972-88. The impact of this variable on M is markedly high from 1983 through 1985, capturing the effect of the nominal devaluation of 1983 on M.

Finally, a dummy version of the Chow test<sup>17</sup> was performed for both regressions after 1983. The F statistics found rejected the hypotheses that there is no structural shift for the intercept and coefficients at 5%. This may imply that the linearity assumption is too strong and that a Non-Linear method should be used. Testing linearity is not tried here but it is definitely a topic for further research<sup>18</sup>. Possible explanations about these structural shifts are as follows: for exports, it may be the impact of the presence of a newly installed (1970's) output capacity. For imports, it may be introduction of bureaucracy and tariffs in importing after the Mexican moratorium of 1982.

## 6. CONCLUSION:

The present research aimed to explain the recent boom of the Brazilian trade surplus. Since most of this boom reflects an increase of the quantum of exports and a reduction of the quantum of imports, we estimated both exports and imports quantum equations. The econometric results of these estimations indicate:

(i) From 1971-88, the exports quantum is basically explained by R.O.W.'s income and by the gap of domestic output, with the gap of the US\$ and the basket-dollar rate playing a less important role. From 1983-88, the R.O.W.'s income is the most important determinant of the quantum boom. We also found evidence that the currently depressed environment of the Brazilian economy is relevant in explaining this boom. Even though the gap of the US\$ and the basket-dollar are important in explaining X, their influence is not as big as that of YW and U. The role of the exchange rate seemed to be negligible and sometimes contradictory vis-a-vis economic theory.

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<sup>17</sup> See Ramanathan (1989) p. 263.

<sup>18</sup> If Linearity is rejected the beta coefficient analyses done may be invalid, since it is done used a linear model.

(ii) From 1972-88 the imports quantum depended solely on the evolution of the real exchange rate. Domestic output fluctuations don't seem to impact  $M$ . This evidence was also found for the 1983-88 period.

Of course, it cannot be forgotten that the boom of the trade surplus was in part influenced by government policies aimed to substitute imported oil therefore reducing total imports<sup>19</sup>. This phenomenon was not analyzed here since it is very difficult to model econometrically.

Given the econometric results found, it seems that there is no room for optimism due to the present Brazilian trade surplus. On one hand, it seems that the country is perfectly inserted in the international trade market, being able to supply some industrialized goods at increasing rates. On the other hand, the supply of these goods can stop if there is an internal demand push. Due to the size of the external debt, the issue of growth and trade surpluses needs further investigation and the present paper is only a slight contribution.

Further research should try to replicate the present results using adequate price deflators as soon as they become available. Also, Non-Linear methods should be tried and the issue of simultaneity of the gap and  $X$  investigated. Due to the unavailability of price indices for exports and imports any conclusions about the causes of the present boom of the trade surplus should not be regarded as definitive but subject to revision.

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<sup>19</sup> In reducing oil imports in the 1980's price movements also played an important role.

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