Latin American Trade Elasticities

Thomas M. Fullerton, Jr., W. Charles Sawyer, and Richard L. Sprinkle

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ABSTRACT

An important issue in applied international economics is the extent to which trade flows adjust to changes in income, relative prices, and exchange rates. While there have been numerous surveys regarding merchandise trade elasticities in industrial economies such as the Japan and the United States, relatively little work has been completed with respect to developing regions of the world. Material in this article examines the literature on empirical estimates of import and export elasticities published for Latin America.

Introduction

A traditional area of research in international economics has been the estimation of income, relative price, and exchange rate elasticities for both imports and exports. Aside from general academic interest, there has been a significant amount of emphasis placed on this topic because of its substantial implications for trade policy and balance of payment questions. Calculation of the trade flow impacts associated with the elimination of protectionist barriers under international treaties such as the General Agreement on Tariffs and Trade (now administered by the World Trade Organization), the Caribbean Basin Initiative, and the North American Free Trade Agreement have directly incorporated trade elasticities into their analyses (for example, see Hufbauer and Schott, 1992). The trend toward disaggregating trade elasticity measures into their component parts has accelerated over the past thirty years with the advent of floating exchange rates, widespread business cycle disparities, and the expansion of international commerce as a percentage of gross domestic product in virtually all economies (Sawyer and Sprinkle, 1996).

To date, the vast majority of this research has been directed toward relatively advanced economies such as the Japan or the United States (Orcutt, 1950; Sawyer and Sprinkle, 1997). Given widespread moves toward increased trade liberalization, this topic is of particular relevance in Latin America (Medrano, 1997). The central roles played by merchandise and service trade flows in the 1980s debt crisis further underscores the importance of this subject for the region (Fullerton, 1993a,b). This paper attempts to partially fill this gap in the literature by surveying the literature on the empirical estimation of import and export elasticities for Latin America. More specifically, the period from 1975 through 1997 is covered.

Organization of the paper follows the general approach utilized for other regions of the world for this topic. Section two discusses functional form for both classes of trade equations. Section three reviews several of the prominent issues involved in the estimation of import and export demand equations. Section four summarizes income, price, and exchange rate elasticity estimates published to date for Latin American economies. A summary section with suggestions for future empirical research with respect to international trade in Latin America finalizes the paper.

Import and Export Function Estimation

The traditional approach to estimating import demand equations utilizes a specification involving income and relative prices. As shown in Equation 1, import prices are measured relative to domestic prices in this formulation:

1. $M = f(+Y, -PM/PD)$.

The algebraic signs inside the parentheses indicate the expected signs of the first partial derivatives of the function with respect to each of the arguments. Empirical versions of Equation 1 generally utilize real imports for M, real gross domestic product (GDP) for Y, an import unit value index for PM, and the domestic producer price or wholesale price index for PD.

It is also possible to employ a specification wherein the relative price ratio is broken into its component pieces (Murray and Ginman, 1976). Such an approach is shown in Equation 2:

2. $M = f(+Y, -PM, +PD)$,

where the variable definitions are the same as above. The split-price specification allows Equation 2 to identify differential responses in import volumes to changes in international prices versus domestic prices. Aside from econometric parameter heterogeneity considerations, the split-price functional form is potentially important for Latin American economies where the elimination of trade barriers implies lower import prices that will directly impact PM, but affect PD only indirectly. Similarly, the regional move

toward more flexible exchange rates in Latin America, initiated by Colombia in 1966 but not widely followed until the structural reform efforts of the 1990s (Fullerton and Sprinkle, 1996), leads to direct effects on import prices at the wholesale stage of distribution. As shown below, this approach has been employed in several instances in Latin American trade studies.

A further innovation decomposes import prices into changes in international prices and the exchange rate (Wilson and Takacs, 1979). This version of a theoretical import function is shown in Equation 3:

3. $M = f(+Y, -PM, XR, +PD)$,

where XR represents the exchange rate variable. The algebraic sign associated with XR will be negative if the exchange rate is defined in terms of local currency units per unit of foreign currency, and positive if otherwise. Given the widespread move toward flexible nominal currency valuation systems throughout Latin America (Fullerton and Sprinkle, 1996), this specification offers a principal advantage of permitting import flows to respond in a differential manner to exchange rate and global price changes. On average, the former tend to be more volatile than the latter. This modeling strategy has also been utilized for several countries in the region.

As shown in Equation 4, exports can be modeled in an analogous manner:

4. $X = f(+YF, -PX, XR, +PF)$,

where X stands for exports. Foreign market, or world, income is represented by YF and is expected to carry a positive coefficient. Export prices defined in local currency units will vary inversely with export demand. Expressing export prices in the domestic currency allows the exchange rate, XR, to enter the equation as a separate argument whose sign will depend on how this measure is defined. Because local exports compete for market share with goods and services produced abroad, the global price variable, PF, has a positive sign associated with it. As with the final import equation specification, separating the three price components permits accounting for potentially heterogeneous reactions of export flows to changes in each respective element.

Special Issues in Import and Export Equation Estimation

Following the publication of Orcutt's (1950) article, a large volume of empirical and theoretical research regarding trade elasticities in the United States, Western Europe, and Japan has been published (see Stern, Francis, and Schumaker, 1976, and Goldstein and Khan, 1985). Much of the effort devoted to these topics in recent years revolved around how trade elasticities are utilized in policy analytic exercises. Another recurring theme has involved methodological econometric issues reflecting both mathematical functionality and time series inference. While the original aggregate price ratio approach avoids potential multicollinearity between import and domestic price series, it imposes exact regression coefficient reciprocity. Recent evidence reported for Mexico indicates that demand function parametric homogeneity of this nature may not be appropriate for Latin American economies (Fullerton, Sawyer, and Sprinkle, 1997). Inadvertant imposition of mistaken nonsample information in such cases will introduce estimation bias in the resulting equations. That raises the risk of misleading policy and forecast inferences in any empirical exercises based on subsequent model simulation efforts.

One offshoot of the post-Bretton Woods fluctuating exchange rate era is an increased awareness of lagged trade flow responses to changes in the right-hand side variables of any individual equation specification (Demirden and Pastine, 1995). The J-curve literature has also established that developing country trade flows will not respond instantaneously to income, exchange rate, or relative price shifts (Tegene, 1989). A common practice is to specify polynomial lag structures that allow the impacts associated with changes in the independent variables to grow to a peak over time and then decline (Wilson

and Takacs, 1979). Interestingly, a wide body of evidence has emerged that points to substantially different international commerce reactions to income and relative price component variations. In particular, merchandise trade has been found to respond sluggishly to exchange rate fluctuations (Dixit, 1989). The lags on income terms, in contrast, have been found to be two quarters or less for both imports and exports. Relative prices carry rather long lags of up to twelve quarters, while for exports they tend to be much more abbreviated (Deyak, Sawyer, and Sprinkle, 1990, 1993).

Numerous advances in times series econometrics have spurred additional research on the topic of trade elasticities. Structural stability tests have been used to examine the question of parameter heterogeneity under different exchange rate and trade barrier policy regimes (Stern, Baum, and Greene, 1979). Evidence regarding relative price component inequality has been uncovered in several different contexts (Corbo, 1985; Fullerton, 1993a, b; Warner and Kreinin, 1983). Specification error tests have been utilized to examine the reliability of single-equation models for merchandise trade flows (Thursby and Thursby, 1984). Cointegration tests have also been applied to a variety of international commerce data sets to examine whether the econometric estimation of trade elasticities is even a valid exercise (Carone, 1996; Fullerton, Sawyer, and Sprinkle, 1997). In general, the applications of the new methodologies to estimating trade equations have suggested refinements to the basic approach utilized throughout the post-war period.

Latin American Import and Export Elasticity Estimates

The income, price, and exchange rate elasticities tabulated in this section of the paper date from 1976 forward. This time period is similar to that of other regional surveys (Sawyer and Sprinkle, 1996; Sawyer and Sprinkle, 1997). As noted by those papers, this corresponds with the application of new functional forms and econometric procedures to this area of the literature. It also coincides with the transition from the import substitution era of trade controls in Latin America and the transition to more market oriented policy practices with respect to merchandise imports and exports. Not all estimates have been included in the tables. Papers using the so-called Armington terms-of-trade approach have been omitted (Shiells and Reinert, 1993). Studies reporting counter-intuitive coefficient signs have also been eliminated since the likelihood of such estimates being utilized to quantify the possible impacts of trade barrier removal is remote.

The references to these elasticities are drawn principally from the **Journal of Economic Literature** electronic data base. The latter source is fairly comprehensive and yields a lengthy list of estimates for all of the major Latin American economies and many of the smaller ones as well. However, computerized access to all of the Spanish and Portuguese language journal articles on this topic is not feasible at present. Since the sources included in the tabular material below include some of the most highly cited work published with respect to Latin American trade flows, they are at least partially indicative of the specifications that have been utilized in the articles that are not currently available in electronic format. Additionally, some further references are obtained by using the reference sections of these articles and others published for Latin American economies. The review at hand, therefore, provides a good starting point for understanding what has happened to date with regard to trade flow research in this region of the globe. It cannot, however, be regarded as a comprehensive survey of all of the articles published on the topic in general.

Table I reports elasticities for equations estimated for total merchandise imports. Material in the table is organized in a straightforward manner. Year of publication is listed in the first column. Column 2 contains the name(s) of the author(s). Column 3 reports the sample estimation period, with quarterly frequency data indicated by the inclusion of colons where appropriate. Income elasticities are reported in Column 4. Statistical significance at the standard 5-percent level is denoted by the inclusion of an asterisk next to the numerical estimates. Column 5 shows the relative price elasticities when the traditional homogeniety assumption is imposed. Columns 6, 7, and 8 list the price and exchange rate elasticities associated with the various permutations of the general import function that have been employed over the last two decades for Latin America.

[Table I about here]

[Histogram 1 about here]

Several general traits emerge from the empirical trade elasticities estimated for total imports. First, it appears that total import demand in Latin America is highly income elastic. More than half of the 40 income response measures in Column 4 of Table I are greater than or equal to 1.40 (see Histogram 1). This implies that as income growth improves throughout the region in response to sustained structural adjustment efforts, purchases from abroad are likely to increase by proportionately greater amounts. Second, imports are highly price inelastic in Latin America. As shown in Histogram 2, the majority of the traditional specification parameters reported in Column 5 have values that fall between 0.0 and -0.60. Similar evidence is uncovered under the split-price approach, although there are substantially fewer results to examine and additional verification would prove useful.

[Histogram 2 about here]

Table II summarizes the trade elasticities for imports broken into greater detail. In essence, the disaggregated data utilized to generate the measures reported in Table II avoids imposing identical parameters on all classes of imports. This may be a useful practice for future research efforts since it would not be surprising to find that consumer good imports react differently to global price and exchange rate changes than do intermediate inputs or capital equipment imports. That being said, however, it is interesting to note that many of the elasticity estimates across import categories within specific countries, but not necessarily identical time periods, have very similar magnitudes. For Brazil, for instance, Zini (1988) and Weisskoff (1979) use different functional forms for agricultural and consumer good imports and obtain income elasticity estimates that are fairly close together, 1.98 and 2.19. Another instance of this general pattern is found in the three studies of Mexican imports published by Salas (1982a, 1982b, 1988). It should also be noted that Latin American imports are apparently more responsive than are U.S. imports (Sawyer and Sprinkle, 1996) to variations in international currency valuations.

[Table II about here]

Without the standard deviations for these articles, it is not possible to conduct t-tests to examine the statistical validity of this informal observation, but it is nevertheless an intriguing possibility. Not surprisingly, there is also evidence to the contrary in Table II that supports the less restrictive disaggregated approach. Because there is not a clear trend in either direction, and statistical testing is not possible, the safest procedure appears to be the assumption of parameter heterogeneity across import categories. In cases where only aggregate data are available, there is at least limited evidence that import equations estimated under those circumstances cannot be rejected out of hand as inappropriate.

Previously published elasticity estimates for total exports are presented in Table III. In comparison with the first two tables, it becomes quickly apparent that far less effort has been devoted to empirical research on Latin American exports than has been directed toward imports. Among the relatively small number of studies that have been completed, it can be observed that a wide range of functional forms are utilized. Visual examination of Histograms 3 and 4 indicates that most of the income and relative price elasticities reported for exports appear reasonable.

[Table III about here]

[Histogram 3 about here]

[Histogram 4 about here]

There are, however, a few instances in which the absolute magnitudes of the estimates seem large. The most prominent examples are provided by the exchange rate elasticities for Mexico and Venezuela by Agarwal (1984). In both cases, the exaggerated sensitivity of exports to variations in currency valuations occurs during sample periods in which the respective nominal exchange rates were mostly fixed. When a longer sample period that includes a variable currency peg for Mexico is employed, a much smaller exchange rate elasticity estimate is obtained in at least one instance (Fullerton, Sawyer, and Sprinkle, 1997).

Given the relatively small number of studies conducted for total export elasticities, it is not surprising an even smaller amount of research has been carried out with respect to specialized export categories. Somewhat more unexpected, however, is the fact that all but one of the previously published studies have been carried out with respect to the Brazilian economy. Most prominent among the various features associated with the data listed in Table IV is the relatively elastic response of the various export categories to changes in target market income levels. Fully half of the reported income elasticities in the table are greater than 2.0. That is in contrast to the relative price series where only one elasticity is greater than 2.0 in absolute terms.

[Table IV about here]

Table V summarizes import elasticity estimates from two separate studies for Brazilian trade functions (Weiskoff, 1979; Zini, 1988). The purpose behind isolating the estimates from these two articles is that they provide informal evidence regarding the possibility of aggregation bias for this economy. Comparing the two sets of data indicates that the aggregate coefficients are roughly in line with the smaller component estimates. Total re-estimation from the component pieces and their respective merchandise trade shares is not feasible since elasticities that cover all import sub-classifications are not reported. However, the partial evidence revealed by these two studies published roughly a decade apart from each other is encouraging. Most Latin American current account balance reports do not provide detailed import and export data that extend far enough back to allow estimating intricate sub-component trade functions that aggregate to the totals in a manner analogous to national income and product accounts (Fullerton, 1993a, 1993b).

[Table V about here]

Summary and Conclusions

The estimation of trade elasticities has received enormous attention in recent years. This has occurred partly in response to new advances in time series econometrics and partly in response to the introduction of new international trade agreements. An additional factor has led to a proliferation of these studies for Latin American economies. Many nations in that region of the world have deregulated large portions of their economies including imports and exports as part and parcel of structural adjustment efforts. Although several papers have surveyed empirical estimates of trade elasticities for industrial economies, this type of exercise has not been carried out with respect to Latin America. The research reported herein attempts to partially overcome this gap in the literature by examining studies published within the last quarter century.

A wide variety of elasticity estimates are reported for the various classes of imports and exports included in the tables. Notable among the patterns in the data is the relatively more responsive reaction of Latin American imports to exchange rate variability. Additional research will be required to establish whether this observation is maintained during the era of less restrictive trade practices throughout the hemisphere. Also, a majority of the import and export functions in the sample herein use the single relative price specification that imposes identical coefficients across domestic prices, international markets prices, and exchange rates. Experimentation with the less restrictive specification, when possible, may prove helpful. It will also be interesting to monitor whether the wide range of income elasticities reported for both imports and exports continued to be obtained in future empirical research in the post-structural adjustment

period in Latin America.

The most obvious conclusion that can be reached on the basis of the material reported above is that export functions have received much less attention than import equations in Latin America. The topic of export modeling and elasticity estimation clearly deserves more attention than it has heretofore received. Given the size and importance of Brazil and Mexico, it is not surprising that merchandise trade in these economies has received more attention than have smaller countries in the region. Because there are no guarantees that small country trade equations will exhibit the same characteristics as their larger counterparts, this represents another gap in the literature than should be addressed. The evidence is by no means conclusive, but it appears that flexible specifications for equation formats may be recommendable when data constraints are not binding. Similarly, some of the results also indicate that it may be useful to disaggregate both imports and exports when estimating trade elasticities. Finally, it would be useful to examine the empirical evidence on this issue reported for other regions where structural adjustment packages are being designed. The latter include both Asia as well as Africa.

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Table I - Latin American Trade Elasticities: Total Imports

year	author	period	y	pm/pd	pm	pd	mr
Argentina							
1983	Warner & Kreinin	1972:1-1980:2	0.15		-0.55*	0.95*	0.87*
1984	Agarwal	1970-1978	2.06*	-0.408*			2.09
1989	Cline	1973:1-1987:4	2.42*	-0.32*			
1990	Clavijo & Faini	1967-1987	1.403*	-7.54*			
1992	Faini, Pritchett, Clavijo	1964-1980	2.56*	-2.1*			
Bolivia							
1992	Faini, Pritchett, Clavijo	1964-1980	1.11*	-0.44*			
Brazil							
1976	Lemgruber	1965-1974	1.49*	-0.49*			
1979	Weisskoff	1953-1970	2.33*	-0.37*			
1984	Agarwal	1969-1978	1.670*	-0.762*			-1.86
1986	Bahmani-Oskooee	1974:1-1980:4	0.910*	-0.0691			0.013*
1988	Zini	1970:1-1986:3	1.28*		-0.181*	0.099	
1989	Cline	1973:1-1987:4	0.42*	-0.56			
1992	Faini, Pritchett, Clavijo	1964-1980	0.63	-1.1			
Chile							
1989	Meller & Cabezas	1974:1-1987:4	0.910*	-0.580*			
1992	Faini, Pritchett, Clavijo	1964-1980	2.21*	-0.32*			
Colombia							
1984	Agarwal	1970-1979	1.53*	-0.986			-2.56
1988	Faini	1964-1980	1.25*	-0.52			
1990	Clavijo & Faini	1967-1987	1.263*	-0.499*			
Ecuador							
1984	Agarwal	1970-1978	1.89*	-0.308			-3.98
Guyana							
1995	Gafar	1961-1990	1.29*	-0.32*			
Honduras							
1992	Faini, Pritchett, Clavijo	1964-1980	1.08*	-1.2			
Mexico							
1984	Agarwal	1970-1979	3.86*	-0.563			8.34
1989	Cline	1973:1-1987:4	1.69*	-0.51*			
1990	Clavijo & Faini	1967-1987	1.213*	-1.044*			
1992	Clark	1971:4-1986:3	2.87*		-0.234	-0.199*	
1992	Faini, Prichett Clavijo	1961-1985	1.29*	-1.12*			
1997	Fullerton, Sawyer, Sprinkle	1981:1-1994:4	2.578*		-0.14	2.669*	0.453

Table I - Latin American Trade Elasticities: Total Imports (continued)

year	author	period	y	pm/pd	pm	pd	mr
Paraguay							
1990	Clavijo & Faini	1967-1987	0.672*	-0.478			
1992	Faini, Pritchett, Clavijo	1964-1980	1.42*	-0.56			
Peru							
1984	Agarwal	1970-1979	1.02*	-0.486*			7.56
1992	Faini, Pritchett, Clavijo	1964-1980	1.66*	-0.40*			
1988	Sarmad	1960-1981	0.472	-0.679*			
1990	Clavijo & Faini	1967-1987	0.522*	-0.646*			
1992	Faini, Pritchett, Clavijo	1964-1980	1.66*	-0.40*			
Uruguay							
1990	Clavijo & Faini	1967-1987	1.864*	-0.368*			
1992	Faini, Pritchett, Clavijo	1964-1980	2.12*	-0.35*			
Venezuela							
1975	Khan	1953-1972	0.239	-0.897*			
1984	Agarwal	1970-1978	1.25*	-0.998*			1.34
1984	Melo & Vogt	1962-1979	1.879*	-2.086*			
1988	Sarmad	1960-1981	0.078	-1.019*			
1992	Clark	1971:4-1986:3	4.49*		-0.581	-0.286	

Table II - Latin American Trade Elasticities: Disaggregated Imports

year	author	period	y	pm/pd	pm	pd	mr
Brazil							
Agricultural Products							
1988	Zini	1970:1-1986:3	1.98*		-0.263*	0.124	
Consumer Durables							
1979	Weisskoff	1953-1970	2.88*	-0.07			
Consumer Goods							
1979	Weisskoff	1953-1970	2.19*	-0.27			
Industrial Equipment							
1981	Dib	1960-1978	0.97*	-1.19*			
1988	Zini	1970:1-1986:3	1.19*		-0.558*	0.466*	
Metallic Intermediate Inputs							
1979	Weisskoff	1953-1970	2.75	-0.42*			
Mineral Products							
1988	Zini	1970:1-1986:3	3.21*		-0.045	0.251*	
Nonmetallic Intermediate Inputs							
1979	Weisskoff	1953-1970	2.01*	-0.41*			
Chile							
Capital Equipment							
1989	Meller & Cabezas	1974:1-1981:4	2.157*	-0.486*			
Consumer Goods							
1989	Meller & Cabezas	1974:1-1981:4	2.737*	-1.459*			
1994	Rojas & Assael	1960-1992	3.47*	-0.33			
Intermediate Goods							
1989	Meller & Cabezas	1974:1-1987:4	0.341	-0.444*			
1994	Rojas & Assael	1960-1992	1.41*	-0.26*			
Ecuador							
Raw Materials and Intermediate Inputs							
1993b	Fullerton	1976-1989	0.555*	-0.655*			

Table II - Latin American Trade Elasticities: Disaggregated Imports (continued)

year	author	period	y	pm/pd	pm	pd	mr
Mexico							
Capital Goods							
1982a	Salas	1961-1969	1.890*	-1.409*			-1.30*
1982b	Salas	1961-1979	0.589*	-1.501*			-1.24*
1988	Salas	1961-1986	0.788*	-1.857*			1.255*
Consumer Goods							
1982a	Salas	1961-1969	0.624*	-3.401*			-1.748
1982b	Salas	1961-1979	0.624*	-3.001*			-1.757
1988	Salas	1961-1986	0.839*	-2.427*			-1.89*
Intermediate Goods							
1982a	Salas	1961-1969	0.422*	-2.302*			-1.347
1982b	Salas	1961-1979	0.422*	-2.297*			-1.34*
1988	Salas	1961-1986	0.494*	-1.411*			-1.66*
Venezuela							
Agricultural Products							
1975	Khan	1953-1972	1.362*	-1.176*			
Chemicals							
1975	Khan	1953-1972	0.664*	-1.277*			
1984	Melo & Vogt	1962-1979	1.651*	-0.456			
Food							
1975	Khan	1953-1972	-0.872*	-1.798*			
1984	Melo & Vogt	1962-1979	0.585*	-2.041*			
Machinery & Transport Equipment							
1975	Khan	1953-1972	0.557*	-0.765			
1984	Melo & Vogt	1962-1979	2.734*	-1.318*			
Capital Goods							
1984	Melo & Vogt	1962-1979	0.522*	-0.207			
Tobacco & Beverage Consumer Goods							
1975	Khan	1953-1972	1.969*	-1.033			
1984	Melo & Vogt	1962-1979	1.773*	-2.324*			

Table III - Latin American Trade Elasticities: Total Exports

year	author	period	yf	px/pf	px	pf	xr
Argentina							
1984	Agarwal	1970-1978	1.78*	-0.50*			-0.73*
1992	Faini, Pritchett, & Clavijo	1967-1983	0.57*	-1.99			
Brazil							
1976	Lemgruber	1965-1974	1.97*	-0.41*			
1984	Agarwal	1969-1978	0.253*	-1.23*			-0.56*
1986	Bahmani-Oskooee	1974:1-1980:4	0.007	-0.151			
1988	Zini	1970:1-1986:3	0.690*		-0.171*	0.131	
1992	Faini, Pritchett, & Clavijo	1967-1983	0.60*	-1.51*			
Chile							
1992	Faini, Pritchett, & Clavijo	1967-1983	0.49*	-0.33*			
Colombia							
1984	Agarwal	1970-1979	1.30*	-0.57*			-1.23*
1992	Faini, Pritchett, & Clavijo	1967-1983	2.08*	-2.38*			
Ecuador							
1984	Agarwal	1970-1978	0.86*	-0.34*			-0.98
1992	Faini, Pritchett, & Clavijo	1967-1983	0.89*	-0.90*			
Mexico							
1984	Agarwal	1970-1977	0.58*	-0.87*			10.87*
1992	Faini, Pritchett, & Clavijo	1967-1983	0.93*	-0.85			
1997	Fullerton, Sawyer, Sprinkle	1981-1994	2.942*		0.601*	-1.292	-0.49*
Peru							
1984	Agarwal	1970-1979	0.53*	-1.56*			-2.38*
1992	Faini, Pritchett, & Clavijo	1967-1983	0.51*	3.00*			
Venezuela							
1984	Agarwal	1970-1978	0.89*	-0.98*			-6.98
1992	Faini, Pritchett, & Clavijo	1967-1983	1.0*	-1.89*			

Table IV - Latin American Trade Elasticities: Disaggregated Exports

year	author	period	yf	px/pf	px	pf	xr
Brazil							
Agricultural Products							
1988	Zini	1970:1-1986:3	0.305		-0.346*	0.195	
Industrial Inputs							
1976	Lemgruber	1965-1974	2.53*	-0.68			
1983	Braga & Markwald	1959-1981	2.59*	-2.82			
1983	Pinto	1954-1975	2.19*	-1.12			
1988	Zini	1970:1-1986:3	1.70*		-0.162	0.242	
Manufacturing Equipment							
1987	Rios	1964-1984	2.244*	-1.592*			
Minerals							
1988	Zini	1970:1-1986:3	0.668*		-0.018	0.228*	
Colombia							
Exports except Oil, Coal, & Coffee							
1993a	Fullerton	1971-1990	0.522*	0.845*			

Table V - Brazilian Import Demand Elasticity Comparisons

year	author	period	y	pm/pd	pm	pd	mr
1979	Weisskoff	1953-1970					
Total Imports			2.33*	-0.37*			
Consumer Durables			2.88*	-0.07			
Consumer Goods			2.19*	-0.27			
Metallic Intermediate Inputs			2.75	-0.42*			
Nonmetallic Intermediate Inputs			2.01*	-0.41*			
1988	Zini	1970:1-1986:3					
Total Imports			1.28*		-0.181*	0.099	
Agricultural Products			1.98*		-0.263*	0.124	
Industrial Equipment			1.19*		-0.558*	-0.466*	
Mineral Products			3.21*		-0.045	-0.251	

Histogram 1
Total Import Income Elasticities

Histogram 2
Total Import Relative Price Elasticities

Histogram 3
Total Export Income Elasticities

Histogram 4
Total Export Relative Price Elasticities