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NATIONAL BUREAU OF ECONOMIC RESEARCH, INC.
THE PONTIFICIA UNIVERSIDADE CATOLICA DO RIO DE JANEIRO
FEDESARROLLO

SECOND ANNUAL INTERAMERICAN SEMINAR ON ECONOMICS

March 30-April 1, 1989

Bogotá, Colombia

IMPORTS CONTROLS, PRICES AND ECONOMIC ACTIVITY IN COLOMBIA

JOSE ANTONIO OCAMPO
FEDESARROLLO

Scheduled for: March 31, 11:15 AM

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José Antonio Ocampo */

1. Introduction

Despite the general call for trade liberalization in orthodox academic circles and the pressure to do so by some international organizations, there is still scant empirical work on its effects on developing countries. How important is the contractionary effect of import liberalization on production for the domestic market? How large are the effects of "rent seeking" on the domestic prices of protected industries? Is import liberalization an essential ingredient of a successful export strategy? These are some of the questions on which many statements and policy recommendations are usually made based on theoretical principles rather than practice.

Colombia underwent over the past decade a complete cycle of liberalization and controls which make her an interesting testing ground for the standard predictions of orthodox trade theory. From 1976 to 1981, the liberalization policy which had been implemented since the early 1970s was enhanced, leading by

the latter year to the most liberal trade regime that the country has experienced in the post-war period. This process was sharply reversed since late 1982. By mid 1984 the country was back to one of the most restrictive import regimes of the past four decades. This process was followed by moderate liberalization since 1985.

This paper analyzes the effects of these fluctuations in import policy on production and price formation in the Colombian manufacturing sector. It is divided in five parts, the first of which is this introduction. The second part reviews very briefly the history of import policies in the 1970s and 1980s. The third presents a simple model of imperfect competion which captures the quantity and price effects of these policies. The fourth estimates the model and simulates the effects of the liberalizations of the 1970s and 1980s and the import controls of the early 1980s on manufacturing production and prices. The paper ends with a short section of conclusions.

2. A brief history of import policies [1]/

The magnitude of the liberalization process which took place in Colombia from the early 1970s to 1982 is summarized in Table 1. Viewed as a complete process, some of its elements are quite impressive. Tariff levels were cut by half with respect to

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[1]/ For a more detailed account of the history import policies, see Ocampo (1988) and the sources quoted in that paper.

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1970, or by 60% with respect to the most protectionist tariff schedule of the post-war period --that of 1964 (See Martinez, 1986). On the other hand, while in the early 1970s only a minor porportion of the tariff schedule was classified under the free licensing regime and a sixth was in the prohibited list, the latter was eliminated in 1973 and the former progresively widened, to encompass at the peak of the liberalization process more than 70% of the schedule. This process was obviously accompanied by an increase in the value of imports under free licensing. By the early 1980s, two-thirds of private imports and more than half of total purchases abroad were brought under such regime. Finally, this process was accompanied by a more automatic approval of requests for import permits under the prior licensing regime. Indeed, from 1974 to 1982 only a minor proportion of all requests for licenses was rejected.

The liberalization process took place in four major phases. In the early 1970s, it concentrated on reducing the red tape and the delays in approving licenses for non-competitive imports and in eliminating some of the "water" in the tariff schedule. The first explicit liberalization measures were adopted in 1973-1974, as part of an anti-inflationary package designed to face the trasmission of world price trends. The prohibited list was then eliminated, items in the prior licesing regime for which there had been no rejections were transfered to the free licensing system and tariffs on intermediate goods were reduced. A new

Table 1

THE LIBERALIZATION PROCESS, 1970-1987

	(1) Average nominal tariff 1/	(2) Distribution of items in the tariff shcedule 2/			(3) Imports under free licensing as % of total imports		(4) Excess demand for import licenses (% of total demand) 3/	(5) Public sector imports as % of total imports, excluding fuels and foodstuffs 4/	(6) Real import exchange rate (Pesos per dollar, 1980=100) 5/	(7) Imports as % of domestic expeniture (1975 prices)	
		(a) Free licensing	(b) Prior licensing	(c) Prohibited	(a) Total	(b) Private sector				(a) Total	(b) Manufacturing 6/
1970	51.9 %		80.4 %	16.2 %	16.5 %		8.9 %		110.1	17.0 %	20.5 %
71		3.4 %			27.5		12.7		114.4	18.8	21.9
72					27.9		12.9		118.8	15.8	18.4
73		20.2	79.8	-	31.2		6.0		118.8	15.5	18.7
74		29.6	70.4	-	43.6		3.4	13.1 %	115.5	15.8	18.6
75	32.6	34.1	65.9	-	42.8			14.7	120.2	14.3	17.4
76					39.8			15.5	119.1	15.0	17.8
77					41.0			11.1	103.0	15.5	18.5
78	30.5	52.8	47.2	-	42.8	49.0 %		7.9	103.9	17.3	20.9
79	28.2	66.7	33.3	-	44.4	50.5	1.1	9.6	100.9	16.7	20.6
80	26.0	66.7	33.3	-	44.0	52.9	1.4	13.9	100.0	18.6	23.4
81	25.9				52.1	65.7	3.4	16.4	93.9	18.6	24.7
82		70.8	29.2	-	54.7	66.6	3.7	16.0	87.5	19.6	26.4
83		41.9	58.1	-	41.4	54.5	19.5	18.6	88.3	17.9	24.2
84	41.7	0.5	83.0	16.5	21.1	30.7	23.8	19.7	97.4	17.0	22.5
85	31.4	27.0	71.6	1.4	14.8	19.2	35.4	13.2	113.0	15.8	20.5
86		36.2	62.7	1.1	42.4	48.9	19.2	14.3	145.6	15.8	21.2
87		37.6	61.1	1.1	45.3	51.9	22.5	12.1	150.7	15.9	

1/ End of year.

2/ 1971 and 1973: August, 1974: June; 1975 and 1978: February; 1979: September; 1980-1987: December

3/ 1970-1971: Reimbursable imports. 1985: Imports subject to budget. Rest: all imports. Data for 1974-1984 (except 1980) is partial.

4/ Refers to import licenses.

5/ Trade-weighted for 22 currences.

6/ Excluding oil derivatives.

SOURCE: Ocampo (1988), Tables 1-4.

liberalization package was adopted in 1976, as part of the measures adopted to reduce the inflationary effects of the coffee boom which started in mid 1975. It concentrated on consumer and capital goods, affecting for the first time some traditional manufacturing sectors. However, the liberalization of these sectors (particularly textiles) was partly reversed in 1977 and 1979. Finally, in 1979-1981, a new wave of liberalization took place, which included a fairly general tariff reduction, a series of complementary transfers of items in the tariff schedule from the prior to the free licensing regime, a more intensive use of the "global license" to promote the imports of capital goods and, most important, a significant increase in public sector imports to reduce the expansionary effects of the ambitious public investment program underway.

In some aspects, the liberalization proces was, however, incomplete. First and foremost, the tariff structure remained virtually unchanged and continued to protect traditional industries (Martinez, 1986). Second, the protection of traditional manufacturing was never abandoned as a criterion of licensing policy and, indeed, in different periods the liberalization measures were so designed as to leave most sensitive imports subject to control (see, on this issue, Garay et al., 1974; Echavarria and Garay, 1979; and Garay, 1982). More generally, liberalization never figured out as a primary policy objective of the three administrations which pursed it. There was

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never a frontal attack on QRs, nor precise quantitative objetives or a timetable to dismantle them (García, 1985). Finally, exchange rate policy was not uniform throughout the process. Thus, liberalization had quite different effects on import coefficients in different periods. In the first half of the 1970s a gradual real devaluation took place and import coefficients actually fell; on the contrary, from 1975 to 1982 a significant real appreciation, together with the liberalization process and the loss of self-sufficiency in oil resulted in a sharp increase in those coefficients.

The high current account deficits generated at the end of this process, together with the strong industrial recession that developed in the early 1980s were the background fro the sharp reversal of the liberalization process in 1982-1984. A series of tariff surcharges increased average nominal protection by some 60% of previous levels (See Table 1). Nonetheless, existing and newly decreed exemptions significantly reduced the effects of tariff policy (Cubillos and Torres, 1987). Thus, increased QRs were more important in practice. The first timid measures to strengthen direct controls, adopted in September 1982, were followed by very aggressive measures in early 1983 and 1984. By the end of the process, the free licensing system had practically disappeared and one sixth of the tariff schedule was back in the reborn prohibited list. Rejection of licenses increased rapidly, but preference was granted in this process to intermediate and

public sector imports. Simultaneously, the government recreated the mechanism known as the "import budget" --which had also been abandoned in 1974--, by which the Monetary Board placed a maximum on the value of licenses which the Foreign Trade Institute could approve. The budget was progressively tightened to reach in the first in the first semester of 1985 only 60% of licenses approved in 1981-1982. An acceleration in the rate of crawl of the peso and higher export subsidies accompanied this process, thus reducing the "anti-export bias" of the the complete policy package. However, the attempt to devalue the currency in real terms was initially checked by continued revaluation of the dollar. Thus, by the end of the process, the exchange rate was still far from an "equilibrium" level.

The sharp fall in international reserves which took place in 1982-1984 --from $4.9 to 1.9 billion-- and the dramatic turnaround in the international capital markets led to a radical change in economic policy in the second semester of 1984. Thus, in 1985 restrictive aggregate demand policies and a rapid crawl of the peso replaced the role which had been assigned since 1982 to QRs as a mechanism of balance of payments adjustment (Ocampo, 1987b; Ocampo and Lora, 1987). This new "orthodox" package included a moderate liberalization of QRs, which was negotiated with the World Bank in the process of contracting a loan to finance the imports required by the export sectors. After mid 1985, tariffs were significantly cut, the prohibited list reduced

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to a few items and the free licensing regime progressively
widened to include, by late 1987, 38% of the tariff schedule (See
Table 1). Liberalization concentrated initially on intermediates
but since 1986 gave increasing emphasis to capital goods. As a
result of this policy, more than half of private sector imports
were brought again in 1987 under the free licensing system. The
import budget was gradually increased, reaching by mid 1987
levels equivalent to the peak imports of the early 1980s. Despite
this fact, the excess demand for licenses remained at
historically high levels. Import coefficients did not increase
significantly, however, thanks to the strong real devaluation of
1985-1986 and the return to self-sufficiency in oil.

3.   The model

The model used to estimate the effects of liberalization
and controls is an extension of that used by Ocampo (1988) for
the same purpose. It has two major componentes. The first is a
simple Keynesian model in which non-primary GDP is determined by
real aggregate demand, including the expenditure effects of
import policies. The second is an equally simple imperfect
competition model which captures the sectorial effects of
liberalization and controls on domestic production and prices.

In the first block, it is assumed that primary GDP (Y_p) is
predetermined by past investment decisions while non-primary GDP
(Y_{np}) is demand-determined. A reduced-form equation is used, in

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which Y_{np} depends on some real "exogenous demand" componentes $(D_1 \ldots D_n)$ and the excess supply of imports, E_m:

$$(1) \quad Y = Y_p + Y_{np} \underset{+}{(D_1} \ldots D_n, \underset{-}{E_m)}$$

The demand for imports $(eM/p_m$, where e is the nominal exchange rate in pesos per dollar, M the dollar value of imports and p_m the domestic price of imported goods) depends, in turn, on GDP, relative import prices $(p_m/p_d$, where p_d is the price index for domestic production) and a series of measures of liberalization $(L_1 \ldots L_n)$:

$$(2) \quad eM/p_m = M(\underset{+}{Y}, \underset{-}{p_m/p_d}, \underset{+}{L_1} \ldots \underset{+}{L_n})$$

Finally, E_m is defined as the volume of imports which can be attributed to direct controls relative to a "normal" --or, rather, average-- level of QRs, i.e.:

$$(3) \quad E_m = M(Y, p_m/p_d, L_1 \ldots L_n) - M(Y, \overline{p_m/p_d}, \overline{L_1} \ldots \overline{L_n})$$

It may be thought that the domestic price of imports includes some "rent seeking" effects of QRs. Thus, an alternative specification of the macroeconomic model uses a foreign price index (p^*) as an indicator of import prices. Thus, equation (2) is replaced by:

$$(2a) \quad M/p^* = M(\underset{+}{Y}, \underset{-}{p_m/p_d}, \underset{+}{L_1} \ldots \underset{+}{L_n})$$

A new equation is then added, in which relative domestic import prices are determined by relative international prices, in pesos, and by the strenght of QRs, as mesured by E_m:

$$(4) \quad p_m/p_d = p_m(ep^*/p_d, E_m)$$
$$\qquad\qquad\qquad\quad + \qquad -$$

The second block is a simple mark-up model in the tradition of Kalecki (1971, Ch. 5) and other post-Keynesians (see, for example, Eichner, 1973; Godley and Nordhaus, 1972; Harcourt and Kenyon, 1976; Okun, 1981; Steindl, 1976; Sylos-Labini, 1979; Taylor, 1983). Firms mantain excess capacities and adjust to demand variations by changing the levels of capacity utilization. Thus, Q_f Q_s the production for the domestic market and p_i the price of the domestic output of sector i,

$$(5) \quad Q_i = Q_i{}'(Y, \ p_i/p_m, \ p_i/p_d, \ E_m)$$
$$\qquad\qquad\quad + \qquad - \qquad\quad - \qquad -$$

On the other hand, prices are formed by adding a mark-up on unit variable costs. The latter are divided into labor (c_{Li}) and raw material and intermediate (c_{Ri}) costs. The mark-up is subject, however, to variations depending on domestic demand and on the impact of import competition. The domestic demand effect is captured by an index of capacity utilization (u). The effect of this varible on prices may be positive or negative, depending on industrial structure and scale economies. The impact of external competition can be divided, in turn, into the direct effect of

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variations in QRs and the impact of price competition. The latter is captured by the relation between labor and raw material costs to the price of imports; as these ratios rise, it can be expected that firms find it harder to pass costs onto prices. Thus:

$$(6) \quad \dot{p}_i = \dot{p}_i (\dot{c}_{Li}, \dot{c}_{Mi}, u, E_m, c_{Li}/P_m, c_{Mi}/p_m$$
$$\qquad\qquad\qquad +\quad +\quad ?\quad -\quad\quad -\quad\quad\quad -$$

where the dot over the variables indicate a rate of increase. Finally, unit labor costs depend on the nominal average wage (w), on capacity utilization and on QRs --insofar as it affects labor efficiency:

$$(7) \quad c_{Li} = c_{Li} (w, u, E_m)$$
$$\qquad\qquad\qquad\quad +\quad -\quad -$$

In this simple specification, the sensitivity of labor demand to wages and the effects of long-term productivity increses will be reflected in the coefficient of w.

This model captures the quantity as well as the price effects of changes in QRs. Liberalization and controls have a direct effect on industrial production (eq. 5) as well as an indirect effect via aggregate demand (eqs. 1 and 5). Note that for all sectors, production for the domestic market is made to depend on aggregate excess imports as well as on the price of the sectoral output relative to the general import price index (eq. 5). This particular specification thus captures through the estimated coefficients not only the intrasectoral substitution between imports and domestic production but also possible

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intersectoral substitution. It thus indicates that the "forced substitution" generated by QRs may patly benefit sector other than those on which they are imposed (see Ocampo, 1987a). Similarly, it indicates that the substitution generated by exchange rate or tariff policy may not only affect the composition of demand in an specific sector between imported and domestic goods but also the aggregate demand for the sector's products.

On the other hand, the model differentiates three price effects of QRs: on the domestic price of imported goods (eq. 4), on the mark-ups for domestic goods (eq. 6) and a more indirect effect via capacity utilization (eqs. 5 and 6). The former two are those which can be appropriately be called "rent seeking" in the traditional sense of the term. It also includes an effect of QRs on labor productivity (eq. 7). Finally, although it does not incorporte the macroeconomic effects of exchange rate policy, its sectoral effects are adequately grasped in equations (5) and (6).

The model has some limitations which should also be pointed out. First, it disregards some supply effects of import policies, particularly those associated with short-term supply bottlenecks and long-term resource allocation. The former were not very important, even at the peak of the protectionist wave of 1982-1985 (see, on this issue, Fedesarrollo, 1985). An adequate analysis of the latter would require, on the other

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hand, a diffrent time horizon to that assumed in this paper. Secondly, the model assumes that economic agents act on the presumption that changes in import policies will endure. This may seem peculir in the light of a long history of balance-of-payments related changes in QRs. Nonetheless, the commitment of the administrations which undertook the liberalization process of the 1970s and early 1980s was sufficiently firm and the underlying balance of payments conditions solid enough to justify the assumption for the first half of the period under analysis. It was only at the very end of the process that expectations of the reversal of policies were created, leading, in fact, to the accumulation of speculative inventories of imported raw materials (see, on this issue, Ocampo, 1987b). However, this implies that the actual reversal of policies after 1982 also generated expectations that a less liberal regime would last. This has been confirmed by the facts, as the later reversal -of controls has been moderate, despite strong pressures by the World Bank.

4.   Estimation and Simulations

4.1. Method of estimation and data

The model was estimated in a linear version with quarterly data for 1976.2 - 1987.4 for the macroeconomic and for 1977.1-1987.4 for the sectoral model, using information for previous quarters for lagged explanatory variables. A recursive process was used. First, equations (1) and (2) were estimated

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simultaneously using TSLS and the values of Y and E_m predicted by this set of equations were used to estimate simultaneously equations (5) to (7) for nine industrial sectors with a similar statistical procedure. Some attempts were made to estimate a macroeconomic model incorporating equations (1), (2a) and (4) but, as we will see, the statistical results were not satisfactory.

In the initial estimations of the macroeconomic model, the effects of import policies were assumed to be uniform throughout the period under analysis. However, in the final estimations of this as well as the sectoral models, three periods were differentiated: a phase of moderate liberalization (1976.1-1978.4), a sharp cycle of liberalization and controls (1979.1-1985.3) and a new period of moderate liberalization (1985.4-1987.4). On the other hand, in the estimation of equation (5), the income effect was divided between a "permanent" (or, rather, trend) and a cyclical component; the latter was estimated simply by substracting from the GDP estimated in the first block its exponential trend. Lagged dependent variables were included in equations (1) and, for some sectors, in equation (5). The estimation of equations (6) and (7) incorporated a Cochrane-Orcutt procedure to correct for first-order autocorrelation. Finally, the estimation of equation (4) incorporated a correction for second-order autocorrelation.

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The quarterly GDP figures are those estimated by the National Planning Office. The exogenous demand variables are those used by Fedesarrollo (1987) to predict industrial production. The results presented below include three of the potential demand variables: the value of the coffee harvest, the value of non-traditional exports and central government expenditure. These variables were deflated by the CPI and thus their "real" value is their purchasing power in terms of the consumer basket. Thus, they indirectly incorporate the effects of agricultural supply shocks, which are the basic determinant of short-term variations of consumer prices in Colombia (Fedesarrollo, 1988). Other demand variables were tried (construction, primary GDP and a measure of "excess taxes", i.e., the deviation of tax revenues from an expected level, determined by the average tax rate) but gave no satisfactory results. Industrial imports, excluding oil derivatives, which were used to estimate equation (2), were calculated from customs data reported by DANE. The industrial production data is taken from the DANE Monthly Manufacturing Survey. Due to the lack of sectoral quarterly export data, production was used as a proxy for production for the domestic market; for that purpose, the indices based on 1980 were multiplied by production for the local market (production minus exports) according to the Annual Manufacturing Survey and the customs data for that year. All the former variables are expresssed in million 1980 pesos and adjusted for seasonal variations. As capacity utilization levels

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are only available on a quarterly basis from 1980 onwards, with a different sectoral classification to that used in this paper, the deviations of sectoral outputs from their trend were used as proxies for that variable.

All domestic prices were estimated from <u>Banco de la Republica</u> wholesale price data and weighted by the relative importance of differente goods in imports and production in 1980. The p_d used in equation (2) is the price index of domestic industrial production, while in equation (5) it is the general wholesale price index. Wages and unit labor costs were calculated from the Monthly Manufacturing Survey. The cost structure used combines the input-output matrices estimated by Leon and Centenaro (1986) for 1980 with information from the Annual Manufacturing Survey of the same year. As no quarterly import price index is available (that published by the IMF is derived implicitly from data on domestic import prices and exchange rates), the international price index used in equations (2a) and (4) is the IMF price index for world trade. Rates of change of prices and costs refer to variations over the same quarter in the previous year.

Finally, three liberalization indices were used. The first (L_1) is the "excess" of free licenses. This variable was calculated by substracting from the real value of free import licenses a "normal" level, which was simply defined as the

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average share of those imports in GDP in the period 1976-1987. The second (L_2) is the percentage of total imports under the free licensing system. The third (L_3) is the "excess" public sector imports, excluding oil and foodstuffs, defined in a similar way to L_1.

4.2 Results

Table 2 reports the best estimations of the macroeconomic model, assuming that relative domestic import prices are exogenous (equations 1 and 2) or endogenous (equations 1, 2a and 4). The two estimations of each of these models differ only in the alternative use of L_1 and L_2 as liberalization indices. In all cases, it is also assumed that the effect of liberalization on import demand and economic activity was uniform throughout the period under analysis. Explanatory variables for industrial imports are included with one lag, while in the estimation of the reduced-form non-primary GDP equation, the demand variables are included as the moving average of the current and the three previous quarters; the lagged dependent variables is then included with four lags.

In the model which assumes exogenous import prices, the estimated income and price elasticities of demand for imports are very high relative to most existing estimates (See Ocampo, 1982). The best study for the period 1951-1984 calculates an income elasticity of 0.9 and a price elasticity of -0.5 for non-

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oil imports (Villar, 1985). Together with the results obtained by Ocampo (1988), this indicates that both elasticities may have increased in the post-import substitution era. On the other hand, the high coefficient of the lagged dependent variable in the second equation indicates a significant inertia of non-primary GDP. The long-term multiplier for the exogenous demand variables are very high for "excess imports" (7.6-8.2), intermediate for non-traditional exports (4.0-4.2) and government expenditure (3.5-3.7) and lowest for the coffee harvest (2.8-2.9).

The results of the model which incorporates endogenous import prices are not very satisfactory, indicating that the international price index used is not closely associated with Colombian import prices. This is reflected in the high constant, the low coefficient for the relative international prices and the significant autocorrelation of errors in the equation. The results indicate, however, that there may be an element of "rent seeking" incorporated in the domestic price of imports. The estimations of equations (1) and (2a) are also unsatisfactory. The income-elasticity of demand for imports is very low, the coefficients for L_1 and L_2 are not statisfically different from zero, whereas that for L_3 is larger than one. On the other hand, of the exogenous demand variables which determine the non-primary GDP, only government expenditure and excess imports are statistically significant.

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The results of the model with exogenous import prices and differential effects of import policies in the three phases defined in the previous section are reported in Table 3. Although the non-reported estimations included L_3 in the import demand equation, they were found to be statistically insignificant in all periods. The estimated coefficient for L_2 in the period 1976.2 - 1978.4 had also the wrong sign and was not statistically significant. Thus, this variable is also excluded from the final estimation of the import demand equation and the corresponding "excess import" variable from the non-primary GDP model. The estimated income elasticity of demand for imports is higher and the price elasticity lower than those reported in Table 2. The effects of the liberalization index are considerable in the period 1979.1 - 1985.3, but much less important --and, in fact, not statistically different from zero-- during the more recent liberalization. On the other hand, the inertia of non-primary GDP is less and the long-term multipliers for non-traditional exports (2.3) and "excess imports" considerably lower (4.7 in the period of sharp changes in import policies and 3.8 during the more recent liberalization episode) than those obtained in Table 2. The multipliers for government expenditure (3.0) and the coffee harvest (2.2) are more similar. These lower estimates are undoubtly closer to the "true" multipliers, particularly in the case of the "excess imports". Thus, the values of Y and E_m calculated by this set of equations are used in the estimation of the sectoral model.

Tables 4 to 6 report the results of the latter model for the nine industrial sectors in which data constraints allowed us to divide the Colombian manufacturing sector. The estimated coefficients are reported except when they were found to have the wrong sing. Several interesting features stand out. The low elasticity of industrial production for the domestic market to the trend level of GDP is a first strinking feature. Indeed, this elasticity is larger than one only in three sectors (tobacco, paper and printing, and chemicals) and in three it is actually negative (textiles and apparel, wood and products, and machinery and equipment). This result may reflect the "structural" problems faced by many industrial sectors in Colombia since the mid 1970s, the analysis of which is, however, beyond the scope of this paper (see, on this issue, Echavarria et al, 1983). The sensitivity of production for the domestic market to the sectoral price relative to the general WPI is also low; indeed, it is only statistically different from zero at a 90% confidence level in two industrial sectors (foodstuffs and beverages, and paper and printing). On the contrary, industrial production for the domestic market is highly elastic to the cyclical component of GDP in five out nine industrial sectors (foodstuffs and beverages, wood and products, paper and printing, non-metalic minerals, and machinery and equipment).

The effects of QRs ("excess imports") and relative import prices on different sectors is quite interesting. First of all,

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most of the effects of the former concentrate in the period of sharp changes in import policies, 1979.1 - 1985.3. In this period, the estimated effect has the correct sign in five industrial sectors. Quantitatively, it is strongest in machinery and equipment, foodstuffs and beverages, and textiles and apparel, where $1 of "excess imports" during this period reduced domestic production in the long run by $0.70, $0.53 and $0.29, respectively. The effect is, however, more robust in statisticaly terms in the first of these sectors. In the tobacco and paper and printing industries, excess imports had also the expected contractionary effect during the period of sharp changes in import policy. The former industry is also the only one for which there is evidence of a significant contractionary effect of the more recent liberalization. On the other hand, the sensitivity of domestic production to relative import prices has the expected negative sign in six out of nine sectors and in some of them it is actually very high --chemicals, and textiles and apparel. Most interesting, in most of these sectors, production for the domestic market is not sensible to QRs. Moreover, in the only two sectors in which the two effects have the correct sign, the price effect is more robust in statistical terms.

As expected, price dynamics is basically dominated by costs and, more particularly, by raw material and intermediate input costs (See Table 5). In most sectors, the latter are rapidly passed on to prices. Indeed, only in machinery and equipment and

Table 4

ESTIMATION OF THE SECTORIAL MODEL BY INDUSTRIAL GROUPS
PRODUCTION EQUATION

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment
ISIC Category	311-313	314	32	33	34	351-352 355-356	36	37	38
Constant	65736	-207	25089	3514	9190	20862	3833	550	14592
	(3.24)	(-0.28) **	(2.20)	(4.42)	(6.94)	(2.15)	(5.84)	(0.61) **	(2.78)
Trend GDP	0.0494	0.0108	-0.0147	-0.0015	0.0408	0.0648	0.0254	0.0042	-0.0186
	(1.93)	(4.34)	(-1.37) *	(-1.56) *	(7.16)	(3.03)	(13.07)	(1.80)	(-1.54) *
	[0.42]	[1.06]	[-0.42]	[-0.24]	[1.13]	[1.23]	[0.86]	[0.78]	[-0.62]
Cyclical GDP	0.1976	-	0.0287	0.0189	0.0642	0.0462	0.0358	-	0.1183
	(2.52)		(0.52) **	(5.54)	(5.56)	(0.94) **	(3.11)		(1.69)
	[1.71]		[0.82]	[3.01]	[1.79]	[0.88]	[1.25]		[3.94]
Excess imports 1979.1-1985.3	-0.3099	-0.0692	-0.1045	-	-0.0432	-	-	-	-0.2546
	(-1.47) *	(-3.28)	(-0.79) **		(-1.08) **				(-2.01)
1985.4-1987.4	-0.1407	-0.2164	-	-	-	-	-	-	-
	(-0.24) **	(-2.66)							
Price relative to imports	-	-	-10856	-1077	-5582	-19482	-2998	-189	-
			(-1.27) **	(-4.37)	(-4.25)	(-3.27)	(-5.66)	(-0.31) **	
			[-0.91]	[-0.52]	[-0.50]	[-1.15]	[-0.31]	[-0.09]	
Price relative to general WPI	-47828	-	-	-123	-4828	-5661	-	-	-
	(-2.98)			(-0.20) **	(-2.44)	(-0.82) **			
	[-1.27]			[-0.06]	[-0.46]	[-0.35]			
Lagged dependent variable	0.4117	-	0.6372	-	-	0.4729	-	0.7535	0.6342
	(3.51)		(4.40)			(3.23)		(6.26)	(4.97)
$\bar{R}^2$	0.899	0.663	0.890	0.486	0.785	0.932	0.809	0.569	0.645
DW or H	-0.928	1.898	2.020	1.612	1.810	-1.163	1.625	-0.404	1.890

* Not statistically different from zero at 95% confidence level.

** Not statistically different from zero at 90% confidence level.

Table 5

ESTIMATION OF THE SECTORIAL MODEL BY INDUSTRIAL GROUPS
PRICE EQUATION

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment
Constant	0.1139 (0.64) **	0.1986 (1.53) *	0.0190 (1.60) *	-0.0604 (-0.54) **	0.2634 (1.34) *	0.2156 (1.12) **	0.0688 (0.40) **	-0.0484 (-0.11) **	0.5676 (1.12) **
unit labor costs	-	0.1741 (2.55)	-	0.0715 (0.88) **	0.3114 (3.44)	-	0.2351 (1.70)	-	0.0198 (0.51) **
unit raw material costs	0.9988 (7.53)	0.1374 (0.52) **	0.9481 (17.85)	1.3127 (4.02)	0.8560 (4.23)	0.7968 (4.37)	0.6314 (2.25)	1.4046 (5.71)	0.1957 (0.82) **
Capacity utilization	-0.0319 (-0.21) **	-0.1369 (-0.69) **	0.1730 (2.72)	0.1145 (0.89) **	-0.3260 (-1.29) **	0.1489 (1.13) **	0.1076 (0.33) **	0.3156 (1.18) **	-0.0537 (-0.45) **
Excess imports 1/ 1979.1-1985.3	-	-	-	-	-0.2243 (-0.59) **	-	-	-	-0.4185 (-1.10) **
1985.4-1987.4	-	-	-1.898 (-2.86)	-	-1.045 (-0.76) **	-0.573 (-0.55) **	-	-	-1.968 (-1.15) **
Labor costs relative to import prices	-	-0.0478 (-0.36) **	-	-0.0050 (-0.06) **	-0.0874 (-0.66) **	-0.0254 (-0.34) **	-	-	-0.0010 (-0.02) **
Raw material costs relative to import prices	-0.1234 (-0.63) **	-	-	-	-0.1972 (-0.73) **	-0.1469 (0.69) **	-0.0363 (-0.20) **	-0.0213 (-0.04) **	-0.3512 (-0.63) **
First order autocorrelation term	0.7568 (6.85)	0.4574 (3.56)	0.5542 (3.98)	0.9130 (13.38)	0.5242 (3.37)	0.7176 (5.60)	0.4798 (3.04)	0.7715 (6.41)	0.9250 (11.70)
Adjusted constant term	-0.0032	0.1547	0.0190	-0.0645	-0.0123	0.0468	0.0347	-0.0671	0.2416
$\bar{R}^2$	0.829	0.556	0.957	0.703	0.733	0.926	0.453	0.854	0.768
DW	1.933	2.223	1.926	1.537	1.818	1.839	1.809	1.472	1.705

1/ Coefficients multiplied by 100.000.

* Not statistically different from zero at 95% confidence level.

** Not statistically different from zero at 90% confidence level.

Table 6

ESTIMATION OF THE SECTORIAL MODEL BY INDUSTRIAL GROUPS
UNIT LABOR COST EQUATION

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment
Constant	30.40 (4.41)	11.30 (2.23)	32.74 (10.04)	46.87 (8.69)	30.73 (5.73)	37.45 (9.56)	40.73 (4.77)	21.69 (5.03)	23.26 (3.77)
wages	0.7435 (23.34)	0.8004 (28.49)	0.6394 (43.25)	0.5194 (17.65)	0.7504 (27.88)	0.6576 (32.00)	0.5987 (17.27)	0.6900 (29.11)	0.7991 (23.70)
Capacity utilization	-111.99 (-2.96)	-224.82 (-7.51)	-130.92 (-6.06)	-189.08 (-5.75)	-248.80 (-5.00)	-203.45 (-7.17)	-136.27 (-3.09)	-194.97 (-6.06)	-92.62 (-3.64)
Excess imports 1985.4-1987.4	-0.0020 (-0.45) **	-0.0053 (-1.24) **	-	-0.0027 (-0.58) **	-0.0033 (-0.69) **	-0.0073 (-1.91)	-0.0016 (-0.38) **	-0.0041 (-0.89) **	-0.0028 (-0.55) **
First-order autocorrelation term	0.6112 (4.69)	-0.4385 (-2.20)	0.0581 (0.37) **	0.3555 (2.40)	0.4910 (3.74)	0.2727 (1.75)	0.7092 (5.97)	0.0353 (0.21) **	0.1463 (0.91) **
$\bar{R}^2$	0.993	0.965	0.980	0.976	0.994	0.990	0.991	0.982	0.980
Dw	2.046	1.959	1.967	1.822	1.963	1.829	1.837	1.921	1.964

* Not statistically different from zero at 95% confidence level.
** Not statistically different from zero at 90% confidence level.

in the tobacco sectors is there evidence of an inflationary dynamics independent of costs, as reflected in the low coefficient of unit raw materials variable and the high "adjusted constant term" estimated at the bottom of the Table. In all sectors, however, there is evidence of a short-term inflationary "inertia", as reflected in the high estimated autocorrelation term. On the other hand, rising levels of capacity utilization have opposite effects in different manufacturing sectors; they fuel inflation in five sectors but tend to reduce prices in four of them. However, only in textiles and apparel is this effect statistically different from zero at a 90% confidence level. Similar weak results are obtained for the effects of import competition on prices. The coefficients for the effects of price competition --both through labor and raw material costs-- have the correct sign in several sectors, but none of them is statistically significant with a 90% confidence level. The "rent seeking" effect of QRs comes out even weaker. Curiously enough, it seems to be slightly more important during the recent timid liberalization. As its effects on production have been minimal, as we have seen, this statistical result is debatable.

Finally, according to Table 6, increasing nominal wages tend to raise unit labor costs. As expected, the estimated coefficients for the wage variable is less than one in all sectors, reflecting both long-term productivity increases and a

possible sensitivity of labor demand to wages. Also, in all sectors capacity utilization tends to reduce unit labor costs. On the contrary, "excess imports" did not have the expected effect on labor costs in any sector during the period of sharp changes in import policies. This variable had the expected effect in most sectors during the recent liberalization, but in none of them is it significant at a 90% confidence level.

4.3. Simulating the effects of import policies

The effects of changes in QRs over the period of analysis can best be appreciated by comparing two alternative scenarios. The first, which we will call "actual", reflects the historical evolution of both aggregate demand and import policies. The second, which we will call "counterfactual", is one in which QRs would have remained throughout the period at an "average" level. The simulations assume that the effect of import policies on GDP would have only affected its cyclical component, as this alternative scenario would have resulted in more controls in the late 1970s and early 1980s, but also more liberalization in 1983-1985.

According to Figure 1, the effects of import policy on GDP were negligible up to 1979. From 1980.3 to 1982.4, it resulted in a 1.5% loss of GDP. Given the share of primary production, this is equivalent to a loss of non-primary GDP of some 2%. On the other hand, the reversal of import policies in the following

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Figure 1
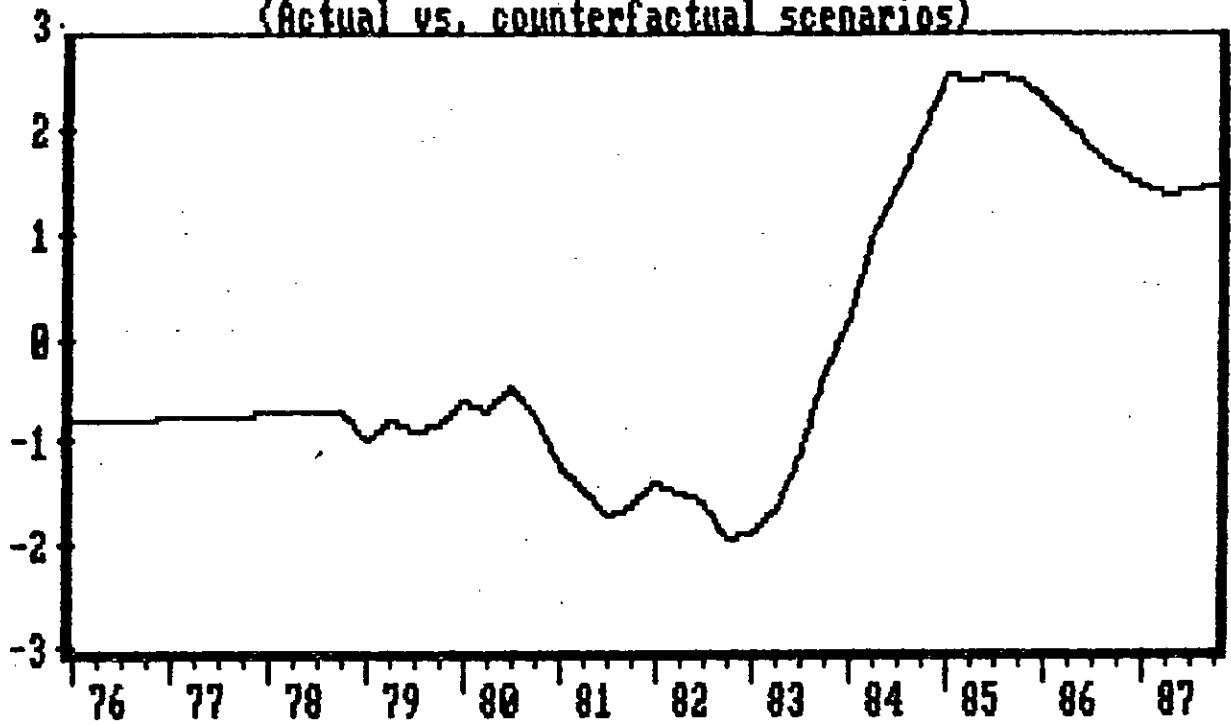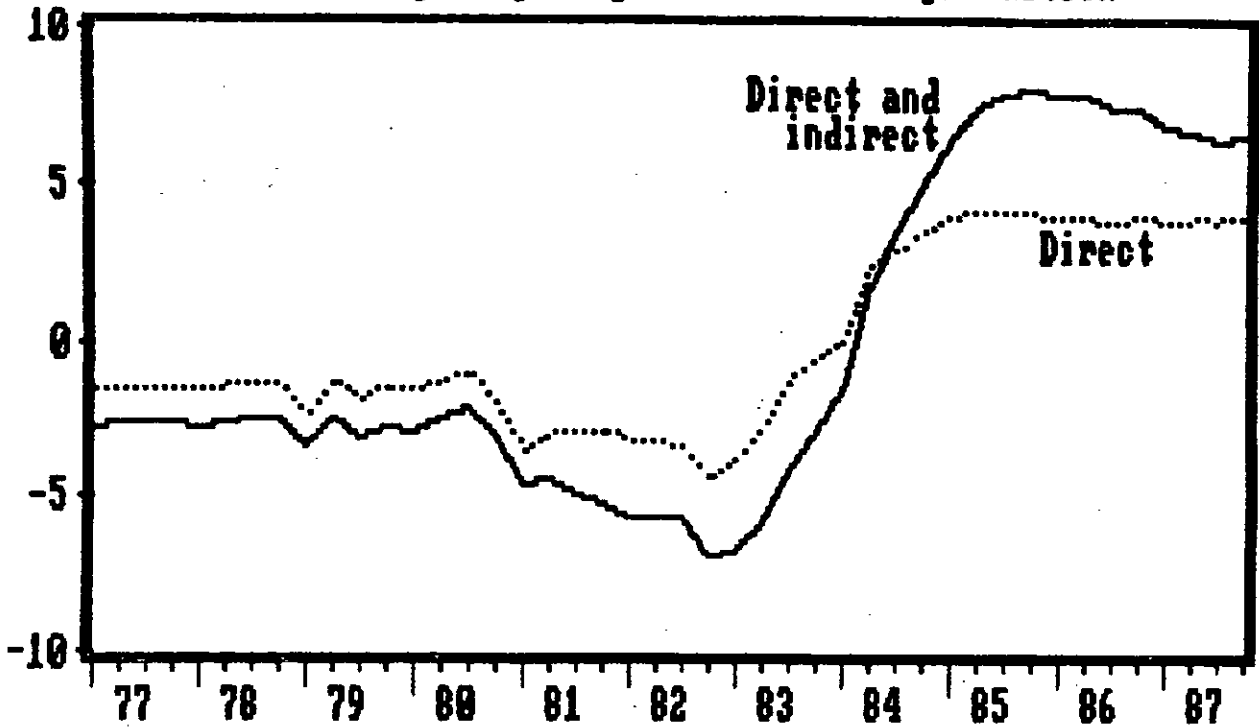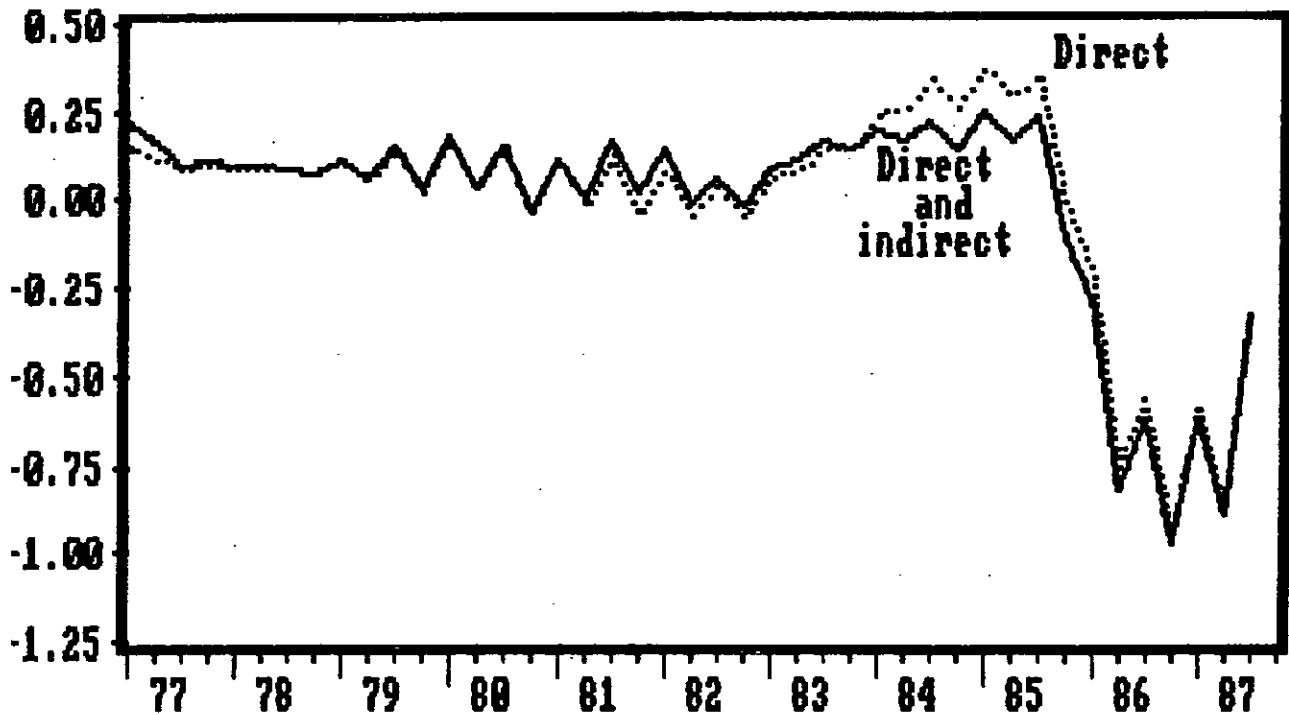Effects of import policy on GDP
(Actual vs. counterfactual scenarios)

Figure 2
A. Effects of import policy on industrial production

B. Effects of import policy on industrial prices
(three-quarters moving averages)

years was one of the major sources of growth. Indeed, from 1982.4 to 1985.2, import policies were responsible for a 4.4% net change in GDP. Indeed, according to the simulations, GDP would have grown at an annual rate of 1.3% during this period, reflecting weak exogenous demand injections and poor primary GDP performance. Import controls increased this rate to 3.1%. Finally, the macroeconomic effects of the more recent liberalization have been weaker than those of the early 1980s. Even then, it resulted in a 1.0% contraction of GDP with respect to the second semester of 1985.

As expected, most of the contractionary and expansionary effects of import policies concentrated in the manufacturing sector. Figure 2.A aggregates the estimated effects for the nine sectors to indicate the net effect of import policies on industrial production. The figure differentiates the "direct" as well as the "indirect" effects of changes in QRs. The first includes only the effects of E_m on Q_i in equation (5), assuming cyclical GDP to have remained unaffected by import policies. The second is the effect of QRs on Q_i induced by the expansion or contraction of GDP. According to the simulations, between 1980.3 and 1982.4, liberalization resulted in a 4.7% loss of industrial production, 72% of which could be attributed to the "direct" effects of import policies. On the other hand, between 1982.4 and 1985.2, import controls were responsible for a 14.4% growth of industrial production, 59% of which were due to their direct

Table 7

SIMULATED EFFECTS OF IMPORT POLICY ON INDUSTRIAL PRODUCTION AND PRICES
(Net effect, Actual vs. Counterfactual scenarios)

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment	Total
I. Industrial Production										
a. Direct effects										
1979.1-1979.4	-1.72	-2.46	-1.99	0.01	-0.97	-0.06	-0.00	0.0	-5.05	-1.85
1982.3-1983.2	-3.47	-6.03	-4.06	0.02	-1.57	-0.11	0.03	0.0	-10.48	-3.71
1985.3-1986.2	3.80	6.63	4.01	0.02	1.52	-0.01	0.02	0.0	14.30	3.56
1987.1-1987.4	2.89	-1.98	5.66	0.02	2.53	0.47	0.07	0.0	14.49	3.74
b. Direct and indirect effects										
1979.1-1979.4	-2.95	-2.46	-2.47	-2.08	-2.59	-0.66	-0.79	0.0	-7.33	-2.99
1982.3-1983.2	-6.24	-6.03	-5.26	-5.17	-5.32	-1.55	-2.21	0.0	-15.57	-6.33
1985.3-1986.2	8.14	6.63	5.85	8.52	7.41	1.67	3.14	0.0	27.05	7.90
1987.1-1987.4	5.62	-1.98	7.19	4.92	5.93	1.60	1.78	0.0	24.83	6.54
II. Industrial Prices										
a. Direct effects										
1979.1-1979.4	0.03	-0.10	0.21	-0.03	0.15	0.05	-0.00	0.0	0.25	0.10
1982.3-1983.2	0.06	-0.16	0.01	-0.03	0.01	0.08	-0.07	0.0	-0.22	-0.00
1985.3-1986.2	-0.06	0.07	-0.26	-0.06	-0.01	-0.19	-0.19	0.0	-0.02	-0.12
1987.1-1987.4	-0.05	0.23	-1.59	0.01	-1.10	-0.50	-0.23	0.0	-1.11	-0.61
b. Direct and indirect effects										
1979.1-1979.4	0.06	-0.19	0.15	-0.17	0.53	-0.04	-0.01	0.0	0.33	0.12
1982.3-1983.2	0.11	-0.16	-0.13	-0.59	0.83	-0.07	-0.24	0.0	-0.04	0.03
1985.3-1986.2	-0.14	0.07	-0.08	0.33	-1.17	-0.02	-0.44	0.0	-0.29	-0.20
1987.1-1987.4	-0.10	0.23	-1.44	0.47	-1.79	-0.39	0.19	0.0	-1.29	-0.63

effects. The more recent liberalization has had very small effects on industrial output.

On the contrary, the effects of changes in import policies on industrial prices have been minimal. As Figure 2.B indicates, the effect was insignificant in 1977-1984. Even at the peak of controls in late 1984 and early 1985, QRs increased industrial price inflation by only 0.3% a year. The liberalization which started in the latter year had a more significant effect on prices. This effect was due mostly to its impact on unit labor costs. However, as indicated in the analysis of Table 6 above, this effect is not very solid on statistical grounds.

The effects of import policy on production and prices in different industrial sectors are summarized in Table 7. As this table indicates, the effects of liberalization and controls on the domestic production of machinery and equipment were very strong. Directly, they also affected the foodstuffs, tobacco, textiles and apparel and, to a lesser extent, the paper and printing sectors. Indirectly, they also had important impacts on the wood industry and somewhat weaker effect on the chemicals and non-metalic minerals sectors. Basic metals seem to be the only sector inmune to changes in import policies. On the contrary, price effects were weak in all sector and insignificant in most of them. The strongest effects were those experienced by the paper and printing sector, but were mostly

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due to the aggregate demand effect on industrial production and its indirect effect on prices through capacity utilization. Moreover, given the statistical results summarized in Tables 5 and 6, most of the effect on prices concentrated in the recent liberalization, particularly in the textiles and machinery and equipment.

5. Conclusions

The statistical results presented in this paper strongly support the hypothesis that changes in QRs have strong quantity and weak price effects. They are those more akin to the standard predictions of Keynesian models of import policies (see, for example, Cripps and Godley, 1976 and 1978; Godley and May, 1977; Hemming and Corden, 1958; and Ocampo, 1987a) than to the Neo-classical "rent-seeking" literature so popular in Northern academic circles and international organizations in recent years. This effect of import policies on prices seem to be insignificant in a context in which mark-up pricing rules prevail.

The direct effects of liberalization and controls on industrial production concentrate in a few sectors-- particularly in the production of machinery and equipment--, most of which are not sensible to relative import prices. However, even in sectors where QRs have weak direct quantity effects, the indirect effects of import policy may be important, given the sensitivity of industrial production to cyclical GDP.

The effects of import policies on prices are small in all and insignificant in most industrial sectors. Moreover, even in those in which price effects are moderate, they are unrelated to "rent seeking" behavior, and are associated to the effect of capacity utilization on prices --and, thus, with the real contractionary or expansionary effect of liberalization and controls-- or with the statistically debatable effect of liberalization on labor productivity.

REFERENCES

Cripps, Francis and Wynne Godley, 1978, "Control of imports as a means to full employment and the expansion of world trade: The UK's case", Cambridge Journal of Economics, pp. 327-334.

Cubillos, Rafael and Luis Alfonso Torres, 1987, "La proteccion en Colombia en un regimen de exenciones", Revista de Planeacion y Desarrollo, June, pp. 45-100.

Echavarria, Juan Jose and Luis Jorge Garay, 1979, "Un analisis preliminar de la actual politica de liberacion de importaciones", Coyuntura Economica, October, pp. 73-90.

---, Carlos Caballero and Juan Luis Londono, 1983, "El proceso colombiano de industrializacion: Algunas ideas sobre un viejo debate", Coyuntura Economica, September, pp. 175-219.

Eichner, Alfred S., 1973, "A theory of the determination of the mark-up under oligopoly", Economic Journal, pp. 1184-1200.

FEDESARROLLO, 1985, "La disponibilidad de insumos importados", Coyuntura Economica, October, pp. 66-73.

---, 1987, "Determinantes del crecimiento industrial: los efectos de la demanda agregada", Coyuntura Economica, December, pp. 58-63.

---, 1988, "La coyuntura inflacionaria en perspectiva", Debates de Coyuntura Economica, No. 9, March, pp. 3-25.

Garay, Luis Jorge, 1982, "La politica de importaciones, 1978-82: una evaluacion", Mimeo, INCOMEX, June.

---, Manuel Martinez, Jose Giordanelli, Ricardo Villaveces and Yesid Castro, 1974, Analisis de la estructura de control a las importaciones en Colombia, Research Report, FEDESARROLLO, August.

Godley, Wynne and Willian Nordhaus, 1972, "Pricing in the trade cycle", Economic Journal, pp. 853-882.

--- and Robert M. May, 1977, "The macroeconomic implications of devaluation and import restrictions", Economic Policy Review, No. 2, Ch. 2.

Harcourt, E. C. and Peter Keynon, 1976, "Pricing and the investment decision", Kyklos, pp. 449-477.

Hemming, M.F.W. and W. M. Corden, 1958, "Import restrictions as instrument of balance of payments policy", Economic Journal, pp. 483-510.

Kalecki, Michal, 1971, Selected Essays on the Dynamics of the Capitalist Economy, Cambridge: Cambridge University Press.

Leon, Alejandro and Jorge Centenaro, 1986, Relaciones intersectoriales de produccion y empleo para analisis de politicas de demanda, Bogota: SENALDE.

Martinez, Astrid, 1986, La estructura arancelaria y las estrategias de industrializacion en Colombia, 1950-1982, Bogota: Universidad Nacional.

Ocampo, Jose Antonio, 1982, "Politica economica bajo condiciones cambiantes del sector externo", Ensayos sobre Politica Economica, No. 2, December, pp. 7-65.

---, 1987a, "The macroeconomic effect of import controls: A Keynesian analysis", Journal of Development Economics, 27, pp. 285-305.

---, 1987b, "Crisis and economic policy in Colombia, 1980-5", in Rosemary Thorp and Laurence Whitehead (eds.), Latin American Debt and the Adjustment Crisis, London: Macmillan, Ch. 8.

---, 1988, "The effects of liberalization and direct import controls on Colombian manufacturing, 1976-1986", Paper presenten in the WIDER Conference on "New Trade Theories and Industrialization in Developing Countries", Helsinki, August (Spanish version in Coyuntura Economica, March 1989).

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--- and Eduardo Lora, 1987, "Colombia", in <u>Stabilization and Adjustment Policies and Programmes</u>, Country Study No. 6, Helsinki: WIDER.

Okun, Arthur M., 1981, <u>Prices and Quantities: A Macroeconomic Analysis</u>, Oxford: Basil Blackwell.

Steindl, Josef, 1976, <u>Maturity and stagnation in American Capitalism</u>, 2nd. ed., New York: Monthly Review Press.

Sylos-Labini, Paolo, 1979, "Pricing and income distribution in manufacturing industry", <u>Journal of Post-Keynesian Economics</u>, 2:1, Fall, pp. 3-25.

Taylor, Lance, 1988, "Economic Openness: Problems to the Century's End", <u>WIDER Working Papers</u>, No. 41, April.

Villar, Leonardo, 1985, "Determinantes de las importaciones en Colombia: un analisis econometrico", <u>Ensayos sobre Politica Economica</u>, December, pp. 61-100.

Table 2
ESTIMATION OF THE MACROECONOMIC MODEL
(t statistics in parenthesis; elasticities in brackets)

Equation and explanatory variables	Lag	Exogenous import prices		Endogenous import prices	
A. Demand for industrial imports					
Constant	-	37463	33788	54455	60188
		(1.88)	(1.60) *	(2.23)	(2.30)
GDP	1	0.1274	0.1291	0.0682	0.0679
		(7.11)	(7.09)	(3.27)	(3.25)
		[1.19]	[1.21]	[0.56]	[0.56]
Relative import prices	1	-42485	-45005	-30969	-35602
		(-2.19)	(-2.33)	(-1.31) *	(-1.50) *
		[-1.04]	[-1.10]	[-0.67]	[-0.77]
L1	1	0.2649		0.0074	
		(2.24)		(0.05) **	
L2	1		13988		-1676
			(2.14)		(-0.22) **
L3	1	-0.0237	0.1397	1.5677	1.4697
		(-0.03) **	(0.19) **	(1.79)	(1.67) *
R²		0.728	0.723	0.589	0.593
DW		1.840	1.667	1.819	1.851
B. Reduced-form non-primary GDP					
Constant	-	24217	25907	21405	21291
		(1.79)	(1.93)	(1.65) *	(1.64) *
Coffee harvest	0-3 a/	0.7783	0.7995	-0.0147	-0.0316
		(1.95)	(2.02)	(-0.04) **	(-0.08) **
Non-traditional exports	0-3 a/	1.0998	1.1853	0.4149	0.3996
		(2.69)	(2.90)	(1.03) **	(0.97) **
Government expenditure	0-3 a/	1.0153	0.9750	1.4292	1.4308
		(2.14)	(2.10)	(2.87)	(2.87)
Excess imports	0-3 a/	-2.0832	-2.3019	-2.1013	-2.2415
		(-3.60)	(-3.75)	(-4.09)	(-4.08)
Lagged dependent variable	4	0.7266	0.7201	0.7649	0.7669
		(7.02)	(7.01)	(7.93)	(7.95)
R̄²		0.968	0.969	0.970	0.970
Durbin-H		1.516	1.470	1.254	-0.466
C. Relative import prices					
Constant	-			0.8365	0.8345
				(12.80)	(12.75)
Relative international prices	0			0.2333	0.2356
				(3.66)	(3.70)
Excess imports b/	0			-1.251	-1.366
				(-3.70)	(-3.64)
Autocorrelation coefficients	1			1.3294	1.3348
				(9.30)	(9.38)
	2			-0.4152	-0.4202
				(-3.10)	(-3.14)
R̄²				0.969	0.969
DW	/			2.098	2.102

a/ Average of current and three previous quarters.
b/ Coefficient multiplied by 100.000.
* Not statistically different from zero at 95% confidence level.
** Not statistically different from zero at 90% confidence level.

ESTIMATION OF THE MACROECONOMIC MODEL
WITH VARIABLE EFFECTS OF LIBERALIZATION
(t statistics in parenthesis; elasticities in brackets)

Equation and explanatory variables	Lag	
A. Demand for industrial imports		
Constant	-	12912
		(0.34) **
GDP	1	0.1665
		(3.80)
		[1.55]
Relative import prices	1	-32576
		(-1.32) *
		[-0.81]
L2: 1979.1-1985.3	1	22973
		(1.87)
1985.4-1987.4	1	7092
		(0.65) **
$\bar{R}^2$		0.730
DW		1.721
B. Reduced-form non-primary		
GDP model		
Constant	-	44788
		(2.32)
Coffee harvest	0-3 a/	0.7118
		(1.72)
Non-traditional exports	0-3 a/	0.7430
		(1.26) **
Public expenditure		0.9538
		(2.05)
Excess imports:		
1979.1-1985.3	0-3 a/	-1.5129
		(-3.65)
1985.4-1987.4	0-3 a/	-1.2092
		(-0.42) **
Lagged dependent variable	1	0.6801
		(6.29)
$\bar{R}^2$		0.958
Durbin-h		1.491

a/ Average of current and three previous quarters.

\# Not statistically different from zero at 95% confidence level.
\#\# Not statistically different from zero at 90% confidence level.

Table 1

THE LIBERALIZATION PROCESS, 1970-1987

	(1) Average nominal tariff 1/	(2) Distribution of items in the tariff shcedule 2/			(3) Imports under free licensing as % of total imports		(4) Excess demand for import licenses (% of total demand) 3/	(5) Public sector imports as % of total imports, excluding fuels and foodstuffs 4/	(6) Real import exchange rate (Pesos per dollar, 1980=100) 5/	(7) Imports as % of domestic expediture (1975 prices)	
		(a) Free licensing	(b) Prior licensing	(c) Prohibited	(a) Total	(b) Private sector				(a) Total	(b) Manufacturing 6
1970	51.9 %		80.4 %	16.2 %	18.5 %		8.9 %		110.1	17.0 %	20.5 %
71		3.4 %			27.5		12.7		114.4	18.8	21.9
72					27.9		12.9		118.8	15.8	18.4
73		20.2	79.8	-	31.2		6.0		118.8	15.5	18.7
74		29.6	70.4	-	43.6		3.4	13.1 %	115.5	15.8	18.6
75	32.6	34.1	65.9	-	42.8			14.7	120.2	14.3	17.4
76					39.8			15.5	119.1	15.0	17.8
77					41.0			11.1	103.0	15.5	18.5
78	30.5	52.8	47.2	-	42.8	49.0 %		7.9	103.9	17.3	20.9
79	28.2	66.7	33.3	-	44.4	50.5	1.1	9.6	100.9	16.7	20.6
80	26.0	66.7	33.3	-	44.0	52.9	1.4	13.9	100.0	18.6	23.4
81	25.9				52.1	65.7	3.4	16.4	93.9	18.6	24.7
82		70.8	29.2	-	54.7	66.6	3.7	16.0	87.5	19.6	26.4
83		41.9	58.1	-	41.4	54.5	19.5	18.6	88.3	17.9	24.2
84	41.7	0.5	83.0	16.5	21.1	30.7	23.8	19.7	97.4	17.0	22.5
85	31.4	27.0	71.6	1.4	14.8	19.2	35.4	13.2	113.0	15.8	20.5
86		36.2	62.7	1.1	42.4	48.9	19.2	14.3	145.6	15.8	21.2
87		37.8	61.1	1.1	45.3	51.9	22.5	12.1	150.7	15.9	

1/ End of year.

2/ 1971 and 1973: August, 1974: June; 1975 and 1976: February; 1979: September; 1980-1987: December

3/ 1970-1971: Reimbursable imports. 1985: Imports subject to budget. Rest: all imports. Data for 1974-1984 (except 1980) is partial.

4/ Refers to import licenses.

5/ Trade-weighted for 22 currences.

6/ Excluding oil derivatives.

SOURCE: Ocampo (1988), Tables 1-4.

ESTIMATION OF THE SECTORIAL MODEL BY INDUSTRIAL GROUPS
PRODUCTION EQUATION

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment
ISIC Category	311-313	314	32	33	34	351-352 355-356	36	37	38
Constant	65936 (3.24)	-207 (-0.28) ‡‡	25089 (2.20)	3514 (4.42)	9190 (6.94)	20862 (2.15)	3833 (5.84)	550 (0.61) ‡‡	14592 (2.78)
Trend GDP	0.0494 (1.93) [0.42]	0.0108 (4.34) [1.06]	-0.0147 (-1.37) ‡ [-0.42]	-0.0015 (-1.56) ‡ [-0.24]	0.0408 (7.16) [1.13]	0.0648 (3.03) [1.23]	0.0254 (13.07) [0.88]	0.0042 (1.80) [0.78]	-0.0186 (-1.54) ‡ [-0.62]
Cyclical GDP	0.1976 (2.52) [1.71]	-	0.0287 (0.52) ‡‡ [0.82]	0.0189 (5.54) [3.01]	0.0642 (5.56) [1.79]	0.0462 (0.94) ‡‡ [0.88]	0.0358 (3.11) [1.25]	-	0.1183 (1.69) [3.94]
Excess imports 1979.1-1985.3	-0.3099 (-1.47) ‡	-0.0692 (-3.28)	-0.1045 (-0.79) ‡‡	-	-0.0432 (-1.08) ‡‡	-	-	-	-0.2546 (-2.01)
1985.4-1987.4	-0.1407 (-0.24) ‡‡	-0.2164 (-2.66)	-	-	-	-	-	-	-
Price relative to imports	-	-	-10856 (-1.27) ‡‡ [-0.91]	-1077 (-4.37) [-0.52]	-5582 (-4.25) [-0.50]	-19482 (-3.27) [-1.15]	-2998 (-5.68) [-0.31]	-189 (-0.31) ‡‡ [-0.09]	-
Price relative to general WPI	-47828 (-2.98) [-1.27]	-	-	-123 (-0.20) ‡‡ [-0.06]	-4828 (-2.44) [-0.46]	-5661 (-0.82) ‡‡ [-0.35]	-	-	-
Lagged dependent variable	0.4117 (3.51)	-	0.6372 (4.40)	-	-	0.4729 (3.23)	-	0.7535 (6.26)	0.6342 (4.97)
R̄²	0.899	0.663	0.690	0.486	0.785	0.932	0.809	0.569	0.645
DW or H	-0.928	1.898	2.020	1.612	1.810	-1.163	1.625	-0.404	1.890

‡ Not statistically different from zero at 95% confidence level.
‡‡ Not statistically different from zero at 90% confidence level.

Table 5

ESTIMATION OF THE SECTORIAL MODEL BY INDUSTRIAL GROUPS
PRICE EQUATION

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment
Constant	0.1139 (0.64) **	0.1986 (1.53) *	0.0190 (1.60) *	-0.0604 (-0.54) **	0.2634 (1.34) *	0.2156 (1.12) **	0.0688 (0.40) **	-0.0484 (-0.11) **	0.5676 (1.12) **
Unit labor costs	-	0.1741 (2.55)	-	0.0715 (0.88) **	0.3114 (3.44)	-	0.2351 (1.70)	-	0.0198 (0.51) **
Unit raw material costs	0.9988 (7.53)	0.1374 (0.52) **	0.9481 (17.85)	1.3127 (4.02)	0.8560 (4.23)	0.7968 (4.37)	0.6314 (2.25)	1.4046 (5.71)	0.1957 (0.82) **
Capacity utilization	-0.0319 (-0.21) **	-0.1369 (-0.69) **	0.1730 (2.72)	0.1145 (0.89) **	-0.3260 (-1.29) **	0.1489 (1.13) **	0.1076 (0.33) **	0.3156 (1.18) **	-0.0537 (-0.45) **
Excess imports 1/ 1979.1-1985.3	-	-	-	-	-0.2243 (-0.59) **	-	-	-	-0.4185 (-1.10) **
1985.4-1987.4	-	-	-1.898 (-2.86)	-	-1.045 (-0.76) **	-0.573 (-0.55) **	-	-	-1.968 (-1.15) **
Labor costs relative to import prices	-	-0.0478 (-0.36) **	-	-0.0050 (-0.06) **	-0.0874 (-0.66) **	-0.0254 (-0.34) **	-	-	-0.0010 (-0.02) **
Raw material costs relative to import prices	-0.1234 (-0.63) **	-	-	-	-0.1972 (-0.73) **	-0.1469 (0.69) **	-0.0363 (-0.20) **	-0.0213 (-0.04) **	-0.3512 (-0.63) **
First order autocorrelation term	0.7568 (6.85)	0.4574 (3.56)	0.5542 (3.98)	0.9130 (13.38)	0.5242 (3.37)	0.7176 (5.60)	0.4798 (3.04)	0.7715 (6.41)	0.9250 (11.70)
Adjusted constant term	-0.0032	0.1547	0.0190	-0.0645	-0.0123	0.0468	0.0347	-0.0671	0.2416
$\bar{R}^2$	0.829	0.556	0.957	0.703	0.733	0.826	0.453	0.854	0.768
DW	1.933	2.223	1.926	1.537	1.818	1.639	1.809	1.472	1.705

1/ Coefficients multiplied by 100.000.

* Not statistically different from zero at 95% confidence level.

** Not statistically different from zero at 90% confidence level.

Table 6

ESTIMATION OF THE SECTORIAL MODEL BY INDUSTRIAL GROUPS
UNIT LABOR COST EQUATION

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment
Constant	30.40 (4.41)	11.30 (2.23)	32.74 (10.04)	46.87 (8.69)	30.73 (5.73)	37.45 (9.56)	40.73 (4.77)	21.69 (5.03)	23.28 (3.77)
Wages	0.7435 (23.34)	0.8004 (28.49)	0.6394 (43.25)	0.5194 (17.65)	0.7504 (27.88)	0.6576 (32.00)	0.5987 (17.27)	0.6900 (29.11)	0.7991 (23.70)
Capacity utilization	-111.99 (-2.96)	-224.82 (-7.51)	-130.92 (-6.06)	-189.08 (-5.75)	-248.80 (-5.00)	-203.45 (-7.17)	-136.27 (-3.09)	-194.97 (-6.06)	-92.62 (-3.64)
Excess imports 1985.4-1987.4	-0.0020 (-0.45) **	-0.0053 (-1.24) **	-	-0.0027 (-0.58) **	-0.0033 (-0.69) **	-0.0073 (-1.91)	-0.0016 (-0.38) **	-0.0041 (-0.89) **	-0.0028 (-0.55) **
First-order autocorrelation term	0.6112 (4.69)	-0.4385 (-2.20)	0.0581 (0.37) **	0.3555 (2.40)	0.4910 (3.74)	0.2727 (1.75)	0.7092 (5.97)	0.0353 (0.21) **	0.1463 (0.91) **
$\bar{R}^2$	0.993	0.965	0.980	0.976	0.994	0.990	0.991	0.982	0.980
DW	2.048	1.959	1.967	1.822	1.963	1.829	1.837	1.921	1.964

* Not statistically different from zero at 95% confidence level.
** Not statistically different from zero at 90% confidence level.

Table 7

SIMULATED EFFECTS OF IMPORT POLICY ON INDUSTRIAL PRODUCTION AND PRICES
(Net effect, Actual vs. Counterfactual scenarios)

	Foodstuffs and beverages	Tobacco	Textiles and apparel	Wood and products	Paper and printing	Chemicals	Non-metalic minerals	Basic metals	Machinery and equipment	Total
I. Industrial Production										
a. Direct effects										
1979.1-1979.4	-1.72	-2.46	-1.99	0.01	-0.97	-0.06	-0.00	0.0	-5.05	-1.85
1982.3-1983.2	-3.47	-6.03	-4.06	0.02	-1.57	-0.11	0.03	0.0	-10.48	-3.71
1985.3-1986.2	3.80	6.63	4.01	0.02	1.52	-0.01	0.02	0.0	14.30	3.60
1987.1-1987.4	2.89	-1.78	5.66	0.02	2.53	0.47	0.07	0.0	14.49	3.74
b. Direct and indirect effects										
1979.1-1979.4	-2.95	-2.46	-2.47	-2.08	-2.59	-0.66	-0.79	0.0	-7.33	-2.99
1982.3-1983.2	-6.24	-6.03	-5.26	-5.17	-5.52	-1.55	-2.21	0.0	-15.57	-6.33
1985.3-1986.2	6.14	6.63	5.85	6.52	7.41	1.67	3.14	0.0	27.03	7.96
1987.1-1987.4	5.62	-1.98	7.19	4.92	5.93	1.60	1.78	0.0	24.83	6.54
II. Industrial Prices										
a. Direct effects										
1979.1-1979.4	0.03	-0.10	0.21	-0.03	0.15	0.06	-0.00	0.0	0.25	0.10
1982.3-1983.2	0.05	-0.16	0.01	-0.03	0.01	0.08	-0.07	0.0	-0.22	-0.00
1985.3-1986.2	-0.06	0.07	-0.26	-0.06	-0.01	-0.19	-0.19	0.0	-0.02	-0.12
1987.1-1987.4	-0.03	0.23	-1.59	0.01	-1.10	-0.50	-0.23	0.0	-1.11	-0.61
b. Direct and indirect effects										
1979.1-1979.4	0.06	-0.10	0.15	-0.07	0.33	-0.04	-0.01	0.0	0.33	0.12
1982.3-1983.2	0.11	-0.16	-0.13	-0.59	0.83	-0.07	-0.24	0.0	-0.04	0.03
1985.3-1986.2	-0.14	0.07	-0.08	0.53	-1.17	-0.02	-0.44	0.0	-0.29	-0.20
1987.1-1987.4	-0.10	0.23	-1.44	0.47	-1.19	-0.39	0.14	0.0	-1.27	-0.57

Figure 1
Effects of import policy on GDP
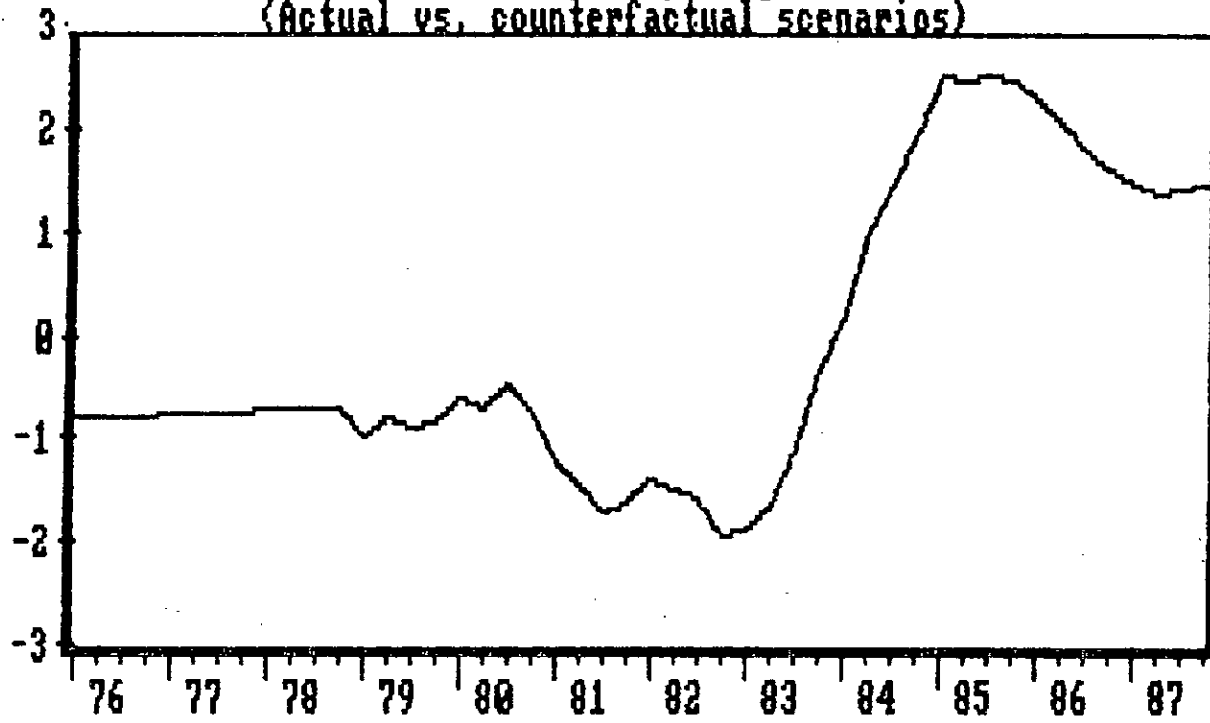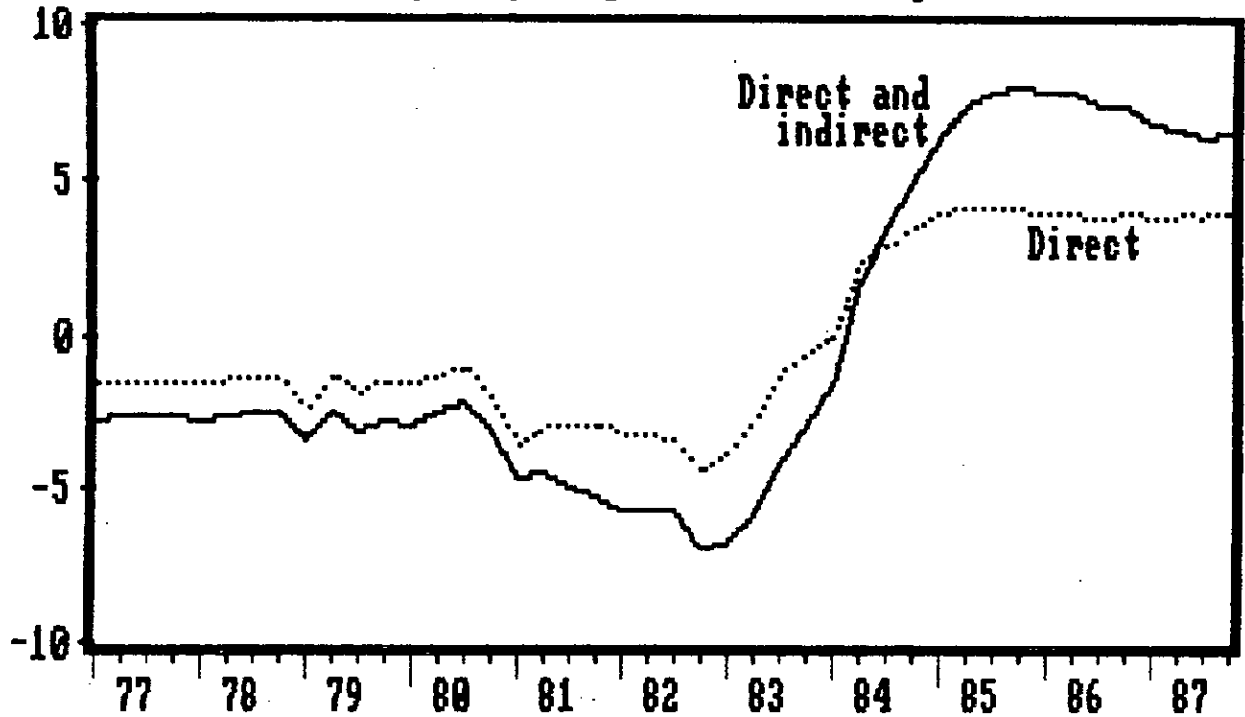(Actual vs. counterfactual scenarios)

Figure 2

A. Effects of import policy on industrial production

B. Effects of import policy on industrial prices
(three-quarters moving averages)