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GROWTH AND TRADE DISTORTIONS IN CHILE, AND THEIR IMPLICATIONS IN CALCULATING THE SHADOW PRICE OF FOREIGN EXCHANGE

by

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Abstract of "Growth and Trade Distortions in Chile, and Their Implications in Calculating the Shadow Price of Foreign Exchange"

This paper reviews projections of probable foreign exchange needs in Chile during the 1970's, and also summarizes a great deal of evidence on recent costs of producing foreign exchange in that country. On the basis of this evidence, it is concluded that the foreign exchange required to support "acceptable" rates of growth in Chile will only be forthcoming under an efficient exchange-earning program, which will need to stress promotion of exports instead of the traditional import-substitution policy. The shadow price of foreign exchange will be the key to investment project evaluation under this new policy, and a substantial part of the paper is devoted to estimating one version of this shadow price, i.e. the equilibrium exchange rate which Chile would have if its present, rather restrictive, commercial policy were replaced by a no-restrictions approximation to the optimal policy.

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Lance Taylor
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Growth and Trade Distortions in Chile, and Their Implications in Calculating the Shadow Price of Foreign Exchange*

I--Introduction

In this paper we attempt to deal with three interrelated problems--forecasting Chile's foreign exchange needs in the medium term, assessing the feasibility of meeting these needs in the face of rather severe trade distortions, and estimating an appropriate shadow price for foreign exchange on the basis of quantitative estimates of the extent of these distortions.

As we will spell out as we go along, there are substantial analytical and empirical difficulties in trying to do all these things. The analytical problems are dealt with at length elsewhere (/2/, /25/) and we concentrate on empirical problems here. The main results of the paper are estimates of the shadow price of foreign exchange (or, in our interpretation, the equilibrium exchange rate) for Chile, which appear in Table 9.

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*This study was undertaken as part of the M.I.T.-ODEPLAN research project in Chile. A first draft was completed in late 1969, and presented at a seminar on public sector project evaluation organized by ODEPLAN for public and private sector executives in April 1970. We are grateful to Gabriel Diaz, Ana Maria Jul, Valentin Michelli and Victor Perez for research help, and to the Harvard University Center for International Affairs and Fundaçao Getulio Vargas for research support after we left Chile.

Why estimate the shadow price of foreign exchange in the first place? Clearly, one has only limited resources to devote to shadow price estimation and propaganda, and one must choose one's targets carefully in light of existing distortions in the economy and the possibilities of making a significant impact on economic welfare through shadow price corrections in investment project evaluation. On both these grounds, shadow exchange rate corrections in Chile are important.

Economic growth forecasts indicate that Chile's foreign exchange needs during the next decade will be very high, justifying a careful screening of investment projects in terms of their costs of saving or generating additional foreign exchange. And the distortions imposed on the economy (especially on the election between export and import-substitution investments) by the protectionist policies pursued over the last four decades necessitate a fairly substantial revaluation of the price of the dollar to achieve an efficient resource allocation. Because of these reasons, there has been extensive work at ODEPLAN and elsewhere on calculation of the shadow exchange rate, and related matters. The results

of these investigations are summarized here.

The organization of the paper is as follows: in the next section, we give a summary of projections which have been made of Chile's foreign exchange needs during the next decade. This will be followed by a review of the comparative costs of generating foreign exchange in different branches of the Chilean economy, with evidence coming from a variety of sources. This cost analysis will lead finally to the conclusion that the Escudo is over-valued in terms of the dollar, and a foreign exchange shadow price which can compensate for this overvaluation in investment project analysis will be presented.

II--Projections of Foreign Exchange Use

Several models have been developed to forecast Chile's foreign exchange needs in the 1970's. These will be reviewed in due course, but first it is worthwhile to make some order-of-magnitude projections of what these requirements are likely to be.

As a preliminary, we may characterize the current foreign exchange scene as follows: Chile now exports (and imports) about U.S. $1000 million per year, with imports

amounting to about 14% of GDP. Imports of intermediate inputs to production make up a bit more than one-half of total goods imports, capital goods make up almost one third of these imports, and consumer goods are the balance. The intermediate imports (in CIF values) are about seven percent of GDP, while capital goods imports make up more than one-third of total gross capital formation. In recent years, exports of copper and other minerals have made up 70% or more of total exports.

What are the possible future paths of evolution from this situation? To make projections it is necessary to start from some assumptions about what is likely to remain constant, and what is likely to change in the relationships among import-export and domestic variables.

A very basic assumption is that capital goods imports are unlikely to decline as a share of gross capital formation. One reason for assuming this is that the production of capital equipment which does take place in Chile is very expensive in terms of world prices (as will be discussed more thoroughly below), and it may not be economical to expand it further. Another reason is that very few small countries

(including even the most advanced ones), have succeeded in reducing their import component of capital formation to below about 30%.[1/]

Secondly, we assume that intermediate imports also will not be substituted to a great extent, except at high cost. This is not consistent with the investigation of Lilia Rodriguez /22/, who found on the basis of survey information that somewhat more than one-half of intermediate imports are "competitive" and could be substituted. However, her definition of competitiveness is ample, referring to all technical possibilities. The practice is rather more difficult, and for this reason no drastic reduction in the importance of this type of imports is postulated.

Thirdly, suppose for the moment that exports can only grow proportionately to GDP. This means that in the absence of foreign capital inflows, foreign exchange availability in any moment will be about 15 percent of GDP (from exports), less intermediate imports (seven percent), less factor payments abroad (about three percent). This leaves five per-

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[1/] For empirical verification of the great importance of capital goods imports in small countries, see Adams /1/ and Taylor /24 /.

cent of GDP in foreign exchange available for capital goods and consumption imports. On the other hand, capital goods imports make up one third of investment, so that if all consumption imports were suppressed investment would still be limited on the foreign exchange side to 15% of GDP. If the capital-output ratio is three, then the maximum rate of growth of GDP on the assumption that exports make up a constant fraction of GDP and not allowing imports of consumption goods and capital inflows is five percent. Clearly, exports plus foreign capital inflows plus import substitution will have to grow more rapidly than GDP (at a sustained rate even after the new copper production capacity comes on stream) to allow the rates of economic growth which are now being talked about in Chile--at least on a political level.

There are a number of things wrong with the calculation we have just gone through, most of which are related to the rigidity of its hypotheses of proportionality of different variables. However, its basic result--that rapid export growth or further import substitution is a necessary condition for high growth rates--is verified by more complex models.

Three models of the requisite type will be reviewed here. The first of these is the ODEPLAN two-gap model, (/9/, /10/), and the second is the linear programming model of the Chilean Economy developed by the Global programming group at ODEPLAN /20/. The most recent foreign exchange gap forecasts of these models are briefly summarized below. A third neoclassical model /25/ was also developed to emphasize the fact that substantial "trade improvement"[1/] is a necessary condition for rapid economic advance--even under strong assumptions allowing maximum possibilities of substituting domestic for foreign production.

This model assumes that production possibilities for domestic uses and trade improvement (non-traditional exportation and import substitution) are described by a three-factor neoclassical production function, the factors being labor,

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[1/] By "trade improvement" (the phrase comes from Chenery and MacEwan /7/) we mean new production either for import substitution or export.

domestic-type capital and foreign-type capital. Accumulation of domestic-type capital is what is left of production after consumption of domestic goods, production for trade improvement, exogenous expenditure (mainly government) and capital depletion are subtracted. The amount of accumulation of foreign-type capital is foreign exchange supply (production for trade improvement plus exogenously determined mineral exports, both valued at world prices) less intermediate and consumption imports and exogenous foreign exchange flows abroad. Intermediate imports are assumed to be proportional to domestic output levels, while consumption imports are determined by total consumption demands and price elasticities.

For this paper, the model was used to work out the rates of growth of mineral exports and production for trade improvement needed to support different rates of growth of per capita consumption on the assumption that trade improvement is of equal value both in domestic and world prices[1/]. Figure 1 shows the various growth rates of tradi-

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[1/] This assumption understates required production for trade improvement, since it amounts to assuming that Chilean prices are equal to world prices at the current exchange rate, i.e. Chilean non-traditional exports are competitive in the world market without subsidy. As we will see below, this is in general not true.

tional exports and trade improvement needed to support rates of growth of per capita consumption of three and four percent per year. These rates of consumption growth are (optimistically speaking) feasible in terms of historical average savings rates.[1/] (The solid lines in the graph refer to different assumptions about the rates of exogenous technical progress in the economy--the value of 2.5% per year is roughly consistent with the findings of Harberger and Selowsky /11/, while the value of 1,25% is closer to the estimate of Bruton /5/ as corrected by Michalopolous /18/.)

From the Figure, it is clear that relatively high growth rates of production for trade improvement (or massive foreign capital inflows) will be required to support the assumed rates of consumption growth, even when sustained growth rates of the value of mineral exports are relatively high. For example, on the pessimistic (and probably more realistic) assumption about technical progress, a rate of

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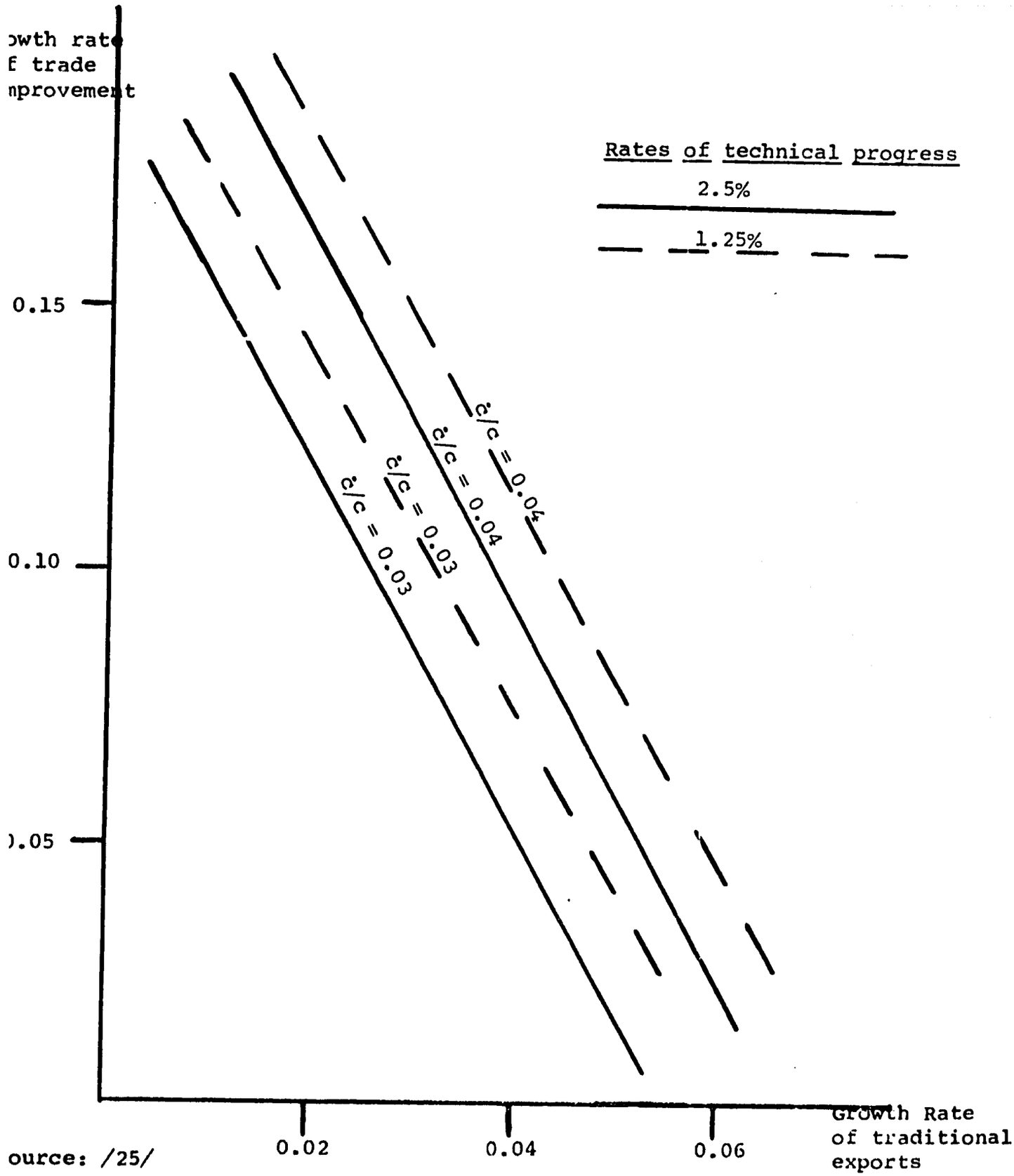
[1/] Figure 1 is based on solutions to the model assuming a direct partial elasticity of substitution of 2.0 between domestic type capital (plant) and foreign-type capital (equipment). This assumption is consistent with values estimated for this parameter in the U.S.A. by Sato /23/, and allows "much" more possibility of substitution against foreign-type capital than the zero-elasticity production functions of two-gap models.

Figure 1: Growth rates of trade improvement needed to support different consumption growth rates ($\dot{c}/c$)



ource: /25/

growth of mineral exports of five percent[1] implies that production for trade improvement has to grow at about seven and one-half percent per year to support a per capita consumption growth rate of four percent. Either in terms of import substitution or exportation, this rate of growth would be a non-trivial achievement, and it would have to be exceeded if technical progress occurs less rapidly than the historical trend or if copper prices fall off.

The rates of growth of GDP underlying the consumption growth rates of Figure 1 are not astronomical, ranging between five and six percent. Using the ODEPLAN two-gap model, Foxley, Gomez and Infante /10/ calculated that foreign trade and savings needs would be satisfied in 1980 if GDP grows at exactly six percent per year and exports and imports grow at the following alternative rates:[2]

Export Growth	Import Growth
6.0%	6.4%
5.5%	5.9%
5.0%	5.3%
4.5%	4.6%

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[1] In terms of five-year growth rates (taking into account the projected hump in copper production in 1971), this is probably a reasonable estimate.

[2] See Foxley, Gomez and Infante /10/, Table 3.

If imports grow at the high rate (the most probable happening, since a rate of growth of imports substantially less than the rate of growth of GDP is an unlikely prospect) and mineral exports grow at five percent, then these figures imply that non-traditional exports will have to grow at eight percent per year to fill foreign exchange needs in 1980. This result is also broadly confirmed by ODEPLAN linear programming model /20/, which permits a rate of growth of GDP on the order of six percent per year with an overall export growth rate of four and one-half percent, but only when the balance of payments deficit is on the order of $200 million annually. This figure implies that the linear program concurs with the other two models in forecasting that trade improvement (or a massive payments deficit) is in large measure a necessary condition for acceptable growth rates in the 1970's.

III--Costs of Trade Improvement

What problems will Chile face in generating the postulated amounts of trade improvement?

Given the large absolute amounts of trade improvement

required, it is obvious the investments in import substitution and export promotion will have to be carefully selected and designed to yield maximum yields in terms of foreign exchange at minimum cost, even under the unlikely best of conditions (for example--no drastic fall of copper prices from their present levels). However, adopting comparative cost criteria in investment requires knowledge of current costs, for use in making rules about when to reject inefficient investments. Further, cost and price data are useful in indicating the point from which Chile must start in any attempts to compete in world markets--if the country is priced out of market by large amounts in certain products, common sense would suggest the further expansion of their production be curtailed.

As it turns out, Chile does have high domestic prices, the result of a long history of trade restriction and the consequent overvaluation of the Escudo. There is no one good set of evidence which can be cited to justify this assertion, but a number of indirect calculations have been made which tend to verify it. These are reviewed in some detail in this section, since they are of relevance to the

calculations of foreign exchange shadow prices further on.

A--Direct Price Comparisons

In a country which has long practiced trade restrictions through high and diverse tariffs, import quotas and prohibitions, multiple exchange rates, special import regimes, and import deposits at various rates and real costs of capital, tracing the relationship between domestic and C.I.F. import prices is exceptionally difficult. For this reason, direct price comparisons at the wholesale level would be the best basis for computing indices of domestic overvaluation. At ODEPLAN, we attempted to do this, but not with complete success. The only reasonably complete price survey we could find was rather old (dating from 1960-62) and was taken at the consumer level by ECLA to compute parity exchange rates (/26/, /27/). We used this data to compute ratios between Chilean users' prices (in Santiago) and minimum users' prices in the capitals of the South American countries sampled by ECLA. This ratio will approximate the ratio between domestic and international prices CIF-Santiago insofar as the following assumptions are not greatly violated:

i) No price discrimination between domestic and foreign demand in the sample countries;

ii) Similar domestic commercialization rates (proportional differences between wholesale and users' prices) in all countries;

iii) Transport costs between Latin American sources and Chile approximately equal to the positive difference between true international prices and minimum sample prices.

The credibility of these hypotheses is difficult to evaluate, but it is clear that the ECLA results must be used to make only tentative inferences. However, when one notes from Table 1 that Chile has the dubious distinction of not having the lowest purchasers' price in the sample for any of the 28 groups of goods therein, and that Chilean prices are on the average 228% of minimum Latin prices, the implications of the price comparisons are clear: At least in the first part of the last decade, Chilean prices on the average for a wide variety of goods were very far from being competitive.

More recent detailed evidence on this matter is not available. However, some price comparisons made in 1969

TABLE 1

Chile: Users' Prices of Groups of Tradable Products in Terms of Minimum Prices in Lafta Countries, at the Official Exchange Rates, June 1962

Group of Products	Relative Price in Chile	Weight	Country of Comparison
Meat, Poultry	298	9.90	Argentina
Fish	200	.79	Ecuador
Milk Prod.	253	5.23	Argentina
Cereals	134	10.19	Argentina
Fruits	197	1.10	Ecuador
Vegetables	205	9.12	Peru
Sugar	201	1.91	Peru
Fats, Oils	312	2.52	Argentina
Other Foods	285	2.50	Colombia
Non Alcoh. Beverages	244	1.24	Mexico
Alcoh. Beverages	282	8.84	Argentina
Tobacco	380	1.32	Peru
Clothing	269	11.02	Ecuador
Footwear	144	4.73	Ecuador
Textiles	225	3.31	Colombia
Household Utensils	345	4.81	Brazil
Furniture	238	.88	Peru
Elec. Appliances	318	.88	Argentina
Operation Private Transportation	217	1.32	Venezuela
Toilet Articles	365	.44	Brazil
Pharmac. Prod.	168	1.53	Brazil
Books, Toys	211	1.72	Brazil

TABLE 1 (Cont.)

Group of Products	Relative Price in Chile	Weight	Country of of Comparison
Agric. Machin.	123	.57	Venezuela
Indus. Machin.	141	5.66	Mexico
Office Equip.	254	.28	Argentina
Road Trans. Equip.	189	2.56	Mexico
Other Vehicles	144	.57	Mexico
Construction Mat.	134	5.09	Ecuador
AVERAGE	228	100.00	

NOTES: The table was constructed from published and unpublished data gathered by ECLA in 1960-62 in all Latin American countries. See: ECLA, Medición del nivel de precios y el poder adquisitivo de la moneda en América Latina, 1960-62 (E/CN.12/653, 30 August 1967), especially Cuadro VII-b, p. 197. The official exchange rates used are presented in IMF, International Financial Statistics, 1, 16 (January 1963). The weights for consumer goods are estimated from Chilean per-capita consumption; the demand distribution between consumer and capital goods and the weights for capital goods are derived from average final demand figures for all Latin American countries (all weights from unpublished information by ECLA).

by the Chilean Steel Institute tend to support the inferences drawn from the ECLA prices (Table 2), as does most casual store-window observation. There seems to be little doubt that Chilean prices are high. The main question to be asked, however, is what we can infer from these prices and other data about costs of production in Chile? To this type of analysis we now turn.

B--Comparative Costs: Bruno-Krueger Exchange Rates

The Bruno-Krueger exchange rate (or domestic resource cost) for a sector is defined as the ratio of total domestic costs of production (payment for labor, domestic capital services, home-produced intermediate inputs, etc.) to the value of the sector's product in world prices, net of costs of intermediate imports and imported capital services. Thus, Bruno-Krueger sector rates give a measure of the comparative costs to the country of diverting resources to either import substitution or export promotion in the various sectors.

In /2/, it is shown that the algebraic formula for the Bruno-Krueger exchange rate BK_i in sector i is

TABLE 2

Comparison Between Recent Chilean and International Prices of Selected Products in the Metal Products and Machinery Sectors, First Semester 1969. (Exchange Rate: US$1 = E° 8,16)

Product Description	Price in Chile US$	International Price US$	Price Index in Chile
1. Electric Sewing Machine	366	120	305
2. Automatic Washing Machine	510	200	255
3. Home Refrigerator	498	80	623
4. Gas Stove	177	63	281
5. Air Conditioner	1.156	150	771
6. Electric Iron	27	8	338
7. TV Set	415	110	377
8. Bicycle	133	27	493
9. Floor Waxer	185	49	378
10. Disc for Agricultural Implements	17	10	170
11. Industrial Abrasive Wheel	281	95	296
12. Electric Drill-Press	593	140	424
13. Three-Phase Electric Motor, ½ HP	101	33	306

NOTE: The basis for international prices is CIF-Valparaiso. Exceptions are the iron and the floor waxer, the international prices of which are the wholesale prices in Colombia and Venezuela, respectively. Products in Chile are priced either ex-factory or at the wholesale level, with the exception of the washing machine, which is priced at the consumers' level. The data presented is based on an original survey by the Chilean Steel Institute.

$$BK_i = \frac{c'(I - A)^{-1} h_i}{\pi_i - \pi_0 a'_0 (I - A)^{-1} h_i} \qquad (1)$$

where c' is a row vector of domestic costs per unit of gross output by sector, A is the input-output matrix for domestic inputs, π_i is the foreign price of product i, π_0 is an index of imported input prices, a'_0 is a row vector of non-competitive intermediate import and capital use coefficients, and h_i is a vector with unity as its i-th element and with other elements equal to zero.

In ODEPLAN, we calculated Bruno-Krueger exchange rates for various industries using the 1962 Chilean input-output matrix /19/ while Victor Perez at the Centro de Planeamiento of the University of Chile made direct cost calculations for a number of recent investment projects. We present the input-output results first.

In these calculations, two different assumptions were made about costs. The first was the theoretically incorrect supposition that domestic costs are adequately represented by value added less indirect taxes, while foreign capital costs are negligible. In this case the vector c' in the above formula is made up of ratios of this cost measure to gross value of output by sector.

The second, theoretically correct but empirically difficult, assumption was that domestic costs are made up of labor payments plus a "normal" gross rate of return to domestically-produced capital used in the production process, while foreign costs include both intermediate imports and a gross rate of return to foreign-produced capital goods. In symbols, this costing procedure gives the following version of the Bruno-Krueger rate:

$$BK_i = \frac{(w\ell' + sk_1')\ (I - A)^{-1}\ h_i}{\pi_i - (\pi_0 a_0' + s\pi_2 k_2')\ (I - A)^{-1}\ h_i} \qquad (2)$$

where in addition to previously defined symbols, w is the wage rate, ℓ' is a vector of labor-output ratios, k_1' is a vector of domestic capital-output ratios, s is the gross rate-of-return to capital, k_2' is a vector of foreign capital-output ratios, and π_2 is an index of prices of foreign capital goods.

Tables 3 and 4 give Bruno-Krueger shadow prices for a number of important export and import-substituting sectors of the Chilean economy. These results were calculated according to the following assumptions:

i) The cost structure of production in a sector for either import substitution or export promotion is the same; however, the international values of goods which substitute imports or are exported may vary.

ii) The "drawback" (read export subsidy) payments which have been given since 1967 as part of Chile's export promotion policy provide an adequate index of the differences between internal and FOB prices of exportable products from individual input-output table sectors (two-digit industries). At least for most sectors with non-negligible exports (noted in Table 3), this is not a bad assumption, since "drawbacks" are given according to manufacturers' cost estimates.

iii) Teresa Jeanneret's estimates of tariff rates on final goods for 1961 /13/ were used to infer the difference between internal and CIF prices of importables. These estimates suffer greatly from being out-of-date, and in addition may be underestimates of true price differentials. However,

Jeanneret's tariffs are the only available price estimates classified consistently with the Chilean input-output table, and in addition cover a far wider range of products than our other price indicators. Using ECLA data presented in Table 1, we attempted to

calculate an alternative set of input-output matrix-consistent tariffs. Unfortunately, these calculations proved to be so sensitive at the sector level to different assumed weighting schemes (perhaps because of the smallness of the samples) that we had to give the project up.

iv) Average capital-output ratios, based on the period 1962-67, were used in formula (2). Like most data of their kind, these are subject to serious reservations, but they at least seem consistent with the aggregate development of the Chilean economy as summarized in ODEPLAN's programming models. The rate of return used in (2) was 20%, a level consistent with the estimates of gross rates of return to fixed capital which have been made for Chile. Total labor

payments (including employer's contributions to pension funds) were used to estimate labor costs in (2).

Besides these assumptions, we should also note that the calculations are subject to the qualifications that the input-output matrix is quite old and is in users' prices. The present calculations should therefore be re-done with the 1967 input-output matrix when it appears (hopefully in producers' prices), to put them on a more firm statistical basis.

With all these caveats listed, we can now turn to a tentative interpretation of the results in Tables 3 and 4, which show sectoral Bruno-Krueger exchange rates divided by the exchange rate in 1962. The Tables support the following inferences:

i) Import substitution is on the average a great deal more expensive than exportation in terms of foreign exchange costs.[1] Of course, this finding results from the difference between the import and export price deflators, but it is still striking to note the range in costs between efficient export activities such as mining and relatively inefficient import-

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[1]This is the usual result of this type of calculation for economies with overvalued exchange rates. See Krueger's original paper, /16/, for another example, Turkey.

substituting industries such as textiles.

ii) When costs of foreign capital are considered, the range of costs of exportation still lies below the import substitution range, except in the cases of nitrate mining (which besides using foreign-made capital intensively, spends over 20% of its gross value of production on intermediate imports) and the capital-intensive basic metals industry. However, even the relatively capital-intensive pulp and paper industry still generates foreign exchange more cheaply than most import substituting sectors.

iii) The most costly sectors appear to be those where import substitution has advanced the furthest, notably textiles and clothing. (This result can also be read from the price comparisons above.) Also, when capital costs are considered, expansion of the heavy industry sectors 22 and 23 appears from these calculations to have been a rather expensive exercise in import displacement.

iv)As a final conclusion, one might hazard a guess from the results of these aggregate calculations that there is room for export expansion with a domestic to foreign cost

TABLE 3

Bruno-Krueger Export Shadow Prices for Chile

Sector of ODEPLAN 1962 Input-Output Matrix	Production Costs Based on: Value Added	Labor payments and 20% return to capital
1. Agriculture, Livestock, Forestry and Hunting (#)	1.108	1.107
4. Iron Mining (#)	0.899	1.803
5. Copper Mining (#)	0.943	0.599
6. Nitrate Mining (#)	0.958	negative
7-8. Other Mining and Quarrying (#)	0.946	0.819
9. Food Products (#)	1.090	0.973
13. Footwear and Clothing	1.116	0.517
14. Wood and Cork	1.137	1.608
15. Furniture	1.121	0.728
16. Paper and Paper Products (#)	1.103	1.644
18. Leather and Leather Products	0.932	0.545
20. Chemical Products	1.029	0.750
23. Basic Metals (#)	1.196	3.804
25. Non-electrical Machinery	0.898	0.592
26. Electrical Machinery	0.995	0.499
27. Transport Equipment	0.928	0.563
28. Other Manufacturers	0.971	0.408

(#) Sectors with more than U.S.$ 10 million of exports in 1967.

Sources: The two shadow prices are ratios of the costs of producing U.S. $1 of exports according to the 1962 technology of the ODEPLAN input-output matrix (in users' prices) to the 1962 exchange rate. The two estimates are based respectively on formulas (1) and (2) of the text. Drawback payments in 1968 were used to estimate differentials between world and Chilean prices.

TABLE 4

Bruno-Krueger Import Shadow Prices for Chile

Sector of ODEPLAN 1962 Input-Output Matrix	Production Costs Based on: Value Added	Labor Payments and 20% return to capital
1. Agriculture, Livestock, Forestry and Hunting	2.25	2.50
9. Food Products	1.66	2.53
10. Beverages	1.88	2.59
11. Tobacco	0.90	0.47
12. Textiles	3.89	negative
13. Footwear and Clothing	3.56	19.16
14. Wood and Cork	1.25	2.10
15. Furniture	2.06	2.41
16. Paper and Paper Products	1.37	6.83
17. Printing and Publishing	1.60	2.97
18. Leather and Leather Products	2.39	21.09
19. Rubber Products	1.71	0.77
20. Chemical Products	1.76	3.56
21. Petroluem and Coal Products	0.82	0.47
22. Non-metallic Mineral Products	2.17	negative
23. Basic Metals	1.67	negative
24. Metallic Products	1.36	2.17
25. Non-electrical Machinery	1.53	1.50

TABLE 4 (cont.)

Sector of ODEPLAN 1962 Input-Output Matrix	Production Costs Based on: Value Added	Labor Payments and 20% return to capital
26. Electrical Machinery	1.71	1.31
27. Transport Equipment	1.45	1.18
28. Other Manufactures	1.99	1.75

SOURCES: The two shadow prices are ratios of the cost of substituting U.S.$1 or imports according to the 1962 technology of the ODEPLAN input-output matrix (in users' prices) to the exchange rate for 1962. The two estimates are based respectively on formulas (1) and (2) of the text. Teresa Jeanneret's nominal tariff rates for 1961 /13/ were used to estimate differentials between world and Chilean prices.

ratio not exceeding 1.25 to 1.5 times the nominal exchange rate, a result consistent with the estimate to be presented below of the Chilean equilibrium exchange rate. On the other hand, much additional import substitution should show a domestic/foreign cost ratio as least two times the nominal exchange rate, with costs running far higher in certain sectors.

To check these last suppositions, we turn to some Bruno-Krueger exchange rates calculated from the cost structures given by Chilean manufacturers when requesting export drawbacks, and from recent investment projects in import substitution.[1/] These estimates appear in Tables 5 and 6 (with names somewhat altered to preserve anonymity). The average domestic resource cost of the export industries (weighted by their net savings of foreign exchange) is 1.138 times the current exchange rate, while the average cost of the import substitution industries is 1.382 times the exchange rate. Once again, exports appear as the cheaper method for earning foreign exchange, especially when one notes that there are no drawback-receiving export industries

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[1/] These results are taken from the honors thesis (memoria) of Victor Perez at the Centro de Planeamiento, Universidad de Chile /21/.

with higher costs than those of Table 5, while a number of recent import substitution activities have costs far higher than those of Table 6.[1/]

C--Comparative Costs: Rates of Effective Protection

As pointed out most forcefully by Balassa and Schydlowsky /3/ and discussed in detail in /2/, the Bruno-Krueger ranking unduly penalizes intermediate input-using industries by valuing domestically produced intermediate inputs at domestic prices.

One way to overcome this bias is through the use of effective protection-type calculations. Since the number of variant rates of effective protection in the literature is now enormous, it is not so clear just which concept is most appropriate for the problem at hand. The variant we use here is due to Hufbauer /12/, and captures the essentials of the situation, although it lacks the refinement of re-estimation of non-tradeable goods' prices discussed in /2/.

In symbols, the Hufbauer formula is as follows: Classify the indices i of the input-output coefficients a_{ij} into two

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[1/] The best known example is, of course, automobile assembly. See Johnson /14/ for a not completely up-to-date but nonetheless enlightening discussion of the high costs encountered in this Chilean industry.

TABLE 5

Bruno-Krueger Shadow Prices for Chilean Export Industries

Industry	Shadow Price[1]	Net Foreign Exchange Earnings[2]
Preserved Shellfish	0.860	$ 248,171
Fish Derivatives	1.349	1,038,088
Steel Products	1.204	470,129
Wool	1.191	3,359,945
Chemical Products derived from Copper	1.509	15,034
Low Voltage Electrical Products	1.457	276,602
Malt	0.721	1,360,714
Organic Chemicals	2.449	89,044
Average	1.343	
Average weighted by Net Foreign Exchange Gains	1.138	

[1]Relative to the current exchange rate.

[2]For a "typical" year.

Source: /21/

TABLE 6

Bruno-Krueger Shadow Prices for Recent Chilean Import Substitution Projects

Project	Shadow Price[1]	Net Foreign Exchange Savings[2]
Electric Condensors	1.009	$ 755,553
Compressors	1.672	255,718
Petrochemical Derivatives	1.116	3,192,975
Plastics Products	1.665	509,868
Agricultural Machinery	1.400	538,225
Medium Voltage Electrical Products	1.996	323,349
Hydraulic Pumps	2.171	430,404
Cutting Tools[3]	0.882	569,331
Intermediate Chemicals[3]	1.990	1,063,000
Average	1.545	
Average weighted by Net Foreign Exchange Savings	1.382	

[1]Relative to the current exchange rate.

[2]For the year in which the project report forecasts the biggest net foreign exchange savings.

[3]The level of production of these commodities permits the exportation of small quantities (to Peru).

Source: /21/

sets, set I corresponding to tradable intermediate inputs[1] and set II corresponding to non-tradable intermediate inputs. Then we can define a "net price" p* which is the revenue from a one Escudo sale in sector j, net of the cost of tradable intermediate inputs:

$$p_j^* = p_j - \sum_{i \epsilon I} a_{ij} p_i - a_{0j} p_0 \qquad (3)$$

at the same time, we can calculate a price π* net of tradable intermediate inputs valued at world terms

$$\pi_j^* = \pi_j - \sum_{i \epsilon I} a_{ij} \pi_i - a_{0j} \pi_0. \qquad (4)$$

The ratio of these two net prices,

$$H_j = p^* / \pi^* \qquad (5)$$

can be used to rank industries and/or projects according to their differences in value-added-plus-value-of-non-traded-inputs in world and domestic terms. According to this criterion a project is the better, the lower is its ratio H_j. In analog to Bruno-Krueger, import substitution projects will typically have a much higher H_j than export projects.

1/ Non-competitive intermediate import coefficients are denoted by a_{0j}.

Empirically, there has been only one study of rates of effective protection in Chile--the important work of Teresa Jeanneret for 1961 /13/. Here, we present results very similar to hers for the protection given import substitution,[1/] and in addition evaluate the effects of the recently introduced export subsidy ("drawback") program in offsetting the taxation imposed on Chilean export production through protection of intermediate inputs.

Estimates are presented in Tables 7 and 8 of rates of effective protection (effective promotion) of import substitution (exportation). As with the Bruno-Krueger exchange rates, we assume the domestic cost structures for the two activities in each sector are the same.

The effective protection calculations are to be understood in terms of the net protection a sector receives after purchase of intermediate inputs (a positive number). Similarly, the effective promotion of exportation is positive if export subsidy payments more than counteract the effects of taxation of intermediate inputs.

[1/] The result reported here are based on Jeanneret's tariff rates, but use the Hufbauer protection formula instead of other formulas used by Jeanneret, and in addition take into account differences between world and domestic prices for goods actually imported for intermediate uses (involving the terms with a_{0j} in the above formulas) which Jeanneret omitted.

We have the following observations about these results:

i) Once again, the difference in costs of producing foreign exchange between import substitution and export activities shows up clearly. None of the major export sectors has a shadow price of foreign exchange greater than about 1.2, a value exceeded by almost all import-substituting sectors.

ii) Although the taxation due to tariffs on intermediate imports in many export sectors is substantial (first column of Table 7), it appears to be offset in most cases by the export subsidies. (The positive values in the third column of Table 7 indicate negative effective taxation, or effective promotion). On the other hand, effective export subsidies are generally far below the levels of effective protection of manufacturing sectors, and it is by no means obvious that the drawbacks are sufficiently large to induce producers to venture seriously outside the protected domestic market.[1/]

[1/] International evidence is always of doubtful applicability in specific local situations, but it is worth noting that Pakistan gives export subsidies approaching 100 percent of value added /12/, while Colombia has experimented with special export exchange rates pegged well above the nominal rate /17/. Both countries have had good results in fomenting exports, and the Chilean experience with the comparatively timid incentive given to date suggests that this country also might have more healthy growth of exports with more active support policies. Non-traditional exports have been increasing consistently in recent years, with little protection aside from Chile's relatively modest drawback program. (For details on recent export promotion activities, see Jul /15/.) A more active policy pursued for a relatively long period (such as a decade) might well lead to the kind of sustained export growth which has characterized Pakistan, Korea, Japan, Israel, and a few other developing countries.

TABLE 7

Rates of Effective Promotion of Chilean Export Sectors

Sector of ODEPLAN 1962 Input-Output Matrix	Taxation due to Tariffs on Intermediate Inputs	Rate of Export Drawback (relative to F.O.B. price)	Effective Promotion with Drawback	Shadow Price of Foreign Exchange
1. Agriculture, Livestock, Forestry and Fishing (#)	-0.056	0.185	0.128	1.147
4. Iron Mining (#)	-0.138	0.0	-0.138	0.879
5. Copper Mining (#)	-0.118	0.0	-0.118	0.895
6. Nitrate Mining (#)	-0.128	0.0	-0.128	0.886
8. Other Mining (#)	-0.157	0.060	-0.070	0.935
9. Food Products (#)	-0.595	0.270	0.030	1.030
13. Footwear and Clothing	-0.286	0.290	0.045	1.047
14. Wood and Cork	-0.039	0.238	0.181	1.221
15. Furniture	-0.156	0.300	0.152	1.179
16. Paper and Paper Products (#)	-0.272	0.270	0.123	1.140
18. Leather and Leather Products	-0.528	0.150	-0.247	0.802
20. Chemical Products	-0.218	0.241	0.123	1.141
23. Basic Metals (#)	-0.193	0.283	0.173	1.209
25. Non-electrical Machinery	-0.269	0.121	-0.095	0.913

TABLE 7 (cont.)

26. Electrical Machinery	-0.191	0.257	0.093	1.103
27. Transport Equipment	-0.268	0.210	0.007	1.007
28. Other Manufactures	-0.174	0.180	0.040	1.042

(#) Sectors with exports of more than U.S.$ 10 million in 1967.

SOURCES: Shadow prices of foreign exchange calculated according to formula (5) of the text. Rates of effective promotion and taxation due to tariffs are calculated with respect to domestic value added. Calculations are based on ODEPLAN's 1962 input-output matrix (including unpublished estimates of both CIF and domestic value of imported intermediate goods), TeresaJeanneret's estimated tariffs on intermediate imports in 1961 /13/ and Drawback payments in 1968.

TABLE 8

Rates of Effective Protection of Chilean Import Sectors

*(relative to C.I.F. price)

Sector of ODEPLAN 1962 Input-Output Matrix	Protection from Tariffs on Intermediate Inputs	Nominal Tariff Rate*	Rate of Effective Protection	Shadow Price of Foreign Exchange
1. Agriculture, Livestock, Forestry and Hunting	-0.056	1.238	0.592	2.452
9. Food Products	-0.595	0.820	0.684	3.165
10. Beverages	-0.148	1.218	0.621	2.638
11. Tobacco	-0.148	1.057	0.008	1.008
12. Textiles	-0.372	1.818	0.822	5.620
13. Footwear and Clothing	-0.286	2.549	0.761	4.188
14. Wood and Cork	-0.039	0.352	0.232	1.303
15. Furniture	-0.156	1.294	0.559	2.269
16. Paper and Paper Products	-0.272	0.552	0.331	1.494
17. Printing and Publishing	-0.124	0.718	0.435	1.769
18. Leather and Leather Products	-0.528	1.612	0.764	4.246
19. Rubber Products	-0.336	1.019	0.577	2.366
20. Chemical Products	-0.218	0.937	0.516	2.065
21. Petroleum and Coal Products	-0.156	0.049	-0.350	0.741
22. Non-metallic Mineral Products	-0.191	1.390	0.641	2.787
23. Basic Metals	-0.193	0.655	0.427	1.744

TABLE 8 (cont.)

24. Metallic Products	-0.223	0.592	0.310	1.450
25. Non-electrical Machinery	-0.269	0.844	0.421	1.726
26. Electrical Machinery	-0.191	1.052	0.479	1.919
27. Transport Equipment	-0.268	0.839	0.404	1.677
28. Other Manufactures	-0.174	1.249	0.564	2.294

SOURCES: Shadow prices of foreign exchange calculated according to formula (5) of the text. Rates of effective protection and taxation due to tariffs are calculated with respect to domestic value added. Calculations are based on ODEPLAN's 1962 input-output matrix (including unpublished estimates of both CIF and domestic value of intermediate imports), and Teresa Jeanneret's estimated tariffs on intermediate and final imports in 1961.

iii) In terms of relative incentives, it appears that agricultural exports are as well protected as those of the industrial sectors. On the other hand, import substitution in agriculture receives much less protection than the same activity in many industries. There is much variation among rates of effective protection for the various industrial sectors. Similar patterns are found both in the effective protection and Bruno-Krueger calculations--for example the high protection given textiles and clothing.

iv) Judging from the sectors which have more than $10 million in exports, it appears that the effective subsidy rates of 10-20 percent of domestic value added may lead to a fairly healthy export response. This compares to rates of effective protection exceeding 50 percent of domestic value added (or 100 percent of value added in world terms) in many domestic manufacturing sectors. The mid-point of this range--a domestic cost of foreign exchange production 30 to 40 percent above the nominal exchange rate--is consistent with the general results from the Bruno-Krueger calculations and the calculation in the next section of the equilibrium

exchange rate for Chile.

IV--Shadow Price Calculations

To review briefly: we calculated in Section II that import substitution and/or promotion of non-traditional exports will have to take place at a high rate during the decade of the 1970's as a necessary condition for an acceptable growth performance in Chile. In Section III, analysis of cost revealed that in the 1960's at least, there were ample prospects for some import substitution and numerous export promotion schemes at costs on the order of 1.2 to 1.5 times the current exchange rate.

What can we infer from these results about the evaluation of investment projects?

First--note that the high requirements for trade improvement require something approaching a completely efficient allocation of scarce resources. This means that an Escudo spent in one use should bring returns not exceeded by possible returns in other uses. For example, an Escudo should not be spent to substitute U.S.$ 0.05 worth of imports when it perfectly well can be used to generate U.S.$ 0.08

of foreign exchange through exports.

Import substitution and export promotion projects should be compared to each other in evaluation, and should not be treated as separate kinds of investment. They really do the same thing.

Second--The comparative cost results indicate that import substitution tends to be more expensive than exportation in terms of domestic resources. The reason for this is fairly easily seen in terms of a well-known diagram (Figure 2) relating the demand and supply of foreign exchange. At the usual demand-supply equilibrium point, the price of foreign exchange is P_e, and its demand (from curve D-D) and supply (from curve S-S) are equal at the level Q_e. In Chile, the effect of protectionist policies has been to make the after-tariff price of imports something like P_m, while the actual market price of the dollar is P_x. Thus, both imports and exports are at levels inferior to those which would be observed with a more free foreign trade situation. Since the domestic cost of imports is P_m, in general costs of industries substituting imports will be at about this level. On the other hand, since exporters only gain P_x, costs of

export projects are about at this level. With free trade, the exchange rate would rise above P_x and the export and import substitution projects which now cost about 1.2-1.5 times the exchange rate would become profitable at ruling market prices.

The above analysis suggests that the equilibrium exchange rate P_e is a good first approximation to the appropriate shadow price for project evaluation. One would certainly not use a rate higher than this, because projects which would lose money even in a non-distorted market would still be profitable in shadow price calculations. On the other hand, a lower rate than P_e would discriminate against otherwise feasible projects (particularly those for import substitution). For this reason (and others presented in /2/) the no trade-restriction exchange rate is our proposal for the shadow price of foreign exchange.[1/]

How do we calculate this exchange rate?

At once, note that the calculation should be of a fairly "long-term" nature, in the sense that cyclical effects should not influence the results. For example, the fact that the

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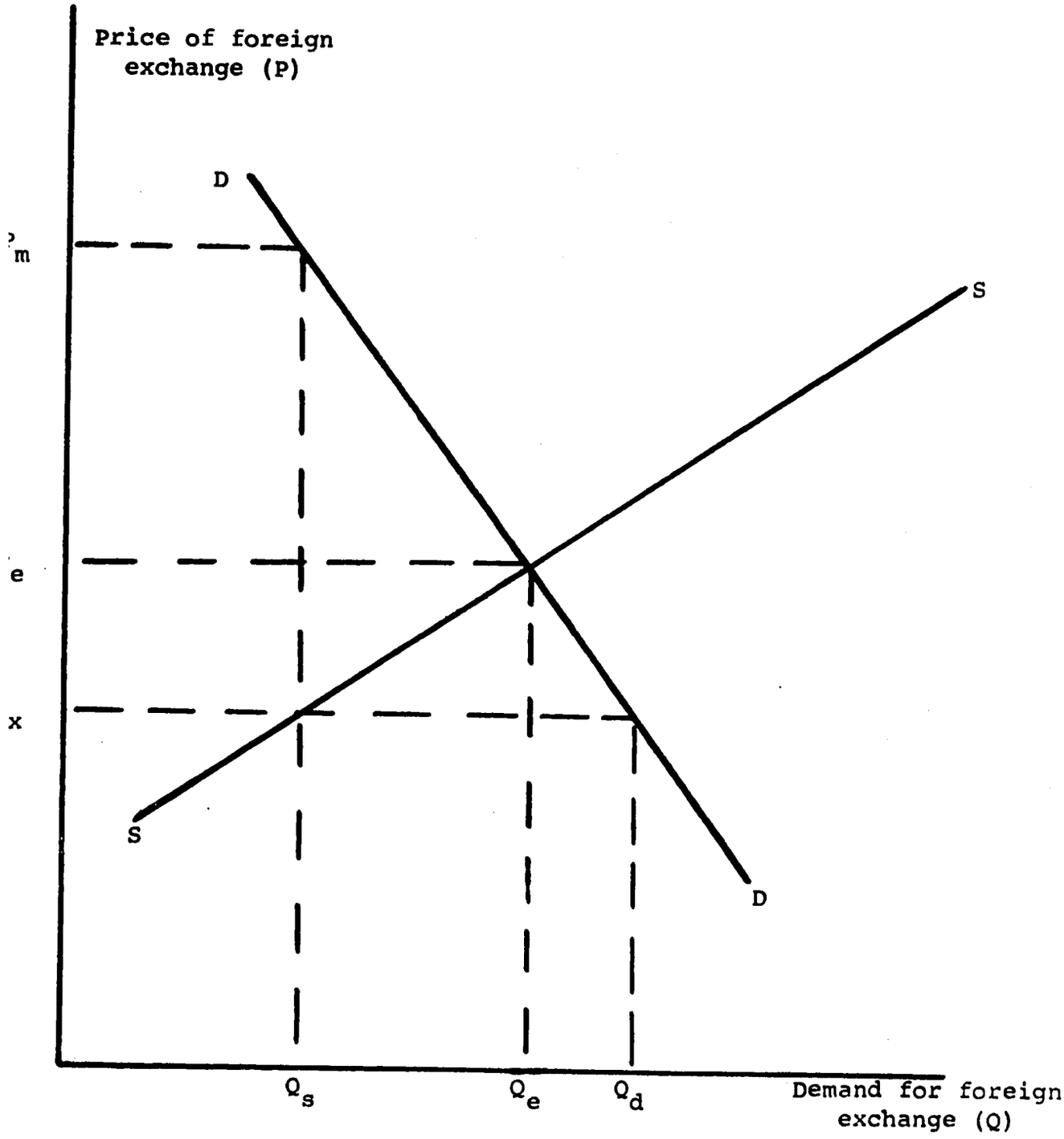
[1/] Uncritical use of P_e is of course subject to some reservations, as discussed in /2/. However, we do feel that P_e is a valid first approximation to "the" shadow price, and recommend its use for that reason.

Figure 2: The foreign exchange market



Central Bank accumulates reserves because of the high price of copper does not substantially alter the assertion that the Escudo is overvalued because of the level of import protection in Chile. When the price of copper falls back to a "normal" forty cents per pound, accumulation of dollars by the Central Bank will stop, and the surplus on balance of payments will revert to a level closer to zero.

Second, a balance-of-payments policy has to be assumed to calculate an equilibrium exchange rate. We suppose here that the deficit or surplus on current account will be approximately zero.

Third, a certain level of import protection and export subsidies has to be assumed. We estimated protection levels with the ECLA prices of Table 1, and assumed no drawbacks. The latter assumption is not too misleading (since export drawbacks still cover only a small fraction of total exports), and our justifications for using the old price data and the way it was brought up to date are given below.

Finally, we note that monetary policy is not explicitly considered in our calculation of the equilibrium exchange rate, since we used a partial equilibrium ("Robinson-Metzler")

model in which imports and exports depend only on their own prices. This is an omission which one ideally would like to correct, but as indicated in /2/, models of the foreign exchange market proposed to date which incorporate monetary effects explicitly make other restrictive assumptions which are on balance as limiting as the Robinson-Metzler hypothesis. Given this limitation, we chose to work with the traditional model. From it, we derive the following expression for the equilibrium exchange rate r* ,

$$r^* = r\,\tau^{1/(1-q)} \tag{6}$$

where

$$q = D(1 + \eta_x)\,\varepsilon_x(\varepsilon_m - \eta_m) \,/\, (1 + \varepsilon_m)\eta_m\,(\eta_x - \varepsilon_x). \tag{7}$$

and where the symbols are defined as follows:

D, balance of trade deficit in ratio terms;

r, market exchange rate;

τ, "force" of tariff (=1 + tarirf); η_x, price elasticity of export demand; ε_x, price elasticity of export supply; η_m, price elasticity of import demand; and ε_m, price elasticity of import supply.

On the basis of the ECLA price sample described above, we have an average tariff of 128 percent to use in calculating the equilibrium exchange rate.[1/] On the elasticity side, we note that Chile's many trade restrictions have the effect of minimizing price responsiveness as estimated from time series. Under these circumstances, we thought it worthwhile to make subjective estimates of the relevant elasticities on the basis of an intuitive appraisal of Chile's foreign trade sector.[2/]

To begin, note that the experience of Western industrial countries suggests that import demand elasticities under conditions of free trade are fairly high. Using an average figure--which seems to be valid for Western countries in general--we assume that the import demand elasticity in Chile is equal to 2.0 (see Balassa /4/ for the relevant inter-

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[1/] During the observation period, the ratio of Chilean exports to imports was practically one. Thus we let D=1 in the above calculation of 1/(1-q).

[2/] Subjective appraisals generally provide the final estimates of foreign trade price elasticity even in studies of the developed countries, e.g. Floyd /8/ and Balassa and associates /4/.

national data and sources).

We also believe that supply elasticities are likely to be high. Figure 2 and the experience of small countries in the world economy which adopt a relatively free trade policy suggest that the export sector in Chile would be much bigger if import restrictions were abolished. A glance at particular export industries suggests the same conclusion. Supply responsiveness in copper production (about 70 percent of exports) is likely to be relatively high now that the long standing and paralyzing conflict between the Chilean government and the U.S. copper companies is being resolved with the "Chileanization" of the mines. Also, several potential export industries are already entering the world market as the result of the export promotion policy. Such industries--producing wine, fresh and canned fruits, wool, fish products, pulp, paper, and specialized parts and components in the metal products and electronics sectors--are likely to be highly responsive to price. Hence, it is not farfetched to assume export supply elasticities on the order of 3.0.

Regarding the foreign elasticities, assuming that import supply is infinitely elastic seems reasonable. On the

demand side, it is best to consider separately copper and the rest of exports. For the former, it must be noted that even after the present expansion of the mines is completed, Chile's share in world production will be smaller than twenty percent. If both the absolute value of the world copper consumption elasticity and the world production elasticity are as small as 0.5, then a well-known formula tells us that Chile's demand elasticity will still be equal to -4.5. For the rest of Chile's export products, the elasticities must be much higher, since the country's market share is negligible in everything besides copper. We can comfortably assume an overall price elasticity of demand for Chilean exports on the order of -9.0.

We thus arrive at the following figures: $\eta_x \cong -9.0$, $\epsilon_x \cong 3.0$, $\eta_m \cong -2.0$, $\epsilon_m \cong \infty$ and $D \cong 1.0$. Applying these guesses in equation (7) we conclude that $1/(1-q)$ is equal to 0.5, and combining this estimate with our previously estimated value of 2.28 for τ, we conclude from (6) that in June, 1962, the Chilean equilibrium exchange rate was 51 percent above the official rate.

The most desirable way to bring this calculation up to date would be through the use of more recent tariff estimates. The sum effect of tariffs and other import restrictions is likely to have changed since the early 1960's, but no detailed indicator of these changes is available.[1/] Moreover, alternative approximate estimators of aggregate tariff changes yield totally inconsistent results, as shown below:[2/]

Index of tariff rates based on:	1962	1963	1964	1965	1966	1967	1968
i) Ratio between tariff receipts and imports	100	71	57	63	74	91	71
ii) Ratio between post-tariff Escudo unit value and dollar unit value of imports	100	98	111	94	96	n.a	n.a

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[1/] A forthcoming joint study of the Brookings Institution and economic research institutes in the LAFTA countries will contain estimates of parity exchange rates for 1968 in the area. The basic data of this study could be used to update our tariff estimates.

[2/] Sources for these estimates are (i) ODEPLAN, and (ii) monthly bulletins of the Central Bank.

Under these circumstances, we can only call on the principle of insufficient reason to assume that any tariff changes that might have occurred in recent years are adequately measured by the evolution of the relationship between the parity exchange rate (based in June 1962) and market exchange rate. In other words, we assume that the equilibrium exchange rate moves in accordance with the difference between a domestic and foreign price index only. The market clearing exchange rate, on the other hand, has to compensate not only overall price movements but also any change in tariffs or import restrictions. Thus, if the market rate increases by more than the parity rate does, this means that tariffs and other import restrictions are going down. Naturally, the market rate may move at a speed different from the parity rate for a number of other reasons, such as changes in capital movements or shifts in the export and/or import functions. In /2/ a more refined formula than the parity rate for changes through time in the equilibrium exchange rate is developed, taking into account these other factors affecting the balance of payments. However, we have not been able to implement empirically this new formula which seems very sensitive to particular assumptions made about price-elasticities and to changes in capital movements which are both volatile and hard to measure.

Given this problem, we have simply used changes in the nominal exchange rate and price indices to update our equilibrium exchange rate estimate.[1/] We first constructed an index for the real value of the equilibrium exchange rate, using as a deflator the ratio between the wholesale price index in Chile and the corresponding U.S. index. The deflated equilibrium rate was then divided by the official rate to give a year-to-year estimate of the foreign exchange shadow price. From the detailed calculation in Table 9 it appears that Chile's exchange rate has improved considerably since 1962. In 1969, the overvaluation of the Escudo was on the order of 25 percent, as opposed to 51 percent in 1962. Observe, however, that the 12 percent increase in the U.S. wholesale price index over the period made a significant contribution to this improvement.

V--Conclusions

The main theme of this paper has been that investment in trade improvement should be assigned according to the comparative cost principle of resource allocation, i.e. that the usefulness of an Escudo of investment should be measured in terms of the dollars it produces, regardless of whether the investment takes place in import substitution or export-

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[1/] This type of parity adjustment can be justified rigorously only under strict conditions, as we indicate in /2/. Here, we can only plead lack of data as our justification for making these estimates.

TABLE 9

Equilibrium Exchange Rates in Chile, 1962-69
(Escudos per dollar)

Year	Official[1] Exchange Rate in Current Prices	Ratio Between the Wholesale Price Indexes of Chile and the U.S. (June 62=1.00)	Equilibrium[2] Exchange Rate: $1/(1-q)=.5$ and $\tau=2.28$	Ratio Between Equilibrium and Official Exchange Rates
June 1962	1.05	1.00	1.59	1.51
1962	1.14	1.04	1.66	1.45
1963	1.88	1.60	2.54	1.35
1964	2.37	2.40	3.82	1.61
1965	3.13	2.96	4.70	1.50
1966	3.95	3.48	5.54	1.40
1967	5.10	4.16	6.62	1.30
1968	6.80	5.32	8.46	1.24
April 1969	8.37	6.57	10.45	1.25

[1] Average buying rate in the bank market.

[2] The equilibrium exchange rate for June 1962 was obtained according to the formula $1.05\ (2.28)^{.5}=1.59$. The rate for the remaining years is equal to 1.59 times the ratio between the wholesale price indexes of Chile and the U.S.

SOURCES: Banco Central de Chile, Boletín Mensual, and IMF, International Financial Statistics.

ation. Further, the investment will be justified in terms of shadow price calculations, if it is profitable when all its internationally tradable products and inputs are converted from dollar to Escudo-valuation with a shadow exchange rate about 1.25-1.30 times the level of the official exchange rate, and non-tradable inputs are valued at domestic prices.

To this general principle, few qualifications can be added. However, it is still important to note that

i) Revaluation (and probable reduction) of the shadow exchange rate should be undertaken in line with the reduction in tariffs and other protective measures which will take place in the future as a response to Chile's entry into the Grupo Andino. In particular, when it is clear what plans of tariff reduction will be followed, a thorough study of effective protection of industry and recalculation of the equilibrium exchange rate under the new conditions should take place.

ii) With a value of 1.25-1.30 for the shadow exchange rate, it is very possible that many socially desirable trade improvement projects will not be profitable under current market prices. This is to be expected in import substitution,

but the fact that desirable export projects may not be profitable at the current exchange rate is often taken as surprising. As a not uncommon example, we may cite a Minister of Economics, who said recently that[1/]

> We consider that...policies stimulating exports need not be permanent. On the contrary, they should serve as supports when a new line of exports is entering the market, but then should be reduced gradually. Thus we will avoid supporting exports that cannot reasonably compete in foreign markets.

Despite the Minister's last sentence, our accumulated evidence indicates that there is no reason at all to expect acceptable export projects to be competitive in the long run <u>at the current exchange rate</u>. In terms of Figure 2, there are projects which are not profitable at the current price of the dollar P_x, but which would become profitable as the price moves toward its equilibrium value P_e. And in terms our cost data, although it is clear that in some industries exports are profitable even with the undervalued dollar of today, the same cannot be said of all lines of production.

Thus, the correct way to restate the Minister is that <u>exportation and substitution of imports should be protected</u>

[1/] <u>El Mercurio</u>, September 24, 1969.

only up to the point where they cease to be competitive in foreign markets when their tradable costs and returns are valued at the equilibrium exchange rate which is about 1.3 times the current exchange rate.

Of course, this type of protection has been given in the past as a matter of course to import substitution projects which would not have been competitive in world markets even at exchange rates two or three times as high as the official rate. More modest protection can be given to acceptable import substitution projects in the future. A more serious problem will be arranging protection of exportation in the critical years before tariff reductions will have made unnecessary the use of a shadow price for foreign exchange.

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