

**Productivity, Exports, and External Economic Policy in Chile,
1970-1990**

by

Donald G. Richards *

Prepared for delivery at the 1997 meeting of the Latin American Studies Association, Continental Plaza Hotel, Guadalajara, Mexico, April 17-19, 1997.

Abstract

Recently economists who study the so-called Newly Industrializing Economies (NIEs) of East Asia have pointed to these countries particular trade policies as a vital ingredient in their recipes for successful capitalist "take-off". In particular the argument is typically made that the decision of the Asian NIEs to abandon early on the policy of import substitution industrialization in favor of, first, market liberalization, and then aggressive export promotion, accounts for their ability to realize strong balance of payments positions as well as enviable rates of economic growth. Several recent studies purport to show that the microeconomics of East Asia trade and growth success involve the stimulus provided to productivity growth attendant on the movement to greater economic openness. So confident have been certain students of the East Asian model that they have not hesitated to recommend it to other economies, including those in Latin America, undergoing what has been referred to as the "neoliberal transition".

The specific objective of the present work will be to empirically examine some aspects of that model to Chile-- a Latin American country that more than any other in the region has mimicked the NIE experience in terms of its external economic policies. In particular the paper seeks to determine what consequences greater economic openness has had for sectoral productivity levels and growth over the period 1970 through 1990. Towards this end an estimable model is specified and tested against the available data.

* Professor of Economics, Indiana State University, Terre Haute, IN 47809, tel. (812) 237-2179, fax. (812) 237-4349, e-mail: ecdrich@scifac.indstate.edu

I. Introduction

In a recent special issue of The Developing Economies a number of authors examined the question of trade liberalization and productivity growth for a variety of Asian economies. The set of papers was inspired by the observation that several of these countries; especially the so-called newly industrialized economies (NIEs) of South Korea, Taiwan, Hong Kong, and Singapore; have, in recent decades, experienced enviable rates of economic growth as well as growth of exports. The reasons noted for this performance include the fact that the NIEs abandoned inward-looking import substitution industrialization policies during the decade of the 1960s and instead turned to a more open trade strategy. Such open policies, in fact, that often included aggressive promotion of exports in addition to the liberalization of imports.

The advantages of this switch in trade policy regime are detailed by Urata (1994). They include, most prominently, the greater impulse to efficiency in production as a matter of both greater (international) competitive pressure as well as the ability to exploit economies of scale in production attendant on larger (foreign) markets. An interesting and heretofore relatively unexplored empirical question addressed by the special issue is the degree to which the greater the openness of the trade regime can be tied to measurable increases in productivity. A number of the contributions then proceed to demonstrate that greater openness is

indeed associated with increases in total factor productivity.

While the point is made that the success of the fast-growing Asian countries must be explained in terms of other factors, including human capital accumulation and other state policies, the clear implication is that trade policy is preeminently responsible for these countries' high growth performance in the 1970s, 80s, and 90s. It has been frequently argued, in fact, that the NIEs provide a model for success that other regions, including Latin America, ought to emulate.

The purpose of the present study is to pose the same questions for one Latin American country in particular, Chile, that the authors of the Asian studies examine for their respective countries. Most significantly, I want to empirically assess the relationship between the trade orientation of the Chilean economy and the behavior of two measures of productivity. Chile is taken as the country of focus here since, more than any other Latin American country, it most closely approximates the growth performance of the Asian NIEs. While Chile did not turn to a liberal trade policy as early as the Asian countries, it was the first of the Latin American countries to embrace neoliberal reform following the military coup of 1973.

The fact that Chile endured continuous military dictatorship between 1973 and 1989 is also often pointed to as the reason for its unswerving commitment to such reform over this period, even during periods when it encountered serious economic crisis as it

did in the mid 1970s and again the early 1980s.

The plan of the paper is as follows: Section II will provide a brief outline of Chilean economic policy under the military junta paying particular attention to external economic policy. Section III will set out the methodological approach, describe the data, and present descriptive statistics on the level and growth of productivity for the time period of interest. Section IV offers an estimable model to test for the effects of Chile's international economic policy regime on the behavior of productivity for these periods of interest. Regression results are reported and commented on in section V. Section VI summarizes the findings and provides some concluding observations.

II. Chilean External Economic Policies and Productivity, 1973-1990.

As is well known Chile underwent a dramatic reversal of economic policy following the 1973 military coup led by General Augusto Pinochet that toppled then socialist president Salvador Allende Gossens. While the immediate aftermath of the coup was a period of considerable economic confusion caused by policy uncertainty as well as external economic shocks, by 1975 the process of the neoliberal transformation of the economy was underway. A prominent feature of this transformation was the opening of the economy via the reduction of tariff and non-tariff barriers to trade. Table 1 presents data on this opening for the

post-coup period through the end of the decade.¹

Liberalization of international trade, as well as the elimination of domestic economic restrictions, is given credit by some economists for promoting high rates of economic growth for the period between 1976 and 1981 which averaged 7.2 percent on an annual basis.² At the beginning of this period, however, the government's macroeconomic stabilization plan had made insufficient progress against high inflation-- a goal which was perceived as the major policy challenge in the post-coup years.³ Prior to 1978 government policy operated on the basis of assumptions that saw Chile as an essentially closed economy. Correspondingly a strictly monetarist policy approach was adopted that emphasized fiscal and monetary contraction. After 1978, however, a theoretical and policy perspective emerged that argued for the use of the exchange rate as a stabilization tool. A policy of preannounced mini-devaluations of the exchange rate (la tablita) was expected to work to bring the domestic inflation rate into conformity with the global rate of inflation.⁴ The trade reforms themselves also acted to force the currency to depreciate in order to maintain external balance.

Additional reforms of the Chilean economy had important repercussions for its external sector. Primary among these was a dramatic liberalization of the financial sector accompanied by the lifting of restrictions on the capital account resulting in massive inflows of foreign capital. Edwards and Edwards (1987) argue that

the backward index-linking of wages also had the effect of creating nominal wage adjustments unrelated to productivity increases with resultant inflation, (pp.42-44). The effect of both of these measures was a real appreciation of the Chilean peso that hurt the competitiveness of exports. Still additional events hurting Chilean exports involved exogenous factors contributing to a decline in the terms of trade.

By 1979 the government had committed itself to fixing the value of the peso to the dollar at a level that would prove to be unsustainable. With the onset of the 1981 recession the Chilean economy fell into a deep depression. The trade deficit climbed to 10.3 percent GDP in 1981 and the economy contracted by 14.1 percent in the following year with the rate of open unemployment reaching nearly 20 percent. In the face of mounting economic crisis external economic policies underwent something of a reversal. The average rate of tariff protection was increased and exchange controls were imposed. Moreover, as Dornbusch and Edwards (1994, p.92) point out, Chile was forced to default on its external debt and entered negotiations to restructure its obligations much earlier than similarly placed Latin American countries.

With economic recovery in 1983 average tariff rates began to come down once again so that by 1988 they had been reduced from their post-crisis high of 26 percent to an average of 15 percent. Along with the reliberalization of imports there also occurred a perceptible change in trade policy as it concerned exports after

1983. The state took a much more activist approach to the promotion of non-traditional exports and especially those in the agro-industrial sector. Thus tax credits and subsidies were provided to large forestry firms. Controls have been reintroduced to stabilize the prices of non-traditional agricultural exports. State led arrangements were introduced to enable indebted export oriented firms to renegotiate the terms of previously contracted debt with banks. Moreover, exchange rate devaluations were used to provide Chilean exporters with a competitive advantage in global markets, (Silva 1990).

An important qualification to this apparent reversal of the neoliberal formula for greater productive efficiency after 1983 is that active state intervention did not have as its objective a desire to promote greater equality of access to resources and of incomes in the rural sector. The authoritarian state remained committed, for example, to its established policy of returning lands redistributed under the Popular Unity regime of Allende. Large scale production by both foreign and domestic firms was favored for their perceived economies of scale advantages. Moreover, the state pursued labor policies designed to reduce labor costs as a means of further enhancing the international competitiveness of the new export lines.

How successful the external economic policy measures of the authoritarian state have been in promoting high levels of productivity is a debated question. Some writers have argued that

the impressive growth record of the Chilean economy, even in the post-1983 period, has been based on an intensive exploitation of human resources combined with an extensive exploitation of natural resources, (Collins and Lear 1995). Marfán and Bosworth (1994) are struck by the lack of productivity growth, measured either in output per worker or joint factor productivity terms, after 1970 given the oft-noted theoretical connection between economic liberalization and productivity (p.171). Noting that productivity changes over time may display both cyclical as well as secular tendencies they detect a trend deterioration in productivity through the early 1990s even while allowing for the economic crisis in 1983, (pp.172-173). Tybout, de Melo, and Corbo (1991) agree that improvements in productivity across Chilean manufacturing sectors are not detected between 1967 and 1979 but argue that such improvements may be masked by the high degree of macroeconomic instability that characterized the period. Utilizing limited information estimation techniques they present carefully qualified results that suggest that trade liberalization is associated with sectoral level productivity advances. Finally, Liu's (1993) sector level empirical analysis of Chilean manufacturing demonstrates that the enter/exit patterns of firms bear a clear relationship to their relative productivities with more competitive firms more likely to survive than less competitive ones. The author suggests the desirability of additional empirical work that would relate the differences in firm level technical efficiency to specific

liberalization policy measures. What follows is a first attempt to address that need.

III. Data and methods.

In the sections to follow I shall be concerned to specify and estimate a model that "explains" the levels and changes in productivity across sectors of the Chilean economy and over time. The first important question to consider is that of the relevant measure of productivity. It is by now conventional wisdom and practice among those who study economic productivity that its preferred standard of measure is total factor productivity (TFP). TFP is calculated as the residual of the growth of value added after accounting for the separate contributions of direct inputs into the production process, typically labor and capital. It is then, as the name suggests, a separate and distinct measure of the increased in output attributable to efficiencies realized as a result of combined input growth.

The calculation of TFP at the sectoral level requires, among other series, a measure of the size of the capital stock at the sectoral level. As these measures are not readily available for Chile alternative measures of productivity must be employed. The ones used in this study are (1) a measure of labor productivity calculated as the ratio of value added to industrial employment and (2) a measure of firm productivity measured as the ratio of value added to the number of firms in the sector.⁵ Table 2 provides

data on the growth of these measures of productivity for the entire period of the analysis as well as the two sub-periods of particular interest. The figures in the table are calculated on the basis of data taken for twenty-seven industrial sectors over the time period 1970-1990.⁶ Overall the data suggest very modest rates of productivity growth with the bulk of that growth occurring in the earlier period. The second period in fact shows that productivity change was, on average, actually negative.

Table 3 provides figures for the rate of productivity change at the sectoral level. The data here suggest that the most rapid productivity advances have occurred in industrial sectors that involve agriculture (313, 314), light manufactures involving primary materials (321, 323, 341, 361, 362), and other manufactures involving primary materials (353, 351). Industries that have especially laggard in productivity advance include heavy manufacturing (371, 372, 381). This group includes the especially important category of non-ferrous metals which in the Chilean case is synonymous with copper, the country's single most important export. On the other hand, two of those sectors identified above as experiencing relatively rapid productivity growth have emerged in the past two decades as important sectors of international comparative advantage in Chile, e.g. beverages (313) and paper and products (341). Based on this sort of casual empiricism the relationship between productivity growth and openness to trade would seem to be an open question. It is to this specific question that I now turn.

IV. An estimable model of sectoral productivity and trade.

The specification of the model to econometrically explain productivity in terms of international economic policy regime is inspired both by theoretical empirical work on the topic.

One question that previous writers have addressed in their examination of productivity growth over time and across countries is the importance of economies of scale. The familiar argument is that scale economies are virtually by definition associated with productivity growth given that they involve reductions in the unit cost of production. The difficulty of model specification, however, is that scale economies are not directly observable and must be inferred from other industrial characteristics. One possibility is to employ as an explanatory variable a measure of industrial concentration, (Kwak 1994). The argument in this case is that the basis of such concentration is often tied to the ability of firms to exploit the efficiencies of large scale production and thereby limit the space for potential competitors. Unfortunately, the available data do not permit the calculation of such an index in the case of Chile. As an alternative use is made of a variable that enables us to represent the average size of firm within a sectoral category and to compare this both across industrial sectors as well as over time. This alternative measure is simply the ratio of total sectoral output to the number of firms in the industry.

An additional variable frequently identified in the theoretical and empirical literature on productivity is the capital-labor ratio or size of the capital stock. It is argued that productivity is largely a matter of supplying workers with more and better equipment with which to work. As noted earlier our data set lacks information on the size of the capital stock at the sectoral level. We must content ourselves with an alternative variable that is perhaps a close cousin of the size of the capital stock. This is the rate of gross investment. Inasmuch as current investment is unlikely to have an immediate effect on productivity it shall be included in the model with a one-period (year) lag. The argument then is that the higher the rate of sectorally specific investment any given year, the greater the productivity in the following year.

In addition to these essentially domestic industry-specific explanatory factors the current model shall also include three variables that attempt to capture the character of the international economic policy regime. These variables, in fact, represent the true focus of the empirical investigation. The first of these, the ratio of exports to output, is sectorally specific and measures the degree of openness of the industry in question. The argument is straight-forward and well-known; the desire and ability to export induces firms to seek out productivity advances that enable them to compete in international markets. Moreover, the opportunity to produce for large, global markets enables firms

to achieve the economies of scale associated with declining costs and high levels and growth in productivity.

Two other variables are included that, while not sectorally specific, reveal important information about the international economic regime over time. These are respectively, the average rate of tariff protection, measured as total tariff revenue divided by total imports of goods and services, and the level of direct foreign investment. Ideally we should like to have these variables for each of the individual industrial sectors. Lacking data for these the aggregate measures are utilized. The theoretical link between tariff levels and productivity is similar to that for export share-- namely, lower levels of protection compel firms to seek greater efficiency in their production and marketing in order to compete with imports. In the case of foreign direct investment the argument is that such investment will result in the transfer of capital, technology and managerial capacity that will promote productivity as well as provide domestic producers with greater competitive pressure.⁷

In the statistical investigation of the above relationships we find it useful to consider two versions of the model-- one that sets the dependent variable as the level of productivity and the second that sets it as the rate of growth of productivity. Inasmuch as the data in table 3 suggest a close correlation between productivity measured in labor and enterprise terms, I confine myself to a consideration of the first of these. The estimable models then may be given expression as follows:

where the variables have the following meanings:
$$PRO = \beta_0 + \beta_1 LINV + \beta_2 SIZE + \beta_3 EXPSH + \beta_4 TAR + \beta_5 DFI + \mu$$

(G)PRO = alternatively, the level and rate of change of labor productivity;

LINV = the one-period lagged value for gross investment in the industry;

SIZE = the ratio of industry final output to the number of firms in the industry;

EXPSH = the ratio of industrial exports to total output in the industry;

TAR = the average level of tariff protection across all industries in a particular year;

DFI = the amount of foreign direct investment across all industries in a particular year;

μ = error term.

The data set consists of a pooled time-series (1970-1990), cross-industrial (27 sectors) collection of observations with missing values for the years 1986-1988. Series involving nominal values were deflated using the GDP price deflator. Export values were converted to national currency terms with the use of the parallel dollar exchange rate. The regression models given by the above equation are further specified by the inclusion of a set of 26 dummy variables that identify 26 of the 27 ISIC industrial categories that are considered in the analysis. The results for these will not be reported though especially statistically interesting results they will be commented on.

V. Regression Results

The first set of regression results are presented in table 4

and includes the results for both versions of the model with measures for the level of labor productivity (PRO) and the growth of labor productivity (GPRO) serving as the dependent variables. The results present basically similar stories for the two dependent variables. In particular, the results fail to support the standard theoretical expectation that exposure to the competitive pressure of the global economy enhances productivity. The parameter estimates relating tariff protection to the level and growth of productivity are positive and negative respectively but not statistically significant in either case. While barely insignificant the sign for the parameter estimate for export share is negative in the growth equation which also contradicts the a priori expectation. Only the estimate for direct foreign investment provides support for the liberalization position though this result only suggests statistical significance in the growth equation.

It is notable that in both versions of the model the parameter relating the average size of firms in terms of production is positively related to productivity (strongly significant in each case) while that for (lagged) investment is inverse, though insignificant in each version of the model.

The overall picture that emerges then on the basis of the entire time period from 1970-1990 is mixed as regards the success of neoliberal reform in promoting productivity with perhaps those reforms involving trade relationships being less successful than

those involving the rules pertaining to foreign investment. The fact that firm size carries a parameter estimate that is recurrently positive and statistically significant suggests that there may well be economies of scale advantages accounting for productivity differences among and between industries. It is well known that foreign direct participation typically involves those industries where size and scale efficiencies are salient characteristics.

Additional regression results are presented in tables 6 and 7. These results are based on an estimation of the same model described earlier but tested against the data set divided into two sub-periods. The first of these runs from 1970 through 1982 and represents what was referred to in section II as the first phase of the 'Chilean miracle'. This period, it will be recalled, encompasses those years over which there ruled a policy regime that could literally be called neoliberal. It was the period during which there occurred a process of marketization of virtually all aspects of the economy including the dismantling of barriers to trade. The second period, 1983-1990, is separated from the first by a severe recession and otherwise distinguished from it by an important shift in economic policy regime. During this second phase of the 'miracle' the state took a more activist role in the economy with a view to a more aggressive promotion of its structural transformation. That is to say, during this period the state took a particular interest in an active export promotion

policy. Division of the data set according to this distinction will enable us to investigate the significance of the policy regime change on the key issue of industrial productivity.

In the case of the earlier period (table 6) we find results that are very similar to those obtained for the entire sample period. That is, contrary to the standard neoliberal expectation, the share of exports is inversely related to the growth of productivity across industrial sectors. In the case of the level of productivity, the parameter carries the expected positive sign but the corresponding t-ratio fails to suggest statistical significance. Interestingly, in the case of the 1970-1982 period we find the same result with respect to the parameter relating direct foreign investment to productivity growth. Also notable is the "non-result" with respect to the export share ratio. The relevant parameter once again carries a negative rather than the expected positive sign. As before this parameter estimate is positive in the level equation but also fails to indicate statistical significance.

Finally, for both versions of the model the estimates relating average firm size to productivity are positive and significant while the results for lagged investment are positive for level and negative for growth with each case accompanied by a small t-ratio.

Turning our attention to the second phase (table 7) we find few results worth commenting on. Only the parameter attached to the variable SIZE in the growth equation suggests a statistically

significant result with all others having small t-ratios. The low value for R-squared in this equation further indicates the lack of explanatory power for the model in this time period. The only other variable that comes even remotely close to statistical significance is DFI in the level equation. For this case, in contrast to the theoretical expectations and the empirical findings of the growth equations in tables 5 and 6, the estimated parameter is negative.

VI. Summary and conclusions.

In general, the regression results for the model linking the productivity record for Chile for the period 1970-1990 to government's external economic policy regime is not supportive of the standard neoliberal argument in favor liberalization and promotion of international trade. No evidence is detected, for example, that on a sectoral level, greater participation in global markets translates into greater labor productivity. On the contrary, it is found in some cases that higher levels of average tariff protection relate directly to levels and rates of growth of labor productivity. On the other hand, there also appears to be some evidence that high rates of growth of productivity are directly related to high levels of direct foreign investment. These are not, of course, necessarily paradoxical outcomes. Foreign investment may be motivated precisely by the desire to gain access to a market from which it is otherwise excluded by

protectionist measures. From this perspective a policy of protection appears entirely rational that promotes technology-bearing, productivity-enhancing direct foreign participation.

It is somewhat curious that when the overall time period under consideration is disaggregated into two historically logical sub-periods, 1970-1982 and 1983-1990, the results alluded to above hold very well for the first but not the second of the two sub-periods. What is especially puzzling is the finding that over the years 1983-1990, a period during which the Chilean state took a more activist role in the economy as compared to the earlier, more genuinely liberal sub-period, the level of direct foreign investment is inversely related to the level of labor productivity (though the corresponding t-ratio suggests significance at only the 24 percent level). A possible explanation for this outcome is at hand when we consider the specific sectors that were the object of the government's export promotion strategy. These involved sectors dedicated largely to the harvesting and processing of primary products such as lumber and wood products, paper products, fruit, and fish and fishmeal. While it is certainly true that foreign capital was a major partner in the growth in these sectors, it is also true that this growth was based on the widespread use of low-skilled and low-paid labor. This interpretation does not suggest that foreign investment itself caused low productivity growth in Chile's non-traditional exports, only that it participated fully in these sectors.⁸

In general then it does not appear from the present analysis that economic liberalization and export promotion has been sufficient to propel the Chilean economy to the levels of productivity necessary for widespread increases in the standard of living. This is in spite of the impressive growth record for the economy since 1983. It may be, as some have argued, that the failure of the country to simultaneously invest in adequate levels of education and training has operated as a break on the growth of productivity. Given the degree to which the Chilean authoritarian state consciously neglected provisions for social goods and services during the period under examination perhaps it is well to re-emphasize the importance of the quality of human resources in general as a key factor in productivity-based economic growth.

Appendix of Statistical Sources

PRO is calculated as the ratio of number of employees to value added by industrial sector. Industrial sectors are defined by 3-digit International Standard Industrial Classification codes. Source: Yearbook of Industrial Statistics, United Nations, New York.

LINV is the lagged value of gross industrial investment. Source: Yearbook of Industrial Statistics, United Nations, New York.

SIZE is calculated as the ratio of industrial output to the number of firms in the industry. Source: Yearbook of Industrial Statistics, United Nations, New York.

EXPSH is calculated as the ratio of exports to total industrial output. Source: International Trade Statistics Yearbook, United Nations, New York.

TAR is calculated as the ratio of tariff revenues on imports to gross domestic product. Source: Government Finance Statistics Yearbook, International Monetary Fund, Washington, D.C.

DFI is the stock of direct foreign investment across industries. Source: Yearbook of International Finance Statistics, International Monetary Fund, Washington, D.C.

Nominal values were converted to real terms by the use of the GDP price deflator. Dollar values for exports were converted to national currency units with the use of the parallel dollar exchange rate. Source: Statistical Abstract of Latin America, James W. Wilkie, (ed.), UCLA Latin American Center Publications, Los Angeles.

Notes

1. Non-tariff barriers to trade were eliminated by the end of 1976.
2. This is calculated from data provided by Edwards and Edwards (1987), p.12.
3. The annual rate of inflation in 1976, while greatly reduced from the 605.9 percent level in 1973, was still unacceptably high at 198 per year, (Corbo and Fischer 1994, p.33).
4. The policy, also adopted in Argentina and Uruguay in the 1970s, is based on a theoretical approach called the monetary approach to the balance of payments (MABP). MABP sees the money supply as an endogenous variable subject to adjustment according to the balance of payments position of the country. The approach also makes the strong assumptions that all goods are traded and the international version of the law of one price (purchasing power parity) holds. The upshot of these assumptions is that the domestic rate of inflation is held in check by foreign competition such that it can never exceed the foreign inflation rate plus the (preannounced) rate of devaluation.
5. The appendix provides a list of data sources for all series used in the tables and statistical analysis unless otherwise noted.
6. It should be noted that missing data prevent the inclusion of observations for the period 1986-1988 for all sectors.
7. Once again, the ideal situation would make use of sectorally-specific data on direct foreign investment. As these data are unavailable I resort to the use of aggregate figures.
8. The possibility that the results in table 7 are distorted, or made spurious, by the missing data for 1986-88 cannot be dismissed, of course.

Table 1: Maximum and effective rates of protection.

	1973	1974	1976	1979
Maximum tariff	200	140	65	10
Effective rate of protection	151	51	20	14

All figures are percents.

Source: Dornbusch and Edwards (1994)

Table 2: Average Annual Productivity Growth Rates, 1970-1990 and sub-periods.

	1970-1990	1970-1982	1983-1990
*			
Labor productivity **	0.30	5.30	-11.80
Firm productivity	.80	1.96	-0.22

* excludes data for 1986-88.

** weighted by sectoral shares of total output.

Table 3: Average Annual Productivity Growth Rates by Sector, 1970-1990.

<u>ISIC Code and Industry</u>	<u>Labor Productivity</u>	<u>Firm Productivity</u>
311 Food	0.12	-1.09
313 Beverages	2.32	1.63
314 Tobacco	15.29	6.00
321 Textiles	4.72	-0.22
322 Apparel	-0.12	-0.33
323 Leather	3.75	-1.43
324 Footwear	0.71	-1.92
331 Wood Prods.	0.78	1.72
332 Furniture	0.03	1.17
341 Paper & Prods.	4.55	5.64
342 Printing & Pub.	3.95	4.77
351 Indust. Chems.	18.56	9.29
352 Other Chems.	-0.80	0.15
353 Petrol. Refin.	34.58	28.69
355 Rubber Prods.	1.58	-2.97
356 Plastic Prods.	-5.07	-0.33
361 Pottery, Clay	13.63	-7.45
362 Glass & Prods.	11.72	3.42
369 Non-metal Prods.	3.49	0.73
371 Iron & Steel	-7.78	-7.85
372 Non-ferrous Mets.	-8.19	-6.07

381	Metal Prods.	-0.87	-2.54
382	Machinery	3.30	-2.42
383	Electric. Mach.	1.34	-3.71
384	Trans. Equip.	5.42	-2.93
385	Profess. Prods.	9.81	-0.58
390	Other Industs.	19.72	-0.60

Table 5: Regression Results with Dependent Variables PRO, Labor Productivity, and GPRO, Labor Productivity Growth, 1970-1990.

	PRO		GPRO	
<u>Variable</u>	<u>Estimate</u>	<u>T-Ratio</u>	<u>Estimate</u>	<u>T-Ratio</u>
Intercept	0.492	0.062	-0.029	-0.226
SIZE	0.114	6.792 **	0.05E-2	2.005 *
LINV	-0.007	-0.164	-0.08E-2	-1.241
EXPSH	0.114	0.164	-0.017	-1.558
TAR	0.018	0.123	-0.03E-3	-0.013
DFI	0.07E-2	0.093	0.06E-2	4.950 *
	N = 428		N = 428	
	F-Stat = 33.339		F-Stat = 1.810	
	adj. R ² = .700		adj. R ² = .055	

Table 6: Regression Results for Sub-period 1970-1982.

	PRO		GPRO	
<u>Variable</u>	<u>Estimate</u>	<u>T-Ratio</u>	<u>Estimate</u>	<u>T-Ratio</u>
Intercept	-0.346	-0.051	-0.014	-0.080
SIZE	0.292	10.988 *	0.002	2.624 *
LINV	0.032	0.832	-0.07E-2	-0.672
EXPSH	0.277	0.546	-0.016	-1.265
TAR	-0.017	-0.155	-0.08E-2	-0.274
DFI	-0.02E-2	-0.046	0.07E-2	4.640 *
	N = 294		N = 294	
	F = 38.836		F = 1.886	
	adj. R ² = .800		adj. R ² = .085	

Table 7: Regression Results for Sub-period 1983-1990.

<u>Variable</u>	Pro		GPRO	
	<u>Estimate</u>	<u>T-Ratio</u>	<u>Estimate</u>	<u>T-Ratio</u>
Intercept	11.990	0.258	0.060	0.207
SIZE	0.007	0.156	0.001	3.516 *
LINV	0.147	1.047	-0.01E-2	-0.145
EXPSH	15.702	0.202	0.156	0.321
TAR	0.616	0.320	-0.003	-0.282
DFI	-0.143	-1.182	0.03E-3	0.045
	N = 133		N = 133	
	F = 7.801		F = 1.293	
	adj. R ² = .613		adj. R ² = .064	

References

- Collins, Joseph and John Lear, Chile's Free Market Miracle: A Second Look, Institute for Food and Development Policy, Oakland, 1995.
- Corbo, Vittorio and Stanley Fischer, "Lessons from the Chilean Stabilization and Recovery," in The Chilean Economy: Policy Lessons and Challenges, Barry P. Bosworth, Rudiger Dornbusch, and Raúl Labán, (eds.), The Brookings Institute, Washington, D.C.: 1994.
- Edwards, Sebastian and Alejandra Cox Edwards, Monetarism and Liberalization: the Chilean Experiment, Ballinger, Cambridge: 1987.
- Kwak, Hyuntai, "Changing trade policy and its impact on TFP in the Republic of Korea," The Developing Economies, vol.32, no.4 (December 1994):398-422.
- Liu, Lili, "Entry-exit, learning, and productivity change: evidence from Chile," Journal of Development Economics, vol.42 (1993):217-242.
- Marfán and Bosworth, "Saving, investment, and economic growth," in The Chilean Economy: Policy Lessons and Challenges, Barry Bosworth, Rudiger Dornbusch, and Raúl Labán, (eds.), The Brookings Institute, Washington, D.C. 1994.
- Silva, Patricio, "State subsidiarity in the Chilean countryside," in Neo-Liberal Agriculture in Rural Chile, David E. Hojman (ed.), St. Martin's Press, New York, 1990.
- Tybout, James, Jamie de Melo, and Vittorio Corbo, "The effects of trade reforms on scale and technical efficiency: new evidence from Chile," Journal of International Economics, vol.31 (1991):231-250.
- Urata, Shujiro, "Trade liberalization and productivity growth in Asia: Introduction and major findings," The Developing Economies, vol.32, no.4 (December 1994):363-372.