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Chile: Trade Performance, Trade
Liberalization, and Competitiveness

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Chile: Trade Performance, Trade Liberalization, and Competitiveness

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Abstract

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This paper analyses the evolution of Chile's trade between 1990 and 2007, studying in particular the impact of trade liberalization in addition to traditional price and demand determinants. The results show that export and import flows are mainly responsive to external and domestic demand, and less so to relative prices, although there is a small impact on imports. In addition, the analysis suggests that trade liberalization may have played a role in increasing exports and imports. Estimations of trade elasticities for other countries in Latin America tend to confirm the results found for Chile.

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Keywords: trade elasticities, trade liberalization; competitiveness.

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I. INTRODUCTION

Over the past three decades, Chile has experienced one of the most rapid increase in external trade in Latin America. Since the implementation of an ambition reform agenda in the mid-1970s, the annual average growth of trade volume has been of 8 percent, second only to Mexico and about 2 ½ percentage points higher than the average in Latin America. Between 1990 and 2007, trade openness, measured as the sum of exports and imports of goods and service to GDP has increased from 49 percent of GDP to 65 percent of GDP. Although a considerable part is accounted for by a threefold increase of copper prices, when excluding copper and correcting for its effect on price changes, the non-copper trade ratio has actually increased by about 12 percentage points of GDP over the same period.[2]

The trend reflects both import tariff reduction and an active trade policy pursued by Chile over the past decade. Between 1998 and 2002, Chile gradually reduced its import tariff rate from 11 to 6 percent. It also signed a number of trade or association agreements with its main trading partners, which leads, as of 2007, to an effective tariff rate of 2 percent much lower than the nominal rate. Chile ratified during the second half of the 1990s a number of trade agreements, mostly with neighboring countries. Since 2003, it has ratified in quick succession free trade agreement (FTA) with its major trading partners (the European Union, the United States, China, and Japan). As a result, the share of trade covered by trade agreements has jumped from 25 percent at end-2002 to 83 percent by end-2007.[3]

Trade has expanded despite an appreciation of the real exchange rate in the wake of the copper boom. Exports diversified beyond copper before the 1990s, although copper remained the principal export representing about 2/5 of export values before the sharp increase of the price of copper in 2003. The appreciation of the real effective exchange rate (REER) has only been around 22 percent during 2003-07. The relatively muted impact of the commodity boom on the REER is due in part to the ownership structure in the mining sector, where half of copper mines are owned by foreign companies, as well as to Chile's macroeconomic framework. The structural fiscal rule has led to saving abroad a large

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[2] Over 1990-07, total trade increased by 17 percentage points of GDP, of which 12 percentage is accounted by copper exports and the rest by non-copper trade. However, the increase of copper price also inflates the export and GDP deflators. The methodology used here to correct for this consists simply of holding constant copper prices at their level of 2003. Holding prices at their 2004 level gives a nominal GDP lower by 14 percent and an increase of non-copper trade by 12 percentage points of GDP. Holding copper prices at their 2004 or 2005 level would give a nominal GDP deflator lower by respectively 11 and 8 ½ percent.

[3] Some features of Chile's trade policy are worth emphasizing (see Schiff, 2002). Chile has actively sought trade treaties with "Northern" countries, which are those that are considered to give the most in terms of welfare improvement. In addition, Chile has pursued this policy not just to expand market shares in partner countries or to benefit from cheaper imports, but also with the aim of attracting foreign investment and become an export hub for countries within its web of trade alliances.

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Figures 1-6. Chile: External Trade Indicators

Fig. 1: Growth and contribution of exports 1/

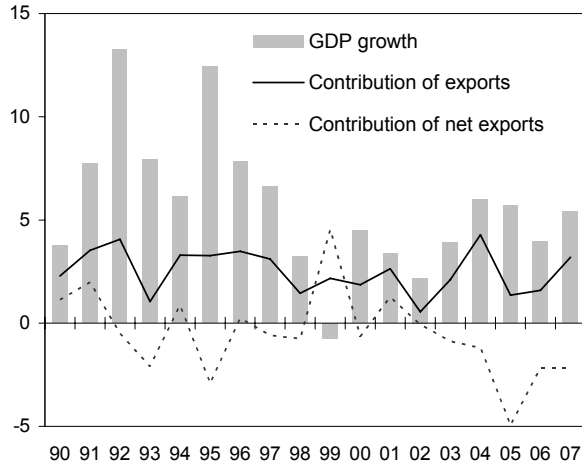Fig. 2: Tariff rate (lhs) and trade covered by FTA or trade cooperation/association agreements (rhs) 1/ 2/
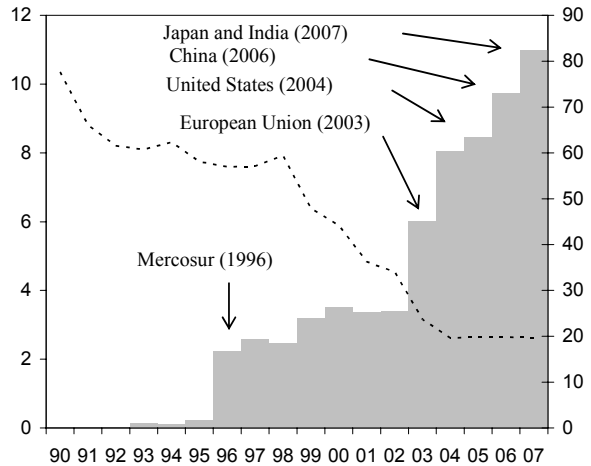

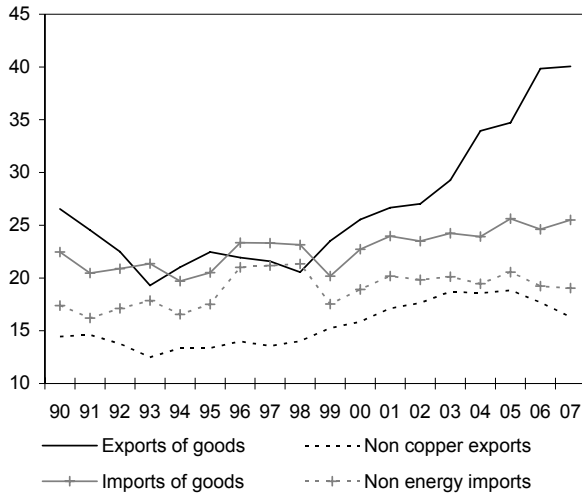Fig. 3: Trade flows (as share of GDP)

Fig. 4: REER indexes (1990 = 100) and copper price
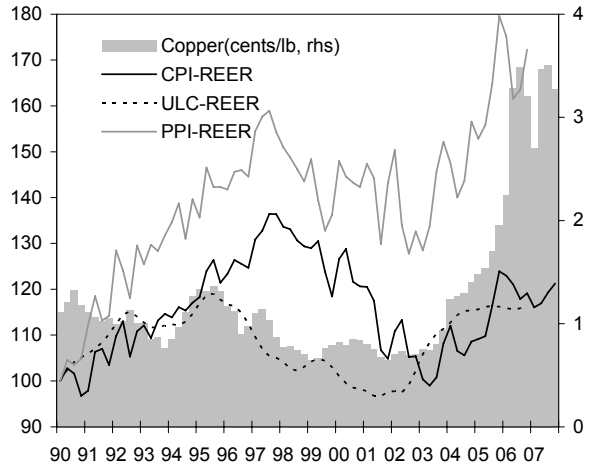

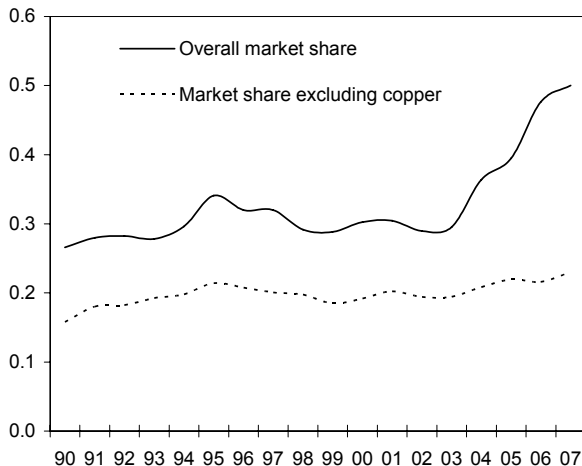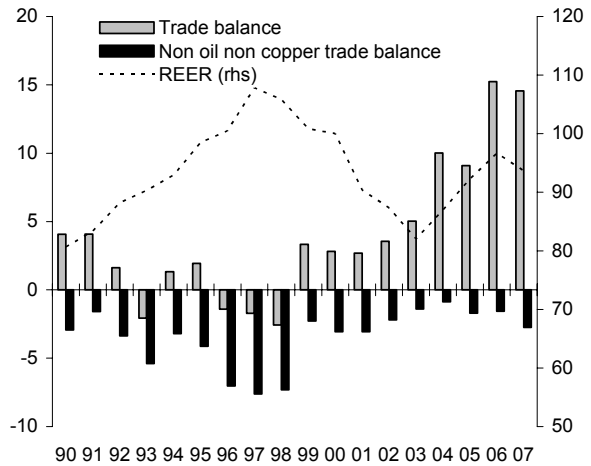Fig. 5: Export market share to the world 1/

Fig 6: Trade balance as share of GDP and REER

1/ For 2007, Q1-Q3.
Sources: Banco Central de Chile and staff estimates.

2/ Inbound tariff on imports, national accounts data.

fraction of the windfall gains from high copper price, while the inflation targeting framework has anchored price stability. Despite the appreciation, the market share of Chilean exports in the world has continued to increase between 2003 and 2007 while non copper export volume has continued to expand at a healthy growth rate over 5 percent. Higher import growth than export growth has also led to a slight deterioration of the non-commodity trade balance. The deterioration of the non-copper non-energy trade balance nonetheless remains contained compared to the situation in the second half of the 1990s.

This paper attempts to shed light on the impact of these determinants on Chile's external trade. In addition to traditional demand and price variables, we also specifically analyze the impact of trade liberalization. After discussing the methodology to assess the evolution of trade flows (Section II), the analysis is performed either at the aggregate level, by focusing on non-copper exports and non-energy imports (Section III), or at a disaggregated level (Section IV). We also assess the robustness of the results by adding additional determinants. The estimation of trade elasticities for other countries in Latin America (Section V) allows to put the results in perspective.

II. METHODOLOGY

The analysis uses the conventional treatment of trade flows as a function of real income and relative prices. Export volumes are assumed to depend on world demand addressed to the country and on external competitiveness while import volumes are modeled as a function of domestic demand and internal competitiveness. An important additional variable added to both the export and import equations is the one capturing the impact of trade liberalization that occurred during the period of analysis. The robustness of the export results is also tested when variables capturing either supply factors or the impact of the exchange rate regime are added.

Given the non-stationarity of the variables of interest, we use cointegration techniques for the estimation. The preferred methodology is the cointegrated VAR approach of Johansen (Johansen, 1991; Juselius, 2005), which allows to test for the number of cointegration relations in a system of equations, and encompasses both the long-run and the short term dynamics. However, as this methodology could be exposed to problems of misspecification and small sample problems, we test the robustness of the results by performing regressions using the Dynamic OLS (DOLS) of Stock and Watson (1991), which tend to present less dispersion in small samples. For the sake of simplicity, only the most important results obtained by DOLS are reported.[4]

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[4] To be more specific about the methodologies used, let z_t be the vector of endogenous variables (x, y, p) representing, say, export volume, external demand, and external competitiveness. For simplicity additional variables are neglected. The Johansen procedure estimates the following equation:

Standard tests help define the specification of the VAR model. The lag structure of the unrestricted VAR is determined based on the AIC and BIC information criteria. An inspection of the residuals of the unrestricted VAR suggests whether dummies should be included or not. Bera-Jarque tests and Box-Pierce tests check that the residuals of the VAR are normal and not autocorrelated. The cointegration rank is then determined using the trace and the eigenvalue tests. In the most general form, the VAR includes a constant in the cointegration vector and in the short-term dynamics, but the presence in the cointegration vector of a trend, capturing for example increased openness, is also tested occasionally.

The analysis focuses on the magnitude and significance of demand and price elasticities, as well on the loading coefficient to the long-term relations. One expects the demand elasticity to be positive for both exports and imports. If competitiveness is measured by the same indicator for exports and imports, such as the REER (with an increase representing a real appreciation), the price elasticity should be positive for imports but negative for exports. In this case, the condition of Marshall-Lerner is fulfilled if the sum of the absolute value of import price and export price elasticities is above one. This condition ensures that the real exchange rate plays a correcting role for an imbalance of the trade balance in the long-run; for example, a real depreciation leads to an improvement of the trade balance by boosting exports and reducing imports. Another coefficient of interest is the loading coefficient to the cointegration relation, which shows the speed of adjustment to disequilibrium in the long run relation. A temporary increase of trade volume above its long term value in one period should lead, all things being equal, to a decline of trade volume growth in the following periods, until the disequilibrium is absorbed.

All data are quarterly, spanning 1990Q1-2006Q4.[5] The data set has been constructed using time series from the balance of payments and the national accounts, as available from the Central Bank of Chile (BCC) and the Statistical Institute (INE), as well as information from other databases (WEO and DTS from the IMF, COMTRADE, and Haver Analytics). The sample period has been determined by data availability. Although the period is relatively short, it covers a full cycle of appreciation and depreciation of the real exchange rate. For the

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$\Delta z_t = \sum_{l=1}^{l=k-1} \Gamma_l \Delta z_{t-l} + \alpha\beta' z_{t-1} + \mu_t + \varepsilon_t$ where α is a scalar of loading coefficients to the cointegration relations, k the lag structure, and μ_t a term representing a constant and possibly also a trend. Assuming a unique cointegration vector $\beta' z_{t-1}$ and normalizing for export volume, the long run relation can be expressed as: $x_{t-1} = \beta_1 y_{t-1} + \beta_2 p_{t-1} + \beta_0$ where β_1 represents the demand elasticity and β_2 the price elasticity.

By contrast, the DOLS methodology assumes the existence of a single cointegration relation and estimates the following long run relation: $x_t = \beta_1 y_t + \beta_2 p_t + \sum_{l=-k}^{k} \gamma_{1,l} \Delta y_{t-l} + \sum_{l=-k}^{k} \gamma_{2,l} \Delta p_{t-l} + \beta_0$.

[5] A summary of the database, as well as a complete description of the variables and of their statistical properties, is given in Annex Tables 1 and 2. Annex Table 3 provides descriptive statistics on the origin and destination of trade flows as well as on the chronology of trade agreements.

export equation, world demand was proxied by the weighted average of GDP of the partner countries, with the weights reflecting Chile's trade share, either at the aggregate or at the sector specific level. For the import equation, domestic demand is captured at the aggregate level by domestic demand excluding inventories or, for sector specific equations, by the relevant demand variable (e.g. private consumption for imports of consumption goods). Competitiveness is measured for both flows by the REER or by relative export or import prices, either at the aggregate or at the sector specific level. The impact of trade liberalization is captured by different variables, such as the implicit tariff rate, the share of trade covered by an association or free-trade agreement (sometimes loosely referred to in tables as "share of FTA"), or simply by a time trend.

III. ESTIMATIONS AT THE AGGREGATE LEVEL

This section presents the results for the long-term relations of exports and imports at the aggregate level. To abstract from commodity trade flows, which may display a different behavior from other flows, the aggregates considered are non-mining exports and non-energy imports. This section also provides estimates of short term equations and dynamic contributions to illustrate the importance of the determinants of trade. The next section will present some robustness analysis, in particular by estimating trade flows at the sectoral level.

A. Exports

The existence of a cointegration vector is sensitive to the specification of the VAR. We start by estimating the equation for non-mining exports using the Johansen approach. The AIC information criterion suggests the use of a VAR with 4 lags. In this case, both eigenvalue and trace tests suggest the existence of a single cointegration relation. The number of cointegration relations is sensitive to the lag structure, as with a reduced lag structure of three lags or less, cointegration tests suggest the absence of a cointegration relation (Annex Table 5).

The elasticity of exports to external demand is relatively high, a result robust to alternative specifications. Results for the export equations are reported in Table 1. In the baseline specification with 4 lags, the coefficient for external demand is highly significant, correctly signed, and relatively high, at 2.6. Specifications including a variable for trade liberalization show a similar high demand elasticity above 2. The coefficient is not significantly modified when a constraint of weak exogeneity is imposed on the model; the constraint is accepted by a likelihood ratio test. In addition, the estimation of the model by DOLS confirms the high elasticity of external demand.

By contrast, the price elasticity is generally not significant. In a model with only external demand and the REER, the elasticity to the REER is not significant. Including variables for trade liberalization does not improve the results. As the REER may impact export volume with a lag, alternative specifications for this variable were tried, for example, lagged variables or average over a number of lags. The coefficient remains not significant when

different lagged values of the REER were introduced. When an average of the REER over a given period was introduced, the average of the REER over the past five quarters was found to be significant. However, the result is clearly not robust, as using the average over the past four quarters is still insignificant, while a model with the REER averaged over the past six quarters suggests the existence of two cointegration relations.

Table 1. Equation of Non Mining Exports

	Baseline	Share of FTA Uncons. trained	Share of FTA Weak exog.	Linear trend	Tariff rate	First lag	Avg. 5 lagged quarters	Baseline	Share of FTA	Linear trend	Tariff rate
		Estimation by VECM 1/							Estimation by DOLS		
Cointegrating vector											
Demand	**2.60***	**2.03***	**2.20***	**4.98***	**2.45***	**2.55***	**2.57***	**2.63***	**2.44***	-0.59	0.91
	(0.13)	(0.16)	(0.35)	(0.16)	(0.21)	(0.10)	(0.15)	(0.08)	(0.49)	(1.36)	(0.64)
REER	-0.03	0.07	0.17	-0.01	-0.14	-0.09	**-0.67***	0.18	0.17	0.31*	0.80*
	(0.09)	(0.37)	(0.15)	(1.76)	(0.46)	(0.07)	(0.22)	(0.12)	(0.19)	(0.13)	(0.33)
Liberalization		0.00	0.26	-0.02	-0.01				0	**-0.09***	**0.1***
		(0.00)	(0.00)	(0.01)	(0.03)				(0.00)	(0.04)	(0.04)
Loading coeff.	-0.41*	-0.40*	-0.45*	-0.31*	-0.42*	-0.52*	-0.23				
	(0.12)	(0.08)	(-0.09)	(0.08)	(0.09)	(0.12)	(-0.12)				
R2	0.56	0.58	0.55	0.59	0.61	0.61	0.49	0.97	0.97	0.97	0.98
Log likelihood	522.6	365.9	652.2	545.8	543.1	518.9	545.8	112.5	105.1	119.5	123.7
AIC criteria	-15.1	-9.4	-18.5	-15.5	-14.7	-15.5	-15.5	-2.8	-2.6	-2.9	-3.0
Schwarz criteria	-13.8	-7.3	-16.5	-13.9	-12.3	-14.1	-13.9	-2.1	-1.6	-2.2	-2.0
Lag structure	4	4	4	4	4	4	4	4	4	4	4
Prob. of LR test on restriction			0.20								

Source: author's calculations.

Notes: "*" denotes statistical significance at the 5 percent level; a bold coefficient denotes that it is significant and has the expected sign. Standard deviations are in brackets.
1/ The coefficient of export volume is normalized to -1 in the long-run relation, but to 1 for the loading coefficient.

Trade liberalization variables are not significant and do not seem to affect the magnitude of the demand coefficient. Trade liberalization is captured by three different variables: a linear time trend, the share of trade covered by trade agreements, or the tariff rate. In all three cases, the trade liberalization variable is not significant while the demand coefficient is generally little affected. In the estimation by DOLS, when the tariff rate or a linear trend are introduced, the world demand is no longer significant, but the trade liberalization variables are significant and correctly signed, which may suggest that the trade liberalization variable and the world demand variable may be competing to capture a similar effect of higher external demand addressed to the economy.

Other studies on Chile find similarly a high demand elasticity. Annex Table 4 provides a comparison of results from the literature on trade equations for Chile or for a selection of Latin American, emerging, or advanced countries. Demand elasticities are usually close or slightly above one in advanced economies, but tend to be higher though below two in Latin American countries. Studies on Chile using exports at a disaggregated level find similarly as here a high demand elasticity. For example, Cabezas, Selaive, and Becerra (2004), using volume data from the customs office broken down by destinations, find demand elasticities between 2.3-4.0 for exports to the United States and between 1.2-2 for other regions in the

world. Nowak-Lehman, Herzer, and Vollmer (2005) using sector specific data for a small number of products (salmon, fish, wood, copper, food...) also find demand elasticity between 1.5 and 5. By contrast, the macroeconomic projection model used by the Central Bank of Chile (BCC, 2003) finds a demand elasticity much lower, at 0.5, possibly because the model includes a term for domestic output to capture supply factors or because the impact of external demand is captured by the trade liberalization variable. This last study is closer to ours in terms of the aggregate considered, since it focuses on industrial exports, which represent the bulk of non-mining exports.

Results on external competitiveness are generally mixed in other studies, but, the impact of trade liberalization, when reported, is generally significant. At the aggregate level in the BCC model, industrial export volumes are not influenced in the long run by the REER, as here, but it plays a role in the short term dynamics. The coefficient of trade liberalization, proxied by the tariff rate, is also high and significant. For region-specific estimations, Cabezas, Selaive, and Becerra (2004) find elasticity to the REER of 0.2-0.8, but the significance of the REER disappeared when their model is estimated using panel cointegration. They do not include a term for trade liberalization. Finally, Nowak-Lehman, Herzer, and Vollmer (2005) find competitiveness significant in about half of their equations. Their indicator embeds both the impact of the exchange rate and of trade liberalization, as the sector-specific competitiveness indicator is a weighted average of relative price adjusted for the tariff rates. We will return to the non-significance of the trade liberalization and of the REER variable in the section devoted to analyze the robustness of our results.

B.   Imports

Unlike for the export equation, cointegration tests give consistently one cointegration relation for the import equation. The results reported in Annex Table 5 are based on the estimation on non-energy imports, although an equation with total imports does not yield very different results. In the model with only the REER and domestic demand, the cointegration vector is present only in a model including 4 or 5 lags, but information criteria suggests the use of either 3 or 6 lags. By contrast, in the model which also include the share of trade covered by trade agreements, the existence of a unique cointegration vector is unaffected by the number of lags considered. As information criteria suggest the use of either a very small or a very large number of lags, we choose to retain 3 lags, after considering the significance of the coefficients in the short-term dynamics and the properties of the residuals.

The demand variable is strongly significant and can be constrained to unity in a model including trade liberalization proxied by the share of trade agreements. In the baseline model without trade liberalization, the estimation yields a demand elasticity close to 2.1. In this specification, the loading coefficient is not significant. When adding as a proxy for openness the share of trade covered by FTA, the coefficient of domestic demand declines to around unity. In addition, a likelihood ratio test on demand elasticity shows that the model accepts the constraint that this coefficient is equal to one, as it accepts the stronger constraint

of unit elasticity and weak exogeneity. In this interpretation, non-energy imports have a unit long-run elasticity with domestic demand, while the additional imports are all explained by trade openness. To some extend, the results are sensitive to the estimation technique, since the demand elasticity tends to be much lower in the model estimated by DOLS. In addition, alternative variables for trade liberalization, such as a time trend or the tariff rate, seem to compete with the impact of domestic demand as this variable ceases to be significant when they are included.

The REER has a significant impact for imports, unlike for exports. Although not significant in the baseline estimation with only demand and REER, the REER is significant and correctly signed in all other specifications. In the preferred specification with the share of FTA, the price elasticity is between 0.13-0.20 depending on whether the demand elasticity is constrained or not.

The results are broadly comparable to those of other studies. To our knowledge, there are no recent estimations of import equations at the aggregate level for Chile. The macroeconomic projection model of the BCC (2003) estimates import equations at the disaggregated level, and finds a demand elasticity equal to unity for consumer and capital goods, and slightly higher than unity for intermediate goods; for intermediate goods, the long term relation includes also a variable for the tariff rate and for the REER, with a coefficient higher than here at 0.47. Compared to advanced economies, the demand elasticity is slightly lower here, because part of the effect is captured by the trade liberalization variable, while the price elasticity is on the low side.

Table 2. Equation of Non-Energy Imports

	Estimated by VECM 1/						Estimation by DOLS	
	Baseline	Linear trend	Tariff rate	Share of FTA			Baseline	Share of FTA
				Uncons. trained	Unit elasticity	Weak exog.		
Cointegrating vector								
Dom. demand	**2.07***	-0.59	-0.18	**1.05***	1	1	1.37*	0.59*
	(0.53)	(0.51)	(0.70)	(0.09)	(c)	(c)	(0.04)	(0.24)
REER	-0.04	**1.6***	**2.66***	**0.13***	**0.20***	**0.28***	-0.24*	**1.02***
	(0.17)	(0.56)	(0.45)	(0.06)	(0.06)	(0.06)	(0.12)	(0.38)
Openness		**0.03***	**-0.21***	**0.01***	**0.01***	**0.01***		-0.09*
		(0.01)	(0.05)	(0.00)	(0.00)	(0.00)		(0.03)
								(0.93)
Loading coeff.	-0.07	-0.19*	-0.16*	-0.53*	-0.55*	-0.39*		
	(0.11)	(0.05)	(0.05)	(0.13)	(0.13)	(0.07)		
R2	0.62	0.65	0.00	0.78	0.79	0.64		
Log likelihood	425.5	429.8	338.3	338.3	337.9	563.8	118.0	125.5
AIC criteria	-12.1	-12.2	-8.2	-8.2	-8.2	-15.6	-3.0	-3.3
Schwarz criteria	-10.8	-10.8	-5.6	-5.6	-5.6	-13.5	-2.1	-2.3
Lag structure	4	4	4	4	4	4	4	4
Prob. of LR test on restriction					0.37	0.06		

Source: author's calculations.

Notes: "*" denotes statistical significance at the 5 percent level; a bold coefficient
denotes that it is significant and has the expected sign. Standard deviations are in brackets.
1/ The import volume coefficient is normalized to -1 in the long-run relation, but to 1 for the loading coefficient.

C.   Short Term Dynamics and Dynamic Contributions

Using the long-run equilibrium relation obtained above, the short term dynamics of exports and imports are estimated by OLS. The acceptance of weak exogeneity constraints allowed us to study both export and import equations in a univariate setting. Table 3 presents the result of the estimation, first with all the coefficients with the appropriate lag structure, then after cleaning up for the insignificant coefficients. Although both equations capture the main dynamics of trade flows, the explanatory power of the short term equations are relatively poor: only 45 percent of the variance is explained for exports against close to 60 percent for import.[6] The dynamics of the export equation are particularly poor, since the REER remains not significant in the short run. The only variable significant in the short term dynamics of exports is the lag of export growth. For imports, in addition to the lag of imports growth, the first lag of domestic demand is also significant.

Table 3. Short Term Dynamics of Export and Import Equations 1/

	Non copper exports			Non energy imports		
	Initial	Final		Initial	Final
Long run			**Long run**		
Exports (-1)	1	1	Imports (-1)	1	1
External demand(-1)	-2.2*	-2.2*	Domestic demand(-1)	-1 (c)	-1 (c)
REER(-1)	n.s.	n.s. 0	REER(-1)	-0.28*	-0.28*
FTA(-1)	n.s.	n.s. 0	FTA(-1)	-0.7*	-0.7*
Short run			**Short run**		
Adjust. coeff.	-0.35*	-0.21*	Adjust. coeff.	-0.39*	-0.35*
d Export(-1)	-0.25*	-0.31*	d Import(-1)	-0.39*	-0.45*
d Export(-2)	0.08		d Import(-2)	-0.14	
d Export(-3)	0.05		d Import(-3)	-0.13	
d Price(-1)	-0.18		d REER(-1)	0.26	
d Price(-2)	0.02		d REER(-2)	0.16	
d Price(-3)	0.04		d REER(-3)	0.18	
d Ext. demand(-1)	0.65		d Dom. demand(-1)	1.70*	1.95*
d Ext. demand(-2)	1.21		d Dom. demand(-2)	0.65	
d Ext. demand(-3)	-0.81		d Dom. demand(-3)	0.22	
Dum99Q2	-0.09*	-0.11*	Dum00Q4	-0.20*	-0.23*
Dum98Q2	0.08*	0.09*			
Dum93Q3	0.11*	0.10*			
Dum95Q3	-0.07	-0.08*			
Constant	-2.59*	-1.52*	Constant	-2.36*	-2.08*
Summary statistics			**Summary statistics**		
Adj. R2	0.50	0.45	Adj. R2	0.55	0.57
Durbin-Watson	2.04	1.87	Durbin-Watson	1.72	1.84
Log likelihood	129.71	126.80	Log likelihood	115.44	109.04
Akaike criterion	-3.58	-3.63	Akaike criterion	-3.23	-3.15
Schwarz criterion	-3.08	-3.40	Schwarz criterion	-2.83	-2.99
Estimation period	91Q1	90Q3	Estimation period	91Q1	90Q3
	/ 06Q4	/ 06Q4		/ 06Q4	/ 06Q4

Source: author's calculations.
Notes: "*" denotes statistical significance at the 5 percent level.

1/ Sequential estimation of the long term and short term equations.

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[6] Those results are, however, only slightly smaller than those obtained in the macroeconomic model of the BCC (2003) on disaggregated data: the adjusted R2 is of 0.58 for manufacturing exports; of 0.69 for consumer goods imports; of 0.78 for investment goods imports; and of 0.65 for intermediate non-fuel goods imports.

The rates of convergence to the long-term relationships are relatively fast, with the half lives of deviations from the equilibrium relationships between 2 and 3 quarters. The loading coefficients to the equilibrium relationship are of 0.2 and 0.35 for exports and for imports, which indicates a half life of the deviation from the long-run equilibrium of 3 quarters and 2 quarters respectively. Note that these estimates are lower than the one obtained in the full VECM model above, of 0.4 for exports and 0.5 for imports. Exports adjust more slowly to a deviation from a change of external demand than imports to a change of domestic demand, possibly because responding to a growing world demand by increasing exports requires adjusting domestic production or creating new plants.

Dynamic contributions show that trade flows have been driven mainly by demand factors. The computation of dynamic contributions allows to visualize, for each period, the role of the explanatory variables. They are produced by inverting the polynomial structure of the equation. For export, the dynamic contributions only reflect the impact of domestic demand, given the non-significance of other variables. However, dynamic contributions allow to illustrate that the spike of Chilean exports in the mid-1990s and in the early 2000s are both the reflection of the evolution of world demand addressed to Chile. The equation presents significant negative residuals both in 1995 and in 2000, at the time of the Tequila crisis and in the aftermath of the Asian crisis, which may indicate that Chilean exports were also affected by supply factors, such as the drying up of domestic or external financing in these periods. Although the model captures broadly the pick up of Chilean exports in 2004-06, it does not explain the trend slowdown of export growth. Dynamic contributions for imports present a richer analysis: domestic demand explains the larger share of imports, and the model captures in particular the impact of the recession in 1999, or the pick up of domestic demand in 2004-05. Consistent with its low value in the long-term relation and its absence in the short-term dynamics, the REER plays only a marginal role. Finally, the development of trade agreements could explain in part the pick-up of imports in particular since 2000. The model tends to underestimate the recent increase in imports since 2004.

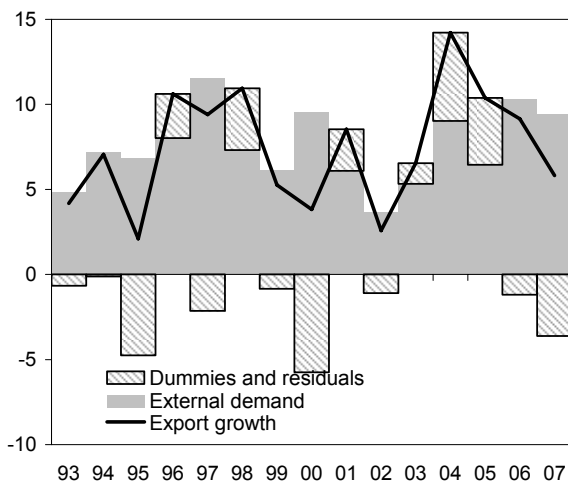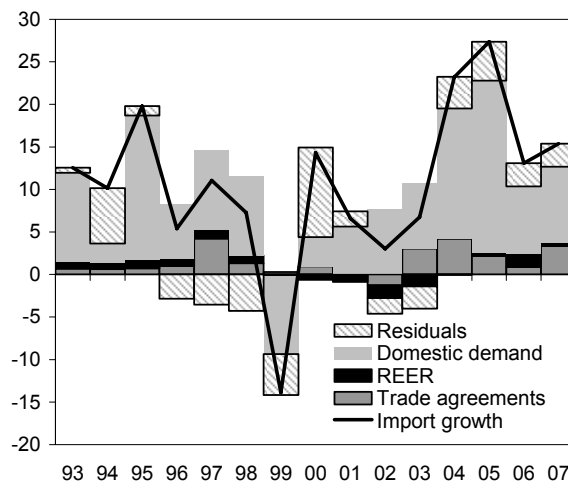Figure 7. Dynamic contributions of non-mining exports 1/

Figure 8. Dynamic contributions of non-energy imports 1/

1/ For 2007, out of sample projection based on 2007Q1-Q3.

In 2007, the equations fail to predict the slowdown of exports, but capture more closely the pickup of imports. Although the estimation period extends only until 2006Q4, the equations can be used for out-of-sample forecasts for 2007, using available data up to 2007Q3. Concerning exports, the continued expansion of the world economy and of demand addressed to Chile tend to predict a higher expansion of export than actually observed. It is possible that the growing residuals in 2006-07 reflect the delayed impact of the appreciation of the exchange rate. Regarding imports, strong domestic demand as well as the expansion of trade agreements at end-2006 could explain the rebound of imports in 2007. The appreciation of the exchange rate contributes only modestly to explain the increase of import volumes. In 2007 as in the preceding three years, the model, however, tends to underestimate the growth of non-energy imports.

IV. ROBUSTNESS ANALYSIS

This section tests the robustness of the results presented above by estimating trade equations at the sectoral level, and by enriching the set-up for the export equation. In particular, we attempt to shed light on why we cannot capture empirically a significant impact on exports of both the real exchange rate and of trade liberalization: is it related to an aggregation issue – which we address by running sectoral regressions - or to an omitted variable bias – which we address by enriching the set-up? On the import side, this section aims more simply at providing additional insights from a sectoral analysis.

A. Sectoral Estimations

Exports

We analyze the behavior of ten different categories of exports using sector-specific demand and relative prices. The database available allows for a breakdown of export volumes in ten different categories: agriculture, food, chemicals, forestry, paper, metallurgy, machinery, miscellaneous manufacturing items, copper, and non copper mining. For each category, we construct sector specific demand and sector specific relative prices. World demand specific for each category is constructed using information from COMTRADE, which provides a breakdown of exports by products *and* by destination. Sector-specific demand is a weighted average of GDP of trade partners, the weights being proportional to the destination of trade for each specific product. For sector-specific prices, we use international copper prices for mining exports and Chilean export prices over manufacturing prices in advanced economies for other exports.[7] Regressions are also performed using simply the

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[7] More specific competitors' price would have been better, but are not always available. For agriculture, food, and forestry, we have also tried to use alternative relevant prices. For example, as the bulk of agricultural exports consist of grapes exported to the US, we have tried to use the U.S. CPI index for fruits as the relevant competitor price; in this case, the demand elasticity is significant, but still not the price elasticity.

REER as an indicator of external competitiveness. As our focus here is on the price elasticity, we do not include proxy for trade liberalization.

The results confirm the strong impact of external demand. For all export categories, demand elasticity is significant and above unity. Demand elasticity tends to be higher for some of the sectors which experienced high volume growth during the period, such as forestry or machinery, with an average volume growth over 10 percent. But this is not always the case: the metallurgy sector experienced a high volume growth, but the demand elasticity is relatively lower; by contrast, demand elasticity for mining is high, but the volume growth has only been around 6 percent annually.

Aggregation issues do not seem to explain the non-significance of the REER at the aggregate level as external competitiveness indicators are also insignificant for most of the sectors. The REER is only significant for metallurgy, while relative prices are significant for forestry, metallurgy, and copper. It is possible that these sectors are more responsive to world competition, as the bulk of domestic production in these sectors is exported.[8] Interestingly, the model captures a high demand elasticity and a significant price effect for copper. This is rather at odds with the recent copper boom, where despite a sustained world demand and skyrocketing of prices, copper export volumes have remained sluggish for most of 2006, in part because of technical problems (landslides or labor tensions in some of the main mines).

Table 4. Estimation of the Export Equation by Sector (DOLS estimation)

	Non mining sectors								Mining	
	Agri.	Food	Forest.	Paper	Chem.	Ind.	Mach.	Misc.	Copper	Non copper
With REER:										
Demand	1.99*	**3.49***	**3.24***	**1.84***	**4.32***	**1.59***	**3.74***	**1.16***	**3.13***	**3.25***
	(0.12)	(0.13)	(0.15)	(0.11)	(0.12)	(0.25)	(0.25)	(0.10)	(0.10)	(0.11)
REER	0.28	0.72*	-0.47	-0.06	-0.11	**-2.47***	2.36*	0.69*	0.70*	1.19*
	(0.28)	(0.23)	(0.26)	(0.27)	(0.24)	(0.41)	(0.29)	(0.17)	(0.16)	(0.17)
With export prices:										
Demand	0.95	**3.57***	**2.83***	**1.90***	**4.31***	**0.97***	**4.34***	**1.35***	**3.45***	**3.19***
	(0.59)	(0.28)	(0.19)	(0.12)	(0.12)	(0.40)	(0.40)	(0.19)	(0.09)	(0.12)
Price	-0.83	0.55	**-0.66***	0.43	-0.02	**-0.84***	0.08	0.51	**-0.12***	0.26*
	(0.60)	(0.32)	(0.19)	(0.42)	(0.22)	(0.41)	(0.94)	(0.57)	(0.04)	(0.06)

Source: author's calculations.
Note: *denotes significance at the 5 percent level. Bolded coefficient if significant and correctly signed.

Imports

We then estimate import equations for four import categories: consumer goods, capital goods, intermediate goods excluding energy, and energy. The equations presented use the

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[8] See Annex Table 6 for descriptive statistics on the characteristics of each export sectors in terms of productivity, employment, world market share, etc.

same regressors as the baseline equation, as well as sector specific regressors, both for price and for demand. For example, private consumption, machinery investment, and aggregate GDP are used as proxy for sector specific demand, while the sector specific price is the difference between import prices from the balance of payments and the deflator of the relevant sector from the national accounts.

Sector specific equations tend to yield higher demand elasticity than at the aggregate level and mixed results for price elasticity. Demand elasticities are of 1.6-2.5 for consumer imports, 1.3-2.0 for capital imports, 0.7-1.3 for intermediate goods, and 0.9-1.2 for energy imports. The proxy for trade liberalization is significant for intermediate goods and for energy, but not for consumer and capital goods. Price elasticities are significant for each categories of import for at least one specification. Overall, the REER tend to perform poorly compared to sector-specific prices. When significant, price elasticities are in the range of 0.3-1.2, which is higher than the results obtained at the aggregate level.

Table 5. Import Equation by Sector (DOLS estimation) 1/

	Consumer goods						Capital					
	Baseline		Household cons.		Import prices		Baseline		Machin. invest.		Import prices	
Demand	1.86*	1.63*	1.82*	1.83*	2.34*	2.44*	1.46*	1.74*	1.29*	1.73*	1.48*	2.03*
	(0.04)	(0.18)	(0.05)	(0.18)	(0.22)	(0.26)	(0.06)	(0.25)	(0.05)	(0.23)	(0.07)	(0.16)
Price	0.00	0.41	-0.02	-0.01	0.42*	0.54*	-0.10	-0.44	0.62*	0.20	0.37*	-0.23
	(0.13)	(0.31)	(0.13)	(0.32)	(0.21)	(0.24)	(0.19)	(0.42)	(0.17)	(0.32)	(0.13)	(0.20)
Liberalization		0.00		0.00		0.00		0.00		-0.01*		0.01*
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)

	Intermediate goods, excl. energy						Energy					
	Baseline		GDP		Import prices		Baseline		GDP		Import prices	
Demand	1.22*	0.93*	1.27*	1.08*	1.13*	0.69*	1.10*	0.58*	1.18*	0.68*	1.08*	1.01*
	(0.05)	(0.15)	(0.07)	(0.16)	(0.14)	(0.12)	(0.05)	(0.19)	(0.07)	(0.21)	(0.13)	(0.15)
Price	-0.65*	-0.17	-0.53*	-0.15	-0.26	0.31*	0.36*	1.16*	0.46*	1.20*	-0.04	-0.11
	(0.16)	(0.26)	(0.16)	(0.23)	(0.17)	(0.12)	(0.16)	(0.33)	(0.15)	(0.30)	(0.06)	(0.11)
Liberalization		0.01*		0.00*		-0.01*		0.01*		0.01*		0.00
		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)		(0.00)

Source: author's calculations.

1/ For each sector, we perform three sets of regressions with or without the FTA variable:
• the baseline regression uses aggregate domestic demand and the REER;
• the second regression uses a sector specific proxy for demand;
• the third regression uses both sector specific demand and sector specific price.

B. Alternative Specifications for the Export Equation

Why is the REER not significant?

The results above have failed to explain the non significance of the REER in the export equation, a situation which may be related to an omitted variable bias. We have explored earlier the possibility that the non-significance of the REER is due to lags in its influence or

to an aggregation problem.[9] However, both failed to provide convincing evidence. This non significance is surprising, both because one expects the REER to be one of the major determinants from a theoretical perspective and because other earlier studies found it significant. In one of the earliest study on the subject, De Gregorio (1984) argued that, as a small open economy with no monopolistic power, Chile is confronted to an infinitely elastic demand from abroad. In this case, the supply of exports should be a function of relative prices rather than external demand. This is the opposite of our results. He also includes in his regression a variable to capture production constraints. This points to one possible omitted variable bias, related to supply factors. A second possible omitted variable we also explore is related to the exchange rate regime and specifically to exchange rate volatility.[10]

Figure 9: Apparent labor productivity of the export sectors
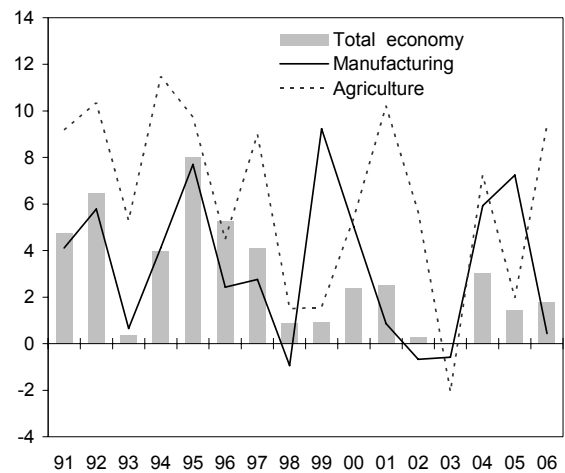
The good export performance of the late 1990s despite the appreciation of the REER at the time also argues for the importance of supply factors. Guergueil and Kaufman (1998), studying the impact of the REER appreciation that run throughout most of the 1990s, argue that the loss of competitiveness associated with the appreciation of the peso had then been offset by productivity gains. A casual glance at the data (Figure 9) also suggests that export volume growth in the mid-2000s has been associated with a renewed expansion of the productivity of the export sectors, while the significant rise in unemployment in early 2000s, related to the economic crisis in 1999, could reflect some constraints on the production side also affecting exports.

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[9] Another dimension of data heterogeneity mentioned earlier and explored by Cabezas et al. (2004) is related to the destination to different export markets.

[10] Another possibility is that, in a country with a major commodity export, namely copper, the impact of the REER may already be captured external demand, as external demand is correlated with commodity price and the REER. To some extent, the current appreciation of 2003-07 or the previous episode in the mid-1990s are somehow related to the increase of copper price. However, in the VECM setting, this effect is not captured by a second cointegration relation.

Table 6. Introducing Supply and Exchange Rate Volatility Factors in the Export Equation

	Baseline	Supply variable			With exchange rate volatility			
		Output	Unemp-loyment	Produ-ctivity	NEER 3 mths	NEER 5 mths	NEER 7 mths	NEER 9 mths
Cointegrating vector								
Demand	2.60*	2.48*	2.61*	2.83*	2.46*	2.59*	2.58*	2.59*
	(0.13)	(0.32)	(0.13)	(0.36)	(0.35)	(0.12)	(0.10)	(0.14)
REER	-0.03	-0.47	0.08*	0.11	-1.34*	-0.59*	-0.53*	-1.15*
	(0.09)	(0.85)	(0.01)	(0.36)	(0.12)	(0.04)	(0.04)	(0.06)
Supply		-0.12	0.00	-0.37				
		(0.45)	(0.01)	(0.36)				
Volatility					-0.61*	-0.17*	-0.1*	-0.21*
					(0.12)	(0.04)	(0.04)	(0.06)
Loading coeff.	-0.41*	-0.20*	-0.41*	-0.54*	-0.03	-0.26*	-0.35*	-0.23*
	(0.12)	(0.06)	(0.10)	(0.14)	(0.02)	(0.06)	(0.08)	(0.05)
R2	0.56	0.53	0.60	0.63	0.53	0.62	0.65	0.62
Log likelihood	522.6	543.1	273.0	750.7	269.2	265.8	265.9	265.1
AIC criteria	-15.1	-14.7	-14.1	-20.9	-12.6	-12.8	-14.1	-13.3
Schwarz criteria	-13.8	-12.3	-11.5	-17.8	-10.2	-10.3	-11.7	-10.9
Lag structure	3	4	4	4	3	3	3	3

Source: author's calculations.

However, introducing supply factors in the equation does not improve the results on REER. We use alternative proxies for supply factors, the productivity in the economy, measured either directly by domestic output, by the aggregate TFP, by the apparent labor productivity of export sectors (measured as a weighted average of productivity in agriculture and manufacturing), or by constraints in the labor markets, proxied by the rate of unemployment. However, the results (reported in Table 6) show that these factors are not significant in the long term relation. Besides, the results concerning external demand or REER are not modified in these alternative specifications.

A second possible omitted variable is related to the exchange rate regime. In particular, Chile moved from a crawling peg to a flexible exchange rate in 1999. The move to a flexible exchange rate seems to have led to a greater volatility of the exchange rate and thus could have hurt exports. At the same time, the impact of higher volatility on export decision is unclear, since firms may react to higher exchange rate uncertainty by higher recourse to hedging instruments. A cross-country study on the relation between exchange rate volatility and trade flows by Clark, Tamirisa, and Wei (2004) finds some evidence of the detrimental impact of exchange rate volatility, but also argues that the relation is not robust to reasonable perturbation of the specification linking bilateral trade to its determinants. In the following estimations, we measure volatility as the standard deviation over a given window of monthly changes of the NEER.[11]

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[11] Alternative measures of volatility could focus on the REER or on the U.S. dollar / Chilean Peso exchange rate if most exports are traded in U.S. dollars

In the specification with volatility, both the volatility variable and the REER are significant and correctly signed, but the coefficients are relatively unstable. Table 6 reports the results using the volatility of the NEER over a window of 3, 5, 7, and 9 months. In all cases, both the REER and the volatility indicator are significant and correctly signed. The price elasticity is between 0.5-1.3. However, although cointegration tests only indicate the existence of a unique cointegration vector, it may well be that what is captured is a negative correlation between exchange rate volatility and the level of the REER (Figure 10). This could explain why the coefficients are jointly significant, broadly proportional, and relatively unstable. Although it is not clear why we should have historically this relation over the sample, one possible reason for the negative relation between volatility and the level of the REER could be that foreign exchange market participants expect the exchange rate to stabilize when the

Figure 10. REER and exchange rate volatility 1/
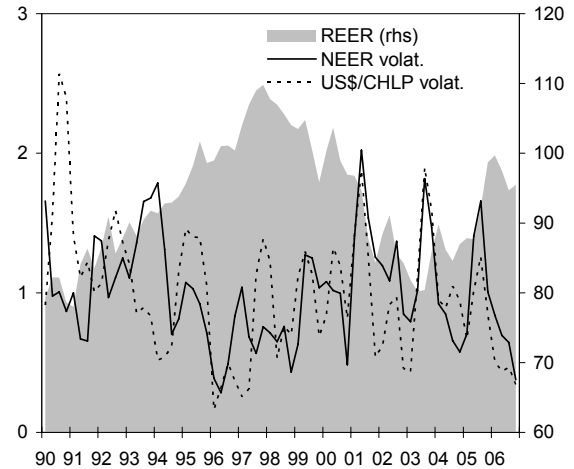
1/ Volatility is measured as a standard deviation of the relevant exchange rate over a window of 9 months.

REER is high, possible because of direct intervention of the central bank (until 1999) or indirect intervention.[12] For these reasons, and given that other authors question the introduction of volatility variables in trade equation, we do not interpret this result as definite empirical evidence of the impact of REER on export volume.

Why is trade liberalization not significant?

As for the REER, the non significance of trade openness in the baseline export equation contrasts with the results obtained in other studies as well as from general predictions of theoretical models. As mentioned earlier, Nowak-Lehman, Herzer, and Vollmer (2005) and BCC (2003) find significant impacts of trade liberalization, measured in both case by tariff rates. Theoretical models also argue for benefits from FTA, although mostly from non-trade channels. For example, Cabezas (2003) sees some benefits of the FTA with the USA based on a theoretical model, although the positive effects come mainly through reduced risk premium or increased foreign direct investment, rather directly from trade. Chumacero, Fuentes, and Schmidt-Hebbel (2004) argue that the main effect of FTA should come through a reduction of risk-premium or improved factor productivity. At the same time, they expect the trade impact of the treaties signed with the European Union in 2003 or the USA in 2004

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[12] For example, in 2007, responding to concerns of the export sector about the appreciation of the dollar, the government issued peso-denominated bonds instead of converting in peso dollar revenues, arguing that, despite the overall record fiscal surplus, it faces a small fiscal deficit in peso. This decreased the pressure on the exchange rate in the foreign exchange market.

to be small, given the already high degree of trade openness of Chile.

We discuss below two analyses, one based on recursive estimation, which tends rather to support the growing impact of trade liberalization on the economy, and another based on the expansion of world trade, which tends to weaken the case for the impact of trade liberalization.

Recursive estimations suggest that the high coefficient of income could already capture the impact of trade liberalization. As noted earlier, the elasticity of export to external demand is larger than those obtained for advanced economies. Could the high elasticity in Chile already capture part of the impact of the policy of trade openness? To shed light on this question, we estimate the baseline export equation recursively. The starting point of the estimation period is always 1990Q1, but the end-point is shifting from 2001Q1 to 2006Q4. As seen in Figure 11, the elasticity to external demand is increasing over the most recent period, where the share of trade covered by FTA increased significantly. By contrast, before the rapid expansion of trade association in the early 2000s, the demand coefficient was closer to those found for other countries, slightly above unity. We note also that price elasticity remains insignificant whichever end point is considered.

Figure 11. Recursive estimates of external demand elasticity and of REER elasticity (with 2 standard deviations)
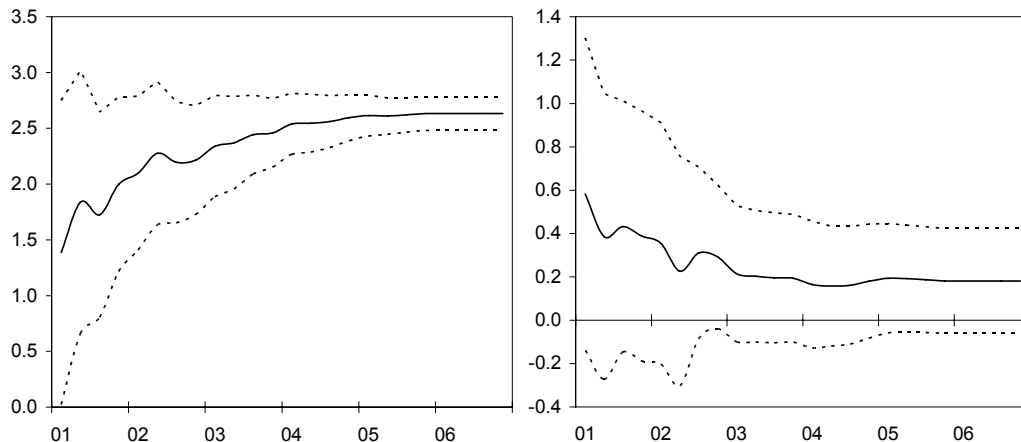
A second direction consists in using partners' imports as a proxy for external demand, which allows to abstract from the increase of trade related to the expansion of world trade. As an alternative demand indicator, we use the weighted average of partners' import volume. This specification allows to analyze whether the high income coefficient is the result of Chile's trade policy or is the result of the global expansion of world trade. Similarly to the baseline export equation presented above, the equation is very sensitive to the specification of the VAR. The AIC criterion would lean toward a long lag structure, the Schwarz information criterion for a shorter lag structure, but a cointegration vector is only present for an intermediate lag structure. This invites to take the following results with great caution. Using a VECM with 4 lags, both the income and price elasticity are significant and with the expected sign.

Demand elasticity to partners' imports is lower than unity - while price elasticity becomes significant (Table 7). As expected, the income elasticity is lower than in the model with partners' output, but surprisingly the coefficient is below unity, which seems at odds with the increase of the export market share of Chile over the sample period. This difference could be explained either by the specificity of Chile's exports markets (more dynamic than the world in general) or by some contrasting evolutions of GDP and import deflators. Introducing different measures of trade openness in the equation with partners' import tend to yield poor results and further evidences that the income variable is competing with the trade openness variable. One merit of the last exercise, however, is to highlight that part of the high income elasticity in Chile is the result not just of its trade policy but also of the overall increase of world trade. In addition, with this specification, the elasticity to the REER is significant and correctly signed.

Table 7. Equation of Non Mining Exports using Partners' Imports

	Baseline		Proxy for openness		
	DOLS	VECM	Share FTA	Linear trend	Tariff
Cointegrating vector					
Income	0.85*	0.85*	0.68*	-2.68*	0.02
	(0.02)	(-0.11)	(0.12)	(0.62)	(0.20)
Price	-0.21*	-0.23*	-0.07	1.45*	1.19*
	(0.10)	(-0.02)	(0.16)	(0.30)	(0.39)
Openness			0.00*	0.30*	-0.15*
			(0.00)	(0.05)	(0.04)

Source: author's calculations.

V. ESTIMATIONS FOR LATIN-AMERICAN COUNTRIES

This last section attempts to put the results on Chile into perspective by estimating trade equations for a sample of Latin American economies. As with Chile, other countries have experienced large swings in the real exchange rate, partly induced by changes in commodity prices and have also engaged in trade agreements since the 1990s. In addition, many countries have also engaged in trade association or free-trade agreements, or are currently negotiating such agreements. For reason of data availability, the regressions are run on trade volume of goods and services, using data from the national accounts.[13]

With Mexico, Chile is the Latin American countries most engaged in trade liberalization. One specificity of Chile's trade agreements is that they progressively covered an increasing share of exports. The experience of Chile is slightly different from other countries: Mexico signed in 1994 the NAFTA with Canada and the United States, which immediately covered the bulk of its trade. Additional trade agreements with first-world economies, such as the European Union in 2001 and Japan in 2005, only added marginally to

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[13] See Annex 1 on the sources of the data used.

the share of trade covered by FTA. By contrast other Latin American countries mostly signed trade agreements with regional neighbors, which only covered a small fraction of trade, around 10 or 20 percent as most trade flows are with countries outside the region (Figure 12). For example, the Mercosur was signed in 1991 between Argentina, Brazil, Paraguay and Uruguay. The Andean Pact, encompassing Colombia, Ecuador, Bolivia, Peru, and Venezuela, also received new impetus in the early 1990s.[14] Both trade blocks signed cooperation agreement with another in 2004 and 2005. In addition, Peru and Colombia signed FTA with the USA in 2005 and 2006, but those agreements have yet not been ratified by the U.S. Congress. Focusing at multilateral trade liberalization through trade agreements may, however, lead to underestimate the efforts of Latin American economies to liberalize trade in the 1990s and early 2000s. Data on tariff rates for some Argentina and Colombia show that these countries have also experienced a decline in tariff rate, although of lesser magnitude than in Chile (Figure 13).

Figure 12. Share of trade covered by FTA or association agreements in Latin America 1/

Figure 13. Tariff rate in a selection of Latin America countries

1/ Based on a sample of 26 main trade partners; for Mercosur and Andean Pact, average weighted by GDP.
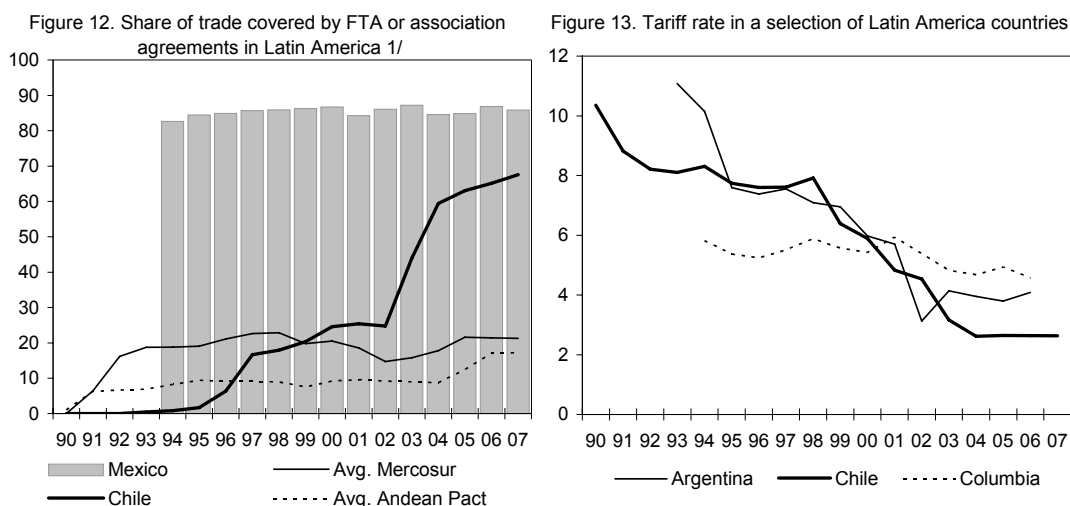
Elasticities of exports to world demand are usually lower for other Latin American countries than for Chile while price elasticities are usually not significant. Results are reported in **Table 8**. The coefficients are usually between 1 and 2, with the exception of Peru (coefficient of 2.5) and Mexico (3.4). The high elasticity for Mexico and Chile may indicate the positive effect on trade agreement on export performance. In addition, the variable for trade agreement in Mexico is significant when estimated with manufacturing exports. As for

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[14] The Andean Pact was officially created by the Cartagena Agreement in 1969 and was renamed Andean Community in 1996. It remained dormant until the early 1990s, when countries agreed to intensify integration in 1991 or with the creation of a free trade zone for some of the countries participating in the Pact. The countries involved in the agreement have changed over time. For example, Chile, one of the original participants of the agreement, withdrew in 1976. Venezuela joined the Andean Pact in 1973 but announced it withdrawal in 2006, although it has not yet formally completed the withdrawal procedures.

Chile, the elasticity to the REER is rarely significant and correctly signed. Only for Brazil, Mexico, and Bolivia is the REER negative and significant. For these countries, the estimates varied widely, from -0.2 to -1.8. In both Mexico and Bolivia, energy exports (oil or gas respectively) represent a large share of exports.[15] In addition, Mexico and Brazil have a relatively large manufacturing export sector.

Table 8 : Estimation of Trade Equations for a Selection of Latin American Countries 1/

	Baseline: total trade in goods and services										Alternative specifications			
	Chile	Arg.	Brazil	Bol.	Col.	Ecu.	Mexico	Peru	Parag.	Urug.	Chile 2/	Chile 3/	Mexico 2/	Brazil 3/
Exports														
Partners' income	2.47*	2.26*	1.74*	1.77*	1.66*	1.17*	3.51*	2.52*	-0.68**	1.44*	2.77*	2.38*	3.50*	1.28*
	(0.09)	(0.11)	(0.10)	(0.17)	(0.09)	(0.05)	(0.10)	(0.08)	(0.34)	(0.09)	(0.20)	(0.21)	(0.18)	(0.19)
REER	0.22*	0.13*	-0.35*	-1.79*	0.09	0.10	-0.71*	0.04	0.37	0.43*	0.24*	-0.02	-0.41	-0.55*
	(0.08)	(0.06)	(0.07)	(0.51)	(0.10)	(0.09)	(0.16)	(0.33)	(0.28)	(0.08)	(0.08)	(0.09)	(0.30)	(0.12)
Share FTA											-0.24	-0.10		
											(0.16)	(0.17)		
Imports														
Dom. demand	1.62*	2.49*	3.26*	1.45*	1.90*	1.54*	3.25*	1.66*	2.77*	2.80*	1.44*	1.06*	2.71*	
	(0.04)	(0.11)	(0.13)	(0.08)	(0.07)	(0.11)	(0.14)	(0.04)	(0.64)	(0.25)	(0.06)	(0.08)	(0.22)	
REER	-0.01	0.26*	0.39*	-0.36*	0.44*	0.16*	-1.46*	0.88*	0.85*	-0.98*	0.05	0.17*	-0.94*	
	(0.03)	(0.04)	(0.05)	(0.22)	(0.05)	(0.08)	(0.19)	(0.19)	(0.33)	(0.24)	(0.04)	(0.05)	(0.28)	
Share FTA											0.24*	0.61*	0.17*	
											(0.06)	(0.08)	(0.06)	

Source: author's calculations.
Notes: "*" denotes statistical significance at the 5 percent level; bolded if with expected sign.
1/ Estimation with Stock-Watson, coefficient of import normalized to 1. Estimation period: 1990Q1-2006Q4 except for Colombia
2/ Chile and Mexico: Specification with FTA and total trade in goods and services.
3/ Chile and Mexico: imports excluding. energy. Chile, Mexico, and Brazil: manufacturing exports.

Elasticities to domestic demand are always significant, and usually higher for Latin American countries than for Chile, while the price elasticity is usually significant. Demand elasticity generally hovers around 1.5-2.5 against an elasticity around 1.6 without the variable for trade liberalization (proxied by the share of trade covered by trade agreements) and close to 1.4 with it. For Chile, the estimation on goods only (against goods and services) yields an even lower estimate of 1.1, closer to the one presented earlier. In Mexico, introducing a variable for trade liberalization leads to a reduction of income elasticity from 2.7 to 2.0. Income elasticities for advanced economies generally yield estimates between 1 and 2 and the lower elasticity to domestic demand could possibly be explained by the fact the economy is more diversified. In addition, as in Chile, imports seem to be more responsive to relative price. For a majority of countries, the REER variable is significant and correctly signed.

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[15] See Annex Tables 7a and 7b on some descriptive statistics on the export sectors of Latin American economies.

Overall, the results on Latin American economies tend to support those obtained on Chile. The REER is generally not significant in the export equation, but significant for the import equation. Elasticities for both external and domestic demand are correctly signed and significant. However, the elasticity to world demand appears higher for Chile, as in Mexico, which may indicate some positive impact of trade liberalization. By contrast, the elasticity to internal demand is somewhat lower in Chile.

VI. CONCLUDING REMARKS

This paper has attempted to shed light on the determinants of trade flows in Chile. We found that trade flows are determined preeminently by external and domestic demand factors. By contrast, the REER is usually not significant in the export equation and, although significant and correctly signed in the import equation, has only minor explanatory power. The REER is found to be significant in some specifications of the export equation, but the results do not appear to be very robust. The elasticity of exports to the REER is found significant when considering a long lag, when running estimations on a limited number of export sectors, or when correcting for the omitted variable bias by introducing a variable for exchange rate volatility. At the aggregate level of trade of goods and services, similar results are generally found for other Latin American countries.

In addition, this papers finds that trade liberalization may have played a role in the expansion of trade. Trade liberalization, as measured by the share of trade covered by FTA, is directly significant in the import equation, and could explain the additional increase of import volume above the expansion of domestic demand. Trade liberalization is not directly captured in the export equation, although the high elasticity of exports to external demand may partially capture this effect. Trade equations for Mexico, the only other country in Latin America with a comparable degree of trade liberalization, also show a significant coefficient for a trade liberalization proxy.

Looking ahead, the results suggest that a global slowdown poses a significant risk for Chilean exports. The estimations suggest the recent appreciation of the exchange rate is likely to have limited effects on export volumes, although lower relative prices for external goods could increase competition in domestic markets. By contrast, given the high elasticity of exports to world demand, Chile maybe more affected by a global slowdown. As for trade liberalization, there is likely to be less of a direct impact on trade volumes in the future, given that the bulk of Chilean trade is now covered by bilateral trade agreements and effective tariff rates are at very low levels. However, the beneficial impact of past trade agreements are likely to be seen from a higher sensitivity of Chilean exports to increases in world demand during the next global upswing.

The sample data set for Chile comprises quarterly data covering the period 1990–2006. A complete description of the variables and the data is given below. Table 1 summarizes the sources and the time series used. Table 2 presents the statistical properties of the variables used for Chile. Statistical properties of the time series used for the cross-country comparison are not reported here but are available upon request.

Trade volume. Detailed trade volume data are available on a quarterly basis from the balance of payments from 1996Q1 onwards and cover about 30 different products for exports and a dozen for imports. National accounts also contain trade volume aggregates for goods and services since 1996Q1, but with a less detailed breakdown. In addition, staff from the central bank provided quarterly trade indexes for the period 1990Q1-96Q4. However, this last dataset provides a less detailed breakdown that the balance of payments since 1996, with only 6 categories for exports and 7 for imports. Eventually, after using appropriate assumptions, we retained 10 categories for exports and 4 for imports and backdated existing balance of payments time series before 1996. These categories were then aggregated using Paasche indexes to construct relevant time series, such as non-copper exports, non-mining exports, or non-energy imports.

REER and competitiveness. The main variable used the real effective exchange rate is the one based on CPI data using the methodology of Bayoumi, Lee, and Jayanti (2005) and produced by the IMF (Information Notice System, INS). This methodology takes into account not only competition in a given market but also third party competition. Alternative variables for the REER were constructed, based on the PPI or on Unit Labor Cost, both using data from Haver Analytics. In addition, sector-specific competitiveness indicators were constructed using export and import price indexes for each sector. For exports, the comparator prices in foreign markets used is the CPI, while for imports the comparator price is the domestic deflator of each specific sector.

External and domestic demand. External demand addressed to Chile was constructed using a weighted average of real GDP of Chile's main trade partners. Using variable weights instead of fixed weights, to account for changes in Chile's origin and destination of trade over the sample period, gives a very similar variable. To measure external demand addressed to one specific sector, say forestry exports, the weights for Chile's importers are derived from the COMTRADE database, which provided time series of Chile's trade by destination and products. Domestic demand for the sample period was constructed using information available from the national accounts with the base year 2003, 1996, and 1986. Sector specific demand indicators, say private consumption for consumer goods, was constructed using the same methodology.

Trade liberalization. One measure of trade liberalization is the implicit import tariff rate, using import taxes from GDP by sectors and divided by the imports of goods from GDP by

expenditures. However, unless there is full reciprocity from Chile's trade partners—which is not the case, this indicator is more relevant for imports than for exports. At the sectoral level, the most relevant indicator of trade liberalization would have been actual tariffs rate applied for each sectors, but this information was only available for import tariffs and only since 2000 (Becerra, 2006). The other indicator of trade liberalization is the share of trade covered by a trade agreement, from the quarter during which a trade agreement is signed. The database Direction of Trade Statistics from the IMF was used for the quarterly breakdown of trade by origin and destination. No distinction is made between an association agreement, as with Mercosur since 1996, or a free-trade agreement, as with the United-States in 2003, and as such, this variable is also a very imperfect measure.

Cross-country data. Detailed data on trade for Latin America countries or not readily available and the categories used, when available, are usually not fully comparable. For this reason, the data used covered trade volume of goods and services from national accounts data. More detailed trade information, in particular on manufacturing exports, was used when available. The REER and world demand are obtained from the INS and the WEO database. Information on free trade and association agreements are obtained from national sources.

Annex Table 1: Database Used

Database	Source	Description	Frequency
Balance of Payments	Banco Central de Chile	- Volume and price indexes for exports and imports. Broken down into different items.	Q
		- Export and import values in US$.	Q
National Accounts	Instituto Nacional de Estadisticas de Chile	- Volume and value for Trade of goods and services. Broken down into different items.	Q
		- Real GDP by expenditures	Q
		- Import tariffs.	Q
DTS (Direction of Trade Statistics)	IMF	Export and imports values in US$ by origin and destination.	Q
INS (Information Notice System)	IMF	Real effective exchange rates and nominal effective exchange rates for Latin American countries.	Q
WEO (World Economic Outlook)	IMF	Real GDP	Q
Haver Analytics	Haver Analytics	- Producer price indexes for Latin American countries.	Q
		- Output and employment.	Q
		- CPI.	
COMTRADE	United Nations	- Export and import values by destination/origin and by products (SITC classification).	A

Annex Table 2: Descriptive Statistics 1/

| | Average annual change 2/ | | | | | Stationary tests 3/ | | | | | |
| | Mean | Med. | Max. | Min. | Std. dev. | ADF test | | | KPSS | | |
						Level	First diff,	Order integ.	Level	First diff,	Order integ.
Export volume											
Total exports, of wich:											
Non copper exports	9.1	8.4	29.3	-4.1	7.3	-1.18	-4.75	I(1)	0.11	0.06	I(0)
Non mining exports	9.0	8.7	32.3	-7.1	7.9	-1.42	-4.98	I(1)	0.11	0.06	I(0)
Manufacturing exports	9.5	9.8	36.9	-9.9	8.8	-1.46	-4.99	I(1)	0.12	0.06	I(0)
Exports by sectors:											
Copper	8.0	8.3	33.2	-17.6	10.6	-1.62	-5.85	I(1)	0.24	0.08	I(1)
Non copper mining	9.9	9.6	75.7	-14.1	13.7	0.46	-4.28	I(1)	0.09	0.07	I(0)
Agriculture	7.4	8.8	51.1	-24.6	14.8	-0.59	-5.64	I(1)	0.14	0.05	I(1)
Food and beveradges	9.9	9.9	40.0	-10.8	11.0	-0.73	-5.38	I(1)	0.10	0.06	I(0)
Wood and forestry	9.8	8.2	79.9	-36.5	18.6	-0.52	-5.81	I(1)	0.13	0.07	I(1)
Paper	13.3	6.7	117.3	-22.4	24.7	-2.75	-4.52	I(0)	0.19	0.09	I(1)
Chemicals	14.6	13.2	76.9	-28.0	19.0	-0.15	-6.03	I(1)	0.10	0.07	I(0)
Industrial	10.7	9.7	106.1	-36.3	27.0	0.02	-6.11	I(1)	0.25	0.08	I(1)
Machineries	15.1	14.4	86.0	-30.9	26.3	-3.58	-4.78	I(0)	0.26	0.07	I(1)
Other industrial goods	6.6	2.5	103.1	-19.1	17.4	-3.24	-5.63	I(0)	0.23	0.06	I(1)
Import volume											
Total imports	9.8	11.0	29.3	-16.2	10.4	-0.36	-5.74	I(1)	0.14	0.10	I(1)
Non energy imports	10.6	12.0	30.7	-21.2	12.2	-0.47	-5.09	I(1)	0.13	0.09	I(1)
Imports by sector:											
Consumer goods	16.1	13.5	65.5	-28.6	19.4	-1.97	-4.87	I(1)	0.19	0.09	I(1)
Intermed. goods, excl. energy	8.8	7.9	31.5	-12.3	11.0	0.40	-5.50	I(1)	0.15	0.07	I(1)
Energy imports	7.1	6.2	41.1	-19.3	12.1	-1.28	-7.37	I(1)	0.22	0.06	I(1)
Capital goods	12.2	10.9	65.9	-37.4	22.5	-0.62	-4.79	I(1)	0.12	0.07	I(1)
External and domestic demand											
World demand (GDP)	2.8	2.6	4.8	0.2	1.2	1.09	-5.67	I(1)	0.08	0.06	I(0)
World demand (imports)	9.1	9.2	17.2	-2.8	4.0	-0.87	-2.86	I(1)	0.23	0.08	I(1)
Domestic demand, excl. inventorie	6.7	5.6	18.5	-9.5	5.7	-1.58	-7.44	I(1)	0.23	0.10	I(1)
Machinery investment	9.6	8.9	45.4	-31.3	16.1	-0.75	-4.20	I(1)	0.12	0.07	I(0)
Consumption	6.3	6.1	16.8	-4.3	4.4	-1.60	-11.94	I(1)	0.25	0.09	I(1)
Private consumption	6.9	6.8	19.4	-5.6	5.1	-2.16	-8.63	I(1)	0.26	0.10	I(1)
Competitivness											
CPI-based REER	1.3	1.9	14.1	-13.1	6.4	-1.65	-4.55	I(1)	0.23	0.12	I(2)
ULC-based REER	0.8	0.3	11.4	-8.2	4.5	-1.39	-2.15	I(2)	0.17	0.15	I(2)
PPI-based REER	3.3	3.6	14.8	-14.6	7.1	-2.26	-6.10	I(1)	0.18	0.13	I(2)
Foreign prices	1.3	1.1	6.4	-7.3	2.9	-0.22	-3.23	I(1)	0.13	0.14	I(2)
Domestic demand deflator	5.9	6.9	27.9	-19.6	10.6	-2.70	-3.91	I(0)	0.18	0.15	I(2)
Trade liberalization											
Share of trade covered by FTA	23.2	18.9	72.9	0.0	22.7	1.37	-4.50	I(1)	0.24	0.04	I(1)
Tariff rate	6.1	7.0	9.2	2.2	2.3	-0.81	-4.41	I(1)	0.20	0.11	I(1)

Source: Central Bank of Chile; author's calculations.

1/ All variables, except the share of trade covered by FTA, are converted in logarithm.

2/ Level for share of trade.

3/ I(0) denotes that the variable is stationary and I(1) that the variable is integrated of order 1. For the ADF test, the test statistic for rejecting the null hypthesis of non stationarity at the 5 percent level is -2.89. (-3.49 at the 1 percent level). For the KPSS test, the test statistic for rejecting the null hypthesis of stationarity at the 5 percent level is 0.46 (0.74 at the 1 percent level).

Annex table 3. Main Trade Partners of Chile and Trade Agreements

	Weights in INS REER 1/	Origin of imports		Destination of exports		Destination of exports by products in 2005							Industrial			Trade agreements ratified by Congress, if any 2/
		2000	2006	1990	2006	Copper	Non copper	Agri.	Food	Wood	Paper	Chem.	Basic iron prod.	Transp., metal., elect.	Other ind. prod.	
United States	23.5	19.0	15.6	17.2	15.6	15	17	40	25	52	24	27	17	13	37	Jan. 2004
Brazil	7.6	7.8	11.8	5.6	4.8	5	4	2	2	0	5	6	5	7	3	Oct. 1996 - MERCOSUR 3/
Germany	7.1	7.2	3.5	11.3	3.1	1	3	2	4	0	0	2	1	2	0	Feb. 2003 - EU
Japan	6.9	7.9	3.2	16.0	10.5	1	16	2	16	1	0	3	1	0	0	Sept. 2007
China	6.3	0.8	9.7	0.4	8.6	16	9	0	3	0	1	1	14	1	0	Oct. 2006
France	5.5	4.1	2.0	4.6	4.2	9	1	1	2	0	0	3	8	0	1	Feb. 2003
Argentina	5.3	7.0	12.6	1.3	1.3	1	2	0	1	2	11	2	2	15	8	Oct. 1996 - MERCOSUR 3/
Mexico	4.3	1.4	2.8	0.7	4.0	3	5	4	6	20	11	5	4	10	9	Aug. 1999
Italy	4.2	2.7	1.8	4.7	4.9	11	1	3	2	3	0	2	9	0	1	Feb. 2003 - EU
Canada	4.1	3.1	1.3	0.6	2.2	5	2	1	2	2	3	1	5	9	3	July 1997
Korea	3.9	1.7	0.0	3.0	5.9	7	5	1	2	1	0	6	6	0	0	Apr. 2004
Spain	3.8	2.2	2.0	3.1	2.4	2	3	4	3	3	1	3	2	1	1	Feb. 2003 - EU
United Kingdom	3.2	2.5	0.8	6.4	1.2	1	2	6	4	4	3	3	1	0	0	Feb. 2003 - EU
Netherlands	2.4	0.9	0.8	3.6	6.7	6	6	8	3	2	3	10	7	0	0	Feb. 2003 - EU
Belgium	2.1	0.9	0.5	2.8	1.3	0	1	0	1	2	0	4	0	0	0	Feb. 2003 - EU
Peru	2.0	0.7	4.0	0.9	1.6	0	3	1	2	2	11	4	1	11	10	Signed Aug. 2006, not ratifi
Taiwan	1.7	1.1	0.8	3.2	0.0	9	1	3	2	0	0	1	7	0	0	
Sweden	1.7	2.6	1.0	0.8	0.7	0	1	0	0	0	0	0	0	0	0	Dec. 2004 - EFTA
Australia	1.5	0.4	0.6	0.4	0.2	0	0	0	0	1	1	0	0	1	1	
Colombia	1.4	2.3	1.0	0.9	0.9	0	1	2	1	0	0	2	1	6	2	Signed Nov. 2006, not ratifi
Switzerland	1.4	1.1	0.4	0.1	0.2	0	0	0	0	0	0	0	0	0	0	Dec. 2004 - EFTA
Other	0.0	22.8	23.9	12.3	19.5	6	16	17	17	5	19	15	8	22	23	
Memorandum:																
European Union		26.1	14.6	38.3	26.8	32		25	20	14	7	25	29	4	4	
Latin America		24.4	35.2	12.4	16.3	9		10	12	24	45	19	13	50	31	
Asia		12.9	16.8	26.3	32.3	33		7	23	2	1	12	28	1	1	

Source: INS and DTS, IMF; COMTRADE, UN.

1/ INS data. Based on a 1999-2001 weights of 21 principal patrners or competitors.

2/ Date of ratification of the FTA, if any.

3/ Association agreement with MERCOSUR.

Annex Table 4: Income and Price Elasticities for Exports and Imports: a Few Comparative Results

		Export			Import		Is Marshall-	Sources:
	Variable	Income	Price	Variable	Income	Price	Lerner verified ?	
Chile	Manuf.	0.52*	n.a.	Intermediate	1.26*	0.47*	no	BCC model, 2003
				Consumer	1.0 (c)	n.a.		(1989/91 - 2003)
				Capital	1.0 (c)	n.a.		
	Non mining to US	0.81	2.24					Cabezas et al. , 2004
	Non mining to EU	1.65	0.25					(1990-2001)
	Fish	-1.52	-0.63*					Nowak-Lehmann
	Fruit	-3.01*	-2.08*					et al., 2004
	Bever.	-4.66	-1.54					
Latin America								
Bolivia	Total to adv. / to Latam	0.5 / 1.2	0.75	Total	2.20	0.25	yes	Loza, 2000
Brazil	Total	1.5	-0.30	Total	2.8	0.42	no	Paiva, 2003
	Basic	1.5	-0.55	Intermediate	3.3	0.56		
	Manuf.	1.3	-0.32	Capital	2.7	0.33		
	Semi-manuf	1.9	-0.16	Oil	1.8	0.40		
Colombia	Non trad. to US	5.91	0.87	Total	3.56	1.08	yes	Hernandez, 2005
Mexico	Total to US	2.8	0.32	Total	0.94	0.42	no	Garces Diaz, 2002
Advanced Economies								
G7	Canada	1.1*	-0.9*	Canada	1.4*	0.9*	yes	Hooper, Johnson,
	France	1.5*	-0.2	France	1.6*	0.4*	no	Marquez, 2000
	Germany	1.4*	-0.3	Germany	1.5*	0.1*	no	(1970-1999)
	Italy	1.6*	-0.9*	Italy	1.4*	0.4*	yes	
	Japan	1.1*	-1.0*	Japan	0.9*	0.3*	yes	
	UK	1.1*	-1.6*	UK	2.2*	0.6	yes	
	USA	0.8*	-1.5*	USA	1.8*	0.3	yes	
OECD	Canada	1 (c)	-0.74*	Canada	1.45*	1.18*	yes	Murata, Turner, Rae
(manufac	France	1 (c)	-0.17*	France	1.89*	0.45*	no	and Le Fouler, 2000;
trade)	Germany	1 (c)	-0.23*	Germany	2.00*	0.84*	yes	and Meacci and
	Italy	1 (c)	-0.98*	Italy	1.89*	0.45*	yes	Turner 2001,
	Japan	1.3*	-0.32*	Japan	1.45*	1.18*	yes	(1976/78-1997/1999)
	UK	1 (c)	-1.58*	UK	1.45*	0.45*	yes	
	USA	1 (c)	-0.56*	USA	2.17*	0.84*	yes	
Emerging economies								
	Oil exporters	1.27*	0.16	All emerging	1.54*	0.44*	no	IMF, 2006
	Non-oil commod.	1.87*	0.02				no	(1980-2006)
	Manuf. exporters	2.38*	-0.53*				no	

Annex Table 5: Sensitivity to the Lag Structure

Annex Table 5a: Sensitivity of the Non Mining Export Equation to the Lag Structure 1/

Lag structure	Model without trend					Model with trade liberalization 2/				
	k=2	k=3	k=4	k=5	k=6	k=2	k=3	k=4	k=5	k=6
Cointegration relation										
Eigenvalue test										
None	11.3	15.9	25.0*	27.7*	30.5*	14.2	21.0	27.3	31.5*	35.0*
At most 1	6.2	6.4	8.8	8.5	6.9	8.0	11.0	15.4	19.9	24.0*
At most 2	1.1	0.7	0.5	0.5	1.3	6.4	5.9	11.3	10.6	7.8
At most 3						1.4	1.0	1.9	1.2	1.6
Trace test										
None	18.6	23.0	34.4*	36.6*	38.7*	30.0	38.9	56.0*	63.2*	68.4*
At most 1	7.3	7.1	9.3	9.0	8.2	15.8	17.9	28.7	31.7*	33.4*
At most 2	1.1	0.7	0.5	0.5	1.3	7.8	6.9	13.2	11.8	9.4
At most 3						1.4	1.0	1.9	1.2	1.6
Information criteria										
Log likelihood	512.4	514.7	527.0	527.2	528.5	346.4	356.4	379.2	388.8	399.7
AIC	-14.7	-14.7	**-15.1**	-15.0	-15.0	-9.0	-9.0	**-9.4**	-9.3	-9.3
Schwarz	**-13.8**	-13.5	-13.5	-13.2	-12.9	**-7.5**	-6.9	-6.7	-6.0	-5.4

Source: author's calculations.

1/ * denotes that the assumption is rejected at the 5 percent level; for example, for k=4 in the model without trend, the hypothesis of no cointegration is rejected, but the hypothesis that there is at most one relation is accepted; thus there is one single cointegration relation.

2/ Trade liberalization is captured by the share o ftrade covered by trade agreements.

Annex Table 5b: Sensitivity of the Import Equation to the Lag Structure

Lag structure	Model without trend					Model with trade liberalization				
	k=2	k=3	k=4	k=5	k=6	k=2	k=3	k=4	k=5	k=6
Cointegration relation										
Eigenvalue test										
None	21.2	20.4	31.7*	37.6*	26.2	65.8*	71.4*	81.7*	80.6*	65.6*
At most 1	5.0	7.0	9.0	6.1	7.9	14.6	22.0	27.8	25.6	24.8
At most 2	0.0	1.5	0.8	1.9	0.2	6.2	7.9	12.1	8.8	5.0
At most 3						0.1	3.7	5.2*	3.7	0.0
Trace test										
None	16.2	13.4	22.6*	31.5*	18.3	51.3*	49.4*	53.9*	55.0*	40.8*
At most 1	4.9	5.5	8.2	4.2	7.7	8.4	14.1	15.7	16.7	19.8
At most 2	0.0	1.5	0.8	1.9	0.2	6.2	4.2	6.9	5.2	5.0
At most 3						0.1	3.7	5.2*	3.7	0.0
Information criteria										
Log likelihood	400.1	424.2	429.6	434.1	438.9	306.8	331.7	349.6	368.7	384.9
AIC	-11.4	-11.9	-12.0	-12.1	**-12.1**	-7.5	-7.9	-8.1	-8.3	**-8.4**
Schwarz	-10.6	**-10.7**	-10.5	-10.2	-10.0	**-5.5**	-5.3	-4.9	-4.6	-4.2

Source: author's calculations.

Annex Table 6: What Explains the Differences of Elasticity by Export Sector ?

	Elasticity		Share of Employ.	Mean wage / avg.	Share real GDP	Ap- parent labor product.	Labor product. growth	Share GDP at fact. cost	Ratio of v.a. to exports	Share exports	Avg. vol. growth	Avg. price growth	World market share
	Demand	REER	(2006)	(2005)	(2006)	(2006)	(1996-06)	(2006)	(2006)	(96-06)	(96-06)	(96-06)	(2003)
Export sectors													
Agriculture, fishe	1.99*	0.28	12.7	...	5.0	40	3.4	4.6	49	8.4	5.5	-0.4	1.25
Mining	3.2*/3.1*	0.7*/1.2*	1.4	201	7.8	519	4.0	17.9	116	52.1	6.5	14.0	5.50
Industry			13.3	86	16.7	124	3.8	16.7	74	39.6	9.0	1.3	...
Food	3.49*	0.72*			5.0	...	...	4.8	89	14.0	9.2	0.9	0.75
Forest.	3.24*	-0.47*			1.1	...	...	1.1	150	5.1	11.2	0.2	1.12
Paper	1.84*	-0.06			1.6	...	...	1.3	112	5.4	6.3	2.1	1.00
Chem.	4.32*	-0.11			4.6	...	...	4.8	53	6.5	16.0	4.0	0.15
Metall.	1.59*	-2.47*			2.1	...	...	1.8	32	1.7	16.1	5.7	1.00
Mach.	3.74*	2.36*			1.5	...	...	2.1	36	2.9	6.0	2.0	0.02
Misc.	1.16*	0.69*				...	...		...	1.1	1.5	0.4	0.03
Textiles					0.8	...	...	0.8					
Memorandum:													
Non export sectors			72.6	105	79.7	62	2.7	71.3					
Total economy			100.0	100	100.0	100	1.9	100	35	100.0	7.3	7.6	1.10

Sources: Banco Central de Chile; INE; COMTRADE.

Annex Table 7: principal export products in a selection of Latin America countries

Annex Table 7a: Principle Exports and their Share in Total Exports for a Selection of Latin American Economies, 2000-05

	Argentina		Bolivia		Brazil		Chile		Colombia	
1	Petroleum	14	Natural gas	24	Road vehicles	8	Non-ferrous meta	29	Petroleum	28
2	Animal feed	10	Metal ores	14	Iron and steel	7	Metal ores	19	Coal	10
3	Cereals	9	Animal feed	11	Metal ores	6	Vegetables/fruits	8	Coffee,tea,etc.	8
4	Animal/veg. oil	8	Petroleum	8	Meat	6	Fish	8	Crude anim. ar	5
5	Road vehicles	6	Animal/veg. oil	6	Oil seeds	5	Pulp and paper	4	Apparel	5
Total		47		63		32		67		55

	Mexico		Paraguay		Peru		Uruguay		Venezuela	
1	Road vehicles	16	Oil seeds	37	Gold	19	Meat	20	Petroleum	84
2	Electrical equipr	14	Meat	10	Non-ferrous meta	18	Cereals	10	Iron and steel	4
3	Petroleum	11	Animal feed	9	Metal ores	17	Leather	10	Non-ferrous m	3
4	Office/dat proc r	7	Animal/veg oil	7	Animal feed	9	Dairy products	6	Organic chem.	1
5	Apparel	4	Textile fibres	6	Petroleum	7	Textile fibres	6	Road vehicles	1
Total		53		69		70		52		93

Source: COMTRADE

Annex Table 7b. Breakdown of Exports by Products in a Selection of Latin American Economies, 2000-05 1/

	Argent.	Bolivia	Brazil	Chile	Colomb.	Mexico	Parag.	Peru	Urug.	Venez.
Food, animals, beverages	41	24	22	23	18	5	36	21	48	1
Raw materials, excl. fuel	9	19	16	28	6	1	49	19	13	1
Fuel	17	32	5	2	38	11	0	7	3	85
Chemicals products	8	1	6	6	10	4	3	2	6	3
Manufactured goods	12	11	22	7	21	21	11	13	24	6
Machinery/transp. equipment	10	4	26	2	5	57	1	1	4	2
Commodities	2	4	1	4	2	0	1	19	1	0
Non-ferrous metals	1	4	3	29	0	1	0	18	0	3
Total	100	100	100	100	100	100	100	100	100	100
Memorandum										
Index of diversification 2/	0.2	0.3	0.2	0.4	0.3	0.3	0.4	0.3	0.3	0.8
Goods exports (% GDP)	19	22	13	31	17	27	39	17	18	32
Goods imports (% GDP)	16	22	12	31	12	24	39	16	18	5
Manuf. value added (% GDP)	21	15	11	19	16	19	14	16	17	18
GDP per capita (2000-06, US$)	7,322	1,024	3,499	5,238	2,046	5,959	1,379	2,135	5,814	4,598
Population (millions)	38	9	180	16	44	104	6	27	3	26

Source: COMTRADE; WEO.

1/ Derived from the SITC classification system with two digits; exclude in particular non-ferrous metals from manuf. goods.
2/ Hirschman index calculated using the SITC classification with two digits; the higher the index, the less diversified the economy.

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