# Distortions to Agricultural Incentives in Chile

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This paper presents estimates of indicators of direct and indirect intervention in agriculture by the Chilean government since 1960, drawing on the methodology in Anderson et al. (2008). To put those indicators in context, we review Chilean policy reforms that began during the 1970s and the effects of these reforms on the agriculture sector. The review emphasizes sectoral and macroeconomic policies, and elements of the institutional framework that influenced both the incentive framework facing the agriculture sector, and factor markets. The trade- and price-policy-related changes in incentives for different products are reflected in the estimates of rates of government assistance. The impacts of the reforms and other changes on production, rural poverty and rural-urban immigration are also relevant to the policy discussion. Even though government interventions in agriculture declined, the growth of the sector was sustained, and that reform-induced growth made a significant contribution to poverty reduction.

The most dynamic sub-sectors have the lowest rates of assistance. This is striking, given that the output mix of agriculture — specifically, its tendency toward greater export orientation — had an important effect in increasing employment and household income, and in lowering rural-urban migration (Valdés and Foster 2005). The government's present overall policy strategy continues to be conducive to the growth of export-oriented sectors and to the modernization of import-competing sectors. Poverty alleviation and reduced rates of rural-urban migration are strongly linked to export agriculture, rather than to agriculture as a whole.

The first two sections review the Chilean experience with broad policy reforms and their effects on agriculture, with a focus on commercial agriculture. Of particular interest are those policies (sectoral and macroeconomic) and elements of the institutional framework that influence both the incentive framework facing the agriculture sector, and factor markets. Price policies aimed specifically at the agricultural sector were less influential than economy-wide policies such as macroeconomic policies, deregulation and privatization. The expansion of the export agricultural sector has been a serendipitous result of economic reforms, rather

than an explicit pro-export policy objective.[1] The section that follows briefly describes the method used to calculate distortion indicators. The main contribution of this study is the construction of a series of policy indicators according to the project's methodology. These indicators are presented and discussed, after which we speculate in the final section on prospects for further reform.

## History of agricultural policies in Chile

Chile began radical structural and sectoral policy changes oriented toward open trade, privatization and economic deregulation approximately two years following the end of the Allende regime in 1973.[2] But, beginning the story of agricultural policies at an early date is indispensable: the major reforms affecting agriculture during the 1990s and early 2000s were extensions of an earlier profound shift in the government's approach to the economy generally and towards agriculture specifically. To understand the tendency and motivation of recent agricultural policy changes, one should appreciate the radical reforms toward open markets that began thirty years ago, following an earlier period of interventionism and a drastic restructuring of the agriculture sector during the late 1960s and early 1970s.

### *Controlled markets: 1950 to 1974*

Between the late 1950s and the mid-1960s (President Alessandri), the three main goals of economic policy important to agriculture were the control of inflation, the reduction of the budget deficit, and the improvement of net foreign exchange earnings. To stabilize prices the government had a policy of fixing nominal farm prices for essential products (particularly the

[1] The special case of very small farmers is not covered in this study and merits an analysis in itself, which should focus, not on price incentives *per se* — which apply to all producers — but on government subsidies targeted to small farmers through a special government agency (INDAP).

[2] The history of agricultural policies for the period 1960-1984 is well documented in Hurtado, Valdés and Muchnik (1990), a synthesis of which appears in Valdés, Hurtado and Muchnik (1991). For a history of land policies during the period 1973-1980, see Jarvis (1985). See Odepa (2001) for a presentation of the current government strategy towards agriculture. A comprehensive historical overview of Chilean trade policy changes since the 19th century up to year 2000 is available in Lederman (2005). This major study on the political economy of trade policy in Chile examines the influence of changing economic conditions, the role of interest groups, domestic institutions and changes in economic ideology in shaping trade policy changes. Particularly relevant for our study, Lederman's book presents a detailed description of the trade and exchange rate regime between 1974 and 2000, when Chile went through a period of intense liberalization.

wage goods: wheat, bread, beef, milk, rice, sugar and oilseeds), nominal exchange rates, and marketing margins at the retail level. There were export prohibitions of certain products (wheat, flour, lamb, and others), but export promotion of fruits. After a brief attempt at trade liberalization, at the end of 1961, tariffs were increased and import quotas and licenses revived. For agriculture there were differentiated tariffs and prior deposits for imports on products and agrochemicals and machinery. There were, in addition, development programs, particularly for livestock, with subsidies for milk producers, state aid in the construction of slaughter houses, and other investment incentives. The rationing of beef (so-called meatless days) and the prohibition of the slaughter of young and pregnant cattle were mandated. Subsidized credit rates and subsidies on railway transportation for wheat, cattle and forages were established. In 1960 a marketing board for purchases and sales was established (ECA), beginning with wheat and byproducts, later with the authority to extend operations to all products in an attempt to guarantee a "normal supply" of products. The board also gained a monopoly on imports.

In 1965, during the Frei Montalva administration, a more-explicit agricultural policy was formulated. It was oriented toward self-sufficiency and the coordination of relative prices with the aim of increasing overall production. The interventionist price regime intensified in the direction of influencing production and consumption patterns. There were restrictive tariffs, fixed prices for consumers and minimum prices for producers, fixed marketing margins for the major staple crops, export quotas, licenses and prohibitions and quotas on wheat, flour, milk, and beef. Prohibitions on slaughter and the consumption of meat on certain days were intensified. Tax rebates (up to 30 percent of the fob price) on certain exports were introduced (fruits and lamb). Previous interventions in input markets continued, and, to avoid overvaluation of the currency, a crawling peg system for exchange rates was adopted.

In seeking to encourage production, the government recognized the importance of relative prices: the prices of farm products were allowed to rise more quickly than those of non-agricultural goods. To diminish marketing margins, the government intervened in marketing channels, increasing storage and processing facilities, improving transport systems, holding food security stocks of staples, and operating marketing boards to support the prices of wage goods. Of course, a tension emerged between the objective of increased production through higher prices and higher rural relative to urban wages on the one hand, and on the other the objective of wage restraint in the non-agricultural sector.

### *Land reform and the final days of control*

The land reform program of the Alessandri years was small in scale, based on voluntary sales at market prices, and oriented towards the promotion of small-scale farms. By contrast, under the Frei administration, a massive land reform was introduced in 1967 based on expropriations, with partial compensation determined by the state, and oriented toward the establishment of large, cooperative farms (*los asentamientos*). There was no intention of subdivision and the creation of small private farms. A private producer with greater than 80 hectares of irrigated land (or its equivalent) was subject to expropriation.

During the Allende years (1971-1973), the expropriation-based land reform program was strengthened, reaching 40 to 50 percent of farmland resources (as measured by productive equivalents), and the farm production model was based on semi-collectivized, large operations.[3] The interventionist economic policy intensified, inflation accelerated and, given the logic of the prevailing economic model, the government responded with even more severe price controls. Intense inflation and price controls led to food shortages and black markets. The government reacted with an attempt to monopolize the markets for fertilizer, wheat, maize, milk, sugar and other products. In the area of foreign trade, the government accentuated the protectionism of the previous administration, fixing the nominal exchange rate, strengthening the state's import monopoly, and imposing stricter export controls.

### *The move toward markets*

Confronted with hyperinflation, large deficits in internal and external accounts, and a large part of the economy generally (including agriculture) in state hands, the military government in late 1973 began to radically change economic and agricultural policies to allow more market-based resource allocations. The role of the government in the economy was reduced, trade was liberalized, and private property rights were strengthened. During the first phase of reforms, between 1973 and 1983, general economic reforms were put into effect quickly, while sector-specific reforms were deferred. Macroeconomic stabilization and the maintenance of the credibility of reforms were key considerations.

[3] The approach to farm production under the Chilean agrarian reform began with a Yugoslav model and moved to the increasingly centralized model seen in the Soviet Union. For a discussion of the details of Chile's agrarian reform, see Jarvis (1985) and the citations therein.

Chile was the earliest in the developing country grouping to adopt market-oriented, open-economy reforms. Its macroeconomic structural reforms began in earnest in 1975-76 after the economic crisis left by the Allende experiment. Although the bulk of trade reform was implemented between 1976 and 1978, Chile experienced subsequent phases of policy innovation too. Until 1982 wages were fully linked to the consumer price index, for both the private and public sectors. After 1983 there were a number of adjustments aimed at stabilizing farmer prices for wheat, sugar and oil seeds. In 1991, the country expanded its credit and extension assistance to small farmers (Hurtado, Valdés and Muchnik 1990, de la Cuadra and Hachette 1991).

In agriculture, reforms affected land markets and they reduced government involvement in services. Input and product markets were privatized. Especially important, the new land policy provided unrestricted access to land ownership with private property rights protected. Individual land titles were distributed to beneficiaries of the previous land reform program. Relative to the previous decade, government expenditures on agriculture fell dramatically: in real terms, during the period 1980-1983, the government spent only one-third of the amount spent on the sector during the period 1965-1974 (Valdés, Hurtado and Muchnik 1991, pp. 125-130). In 1975, the government entered into a new experiment in trade liberalization, and marketing board and price control agencies (ECA and DIRINCO) were closed. Except for wheat, milk and oilseeds, most of the previous price controls were lifted. Legal ceilings on interest rates were raised and then removed, and preferential rates for agriculture were abolished.

As part of the early introduction of a radical trade liberalization program, almost all non-tariff barriers were eliminated, and tariffs on most imports were reduced rapidly. A uniform tariff equivalent was introduced, beginning at 90 percent in 1975, falling to 20 percent in 1977 and to 10 percent in 1979. Export restrictions were eliminated and the crawling peg system for exchange rates, begun in the Frei Montalva administration (but ended by Allende), was again put in place until 1979 when a fixed exchange rate system was reintroduced.

There were several delays in the implementation of reforms, which adversely affected the agricultural sector. There was a slow elimination of price controls for some products, and reform of land and water rights took longer than expected. Reforms of labor markets (the removal of wage indexation, and the introduction of flexibility in the stevedore market) were also postponed. Airlines and telecommunications were privatized and deregulated, which generated significant improvements in the quality of services and reductions in costs. This

was particularly important for the agricultural export sector, especially for producers and exporters of perishables.

The necessary conditions to stimulate private investments were evidently inadequate with respect to productivity growth. Between 1978 and 1982 Chilean farmers were at a disadvantage with the then-prevailing exchange rate appreciation and reduced world commodity prices. During this period, the question of special treatment of the agricultural sector reemerged: farm lobbies representing import-competing activities sought selective protection. As a general observation, there appears to be a strong correlation between a stronger Chilean peso and political pressures on the part of farm lobbies for greater protection.

***The second phase of reform***

A second phase of reforms began in 1984, following a deep recession. The government reversed the currency appreciation with nominal devaluations and restrictions on short-term capital inflows. In addition, a price stabilization mechanism was established for importables (wheat, sugar and oilseeds) based on variable levies and commonly referred to as price bands. A scheme of minimum customs valuations for milk and derivatives was introduced. The government's policies succeeded in raising the real exchange rate between 1984 and 1991, when a new episode of currency appreciation began, again creating political tension in the farm sector. For producers of import-competing products, the decline in profitability became even more pronounced when Chile joined MERCOSUR as an associate member obligated to grant trade preferences to Argentina, Brazil, Paraguay and Uruguay —countries competitive in wheat, maize, oilseeds and beef.

***Policies in the 2000s***

Specific border price interventions remain in place as price band systems for wheat and sugar. These price bands are due to be phased out around 2010 as part of the Free Trade Agreement (FTA) with the United States. Occasionally safeguards are applied on a very few products, the most recent case being milk products. Given the low level of tariffs (6 percent MFN across the board), the most influential policy changes in recent years have been the

introduction of several FTAs. As discussed below, the proliferation of FTAs reduced the effective average tariff across all goods to about 2 percent in 2005.

Chile has been an associate member of MERCOSUR since 1996, which is the most important trade agreement for import-competing agriculture (although not for exports). MERCOSUR was followed by an FTA with Canada in 1997, Mexico in 1999, the European Union in 2003, the South Korea and the United States in 2004, New Zealand and Singapore in 2005, China in 2006, and there are current negotiations with Japan and Peru. In addition to FTAs there are other agreements granting some preferences to Bolivia, Colombia and Central America.[4]

There is little scope for policy intervention today. There is virtually no trade policy left in Chile beyond safeguards and FTA and WTO negotiations. Current levels of protection are low, with the exception of sugar beets and to a lesser extent wheat. An important element of agricultural policy today is the implementation and monitoring of FTAs. This includes the regulatory framework of sanitary and phytosanitary measures, environmental issues, technology generation, and the special case of small farmers (credit extension and productivity enhancement). The occasional safeguard remains a possible policy instrument within the WTO framework. With FTA disciplines and low unilateral border protection, the exchange rate is an issue though: it has strongly re-emerged in public debate over 2006-07 (as it did in the early 1990s) due to the appreciation of the real exchange rate.

**Farm production and structural changes over the last half century**

The data on Chilean agriculture distinguishes three sub periods following the years of heavy government intervention. Following the Allende government, the Chilean agricultural sector and exports grew at a strikingly high rate (Table 1). This resulted from the end of an exceptionally unstable and interventionist economic and political environment, unparalleled outside of Cuba and the Sandinista years in Nicaragua. Had 1974 been the beginning of the reforms, the growth rates (overall and in exports) would have been much higher. The

[4] For a thorough discussion of Latin America's recent experience with FTAs, including Chile, see Kjöllerström (2006).

liberalized market regime began in 1975. Between 1975 and 1983, average overall growth rates for agriculture returned to the average level of the 1960s. Export growth rates, however, increased considerably. After 1983, overall sectoral growth increased faster than the general economy, leading to an increasing contribution by agriculture to total GDP.

The main impact of liberalization on agriculture was an alteration of the composition of production and trade. As expected, the subsectors of exportables — fruits, vegetables and forestry — increased in importance, while livestock and field crops (primarily wheat) declined (de la Cuadra and Hachette 1991, p. 264). Following reform there was an increase in export growth rates across the board, although there has been a slowing of growth recently (Table 2). Yearly growth rates averaged 10 percent or greater for two decades. Wine production and export growth rates continue to increase, while the expansion of fruits has slowed, due primarily to a decrease in world prices for the majority of fruit exports. It is likely that fruit production and exports would expand at a faster rate if world prices recover to their former levels.

***Factor use and productivity***

During the Frei-Montava and Allende years there were large injections of government funds into the agricultural sector, including a large public investment program and subsidies on credit and input use (Hurtado, Valdés and Muchnik 1990). This led to an initial gain in production value and labor productivity. However, the sector subsequently began to deteriorate, with production falling in 1973 to the levels of 1965. Following 1973, agricultural sector's value added per worker showed an immediate recovery. Although the recovery of the sector was remarkable considering the initial conditions (e.g., 48 percent of the agricultural land in productive-capacity equivalents had been expropriated), the immediate response of agricultural growth to market-oriented reforms was characterized as "too low" (Barahona and Quiroz 1990) given the increases in relative prices to producers that followed. [5] In 1985, there was a radical increase in the growth rate of production and labor productivity. This followed declines in production and labor productivity in 1983 and 1984 (associated with exchange rate increases discussed below). This growth was correlated with an increased use of fertilizers per hectare, an expansion of irrigated land area, increased

[5] For more on the question of the aggregate agricultural supply response to incentives in Chile, see the comments by Jarvis (1990) on the piece by Barahona and Quiroz (1990), and the follow-up discussion by Quiroz, Barahona and Valdés (1990).

machinery, and an introduction of new varieties and the adoption of non-traditional crops (Foster and Valdés 2006).

Increases in land productivity also were notable. Total land use in agriculture and forestry have declined by nearly 10 percent since 1965. Cropland not only declined in absolute terms but also in percentage terms. Land in natural prairies and forests increased as a percentage of all land use, but it declined in absolute terms. Despite a decline in cropland hectares, Chile attained high rates of production growth following the mid-1980s, attributable to increases in non-land input use, especially fertilizers. Moreover, as Arnade (1998) and Gardner (1995) suggest, Chile also experienced a post-reform gain in overall productivity, linked to improved varieties, changes in the crop mix toward higher-valued products, better irrigation methods and other innovations. A simple regression analysis of aggregate production value on input use for the period 1961-1998 indicates that there may have been large gains in overall productivity following the initiation of reforms in 1974-1975.[6] There is less evidence for a shift in the annual rate of overall productivity gain following 1974, and the data suggest that the notable gains in production following the initial phase are explained by increased input use alone.

### *Changes in the structure of agriculture*

Based on the 1997 agricultural census (the most recent census), out of an estimated 330,000 farms in Chile, 103,000 are classified as subsistence and 175,000 as small farms (less than 12 hectares). These two groups of small farmers contributed about 25 to 30 percent of agricultural GDP and controlled about 25 percent of farmland. Medium-size farms numbered about 17,000 and large farms 9,500 (Muchnik 2003, Rojas 2006).[7]

The data show a movement between 1976 and 1997 toward smaller farms in some regions and larger farms in others. The change in farm size is associated with crop mixes in the various regions. The central region, which has had a decline in farm numbers, is the heart of the fruit and wine export sector. These regions have the most sophisticated agricultural economy, and have had a decrease in farm numbers and an increase in average farm size. The

[6] The point estimate for a positive productivity shift post 1974 is 0.157 (16%) with a standard error of 0.072 (p-value of 0.036). This is a shift upward in the productivity trend measured by a simple year index over the entire period of estimation, estimated to be 2.3% per year.

[7] For government programs, Chile officially defines small farmers as those with less than twelve irrigation-equivalent hectares and with a net worth of less than UF 3,500, equivalent to approximately US$110,000. Observed hectares of “small farmers” might therefore vary by climate and topography.

southern regions, where wheat and other traditional crops and livestock predominate, has seen an increase in the number of farms and a decrease in farm size. Although the farm products of the southern regions — grains, milk and beef — compete with imports, there have been notable gains in productivity, spurred in part by the market-oriented environment introduced by agricultural reforms. Productivity gains have been especially notable in the case of wheat and milk. The data presented here are consistent with the hypothesis that productivity gains for traditional products have been available to small and large farmers alike. However, without a measure of changes in the shares of total regional production across farm sizes, there is only weak empirical support to date for the hypothesis.

More-recent evidence suggests that the dairy sector has experienced rapid changes in terms of production levels and in terms of the number and size of producers. Anriquez (2003) reports that the number of Chilean dairy producers has been declining at an annual rate of about 3 percent. Just 2500 milk producers (18 percent of the total) account for 86 percent of milk received by processing plants, while 800 producers (6 percent) account for 60 percent of processed milk (Oficina de Estudios y Políticas Agrarias, ODEPA, 2001).

In the Chilean pork and poultry sector, the number of producers has declined as the scale of production has increased due to the adoption of new technologies and marketing methods. Since 1978, the number of farms in the pork sector declined by 59 percent, while the number of pigs processed per grower increased by over 1100 percent (from 472 to 6046 pigs per grower per year – although there are growers processing more than 100,000 pigs annually). Over the same period, the number of poultry growing units declined 79 percent, while the number of broilers produced per unit increased by over 260 percent (Foster and Vargas 2001).

There is little detailed information available on buyer concentration in the Chilean agriculture sector. There is, however, some evidence of a high degree of buyer concentration and of increasing vertical coordination through contracts and integration in agro-processing. This is reinforced by the increasing concentration of retail food sales in supermarket chains, which puts pressure on the competitiveness of very small producers in terms of sales volume and quality control. Foster and Vargas (2001) report that of the 16 most important agricultural products, only the market for potatoes corresponds to the stylized model of many market participants whose activities are determined by spot prices generated in open markets. All other product markets have a high degree of buyer concentration and/or are coordinated through marketing or production contracts or are integrated completely. The evidence suggests that the degree of industrialization of Chilean agriculture is already high and that

this process of industrialization has been ongoing and continues to intensify. Interestingly, the export-oriented sectors of fresh fruit and wine have less processor concentration than have import-competing sectors.

### *Effects of agricultural reforms on rural poverty and immigration*

The effects of the policy reforms on agriculture derive from five components of reform: macroeconomic stabilization, trade liberalization, deregulation, privatization, and a more explicit commitment to the targeting of social policies. Estimating the effects is complicated for several reasons. There was heterogeneity in the implementation of these reform components. Some elements of reforms were implemented rapidly, most notably macroeconomic stabilization and trade liberalization, while other reforms required time due to the need to implement new institutions and information systems.

While Chile has a large amount of longitudinal and cross-sectional household data (CASEN and FICHA CAS), due to the early initiation of reforms, there is nevertheless limited micro data prior to 1987 needed for comparative analysis of the impacts of reform on poverty, for example.[8] Even with the best data it would be difficult to isolate from real observations the partial effect of any one of the components of the package of reforms from the net effect resulting from the general shift toward market-oriented policies.

The national poverty rate in Chile showed a marked reduction between 1987 and 2000. This was because the full impact of policy reforms became obvious with respect to productivity and the composition of agricultural output and trade. The national headcount poverty measure fell from approximately 45 percent in 1987 to 20 percent in 2000, and the rural headcount fell from over 50 percent to 23 percent over the same period. (By contrast, the Gini coefficient did not change significantly, falling only slightly from 0.56 in 1987 to 0.55 in 2000.)

There are three avenues through which agricultural growth can affect poverty: the labor income of unskilled workers, who are employed relatively intensively in the agricultural sector; poor farmers' income; and real food prices (mainly nontradables). López and Anríquez (2004) present an econometric analysis of the influence of Chilean agriculture

[8] Systematic efforts to compile a nationwide, large, biannual representative household survey for Chile began in 1985 with the first CASEN. Reliable data, however, were not available until the 1987 survey. Comparisons of poverty measures using pre- and post-reform data are difficult, given the dubious nationwide representation of the pre-1985 data.

on poverty alleviation via the impact of agricultural growth on these three factors. Their most important finding is that there is an asymmetric response of the two types of labor — unskilled workers and skilled workers — to expansion of the two sectors (agriculture and non-agriculture). The demand for unskilled workers is more sensitive to an expansion of agriculture than that of skilled workers (elasticities of 0.58 and 0.44, respectively). In addition, and critically for the results of the study, compared to an expansion in non-agricultural output, an expansion of agriculture leads to a relatively higher increase in unskilled labor demand. In contrast, skilled labor exhibits a greater sensitivity to non-agricultural output growth. Moreover, these results can be extended to the case of increasing only the share of agricultural output (keeping total output constant): an increase in agriculture's GDP by 1 percent (with a corresponding reduction of 0.17 percent in non-agricultural output – a zero-growth scenario) leads to a 0.51 percent expansion in the employment of unskilled workers. In Chile, agricultural-based growth is more favorable for unskilled (usually poor) workers than is total economic growth with a stagnant agricultural sector.

In the study by Lopez and Anríquez (2004), the reduction of nontradable food prices affects poverty in two ways: it increases household real incomes, and the food basket that defines poverty becomes cheaper.[9] Their analysis simulates the impact on poverty, via reduced food prices, of an expansion of agriculture by 4.5 percent (an historically reasonable rate, and approximately the rate experienced during the last two years). They find a reduction in poverty of only 0.73 percent.[10] Thus the food price effects of agricultural growth are marginal for both the poor and the vulnerable.

The third channel that López and Anríquez (2004) examine is the relation between agricultural growth and poor farmers' income. Their results suggest that this relation is negligible. Furthermore, the estimates suggest that as aggregate agricultural output increases, so does the share of off-farm income in poor farmers' total incomes. The results are consistent with the increasing importance of non-farm income in rural Chile (Berdegue et al. 2001), and the low rates of subsistence farming. The implication is that increases in agricultural growth would have negligible effects on poverty via poor farmer income.

[9] The nontradable share of the total food budget (0.20/0.27 = 0.74) might appear too high in the case of Chile, but this share includes marketing margins, determined in large part by nontradable services.

[10] López and Anríquez (2003) estimated the long-run elasticity of non-tradable food prices with respect to agricultural output to be approximately –0.6 . Thus a 4.5% expansion in output would result in a decline of 2.7% in the price of non-tradable food, which in turn leads to a 0.5% decline in the food budget. One would not expect that such a small decline would lead to an outward shift in the supply of unskilled labor that might offset the effect of labor demand increase on wages.

The estimates indicate that an expansion of 4.5 percent in agriculture GDP would lead to poverty rates falling 7.4 percent.[11] This result is based on the uncompensated simulations — which are most relevant because they allow for overall growth in the economy. Labor market effects explain more than 90 percent of the total poverty reduction, while food price effects explain the remaining 10 percent. Agriculture's share in the composition of national output is also important. What drives these results is that in Chile the agricultural sector as a whole tends to demand more unskilled labor than the rest of the economy, and thus the strongest poverty effect works through the labor market.

## Past evidence of direct and indirect assistance to agriculture

There are two major previous studies of policy intervention in Chilean agriculture. The first, covering 1960 to 1985, is part of the larger study by Krueger, Schiff and Valdés (KSV, 1988), summarized in Valdés, Hurtado and Muchnick (1991).[12] The second, covering 1985 to 1993, is the World Bank's 1996 surveillance of agricultural price and trade policies for eight countries in Latin America, including Chile (Valdés 1996).[13]

### *The KSV study*

The KSV study differentiated between the direct effects due to sectoral policies (price and border protection, and subsidies) and the indirect effects due to economy-wide policies. With respect to sectoral policies, prior to 1974 Chile favored two export-oriented crops (apples and grapes) and most import-competing crops (beef, maize, milk sugar beets and wheat). Immediately following 1974, the nominal protection for exportables fell to very low rates and, since the initiation of the second phase of reforms in the early 1980s, these nominal protection rates (NPRs) have been effectively zero. For import-competing crops the story is

[11] From a headcount of 20.6 percent in 2000 to an estimated 19.2 percent due to wage and employment effect, plus an additional decline in the poverty rate of 0.15 due to the output price effect of agricultural growth.
[12] We wish to acknowledge there was a significant contribution by Jorge Quiroz during the construction and analysis of the data set in the Hurtado, Valdés and Muchnik study (1991).
[13] Also available is a Handbook for Chile (Valdés and Schaeffer, in collaboration with Errazuriz and Francisco, 1995) covering the details of the calculations of the various protection indicators and including the data base for Chile.

notably different. The NPRs for milk and wheat were relatively high in the decade of the 1960s. The measurements of NPRs during the Allende years are not meaningful, given the regime of price controls, hyperinflation, shortages and rampant black markets. During the 1984-89 period, NPRs were relatively high due to the government's response to the strain on the traditional farming sector, which arose from low international prices and a strong appreciation of the currency between 1979 and 1982. The government response included the initiation of price bands for wheat, sugar and oilseeds, [14] and minimum milk import prices. Although there was depreciation of the exchange rate in the late 1980s, protection remained. During the 1990s, the currency again appreciated, and the already-instituted price bands cushioned traditional producers.[15]

***Other studies***

Extending the analysis in Valdés (1996), Valdés and Foster (2007) analyze the decomposition of changes in real domestic prices for selected Chilean agricultural products. The find, for the initial phase of reforms (1975-1983), that there were, on average, significant decreases in the real border prices of most products except fruits. Real domestic prices increased for fruits and wheat, and decreased for milk and beef. For example, the 0.2 percent average decline in the real price of milk was the result of a 2.4 percent decrease in the real border price, a 46 percent increase in the real exchange rate, and a 44 percent decrease in price supports. This example demonstrates that producers benefited from an increase in the real exchange rate (RER) on average. There was, however, notable volatility and a decline in the RER in 1979-1981, when the nominal rate was fixed at 39 pesos per dollar as part of the government's stabilization program.

In December 1977 a uniform 10 percent tariff was established as a goal to be reached by June 1979 for all importables (de la Cuadra and Hachette 1991). On average, except for wheat, producers faced falling tariffs soon after the tariff goal began to be implemented. A general conclusion is that producers, facing lower real border prices and lower tariffs,

[14] Price bands establish price floors and ceilings on import prices based on a moving average of international references prices.

[15] One source of confusion in reading the NPR calculation for the period 1984-1989 is the restrictions on imports of live cattle, primarily from Argentina, following Chile's being declared free of foot-and-mouth disease (FMD) in the early 1980s. High estimates of NPRs for beef can be attributed to these FMD restrictions on imports from countries with the disease. Assuming that the FMD restrictions are not a trade distortion in the WTO sense, the NPRs for beef would be considerably lower, at the level of the uniform MFN tariff.

nevertheless on average benefited until 1979 from the support provided by a favorable movement in the exchange rate.

During the second phase of the reform, 1984-1989, real domestic prices declined for all products considered in KSV, except for beef and apples. The declines in real domestic prices for wheat, maize and fruits were in spite of a steady increase in the RER, and were due to a decline in border prices. The large increase in domestic beef prices was principally due to the FMD prohibitions on imports of live cattle and meat on the bone from traditional suppliers, such as Argentina and Uruguay during the 1984-1989 period. After 1990 there was a cumulative decline in all real domestic farm prices except for grapes, due to an appreciation of the Chilean currency and, for four of the selected products, due to a decrease in real border prices.

To the extent that the reform-induced changes in the real domestic prices of these selected products approximated the changes in the returns to farming, one can say that the main forces behind Chilean agriculture's price incentives were beyond the control of sectoral policy.[16] The main factors were exchange rates and international prices.

***Tariff rates***

The level of applied tariffs in 2000 was low by world standards for all products, including agriculture (Figure 1(a)). Non-agriculture tariffs were below 8 percent. This was primarily due to a low statutory MFN tariff. By 2006, although the uniform tariff fell to 6 percent, the effective applied tariffs for all goods hovered around 2 percent or less (Appendix Table 2). This is a reflection of the extension of new FTAs to a broader coverage of imported products and importing countries. As mentioned earlier, in the absence of quantitative restrictions (QRs) and virtually no NTBs beyond sanitary and phytosanitary restrictions, there is little scope for trade policy interventions in Chile. The country is an active member of the WTO and it continues to negotiate new FTAs with its remaining large importers, to whom MFN tariffs apply (agreements with China, New Zealand and Japan have already been signed, and negotiations with India are in progress). Trade policy is transitioning toward implementing and monitoring FTAs for both imports and exports, and continued participation in WTO. The only remaining exception to the price bands on sugar and wheat has a self-destruct mechanism built into the bilateral agreements. This is a notable feature of the FTA with the

[16] See Valdés (1996) which reports a decomposition approach to quantify the relative influence of changes in the exchange rate, border prices and trade policy on changes in 'real' farm prices for the period 1985-2005.

United States, for example. Within agriculture there are no policy interventions on exports, except for very small promotional funding through ProChile. The principal agricultural trade policy is restricted to wheat and sugar (and their derivatives, such as flour and fructose). This is due to the persistence of the price band system, which ends in approximately ten years. Nonetheless, even with the price bands, the effective applied tariff averaged across agricultural goods is not above 2 percent (Figure 1(b)).

***Effective rates of protection***

Effective rates of protection (ERPs) at official exchange rates can serve as another revealing indicator of the impact of trade policies on producer returns (value added). The advantage of ERPs is that they incorporate the effects of intermediate input policies, which are reflected across activities according to their cost shares of tradable inputs. Estimates of the ERPs confirm a consistent pattern of protection to importables relative to exportables, particularly during the period 1974-1993 (Appendix Table 2). Before 1974, there were negative ERPs for the importables beef and milk, and wage goods were also subject to internal price controls. Wheat, however, had high positive ERPs. Coincidentally, there were also positive ERPs for exportables, owing to tax rebates and other export subsidies. After 1974, ERPs changed significantly: where positive, ERPs fell for importables; beef and milk went from negative to positive ERPs; and exportables went from positive to negative ERPs. Exports were no longer subsidized and, moreover, tradable inputs (e.g., agrochemicals and machinery) were subject to tariffs.

What has become a much more influential variable affecting Chilean agriculture is the real exchange rate (RER), and its future evolution is a major issue and source of tension in agricultural policy debate. The exchange rate issue is not new, and over the last thirty years tradable agriculture has been exposed to large swings in the RER (Figure 3). This has been and remains the main challenge to the Chilean farm sector. However, political awareness of the importance of exchange rates was low prior to the late 1970s, but it has grown as other buffers on sectoral profitability have diminished. Agriculture's exposure to world market conditions is indicated by the evolution of the index of tradability (agricultural exports and imports relative to sectoral GDP). Tradability has increased eight-fold from the decade of the 1960s (Table 1).

As noted above, direct price-related interventions affect only a very small number of activities, principally the application of price bands to sugar beets and wheat (and wheat

flour). There are a few generally-available productivity-related subsidies (mainly for pasture improvement and some types of small-scale irrigation). Beyond border measures, there is also a policy of direct assistance to small farmers, not through price-related policy but through government transfers via INDAP (a government agency focused on small farmers and providing subsidies to credit, crop insurance, and extension).[17] In effect, these subsidies are more a social policy than a production policy, and the small farm sector, although large in terms of the number of farmers, represents only 25 to 30 percent of agricultural GDP (although small farmers are significant in the case of some vegetable and pulse production). The analysis of direct government assistance in this study does not include these small-farmer-targeted transfers.

For importables other than wheat and sugar beets, such as milk, there was in the past a policy of maintaining a minimum import price. This was dismantled in compliance with the Uruguay Round agreement. The only other direct intervention for imports beyond the MFN tariff is the application of safeguards, which have occasionally been used (most recently on wheat flour from Argentina). However, applied tariff rates have fallen to about 2 percent or less (excluding wheat and sugar for which a specific tariff applies as part of the price band policy). Moreover, there are no interventions for exportables beyond very small amounts for export promotion that are generic for all sectors.

**The present study's estimates of policy distortion indicators**

The methodology for the present study (Anderson et al. 2008) differs somewhat from that of the Krueger, Schiff and Valdes study, even though the main focus is still on government-imposed distortions that create a gap between domestic prices and what they would be under free markets. Since it is not possible to understand the characteristics of agricultural development with a sectoral view alone, the project's methodology not only estimates the effects of direct agricultural policy measures (including distortions in the foreign exchange

[17] INDAP, which deals exclusively with small farmers, has a current annual budget of approximately US$200 million.

market), but it also generates estimates of distortions in non-agricultural sectors for comparative evaluation.

More specifically, this study computes a Nominal Rate of Assistance (NRA) for farmers including an adjustment for direct interventions on inputs. This brings our measure close to an effective assistance measure. We also generate an NRA for nonagricultural tradables, for comparison with that for agricultural tradables via the calculation of a Relative Rate of Assistance (RRA – see Anderson et al. 2008). A Trade Bias Index (TBI) within agriculture is also estimated, as is a consumer tax equivalent (CTE) for agricultural products, where the CTE is equal to the nominal rate of assistance (NRA) for those products affected only by trade measures.

Our NRA estimates cover the following products: wheat, sugar beet, maize, beef, and milk (importables); and apples and table grapes (representative of exportables). These products are selected because of their importance in the agricultural sector and because the selected importables experienced frequent price interventions because of their wage-good nature. Further, since the early 1980s, the only products subject to direct domestic market interventions (beyond the uniform MFN tariff) have been wheat, sugar and edible oils (during a short period), and there have been occasional safeguards for milk products.

The weight that these seven products represent in total farm output value (at market prices) has varied over time, from 50 percent in earlier years to around 30 percent more recently.[18] Although, this coverage appears to be low, since the early 1980s, wheat, sugar and milk are the only agricultural goods with specific price-related policies (beyond the uniform tariff and preferential tariffs under FTAs ).[19] The remaining products are covered by broader policy instruments. Chilean agriculture has become increasingly more diversified through time, and the weight in total production value of principal staples has declined.

Distortion indicators are estimated for three different sectors, importables (Ms), exportables (Xs), and nontradables (Hs). For the Chilean NRA measures, direct input subsidies (e.g., credit) are ignored, since they are largely non-existent except as social programs for small farmers. There are five domestic support programs (treated as non-product-specific transfers) included in the sectoral NRA: small-scale irrigation, pasture

[18] Value of output at current prices obtained from Banco Central, which classifies agricultural into crops, fruits, and the rest, where "rest" includes forestry products. In our estimates for agriculture we deducted the forestry sector.

[19] For some years the price band included oil seeds, as crops, but when importers began bringing in blends that contained edible oils the band was "perforated," and thereafter had little effect on domestic prices. But the government did not respond by adjusting the policy and eventually let it die. Oil seeds were officially removed from the price band system in 2002.

development, export promotion, R&D, and sanitary and phytosanitary expenditures. These support programs represent a small fraction of farm output value, and we distinguish between support to commercial farms and support to small farmers. There are subsidies exclusive to small farmers via credit and technical assistance, which are not included in the NRAs.

### *Classifying the tradability of products and estimates of price pass-through*

In many cases, the classification of products according to their trade status (Ms, Xs, and Hs) is straightforward, because in any given year they appear in the trade value data as net-imported or net-exported at significant levels. Trade status is not straightforward, however, for products that are traded in very small amounts, or not traded at all. The approach adopted here is that domestic prices of nontradables are insensitive to international price changes, rather than restricting the classification of goods according to whether or not the good appears in trade statistics.[20] In some studies, nontradability refers to those activities for which the primary product is not traded internationally. For Chile, sugar beet, raw milk, beef (live cattle) fit this definition and they have no "border price". However, during most of the period analyzed, these primary production activities were effectively import-competing (milk and beef have become marginally exportables). The level of production of such goods was and continues to be significantly influenced by changes in border prices and tariffs. Moreover, the Chilean policy debate between the farm groups and the government regarding interventions for these activities is almost exclusively focused on tariffs, and occasionally safeguards. For example, recently (September 2006) farmers, in order to protect raw milk (a product not traded) from Argentine milk product imports entering with a 1 percent tariff (or less), demanded safeguards on processed milk products.

To illustrate the importance of the definitions we adopt, if one were to use official trade statistics to classify primary products, approximately 48 percent of Chilean agriculture would be "nontradable". The NRAs for nontradables would be quite high, in activities that practically have no support. Someone knowledgeable about Chile would ask the obvious questions: Why such protection estimates for nontradables, and through which policy instruments? As computed, following a trade-statistics definition of tradability, the category nontradables includes sugar beet, raw milk, and beef cattle (live animals), which are

[20] The project's Methodology (Anderson et al. 2008) proposes a criterion for cases where import and export values are small shares (less than 2.5 percent) of consumption or production.

relatively large sectors and are all connected intimately with the category "lightly-processed-tradable products".[21] In an economic sense these three primary activities are tradables: no Chilean policy maker would think otherwise.

There are two options to compute the price pass-through from the tradable good to the primary product. This computation is relevant for raw milk, sugar beets and live cattle, and we illustrate it with the case of moving from powdered milk to raw milk prices. One option is to assume full (or some partial) price transmission, using a technical conversion coefficient (fluid to powder). A second option is to make use of a regression model: to simulate the fluid milk prices that would have prevailed assuming free trade in powder milk. This study adopts the latter strategy. We apply a simple regression model linking raw and powdered milk prices, where these prices are observed in local markets (both observed at the plant gate). An adjustment is sometimes required depending on the differing units and characteristics of the local and international products. For example, wholesale powdered milk has different specifications to imported powdered milk, arising from volume and fat content.[22] For beef cattle, a conversion is made from imported boneless meats; and for sugar beets, a conversion if made from refined sugar.

The classification scheme adopted here is not associated with problems of trade reversal through time. We classify producer-level milk, beef and sugar as tradable, and, although we do not have border price observations of these primary products, we can estimate a border price equivalent.

***Direct price comparisons for seven selected primary products***

[21] The Project Methodology adopted the GTAP hierarchy of processing: primary agriculture, lightly processed food (e.g., meat, dairy and sugar), and highly processed food.

[22] Computing the NRA for milk at the farm level turned out to be very complex. The price per litter paid to farmers by milk plants varies according to various indicators, including the cif price for powder milk, butter fat content, a seasonality incentive (typically in the past 14 percent higher in winter relative to summer prices), refrigeration at the farm level, and other less influential adjustments. A useful study on price transmission for milk is by Quiroz and Fernández (2001), where the authors develop an econometric model which emphasizes the difference in price determination between summer and winter. In their analysis of the fluid milk price paid to farmers, the border price of powder milk is most relevant in the summer, the period of more abundant supply, but less influential for winter production when milk plants need more fluid milk for their production of yogurt and other dairy products. Another relevant study on criteria for price determination by milk plants is in the report to SOPROLE by Valdés-Prieto (2001). In our study, in the case of powdered milk, instead of a direct price comparison we used the MFN tariff information adjusted for trade preferences from FTAs and for safeguards; and, until 1995 adjusted also for a minimum import prices policy prevailing during the late 1980s and early 1990s. Until the late 1990s, New Zealand was an important supplier of powder milk to Chile, but since then Argentina and Uruguay became the dominant suppliers, benefiting from lower tariffs under Mercosur, and lower transport cost.

Direct price comparisons depend on the calculation of the tariff equivalent of border and producer price interventions. We use cif or fob prices at Chilean ports of products that are of a similar quality to the seven goods of interest, and identify a point in the marketing channel where the border and producer prices can be compared. In most studies and for most products the point comparison is close to but not strictly at the farm gate, because statistics are reported at the processing plant, flour mill and auction fair. The border price in domestic currency is adjusted for customs charges, transport and handling costs, storage and marketing. A preliminary effort was made to adjust for product characteristics (e.g., hard and soft wheat, fat content of powdered milk, and export-quality and non-exportable fruits).

Both domestic and border prices derive from the KSV study in the years 1960-1983, and from the Surveillance study in years 1985-1993. Producer and border prices since 1994 come from Odepa website (www.odepa.cl). Farmgate and producer prices are assumed to be equal to observed domestic prices, which are reported at the *mayorista* ("wholesale") level. In some cases the "wholesale" price is the bulk price at the processing plant: Odepa "wholesale" statistics are at the miller level for wheat, at the dairy plant for milk, and at the refinery for sugar beets. Auction fair prices are used for beef cattle. For maize, apples, and table grapes, the Odepa "wholesale" price corresponds to the Santiago central markets price, where farmers and others make bulk transactions. Prices for exported fruits are determined in foreign markets (for farmers selling almost all on consignment). The source of price information for fruits consumed domestically is Santiago's main wholesale market. Although average domestic and export prices differ due to quality differences, they are highly correlated when comparing similar quality fruit. As a storable and import-competing product, wheat prices are a special case, observed monthly and requiring a seasonal adjustment: the price received at harvest is not directly comparable with annual average border prices, because the domestic consumption equivalent of production determines the time of year when imports occur. Thus the observed border price at the time of import must be discounted to adjust for storage costs, of which the interest rate is the main determinant.

As an illustration of the direct-price-comparison methodology for primary products, details the calculation of producer prices of wheat are provided in Appendix Table 3. To calculate the miller price of the imported wheat, the principle inflation adjustments to the wheat cif price (in year 2000, US$127.7) are import-credit documents (2.23 percent of cif), loading and transport cost (US$10.5/ton) and other costs (US$1.6/ton). These cost adjustments raise the cif price to US$144. This price must be adjusted downward — due to storage costs (financial and physical) — to obtain the producer price at harvest. This yields a

producer price such that the buyer-miller is indifferent between farm purchases at harvest and imports later. This is an arbitrage argument: The farmer has the option of postponing delivery and assuming storage costs (although one possible advantage of the miller is access to lower cost of capital, and scale economies.) The formula for this adjustment factor is presented as a note to Appendix Table 3 and is estimated to be 88.5 percent. The adjustment factor, used only for wheat (not applying to imported continuously-produced goods, such as milk and beef), is very sensitive to interest rates, which fluctuated over the years covered in the study. Adjusting the mill-level cif price downward by the adjustment factor yields a producer price equivalent of US$125.3. Given observed harvest average price of US$171.10, the resulting NRA is 36.5 percent.

***A note on lightly processed products***

From a given raw product, there are several intermediate and final consumer good that might be produced. We want, therefore, a representative good in the first stages of processing. For primary products examined in this study that are not directly consumed, the lightly processed products are wheat flour, powdered milk, boneless beef (the imported form in Chile), and refined sugar. Maize, fruits and vegetables are sold as primary products. The lightly processed products considered here represent a lower share of all lightly processed products than the selected primary products represent of all primary agricultural goods. The level of support to wheat, milk, beef and sugar is determined by direct price comparison, as discussed above. The level of support to other lightly processed products is determined in a straightforward manner through MFN tariffs.

***Nominal rates of assistance to agriculture***

Table 3 shows the profile of nominal rates of assistance to producers of primary agricultural tradables (NRAs), for the period 1960-2005. These estimates are based on official exchange rates and include the output subsidy equivalents of input subsidies.[23] The weighted average NRA for importables averaged 4 percent in the 1970s but 21 percent in the 1980s, before falling gradually to less than 8 percent in the present decade (Table 3). For exportables, by

[23] For the annual estimates, and to see what the NRAs are without the input subsidies, see Appendix Table 4.

contrast, the NRA has averaged just below zero since the mid-1970s. Those slightly negative numbers are due to the nominal tariff protection afforded tradable inputs such as machinery and equipment, agro-chemicals, fertilizers and fuel, which have a relatively high cost share in production of exportables. With the steady decline in the uniform MFN tariff and the application of FTAs, however, that imposition on farmers has fallen over the past two decades. The difference between the average NRAs for import-competing versus export agriculture is shown annually in Figure 2.

Since the economic reforms of the mid-1970s, the most dynamic growth has been by producers of exports, who have been the least assisted. And it is them, not import-competing producers, who have been linked with the bulk of rural employment generation, poverty alleviation and the reduction of rural-urban migration rates related to Chilean agricultural growth. Exportables are difficult to assist except through export subsidies, which for Chile are unavailable due to WTO commitments.

The weighted average rate of assistance for all covered products has changed from -8 percent in the ten years from 1965, to 3 percent in the next ten years, to 17 percent during 1985-94, but to just 6 percent this decade. Importantly, the dispersion of industry rates around that mean has also fallen (see 2$^{nd}$ last row of Table 3), which means there is less intra-sectoral misallocation of resources, particularly of land.

Because of the increasing product diversity of Chilean agriculture, our covered products account for a decreasing share of the total value of agricultural production. At undistorted prices that share has fallen from more than half in the 1960s to less than one-third by the turn of the century. To get a sense of how assisted is the rest of the agricultural sector, we used Central Bank data to determine the shares of non-covered farm production made up of import-competing, exportable and nontradable products. We then assumed the average NRA for non-covered nontradables was zero, and that the NRA for non-covered exportables was the simple average of the estimates for covered exportables. For non-covered import-competing products, we assumed their NRAs were half the tariffs reported in Hurtado, Valdés and Muchnik (1990) for the period to 1984, while for later years we used the tariffs reported in Becerra (2006): MFN tariffs for the period 1985-99, and applied tariffs for the current decade. The resulting average NRA for all non-covered products, shown in row 2 of Table 4, is somewhat less than for covered products.

The commodity-specific NRAs do not cover assistance that is non- product-specific. In the case of Chile that takes the form of government direct support for small-scale irrigation, research, market promotion and pasture improvement. Leaving aside programs

restricted to small-farmers, data from INDAP provide the basis for the estimates in row 4 of Table 4. They suggest this additional support adds about 4 percentage points to the NRA for total agriculture, shown in row 5 of that table.

***Assistance to non-agricultural tradable sectors and relative rates of assistance***

What is important for inter-sectoral resource allocation is assistance to agricultural versus non-agricultural producers of tradable products. NRAs for non-agriculture are disaggregated into import-competing, exportable and nontradable products. These indicators are reported in Appendix Table 9.[24] Tariffs were the basis for estimating these NRAs, as for Chile there were no export taxes over the period considered and the NRAs for nontratadables (and any tradable services) are assumed to be zero. The aggregate NRAs for the tradable parts of the non-agricultural sector are summarized in row 8 of Table 4. It suggests the NRA for those industries has fallen from an average of more than 30 percent prior to the reforms from the mid-1970s to less than 10 percent in the 1980s and to only 2 percent in the current decade.

The extent to which farmers prices were distorted relative to that of other producers of tradables is captures in the relative rate of assistance (RRA) measure. This is reported in the final row of Table 4. It suggests that farmers were discriminated against prior to the mid-1970s reforms even though they received positive direct assistance. Their RRA became slightly positive only by the latter 1980s, when general tariffs were increased in response to the macroeconomic crisis. Since 1985, the assistance to both agricultural and non-farm activities has all but disappeared. This drift from negative to slight positive and then zero RRA estimates is illustrated in Figure 3, where it is clear that the earlier anti-agricultural bias of policies prior to the reforms was due entirely to non-farm policies.

A caveat is in order here. In the analysis of relative incentives in Chile, economists often include the price of home goods in the price index of both sectors. This approach differs from the one followed in this study, where relative incentives are restricted to tradables only. This difference in the concept of relative incentives affects the estimates, particularly for the period 1960-1980, when tariffs on manufactured goods were extremely high. The values for the RRA reported in Table 4 are negative, while the RRA would become positive during

[24] The weights for each category changed over the periods. They are based on the authors' best judgment, bearing in mind the historical evolution of the composition of trade. The authors could not find reliable, official sources for these shares through time, so the NRAs by category and for non-agriculture as an aggregate are tentative.

those years if nontradables had been included in the price of non-agriculture. As mentioned earlier, the reader should consider that the study assumed that there were no distortions in the non-tradable sector.

***Accounting for exchange rate misalignment***

The KSV study found that misalignments in the exchange rate help explain Chilean agricultural incentives during the period 1960 and 1983. More recently, the exchange rate phenomenon has taken an even more prominent role in policy debates on prospects for the country's agriculture. Exchange rates are far more influential than trade policy in Chile today, due to the low levels of current tariffs (with sugar and wheat as exceptions).

Hurtado, Valdés and Muchnik (1991) note that during the 1960s and 1970s there was a multiple-exchange-rate system and a foreign-currency-retention scheme. But defining and estimating the distortion is a complex problem, especially considering that there are still major gaps in economists' understanding of the long run behavior of the real exchange rate (RER). Economists have used an array of approaches to the estimation of misalignment, from crude application of PPP doctrines through econometric estimation of single equation misalignment models (the most common approach) to the simulation of large macro-econometric models.[25] A parallel market rate is proposed in the Project Methodology as an alternative for some countries, but there has been no parallel or black market rate in Chile for at least a decade or so.[26]

The basic discussion since the late 1970s in Chile is whether actual RER differs significantly from its long-run equilibrium value; or, in other words, whether it is sustainable considering a targeted current-account deficit. The concern is about overvaluation (or appreciation) of the peso. The appreciation in recent years is a consequence of high world prices for minerals, which in Chile are produced in a large sector operating in competitive international markets. The strength of the peso decreases the profitability of non-mineral exports and import-competing activities. Automatic adjustments (declines) in the nominal

[25] There is a rich literature on the economics of real exchange rates for developing countries which reports estimates for Chile, including Edwards (1989), Hinckle and Montiel (1999) and Edwards and Sevastano (1999).
[26] The incidence of parallel market greatly declined since the late 1970s and disappeared in the early 1990s when exchange controls were dismantled and exchange markets unified. During the 1980s there was a small quasi-legal parallel market, with a modest premium (except for occasional spikes at times of temporary macroeconomic crisis), essentially the result of exchange controls for capital account transactions, an attempt to insulate from temporary capital outflows, a market not relevant for trade transactions.

price of home goods is unlikely, at least in the short and medium term, given (downward) rigidities and adjustment costs. For several years Chile has had a freely floating rate, so responses to peso appreciation is not a question of the Central Bank forcing nominal devaluations. Even so, the domestic currency could still be considered "wrongly" priced if the country's balance of payment surplus or deficit is unsustainable in the longer run. Although not the official view of the Central Bank, estimates by academics suggest that the actual RER has been below its long-run equilibrium value in recent years. Such RER misalignment is a policy choice which has clear inter-temporal consequences since future generations will have to repay any foreign debt that is accumulating.

***Consumer tax equivalents***

To estimate a consumer tax equivalent (CTE) of the effects of trade policy plus sales taxes, it is sometimes assumed that there is a constant mark-up or proportional pass-trough of agricultural product prices at the wholesale level to retail prices. An alternative could be to assume changes in the unit prices of retail goods to the consumer would change in proportion to the cost share of the primary farm product in the value of the processed product. The constant mark-up assumption overestimates (perhaps significantly) the impact of changes in farm-price policies on retail food prices. For example, if wheat represents 10 percent of final retail price of pasta and bread, a 10 percent increase in wheat prices due to a tariff increase would translate into a 1 percent increase in retail price.

The price band for sugar and its impact on the retail price for sugar and its derivatives (directly as sugar and indirectly through its impact on the price of beverages and other consumer goods) has generated an intense policy debate in Chile. It is perhaps the only product chain which is well documented. In their study on sugar for the period 1986 -2003, Galetovich and Venturelli (2005) conclude that the surcharge (specific tax) on the CIF price due to the price band ranged from 0 to 60 percent (over 40 percent in 1986, 1999 and 2000) depending on border price fluctuations. Only in 3 out of 17 years did consumers benefit, while during all other years consumers were taxed, with income transfers particularly high after 1997 (a total of US$523 million between 1986 and 2003). As an illustration, using year 2000 as an example, consumers spent an extra US$81 million for sugar due to the price bands. How was this transfer distributed? Of this amount, the sugar monopsony (IANSA) captured approximately 47 percent, the government received 32 percent in import duties, and farmers captured the remaining 21 percent. And small farmers (less than 10 hectares)

captured only 3 percent of the total transfer. This is ironic, in that the price band was promoted as a price stabilization scheme, and to a lesser degree to help small farmers.[27] On average, it was supposed to be price neutral with respect to consumer prices.

Following the Project's approach, the estimates reported assume full proportional pass-through of price changes to the retail level, so our CTEs should be considered upper-bound estimates. Alternatively, our CTEs could be interpreted as the consumer cost of trade policies *per unit of the primary good* used in producing the processed final product that is retailed. Table 5 shows the CTEs for importables, exportables, non-tradables and the corresponding weighted average for Chile. Note that this does not include the value-added tax (currently 19 percent) since that applies not only to food but to all products and so does not represent a distortion in the sense of this project. These numbers suggest that the CTE has declined from 18 percent in the latter 1980s to less than 7 percent currently. Care is needed in interpreting the CTE results in the context of the political economy of price interventions at the time of high inflation though. During the 1960and 1970s perhaps the main argument for imposing price controls and export restrictions on farm products was the so-called wage – good character of food and, related to this, the implications for inflation. The concern was about prices of such goods at the retail level, thus the importance of how to measure and interpret the impact of interventions on primary products on the prices of food at retail.

**Summary of findings and prospects for Chilean agricultural policy**

In this final section, after summarizing the key findings derived from the NRA analysis we present two broad policy lessons from the Chilean experience before looking ahead at potential risks agricultural policy makers may face during the next decade.

Four finding are worth stressing. First, is that price interventions since the implementation of the economic reforms in the mid-1970s have assisted producers of

[27] As originally designed, the price band system could have been relatively neutral, but farm lobbies succeeded in adjustments in the rules whenever border prices became too unfavorable. Moreover, the prevailing assumption at the time it was designed was that the stochastic process of world prices was stationary, and thus ups and owns would be neutralized to some extent because when the price hits the ceiling price the government does not subsidized consumers beyond the removal of the tariff. More recent analysis has shown that the world price for most commodities shows strong signs of "persistence" when prices are low, while price spikes are usually short-term.

importables, in contrast to zero or slightly negative assistance to those producing exportables. Second, direct price-related interventions affect only a very small number of politically-sensitive, import-competing activities, principally through price bands for sugar, and wheat and wheat flour, and the occasional use of safeguards (most notably for dairy products). Third, the magnitude of the anti-trade bias in agriculture has declined, as a result of the declining level of support to the production of importables. And fourth, the low NRAs since the late 1990s, despite a MFN tariff of 6 percent, are attributable primarily to the implementation of preferential trade agreements with the USA, the EU, Mexico, Canada, MERCOSUR, China and other countries. Chile is now very open and has reached the point where policy makers have little scope for trade and price interventions. The low uniform tariff of 6 percent (wheat and sugar excepted) is a deceptive indicator, because when adjusted for trade preferences the effective rate falls to less than 2 percent for farm products and to even less for non-agricultural products, and there are no export taxes (or subsidies) or other restrictions on exports.

***Two broad policy questions***

The Chilean experience invites two broad policy questions: To what extent has the expansion of the export agricultural sector been the unintended result of economic reforms? And have price policies aimed specifically at the agricultural sector been less influential than economy-wide policies, such as macroeconomic policies, deregulation and privatization?

Regarding the first question, economists involved in the reforms anticipated that the trade liberalization program would reduce significantly the anti-trade bias implicit in previous policies of high industrial protection, import-substitution, exchange rate management, export licenses and other measures that inhibited the production of exportables. This was probably not perceived by the farm lobbies and government officials dealing directly with the agricultural sector, given their micro and sectoral focus rather than an economy-wide perspective.

As to the specific path that the agricultural sector would take toward a greater export orientation, certainly the impacts on poverty of this change were not well understood. There was a general perception that the production of exportables tended to be relatively more labor intensive than import-competing products. Although some agronomists might have anticipated the potential of some fruit products, one of the interesting features of the Chilean story is that there has been substantial development of non-traditional products, some of

which were never before produced in the country on a commercial scale (kiwis, berries, seeds for exports, avocados, olive oil, aquaculture, large-scale forest plantations, and others).

With regard to the second question, the effect of the indirect interventions (exchange rates and industrial protection) overwhelmed the direct (sectoral) policies. Other non-sectoral factors – all related to the service sector – were also influential for agriculture, particularly deregulation and privatization in the larger economy as it affected infrastructure, ports, telecommunications, energy, and banking.

Perhaps the strongest conclusion that can be derived from a review of the impacts of the growth of Chilean agriculture following economic reforms of the last three decades is that the growth in the sector made a significant contribution to poverty reduction. A second conclusion is that the output mix of agriculture – specifically its tendency toward greater export orientation – had a particularly important effect in increasing employment and household income, and lowering rural-urban migration. The present overall policy strategy continues to support the growth of export-oriented sectors and the modernization of import-competing sectors, but poverty alleviation is most notably linked to export agriculture rather than to agriculture as a whole.

Because the evidence points so strongly to the importance of the product mix, rather than to the farm sector per se, paradoxically the protection of the import-competing sector could reduce these positive externalities. Most of the current protection of agriculture in Chile is the result of border, trade-related measures. Such protection can only benefit the import-competing sector. It also represents an implicit tax on the production of exportables, which appears from the analyses elsewhere to be the sector generating most of the positive externalities. The downside to this output-mix message is that certain sub-sectors have had difficulties in adapting to the open-market policy regime, especially small-scale farming.

With respect to generalizing the results of the Chilean case, it is relevant to ask: is it the export nature of agricultural activity that matters, or is it the relative labor intensity of the primary and related activities (such as processing)? The answer is that it is the nature of the activity that matters. For Chile, the export sector coincides with higher labor intensity, but this coincidence is highly unlikely to occur everywhere. An example might be the Pampean region in Argentina, where the export sector is less labor intensive (such as in the case of grains and beef). Similarly, a sector oriented to the production of import-competing crops could also be associated with strong forward linkages in agro-processing (and so be a source of significant employment effects). But for the Chilean import-competing sector, this appears not to have been the case.

Another important aspect of the Chilean case that would argue against generalizing these findings is the counter-seasonality and low-storability of a significant proportion of the country's agricultural exports. Chilean export agriculture has been able to take advantage of both characteristics that tend to be associated with lower trade barriers in northern export markets. A contrasting example of a country that could potentially expand the production of horticultural products is Morocco. Exports of Moroccan horticultural exports to Europe coincide with the harvest of EU competing products. And although Morocco has a trade agreement with the EU, it faces relatively greater restrictions on exports than Chile, hampering the expansion of the sector.

***Reflections on two possible policy risks ahead***

Although the export mix of Chilean agriculture is becoming increasingly diversified, Chile's agricultural exports (leaving aside the important forestry products sub-sector) are strongly concentrated on fruits and vegetables, wine, poultry and pork, and agro-processed products. These are all differentiated goods in which quality and sanitary conditions are crucial in terms of market access, and where an isolated quality problem associated with a small fraction of exports can damage the reputation of an entire sub-sector. So far Chile has succeeded without major problems. But with increasing demands in terms of quality standards in import markets and increasing competition from other exporters, Chile depends on a local capacity to adjust rapidly to these increasing demands and take every precaution against the risk of major plant and animal disease outbreaks.

Another issue is the conditions that could risk the competitiveness of agriculture. We have already mentioned that exchange rate appreciation worries farm groups. As well, rising labor costs in the production of export products – which by nature are quite labor intensive –also are a concern. Labor costs often represent 60 percent of operational costs in fruits and vegetables and in activities for which seasonal employment is important, in a sector subject to high fluctuations in yields and export prices. A trend towards increasing rigidity in labor demand associated with the labor code could risk the survival of some important activities such as berries, seeds and fruits.

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Table 1: Performance indicators for Chilean Agriculture, 1960 to 2004

| | 1960-70 | 1971-73 | 1974 | 1975-83* | 1984-89 | 1990-98 | 1999-01 | 2002-04 |
|---|---|---|---|---|---|---|---|---|
| Economy Wide GDP Growt Rate (%) | 4.1 | 1.1 | 2.5 | 1.7 | 7.5 | 7.3 | 2 | 4 |
| Ag. Production Value Growth Rate (%) | 2.4 | -5.5 | 19.2 | 2.1 | 4.7 | 3.9 | 1.7 | 4.2 |
| Ag. GDP Growth Rate(%) | 2.2 | -6.5 | 26.8 | 2.2 | 8 | 2.5 | 4 | 1.9 |
| Ag Share of Total GDP* | 8.2 | 7.5 | 5.7 | 7.2 | 8.1 | 8.3 | 8.6 | 4.1 |
| Rural population (% of total ) | 28.4 | 23.5 | 22.2 | 19.5 | 17.2 | 15.8 | 14.2 | 13.2 |
| Labor force (% of total) | 27.2 | 23.5 | 22.8 | 21.3 | 19.5 | 18.8 | 14.4 | 13.6 |
| Exports Index (1961=100) | 107 | 126 | 249 | 966 | 2456 | 6622 | 9877 | 12496 |
| Imports Index (1961=100) | 122 | 211 | 540 | 417 | 238 | 701 | 927 | 1366 |
| Ag Trade ( % Ag GDP) | 10.1 | 16.9 | 36.2 | 33.3 | 31 | 59.8 | 83.6 | 84.3 |
| Ag Export Growth Rate (%) | 4.4 | -8.9 | 149.8 | 23 | 19.6 | 12.3 | 4.8 | 11.37 |
| Ag Import Growth Rate (%) | 3.7 | 23.2 | 120 | 4.4 | -4.6 | 18 | -6.4 | 11 |
| Value added per worker (constant 2000 US$) | 2170 | 2154 | 2404 | 2616 | 3211 | 3983 | - | - |

Note * : Excludes forestry and fisheries

Source: World Bank (2006), *World Development Indicators*.

Table 2: Average Annual growth rates of export value, Chile, 1960 to 2005

(percent)

| | All Crops and Livestock | Forestry[1] | Fruits[2] | Wine[3] | Fisheries[4] | Fisheries[5] |
|---|---|---|---|---|---|---|
| 1960-70 | 4.4 | 19.7 | 16.4 | 25.5 | 38.9 | n.a. |
| 1971-73 | -8.9 | 2.4 | 13.2 | 16.6 | 7.8 | n.a. |
| 1974 | 149.8 | 247.7 | 4.9 | 44.8 | 159.1 | n.a. |
| 1975-83 | 23 | 16 | 41.5 | 22.9 | 38.3 | 23.4 |
| 1984-89 | 19.6 | 15.9 | 14.2 | 25.7 | 9.9 | 14 |
| 1990-98 | 12.3 | 9.3 | 6.7 | 35.8 | 2.9 | 7.9 |
| 1999-2001 | 4.9 | 7.4 | 3.2 | 8.2 | - | - |
| 2002-05 | 8.7 | 11.1 | 6.9 | 8.1 | - | - |

1/ Includes industrial round wood, pulp and + particles, sawn wood, wood-based panels, and wood fuel. 2/ Includes apples and grapes. 3/ Included all wines. 4/ Includes salmon, fish meal. 5/ Included all products.

Source: Odepa.

Table 3: Nominal rates of assistance to covered products, Chile, 1960 to 2005

(percent)

| | 1960-64 | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 | 1990-94 | 1995-99 | 2000-05 |
|---|---|---|---|---|---|---|---|---|---|
| **Exportables** [a] | **10.8** | **21.9** | **35.2** | **-1.2** | **-2.0** | **-1.2** | **-0.6** | **-0.5** | **-0.3** |
| Apples | 10.5 | 22.5 | 35.9 | -1.5 | -2.2 | -1.1 | -0.4 | -0.2 | -0.2 |
| Grapes | 11.5 | 19.8 | 32.8 | -0.4 | -1.7 | -1.3 | -0.8 | -0.7 | -0.4 |
| **Import-competing products** [a] | **10.7** | **-8.2** | **-14.5** | **3.0** | **4.8** | **23.9** | **17.4** | **14.8** | **7.6** |
| Sugar | n.a. | n.a. | n.a. | 39.2 | 28.2 | 49.2 | 21.0 | 22.4 | 31.3 |
| Maize | -19.4 | -6.7 | -10.2 | -18.8 | -10.7 | -10.5 | -6.8 | 2.2 | 0.6 |
| Beef | -8.9 | -26.0 | -24.6 | 4.2 | 6.9 | 33.0 | 16.5 | 12.5 | 3.3 |
| Wheat | 10.2 | 7.1 | -19.1 | 5.5 | 7.8 | 14.0 | 27.6 | 25.2 | 10.4 |
| Milk | 201.4 | 30.0 | 12.5 | 22.2 | 6.7 | 45.2 | 22.2 | 15.6 | 5.6 |
| **Total of covered products** [a] | **10.6** | **-6.3** | **-10.6** | **2.5** | **4.2** | **20.6** | **13.7** | **11.2** | **5.7** |
| Dispersion of covered products [b] | 87.9 | 33.0 | 37.2 | 30.4 | 17.0 | 26.1 | 16.5 | 14.7 | 12.1 |
| % coverage (at undist. prices) | 58 | 48 | 47 | 46 | 37 | 38 | 34 | 32 | 29 |

[a] NRAs including product-specific input taxes/subsidies.

[b] Dispersion is a simple 5-year average of the annual standard deviation around the weighted mean of NRAs of covered products.

Source: Authors' spreadsheet

Table 4: Nominal rates of assistance to agricultural relative to non-agricultural industries, Chile, 1960 to 2005
(percent)

| | 1960-64 | 1965-69 | 1970-74 | 1975-79 | 1980-84 | 1985-89 | 1990-94 | 1995-99 | 2000-05 |
|---|---|---|---|---|---|---|---|---|---|
| Covered products | 10.6 | -6.3 | -10.6 | 2.5 | 4.2 | 20.6 | 13.7 | 11.2 | 5.7 |
| Non-covered products | 10.3 | 10.8 | 14.8 | 2.1 | 6.1 | 7.4 | 4.6 | 4.5 | 1.5 |
| All agricultural products [a] | 10.1 | 2.6 | 2.9 | 1.7 | 5.5 | 12.2 | 7.3 | 6.6 | 2.7 |
| Non-product-specific assistance [b] | 15.3 | 13.5 | 9.1 | 2.7 | 1.7 | 0.8 | 0.6 | 1.6 | 2.7 |
| **Total Agricultural NRA** (incl.NPS) | **25.4** | **16.2** | **12.0** | **4.5** | **7.2** | **13.0** | **7.9** | **8.2** | **5.3** |
| Trade bias index [c] | -0.01 | 0.31 | 0.53 | -0.04 | -0.11 | -0.18 | -0.12 | -0.12 | -0.05 |
| ***Assistance to just tradables:*** | | | | | | | | | |
| All agricultural tradables | 11.8 | 3.1 | 3.5 | 1.9 | 6.1 | 13.6 | 8.1 | 7.4 | 3.0 |
| All non-agricultural tradables | 33.8 | 26.1 | 32.1 | 11.2 | 7.2 | 9.0 | 5.9 | 5.3 | 2.1 |
| **Relative rate of assistance, RRA[d]** | **-16.1** | **-18.0** | **-20.0** | **-8.0** | **-1.0** | **4.2** | **2.2** | **2.0** | **0.9** |

[a] NRAs before including non-product-specific (NPS) assistance.

[b] Total of assistance to primary factors and intermediate inputs divided to total value of primary agriculture production at undistorted prices (%).

[c] Trade bias index is TBI = $(1+NRAag_x/100)/(1+NRAag_m/100) - 1$, where $NRAag_m$ and $NRAag_x$ are the average percentage NRAs for the import-competing and exportable parts of the agricultural sector.

[d] The RRA is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Source: Authors' spreadsheet

Table 5: Average consumer tax equivalents for agricultural products, Chile, 1985 to 2005

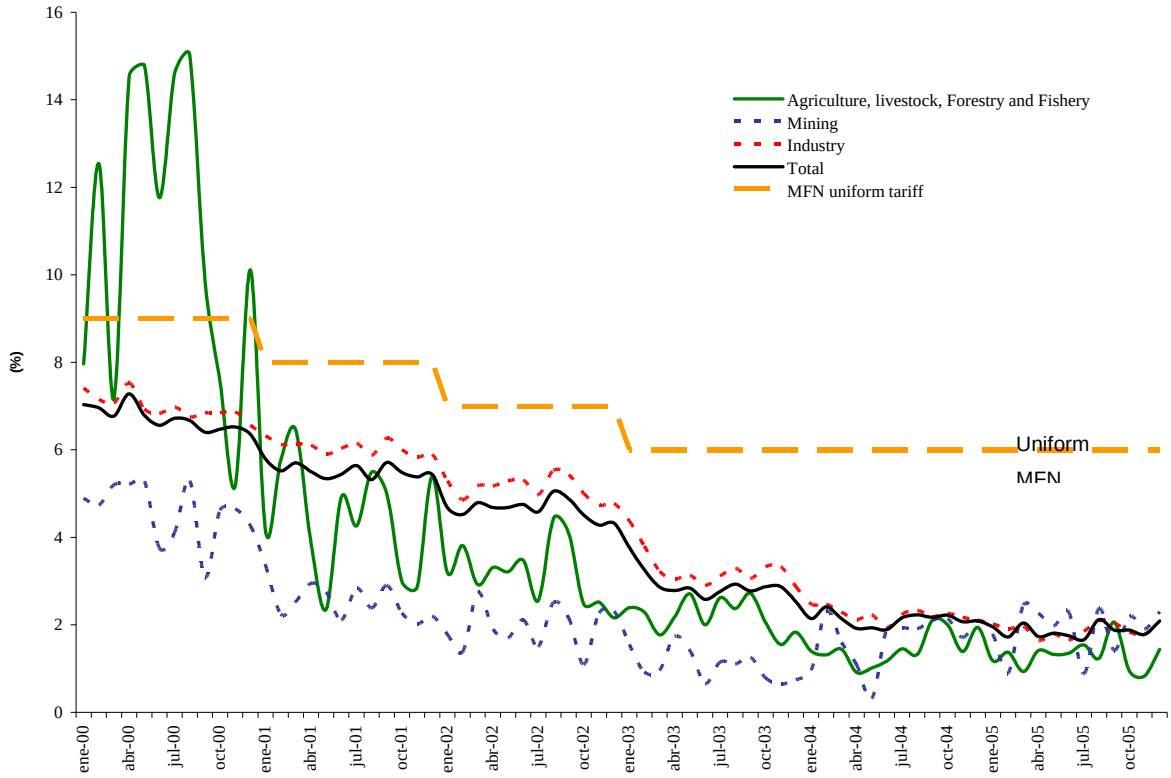
(percent)

| | 1985-90 | 1991-95 | 1996-99 | 2000-05 |
|---|---|---|---|---|
| Importable | 25.7 | 23.6 | 20.2 | 11.8 |
| Exportable | 0.0 | 0.0 | 0.0 | 0.0 |
| Non Tradable | 0.0 | 0.0 | 0.0 | 0.0 |
| **Total** | **17.8** | **15.1** | **13.3** | **6.5** |

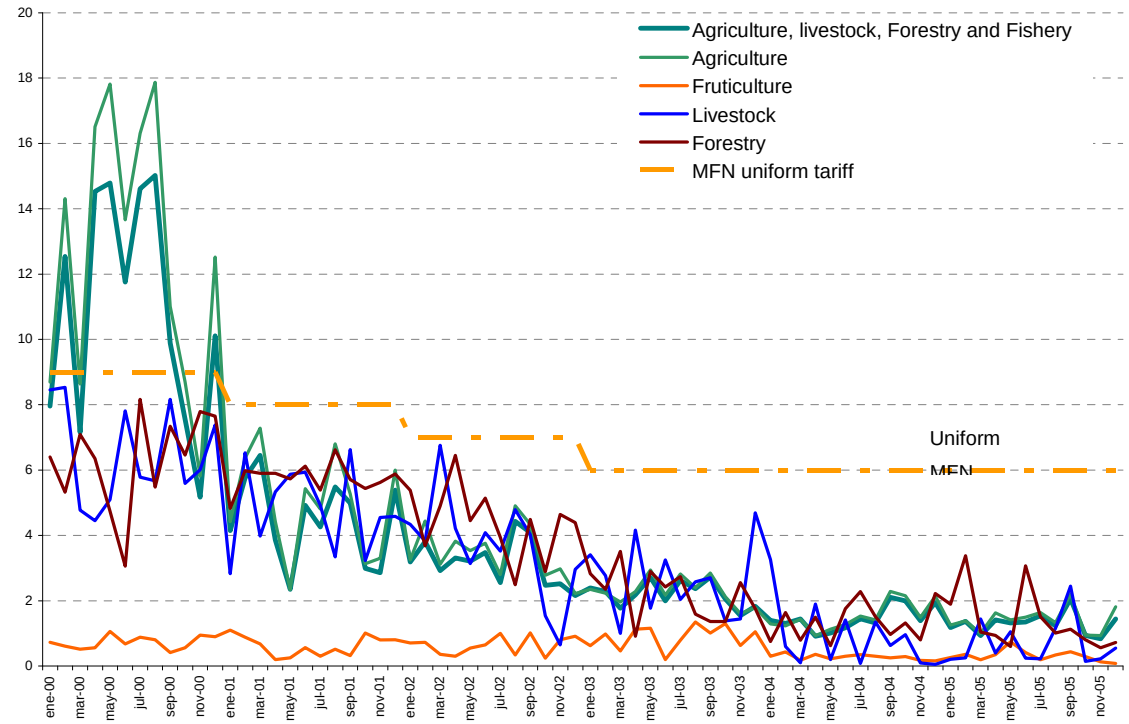
Source: Authors' spreadsheet

Figure 1: Applied tariff adjusted for trade preferences, including both ad-valorem and specific duties, Chile, 2000 to 2005

(a) Key sectors



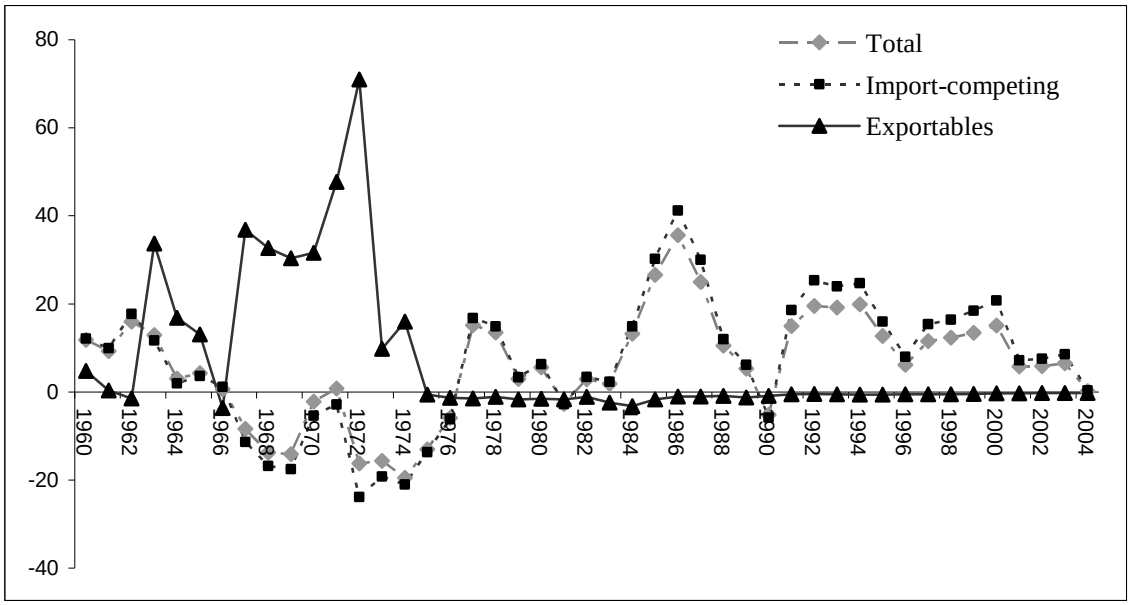

(b) Agriculture (adjusted for trade preferences)




Source: basic data from Banco Central, Becerra study (2006)

Figure 2: Nominal rates of assistance to exportable, import-competing and all[a] covered products, Chile, 1960 to 2004

(percent)

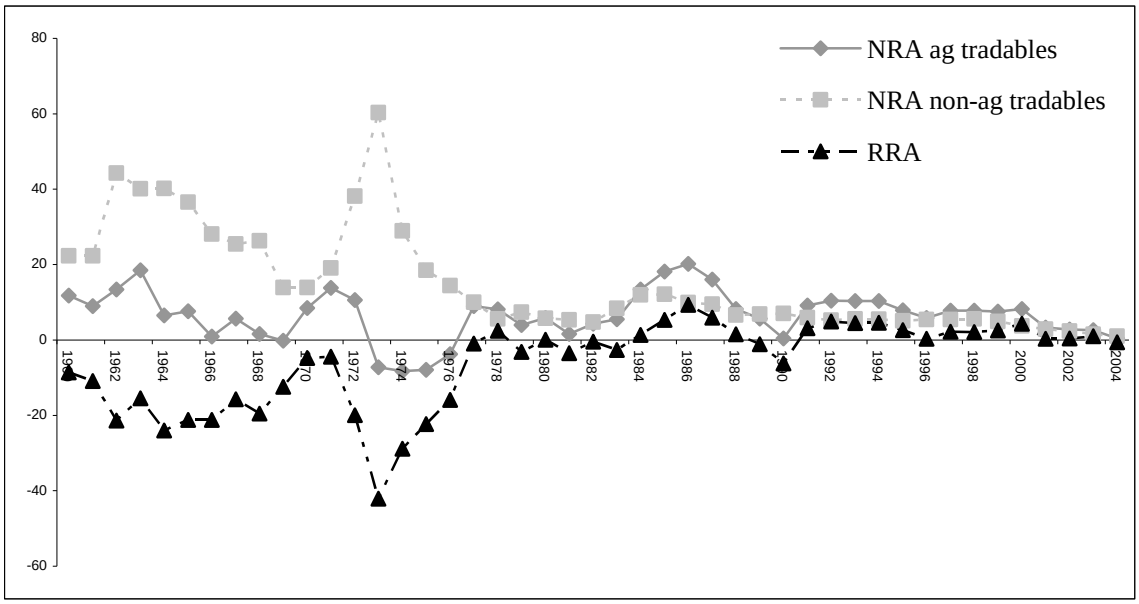



[a] The total NRA can be above or below the exportable and import-competing averages because assistance to nontradables and non-product specific assistance is also included.

Source: Authors' spreadsheet

Figure 3: Nominal rates of assistance to all non-agricultural tradables, all agricultural tradable industries, and relative rates of assistance[a], Chile, 1960 to 2004

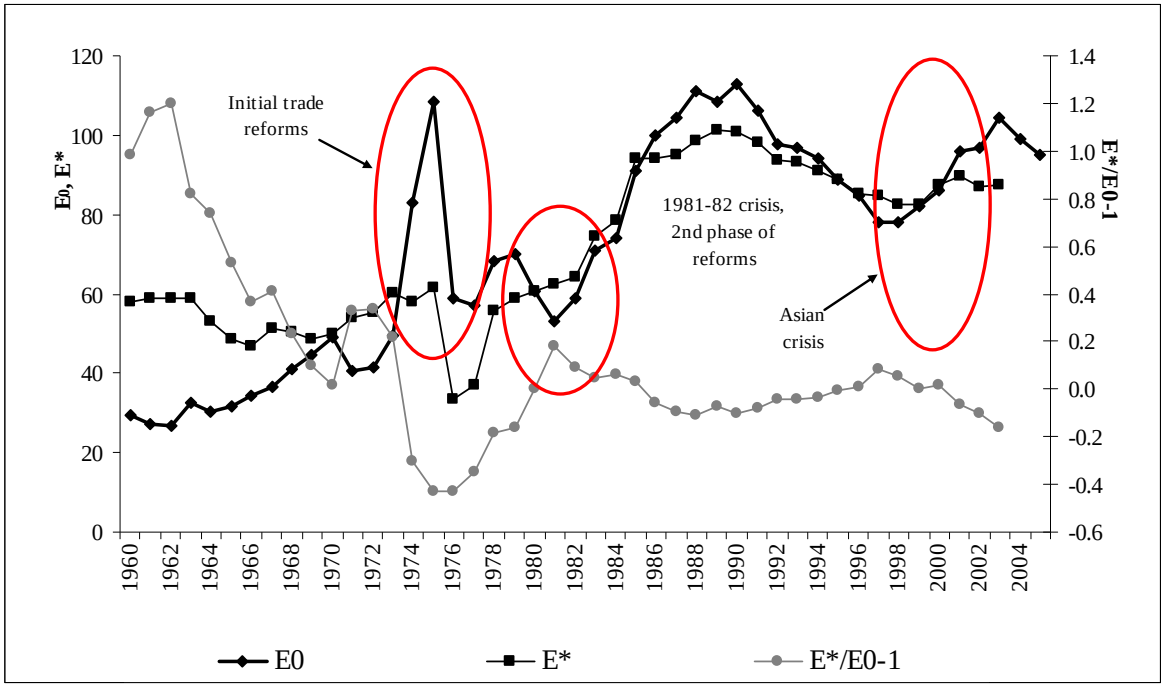
(percent)




[a] The RRA is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Source: Authors' spreadsheet

Figure 4: Real exchange rate (E0, 1986=100) and equilibrium rate (E*), Chile, 1960 to 2003




Source: Real exchange rate from Banco Central

## Appendix: Methodology and data sources

This appendix has some more-detailed tables on tariffs (Appendix Table 1), effective rates of protection (ERPs) for the period 1960-1993 for key tradable agricultural activities (Appendix Table 2), on how the NRA is estimated for wheat in this study (Appendix Table 3), and on the NRA calculations (Appendix Tables 4-7), preceded by a discussion of the methodology and data used to generate the NRA calculations.

### *Calculating NRAs and direct price comparisons:*

A distinction must be made between 'formal' and a 'nominal' tariff equivalent rate. The formal rate is usually defined as the rate as defined in the tariff schedule, while the tariff equivalent nominal rate is defined as the ad valorem equivalent of tariff and non-tariff barriers, including QRs. Chile's trade regime experienced a drastic change around 1976. From a system where QRs and NTBs on imports were common and several restrictions prevailed on exports before 1976, to a regime based predominantly on tariffs, in fact under a uniform tariff system with few exceptions, and no interventions on exportables after 1976. As discussed in the text, there were, however, some exceptions on the import regime for a few agricultural products and thus the relevance of computing the tariff equivalent rate for these products.

The economy was grouped into three categories, import-competing, exportables, and non-tradables. The line between a traded and non-traded good is often difficult to draw. Non-traded goods may be conceivably or physically tradeable, but because of transport costs or other reasons they are not actually traded[28]. What is clear from the history of agricultural policy interventions in Chile is that there were no direct price or trade interventions for non-tradables, although perhaps some production subsidies might have applied for these activities. Seven selected agricultural products were selected for detailed analysis, chosen because they were the focus of agricultural price and trade policies. Since 1976, for these selected products tariff equivalent estimates were made, based on direct price comparisons between border prices (cif or fob) and prices observable closest to farm gate. For the rest of tradable goods, if they were importables the uniform tariff was applied; no interventions applied for exportables.

For each broad commodity category, one representative product was chosen to analyze interventions at the slightly-process level. The representative products are wheat flour, powdered milk, boneless meat, and refine sugar. (For fruits and maize, this slightly-processed level does not apply.) The tariffs that are applied at the level of these lightly processed products are assumed to reflect the distortions upstream and down.

Wholesale domestic prices are available for wheat, sugar, corn, beef, apples and table grapes. Sugar beets and live cattle are not traded. In the case of milk, prices paid by milk processing plants are observed. Border prices were adjusted to the relevant point of competition with farm prices, to reflect domestic transport costs (port-to-plant), harvest-time prices versus annual averages (wheat), quality differences (wheat and fruits), customs charges other than tariffs. These adjustments throughout the forty-five years of the study period

[28] With the significant reduction in transport costs across borders in recent years, products that were clearly not traded in the past are gradually becoming tradables. One example is that of some horticultural products and fluid milk between Argentina and Chile.

consider an attempt to adjust for changes in cost and marketing structure through time. Lack of precise information for every sub-period required the use of extrapolations and interpolations from the available data to determine the adjustment factors

The computation of tariff equivalents for those products which are traded at more or less the same level of processing as sold by farmers (fruits, and corn in this study). In the specific case of beef, it should be noted that farmers raise and sell live cattle, but trade is in the form of meat cuts. Therefore, additional calculations were made in order to obtain import-parity prices by direct price comparison. Border price equivalents of the variety of domestic products in the beef marketing chain are not reported in national statistics, and so technical conversion factors provided by industry sources were used.

The procedure to compute tariff equivalents for those primary products which are not traded directly (milk, sugar, beef in this study) requires some specific adjustments which are not relevant for primary products (fruits, corn, wheat) which are traded without a significant processing activity after the selling point as sold by farmers. For the latter there are wholesale price series which are directly comparable (with appropriate adjustments) to border prices. This is not the case for the former type of products (e.g fluid milk, sugar beet, live cattle). For these products we obtain estimates of what would have been the free-trade border price equivalent of the not directly traded primary products at the wholesale level.

For milk the procedure applied for the estimation of the ratio of the NRA at the primary level relative (unobserved) to the NRA as a slightly processed product was the following: using observed domestic time series of prices, we first estimate a regression equation which captures the historical relationship between the domestic prices of the primary product (raw milk) with wholesale price of the processed product (powder milk). From the price comparison analysis at the level of slightly processed product we estimate the corresponding NRA. Then the predicted price of the primary product under free trade (raw milk) was computed, based on which we estimate the NRA the primary product.

The case of wheat is different, considering that there is trade in wheat grain and wheat flour. As discussed below, the specific adjustments applied for wheat were to capture the effect of seasonality in the harvest being concentrated in three to four months – who pays for the domestic storage cost - quality differences, and domestic margins. Beef represents a third case; farmers sell live cattle and international trade is in the form of beef cuts (boneless beef in this case); due to sanitary restrictions related to foot-and-mouth disease Chile does not import live cattle since approximately the early 1980s.Thus the adjustments – discussed below - consists in predicting the impact of removing border protection on beef on live cattle equivalent prices.

For fruits, there is a difference between the price received for products directly consumed domestically and the price of export-quality products. The wholesale price statistics available corresponds to domestic consumption, on average they are below export prices due to quality differences. Therefore, a quality correction factor ($q_x$) was applied. At the post harvest stage, fruits go through selection, sorting and packaging before offered in the domestic and export markets, and thus there is a margin to adjust for if one is estimating the true farm gate price.

***About the calculation of DRAs***

For DRAs one should adjust for distortions in the prices of tradable intermediate inputs, in the spirit of the approach to effective rates of protection. The DRA calculations were based on policy-induced differences in border and domestic prices of tradable inputs, weighted by

their shares in production costs. Data used to obtain the effective protection rates (EPR) are found in Hurtado, Valdes and Muchnik *(HVM)* and the Valdes's *Surveillance* for the period 1960-93. For the subsequent period the costs structure data were updated for the different inputs. In the case of sugar beets, however, although there were likely changes in the cost structure since 1993, but a lack of data forced the use of the cost structure available in *Surveillance* report. The HVM study did not include sugar.

Intermediate input price data were generated for the periods 1960-1985 and 1985-1993, and presented in the two above-cited studies. Since 1993 the items and shares in the cost structures for each product have changed, and the prices of inputs in the currently available time series going back before 1993 are not directly comparable with the data from previous studies. For the period since 1993 a cost-share structure is available for each product for a specific year (either 1999 or 2000). Taking the cost shares of tradable inputs as constant between 1993 and 2005, the impact of intervention via tradable inputs reflects exclusively the evolution of the import tariff. Fortunately, Chile has a uniform tariff since 1976, which simplifies the calculation to a simple factor. The final results for the tariff-driven adjustments to the costs of intermediate inputs were entered directly into the spreadsheet (row 237).

To this point we have only considered for the DRAs price-related intervention in output and tradable input markets. The DRAs also include non-price-related interventions, in the form of government expenditures, including subsidies. Unfortunately, government budget information was not assignable to specific farm activities, and non-price interventions were used only in the calculation of total-sector $DRA_A$. Information, however, was available to distinguish specific expenditures on small farm programs, and so three DRA measures are reported: (1) without non-price transfers, (2) with non-price transfers, but excluding small farmer programs, and (3) with non-price transfers, and including small farmer programs.

***Wheat data sources and adjustments***

*Quantity data*

- *Production volume data*: ODEPA (1976, 1987 and 2006) covers the period 1980-2005 and FAOSTAT (2006, old version) covers the period 1960 – 1979.
- *Import volume data*: Soft and hard wheat varieties are included under tariff line (*partida*) 1001.1009 (*Arancel Aduanero Chileno*) and to which price bands policy apply. Flour import data are from ODEPA and FAOSTAT.
- The time series of the domestic wheat production dedicated to the flour was approximated using the following identity:

  $$Fl = Q + M - S - F$$

  (*Fl* = wheat equivalent in flour, Q = domestic wheat production, M = wheat imports, S = seed, F = feed). Information from FAOSTAT and ODEPA, and adjusted to match local sources (Fundación Chile, 2005). Flour-wheat conversion factor: ranging from 0.68 to 0.76 between 1960 and 2005 (from various sources, including Fundación Chile, 2005).

*Farm-gate product prices*

- *Farm-gate product prices were obtained from* ODEPA (2006) and complemented by FAOSTAT (2006). Relevant prices considered were at harvest, and correspond to mill prices, averaged between soft and hard wheat.[29]

[29] There was no information available to obtain prices on both kinds of wheat separately.

- Flour wholesale prices, from ODEPA (2006) for period 1975 y 2005. There were no reliable sources for the period pre-1975, and estimates 1960-1975 derived from backward extrapolations based on observed 1975-2005 price ratios representing an underlying technical conversion factor between wheat and flour (ranging between 1.5 y 2.2).

*Border prices*

- Annual cif prices per ton for wheat and flour were obtained from ODEPA and FAOSTAT.
- Quality adjustments were made for the period 1960-1984 adding factors obtained from HVM (1990). Adjustment factors range between 0.96 y 0.98. For subsequent periods there is no information available to make such adjustments (an adjustment factor of 1).

*Direct price comparisons: procedures and methods for obtaining the NRA*

Price comparisons were made using prices at the border and at the millers (representative of the farm-gate price). According to available information in ODEPA (2006b) and from Venturelli (2003), since 1975 the following adjustments were made to estimate the annual border price equivalent at the mill:

- Relevant domestic prices are observed at the harvest period.
- Cif prices were corrected by import credit cost, credit taxes and customs commissions. To these costs were added unloading costs, transport and losses.
- A seasonality correction factor for storage costs was used based on VHM (1990). What would be the price received by the farmer during harvest – P* – that equals the present value of the import parity price (without interventions) – $P_A$ – prevailing in the month imports begin. The numbers of months between harvest and imports reflects the degree of the country's self-sufficiency. The discount rate used is that of the Central Bank's lending rate (Central Bank, 2006). The formula applied is $P^* = \frac{P_A}{H}\left[\frac{(1+r)^H - 1}{r(1+r)^T}\right]$ where $H$ is the harvest period (normally between the 4 and 7 first months of the year), $T$ is period of initial imports, and $r$ the domestic interest rate plus a non-financial cost of 1% monthly.

- In computing NRAs and DRAs border prices were converted from dollars to Chilean pesos at the prevailing market (nominal) exchange rate – as reported by the Central Bank (2006). As discussed in HVM, since early 1960s and until mid 1980s Chile's exchange rate regime went through major changes, during some years with fixed nominal rates, followed by a crawling peg system, then an exchange rate band, and a floating rate since approximately the mid 1990s. A so-called 'parallel' market rate was common during the period of fixed exchange rates in the 1960s and 1970s. Under the floating rate system there has been neither black market nor parallel rate, but this does no imply that there is no exchange rate misalignment, what is discussed in the text. While most results are computed at the prevailing nominal rate at the time, with some hesitation and only as an illustration the report presents alternative estimates of NRAs and DRAs at an equilibrium real rate; these are tentative results which would require further research, beyond the scope of this project
- As an illustration of the approach, Table A-3 presents the adjustments made in computing the tariff equivalent of interventions by direct comparison of prices for wheat in 2000

*Price transmission between wheat flour and wheat grain*

- Direct price comparison have to be interpreted with caution, considering the nature of the adjustments made, but in particularly considering the high price volatility, both inter and intra-yearly price fluctuations. For any given years, this study assumed that the level of interventions (NRA) in wheat grain and wheat flour were equal

***Beef data sources and adjustments***

Primary product: production of live animal (in tons).Considered a non-tradable product, imports of live cattle has been prohibited since the early 1980s due to sanitary requirements when Chile became free of Foot-and-Mouth Disease, a disease which still prevails in traditional suppliers such as Argentina, Brazil, and Paraguay.

Lightly processed product: boneless meat, importable

Observations: import parity price comparison are based on the border price of imported boneless beef and its domestic equivalent adjusted to selling price for live cattle (at cattle auctions)

*Agricultural products and lightly processed foods - beef*

- Production in annual tons slaughter, from ODEPA (2006), assuming an average weight of 450 kg for head (same as in HVM, 1990).
- Production of boneless meat $Q_b$ from the expression $Q_b$=0.276*$Q$, where the parameter represents the conversion of live cattle to boneless meat.

*Farm-gate product prices - beef*

- Prices of live animal (steers) expressed in per ton equivalent based on price series from auction markets in various regions (ODEPA, 2006 and VHM, 1990).
- Domestic prices in boneless meat equivalent based on the value of carcass meat , expressed as a function of the value of boneless meat and the boneless cuts, applying the following expression:

$$P_c^w Q_c = P_{wb}^w Q_{wb} + P_{bl}^w Q_{bl} \text{ or } P_c^w = P_{wb}^w f_{wb} + P_{bl}^w f_{bl} ,$$

Where $P_c^w$ and $Q_c$ are the wholesale price and the production of meat in carcass, respectively, and the subindex in the value expression of the left side *wb,* y *bl* shows meat with bone and boneless. Therefore, parameters $f_{wb}$ y $f_{bl}$ correspond to conversion factors of meat with and without bone, respectively. According to this expression, the wholesale price of boneless meat $P_{bl}^w$ can be expressed as:

$$P_{bl}^w = \frac{P_c^w}{f_{bl}} - \frac{P_{wb}^w f_{wb}}{f_{bl}} \quad (1)$$

where

$P_c^w$ = Carcass price, at wholesale (INE, as reported by ODEPA, 2006)

$P^w_{wb}$ = Price with bones, at wholesale. Available data for 1985 (Panorama Economico de la Agricultura, 1986). The relation between retail price and wholesale price of meat with bones (INE, as reported by ODEPA, 2006); extrapolated for the all period of analysis

$f_{bl}$ = 0.501

$f_{wb}$ = 0.35

*Border prices*

- Border prices of the fresh or frozen boneless meat from ODEPA (2006)
- Border price equivalent for live animal $P_l^*$ were calculated from the prices of carcass meat, using a technical conversion factor $f_{cl}$ = 0.56 and margin *m* estimated in 9%:

$$P_c = \frac{P_l}{0.56}(1+m) \tag{2}$$

*Direct price comparison for computing NRAs*

- Import cost assumed at 5%, based on various sources in the industry.
- NRA for the period 1960-1984 based on the VHM report (1990) and for 1984-94 from the *Surveillance* report (Valdes 1996).
- Exchange Rate, same as in wheat above.

*Price transmission and distortions*

From the expressions (1) and (2), the border price equivalent to reach the live animal price in the absence of distortions expressed in boneless meat equivalent:

$$P_l = \frac{f_{cl}\, f_{bl}}{(1+m)}\left[ P^w_{bl} + \frac{f_{wb}}{f_{bl}} P^l_{wb} \right] = 0.257\left[P^w_{bl} + 0.7 P^l_{wb}\right] = 0.257\, P^w_{bl} + 0.180 P^l_{wb}$$

*Obtaining DRA*

Production cost figures to adjust for interventions in tradable intermediate inputs from consultation with the industry.

***Milk data sources and adjustments***

Primary product: raw milk, non tradable

Lightly processed product: powder milk (most important processed product), importable during the whole period analyzed.

Note: direct price comparison was made to the level of processed product, and the price equivalent for the primary product under no-intervention was simulated by simple econometric methods.

*Quantity data for agricultural products and lightly processed foods*

- Production data of raw milk from 1990 from the Milk Bulletin, from ODEPA (2006) and from FAOSTAT (2006) for period before 1990.

- Production of powder milk data since 1975 obtained from the Milk Bulletin, from ODEPA (2006). There was not information available for the period before 1975, so a time series was generated based on the historic relationship between milk plant reception and a conversion factors, estimated econometrically as:[30]

$$\ln Qpw_t = -3.93 + 1.03 \ln Qf_t$$

being $Qpw_t$ and $Qf_t$ represent powder and raw milk production, respectively.

- Data of milk plant reception volumes available since 1979 onwards. Prior to 1979 estimated by extrapolation of the series 1979-2005.

*Domestic prices*

- Domestic prices of fresh fluid milk paid to producers (farm gate prices), from ODEPA (2006), Milk Bulletin.
- Wholesales domestic prices of powder milk, from ODEPA (2006), Milk Bulletin.
- Conversion factor from fluid to powder from ODEPA (2006), Milk Bulletin.

*Border prices*

- Border price per ton of powder milk obtained from Customs Statistics represent the import value per unit, with no adjustments for possible quality differences (fat content, others).

*Direct price comparison: procedures and methods for obtaining NRA*

Direct border/domestic price comparison was done for the powder milk equivalent at the point of competition with farm prices (milk plant). This includes adjustments for conversion factor, domestic transport, packing, and marketing costs, a margin ranging between 5% and 15%.But the adjustment issue is more complex, as explained in the text, considering that farm prices vary according to the season, refrigerated vs un-refrigerated raw milk, and other variables. Moreover, during some years before 1994 the government applied a minimum import price scheme (removed after the Uruguay Round Agreement) and safeguards, as part of dairy sector policies.

Having generated the relevant time series, a simple adjustment approach was applied to capture the degree of price transmission, that is: what it's the price that would have prevailed for the primary product (raw milk paid to the producer) under free trade in powder milk.. The estimated equation linking domestic prices of raw milk (*Pp*) and powder milk (*Pl*)[31] is:

$$\ln Pp_t = -5.42 + 1.19 \ln(Pl_t)$$

*Obtaining DRA*

The share of tradable intermediate inputs in costs of production at the farm level estimated at around 30% for period 1994-2005.

[30] Using Newey West robust estimators to the existence of correlation; $R^2 = 0.957$, $se(b_0)=0.47$; $se(b_1)=0.04$
[31] Using Newey West robust estimators to the existence of correlation. $R^2 = 0.993$, $se(b_0)=0.23$; $se(b_1)=0.02$

***Sugar data sources and adjustments***

Primary product: sugar beet, non tradable

Lightly processed product: refined sugar, importable

Observations: direct price comparison was conducted between domestic and imported sugar. No divergence between the distortions at primary product and processed product level was assumed. Thus, NRAs of sugar beet and refined sugar are identical.

*Quantity data for agricultural products and lightly processed foods*

- *Sugar beet production data*: ODEPA (1976, 1987 and 2006) for period 1980-2005 and FAOSTAT (2006, old version) for period 1960 – 1979.
- *Sugar production data*: FAOSTAT (2006) from 1960 – 1986, Venturelli (2003) for 1986 – 2000 and author's estimation for 2001 – 2005, according conversion factor (implicit in the industry) of years 1997 to 2000.

*Domestic prices*

- Sugar beet prices: available for period 1965 – 2005 (ODEPA 1976 and 2006). Data for 1960 – 1964 was generated by the authors applying the average relation between refined sugar and sugar beet prices, from ODEPA (1976) for the period 1965 – 1974.
- Prices of refines sugar prices: available only for the period 1975 – 2005. The author's extended the price series back to 1969, based on unpublished information obtained from Instituto Nacional de Estadísticas (INE)

*Border prices and price transmission*

- Border price for refined sugar for period 1960 – 2005 measures the average annual per unit import value from ODEPA (2006) and FAOSTAT (2006).
- No quality adjustments made, considered not applicable in this case.

*Direct price comparison for computation of NRA*

Prices comparison was made from border (refined) to processing plant level (sugar beet), based on information available since 1984 in ODEPA (2006b) and from data in Venturelli (2003). Average annual prices were used. CIF prices were adjusted for financial cost of imports ('carta de credito'), credit tax and customs commissions, plus port charges, domestic transport costs and losses. Based on information available for the period from 1983 onwards, the author's estimates of this additional costs amount to approximately 8 percent of the cif price.[32]

[32] Particularly for sugar and maize, our preliminary estimates for the 2000s yielded NRA values that were unexpectedly high (positive and negative, respectively) considering the prevailing border taxes, the results of other estimates and the opinion of various specialists. We concluded that our direct price comparison estimates for these two import-competing products were influenced by domestic industry specific distortions in these activities where there is only one buyer (sugar) or only three or four major buyers (maize). The reader should consider that in this study we are only measuring the NRA that results from trade and price policies, and not the impact of a possible monopsony in these two markets. The NRA values reported were computed based on the import parity price net of tariffs (ad valorem and specific in the case of sugar), adjusted for trade preferences and domestic transport cost and quality adjustment, relative to an hypothetical domestic farm price

***Product coverage and the classification according to tradability***

Grouping products into agricultural importables, exportables and non-tradables was done by the authors according to their best judgement, based on historical patterns of trade. The seven agricultural (primary) activities selected for detailed analysis are representative of exportables and import-competing products. Historically, particularly since the trade reforms starting around 1976, Chile's price and trade policies were focussed primarily in a few import-competing activities, principally wheat, sugar, oil seeds and dairy. The seven products chosen represent between 30 and 50 percent of the total value of the agricultural primary production, depending on the sub-period considered. But readers should considered that there were no product specific policies other than for these few activities, and the rest of importables were subject to the MFN external tariff at the time. Thus, after 1976, for the rest of tradables, there were no intervention on exportables, and importables were subject to the uniform tariff. As discussed in the text, before 1976 there were numerous tariff, QRs and non-tariff barriers for a broads set of products and hence the range of policy interventions covered a much broader set of products.

Data on total value of agricultural production (at domestic prices) was obtained from the Central Bank. But these set of data is aggregated into three major groups, namely agriculture (crops and livestock), fruits and vineyards, and the "rest"; which includes forestry products. The latter was excluded by the authors based on information provided by the Instituto Forestal.

***Calculation of the non-agricultural sector and the RRA***

Classification of the tradability in goods and services for the rest of the economy was done based on information from World Bank data base (Nicita and Olarreaga) and on Chile's National Accounts. Considering the trade regime prevailing since the trade reforms in 1976, as discussed in the text, no direct interventions applied for the export and non- tradable sectors (e.g NRAs = 0). Perhaps a very significant area subject to government interventions throughout the period was the service sector – particularly in public utilities and the financial sectors, both with likely significant impact on the performance of the tradable sectors. But an assessment of the impact of interventions on the services sector was beyond the scope of this study. In computing total interventions, no distortions were imputed to services

Appendix Table 1: Effective tariff by sector, Chile, 2000 to 2005

(MFN tariffs adjusted by trade preferences)

| | 2000 | 2001 | 2002 | 2003 | 2004 | 2005 |
|---|---|---|---|---|---|---|
| **By Economic Sector** | | | | | | |
| Agricultural products and livestock | 11.2 | 4.4 | 3.2 | 2.2 | 1.4 | 1.3 |
| Agriculture (*) | 12.9 | 5.0 | 3.6 | 2.3 | 1.6 | 1.4 |
| Fruits | 0.7 | 0.6 | 0.6 | 0.9 | 0.3 | 0.3 |
| Livestock products | 6.7 | 4.8 | 3.5 | 2.5 | 0.8 | 0.6 |
| Forestry | 6.3 | 5.8 | 4.4 | 2.1 | 1.4 | 1.3 |
| Fisheries | 8.8 | 7.7 | 5.8 | 5.0 | 4.6 | 2.6 |
| Minerals | 4.6 | 2.6 | 2.0 | 1.1 | 1.7 | 1.9 |
| Selected manufactured products | 7.0 | 6.1 | 5.1 | 3.3 | 2.2 | 1.9 |
| Food and feedstuff | 11.1 | 6.9 | 5.2 | 4.1 | 3.5 | 3.0 |
| Beverages and Tobacco | 5.9 | 4.9 | 4.5 | 3.4 | 2.6 | 2.0 |
| Textiles | 7.8 | 7.0 | 6.1 | 4.8 | 4.4 | 4.5 |
| Forestry products/furniture | 7.3 | 6.5 | 5.4 | 2.9 | 2.1 | 2.0 |
| Cellulose, paper products and printing | 4.9 | 3.9 | 3.3 | 1.4 | 0.5 | 0.4 |
| **By Product Category** | | | | | | |
| Consumption Goods | 7.3 | 6.4 | 5.6 | 3.9 | 3.3 | 3.1 |
| Capital Goods | 6.6 | 6.1 | 5.2 | 2.7 | 1.6 | 1.3 |
| Intermediate Products | 6.6 | 5.0 | 4.2 | 2.7 | 1.9 | 1.7 |
| **Total (weighted average)** | **6.7** | **5.5** | **4.7** | **2.9** | **2.1** | **1.9** |

Note (*): actual MFN tariffs adjusted for trade preferences and for specific tariffs associated with price bands and safeguards for agricultural products.

Source: Banco Central, Becerra, 2006.

Appendix Table 2: Effective rates of protection at the official exchange rate, selected primary products, Chile, 1960 to 1993

(percent)

| | 1960-64 | 1965-69 | 1970-73 | 1974-82 | 1983-90 | 1991-93 |
|---|---|---|---|---|---|---|
| **Importables** | | | | | | |
| Wheat | 24.8 | 16.6 | 192.5 | 4.1 | 16.4 | 41.5 |
| Milk | 96.4 | -22.8 | -28.0 | 10.3 | 28.0 | 47.4 |
| Beef | -9.4 | -30.6 | -31.5 | -4.7 | 26.6 | 11.7 |
| Sugarbeet | n.a. | n.a. | n.a. | n.a. | 240.2 | 90.4 |
| Maize | n.a. | n.a. | n.a. | n.a. | -22.3 | -5.6 |
| **Exportables** | | | | | | |
| Apples | 23.4 | 33.6 | 68.3 | -10.1 | -12.0 | -0.7 |
| Table Grapes | 21.2 | 23.8 | 46.0 | 7.3 | -2.4 | -1.0 |

Sources: 1960-86 from Valdés, Hurtado and Muchnik (1001), 1987-1993 from Valdés and Schaeffer (1995)

Appendix Table 3: An example of direct price comparison of an importable primary product, Wheat, Chile, 2000

| | | | |
|---|---|---|---|
| **Volume** | | | |
| A | Production (tons) | 1.492.710 | |
| B | Wheat imports, TOTAL (tons) | 499.923 | |
| **Prices** | | | |
| C | Domestic price, wholesaler, annual average (CH$/ton) | 98.099 | |
| D | Domestic price, wholesaler, harvest period. (CH$/ton) | 94.275 | |
| E | CIF price (US$/ton) | 127,7 | |
| **Exchange rate (CH$/US$), harvest period** | | 551 | |
| **Import cost adjustments** | | | |
| F | Import credit (x CIF) | 0,36% | |
| G | Credit tax (x CIF) | 0,40% | |
| H | Interest (x CIF) | 2,23% | |
| I | Customs commission (x CIF) | 0,2% | |
| J | Unload and transport to plant (US$/ton) | 10,5 | |
| K | Other costs (US$/ton) | 1,6 | |
| L | Losses (x result) | 0,30% | |
| M | TOTAL (US$/ton) | 16,3 | k = [(c(d+e+f+g) + h + i](1+j) |
| N | Domestic rate (%) | 1,16% | |
| O | Storage cost per month (eq. interest %) | 1,00% | |
| P | Month T (Dom. demand > Dom. supply) | 8 | |
| Q | Harvest (nº months) | 4 | |
| R | Seasonality adjustment | 87,1% | p: from l,m,n,o |
| **Eq. Border price (US$/ton)** | | 125,3 | q = p(c+k) |
| **Nominal Rate of Assistance (NRA)** | | 36,5% | =b/(q*Exc.Rate) - 1 |

Note: */ The proportion, *R*, of cif price of the harvest-time producer price that would have to prevail such as to leave indifferent the buyer-miller between farm purchases at harvest and imports. The harvest lasts four months, and so the calculated R is an average adjustment due to storage-related costs. Note that millers are importing to cover four months and the cif price used here is that observed at the beginning of the import period. Using the letters of the first column of the table that correspond to the values in the third column, one can write this proportion: $P_a^{'} = \frac{P_a}{Q}\left[\frac{(1+(N+O))^{Q}-1}{(N+O)(1+(N+O))^{P}}\right]$

Appendix Table 4: NRAs[a] for agricultural primary products, Chile, 1960 to 2005

| Year | Wheat | | Milk | | Beef | | Sugarbeet | | Maize | | Apples | | Grapes | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | NRA$^o$ | NRA | NRA$^o$ | NRA | NRA$^o$ | NRA | NRA$^o$ | NRA | NRA$^o$ | NRA | NRA$^o$ | NRA | NRA$^o$ | NRA |
| 1960 | 23.0 | 35.0 | 186.0 | 209.3 | -19.8 | -18.5 | n.a. | n.a. | -24.1 | -28.5 | 0.0 | 3.6 | 0.0 | 3.6 |
| 1961 | 14.0 | 20.1 | 186.0 | 203.7 | -13.8 | -12.8 | n.a. | n.a. | -37.8 | -42.1 | 0.0 | 0.1 | 0.0 | 0.1 |
| 1962 | 4.0 | 6.3 | 186.0 | 197.5 | -0.7 | -0.1 | n.a. | n.a. | -0.3 | -4.7 | 0.0 | -1.4 | 0.0 | -1.4 |
| 1963 | -9.0 | -7.1 | 186.0 | 198.1 | 2.3 | 3.0 | n.a. | n.a. | -13.6 | -18.0 | 36.0 | 33.5 | 36.0 | 33.5 |
| 1964 | -6.0 | -3.1 | 186.0 | 198.5 | -16.9 | -16.2 | n.a. | n.a. | 0.5 | -3.8 | 19.0 | 16.5 | 19.0 | 16.5 |
| 1965 | 19.0 | 21.8 | 75.0 | 81.1 | -21.9 | -21.4 | n.a. | n.a. | 2.7 | -1.7 | 16.0 | 13.7 | 16.0 | 13.7 |
| 1966 | 59.0 | 51.6 | 41.0 | 34.0 | -25.9 | -26.2 | n.a. | n.a. | -22.3 | -26.7 | 2.0 | -1.9 | 2.0 | -1.9 |
| 1967 | 0.0 | -7.0 | 28.0 | 17.1 | -25.9 | -26.6 | n.a. | n.a. | 5.5 | 1.1 | 41.0 | 36.8 | 41.0 | 36.8 |
| 1968 | -4.0 | -11.9 | 28.0 | 14.6 | -29.9 | -30.4 | n.a. | n.a. | -4.3 | -8.7 | 40.9 | 33.3 | 40.9 | 33.3 |
| 1969 | -11.0 | -19.3 | 23.0 | 3.1 | -24.9 | -25.5 | n.a. | n.a. | 6.9 | 2.5 | 37.0 | 30.5 | 37.0 | 30.5 |
| 1970 | 2.0 | -1.0 | 47.0 | 38.6 | -18.9 | -19.1 | n.a. | n.a. | -3.9 | -8.3 | 33.0 | 31.2 | 33.0 | 31.2 |
| 1971 | 25.0 | 17.3 | 15.0 | 13.2 | -15.9 | -16.4 | n.a. | n.a. | -12.0 | -16.4 | 52.0 | 49.5 | 52.0 | 49.5 |
| 1972 | 15.0 | -5.7 | 4.0 | -14.6 | -36.9 | -37.9 | n.a. | n.a. | -4.7 | -9.0 | 79.0 | 74.8 | 79.0 | 74.8 |
| 1973 | -57.0 | -67.6 | -1.0 | 12.7 | -31.9 | -31.6 | n.a. | n.a. | 35.2 | 30.8 | 32.0 | 11.0 | 32.0 | 11.0 |
| 1974 | -38.0 | -38.5 | 15.0 | 12.6 | -17.9 | -17.8 | n.a. | n.a. | -43.9 | -48.3 | 14.0 | 13.0 | 14.0 | 13.0 |
| 1975 | -31.0 | -34.7 | 37.0 | 25.0 | 0.3 | -0.9 | 75.2 | 69.3 | -46.5 | -50.8 | 0.0 | -1.4 | 0.0 | -1.4 |
| 1976 | -21.0 | -22.9 | 28.0 | 22.7 | 0.2 | -0.1 | -3.3 | -9.2 | -14.8 | -19.2 | 0.0 | -1.4 | 0.0 | -1.4 |
| 1977 | 100.0 | 95.7 | 3.0 | 0.3 | 0.1 | -0.1 | 15.9 | 9.9 | -12.8 | -17.2 | 0.0 | -1.6 | 0.0 | -1.6 |
| 1978 | 9.0 | 5.7 | 12.0 | 9.3 | 23.2 | 22.8 | 76.9 | 71.0 | 6.0 | 1.6 | 0.0 | -1.1 | 0.0 | -1.1 |
| 1979 | -12.0 | -16.3 | 61.0 | 53.5 | 0.1 | -0.5 | 60.7 | 54.8 | -4.0 | -8.3 | 0.0 | -1.9 | 0.0 | -1.9 |
| 1980 | 6.0 | 1.3 | 22.0 | 16.6 | 8.1 | 7.5 | 32.1 | 26.2 | -8.5 | -12.9 | 0.0 | -1.6 | 0.0 | -1.6 |
| 1981 | 12.0 | 6.9 | 2.0 | -3.4 | 0.1 | -0.6 | -10.9 | -16.9 | -4.8 | -9.2 | 0.0 | -1.9 | 0.0 | -1.9 |
| 1982 | 12.0 | 6.3 | 5.0 | -0.6 | 0.1 | -0.6 | 57.9 | 51.9 | 10.8 | 6.2 | 0.0 | -1.2 | 0.0 | -1.2 |
| 1983 | 11.0 | 2.7 | 11.0 | -0.7 | 0.1 | -1.4 | 58.3 | 52.4 | -1.8 | -6.1 | 0.0 | -2.6 | 0.0 | -2.6 |
| 1984 | 35.0 | 22.0 | 39.0 | 21.6 | 32.2 | 29.8 | 34.4 | 27.4 | -27.5 | -31.3 | 0.0 | -3.6 | 0.0 | -3.6 |
| 1985 | 24.6 | 19.8 | 84.9 | 79.8 | 58.8 | 43.3 | 99.9 | 90.9 | -23.3 | -28.2 | 0.0 | -1.9 | 0.0 | -1.9 |
| 1986 | 44.2 | 41.0 | 50.7 | 46.8 | 64.0 | 49.2 | 67.6 | 62.5 | -2.7 | -7.0 | 0.0 | -0.9 | 0.0 | -0.9 |
| 1987 | 27.5 | 23.9 | 63.1 | 59.9 | 38.8 | 26.8 | 49.4 | 44.5 | 2.3 | -3.1 | 0.0 | -0.8 | 0.0 | -0.8 |
| 1988 | -8.6 | -10.5 | 28.4 | 26.7 | 41.0 | 27.7 | 30.1 | 26.5 | 7.9 | 4.5 | 0.0 | -0.6 | 0.0 | -0.6 |
| 1989 | -2.3 | -4.4 | 14.3 | 13.0 | 30.5 | 17.9 | 24.9 | 21.4 | -15.7 | -18.5 | 0.0 | -1.1 | 0.0 | -1.1 |
| 1990 | 10.3 | 7.7 | 0.5 | -0.8 | -1.5 | -12.3 | 15.4 | 12.3 | -26.2 | -28.4 | 0.0 | -0.6 | 0.0 | -0.6 |
| 1991 | 42.9 | 40.3 | 11.5 | 10.1 | 31.9 | 20.0 | 27.1 | 24.0 | -5.5 | -8.1 | 0.0 | -0.4 | 0.0 | -0.4 |
| 1992 | 32.0 | 30.3 | 24.4 | 23.3 | 42.1 | 30.9 | 29.6 | 27.1 | 4.5 | 2.1 | 0.0 | -0.3 | 0.0 | -0.3 |
| 1993 | 26.5 | 24.7 | 37.1 | 36.1 | 32.5 | 21.0 | 37.9 | 35.5 | -2.1 | -4.4 | 0.0 | -0.4 | 0.0 | -0.4 |
| 1994 | 38.0 | 35.1 | 44.2 | 42.6 | 24.7 | 22.8 | 11.1 | 5.9 | 8.8 | 4.7 | 0.0 | -0.2 | 0.0 | -0.2 |
| 1995 | 19.5 | 17.0 | 19.6 | 18.2 | 27.7 | 25.7 | 2.0 | -3.6 | 9.7 | 5.2 | 0.0 | -0.2 | 0.0 | -0.2 |
| 1996 | 1.8 | 0.0 | 10.7 | 9.3 | 18.0 | 16.0 | 10.0 | 4.3 | 4.4 | 0.8 | 0.0 | -0.2 | 0.0 | -0.2 |
| 1997 | 28.9 | 26.5 | 23.5 | 21.8 | 12.4 | 10.4 | 20.0 | 13.4 | 0.7 | -4.1 | 0.0 | -0.2 | 0.0 | -0.2 |
| 1998 | 45.0 | 42.4 | 19.5 | 17.9 | 4.9 | 3.0 | 42.1 | 34.8 | 8.5 | 3.2 | 0.0 | -0.2 | 0.0 | -0.2 |
| 1999 | 42.7 | 40.4 | 12.2 | 10.7 | 9.2 | 7.2 | 70.0 | 63.0 | 11.0 | 6.0 | 0.0 | -0.2 | 0.0 | -0.2 |
| 2000 | 36.5 | 34.6 | 23.4 | 22.0 | 7.7 | 6.0 | 60.0 | 54.0 | 8.2 | 3.5 | 0.0 | -0.1 | 0.0 | -0.1 |
| 2001 | 2.0 | 0.8 | 10.6 | 9.5 | 3.9 | 2.4 | 39.8 | 35.8 | 3.8 | 0.1 | 0.0 | -0.2 | 0.0 | -0.2 |
| 2002 | 3.8 | 2.8 | 1.1 | 0.1 | 11.6 | 10.1 | 45.0 | 41.1 | 5.7 | 2.8 | 0.0 | -0.2 | 0.0 | -0.2 |
| 2003 | 19.3 | 18.5 | 6.1 | 5.3 | 4.2 | 3.0 | 30.1 | 26.4 | 2.0 | -0.4 | 0.0 | -0.1 | 0.0 | -0.1 |
| 2004 | 2.8 | 2.0 | -1.2 | -1.9 | -0.8 | -1.9 | 20.0 | 15.5 | 2.0 | -0.4 | 0.0 | -0.2 | 0.0 | -0.2 |
| 2005 | 4.8 | 3.9 | -0.4 | -1.1 | 1.4 | 0.3 | 19.9 | 15.1 | 1.1 | -2.0 | 0.0 | -0.2 | 0.0 | -0.2 |

[a] NRA$^o$ refers to assistance just from output price distortions (before the output price equivalents of input price distortions are added to get the NRA).
Source: Authors' spreadsheet using methodology from Anderson et al. (2008)

Appendix Table 5: Official exchange rate, Chile, 1960 to 2005

(local currency per US dollar)

| **Year** | Official exchange rate | **Year** | Official exchange rate |
|---|---|---|---|
| 1960 | 0.00105 | 1983 | 78.8 |
| 1961 | 0.00105 | 1984 | 98.5 |
| 1962 | 0.00114 | 1985 | 160.9 |
| 1963 | 0.00188 | 1986 | 192.9 |
| 1964 | 0.00237 | 1987 | 219.4 |
| 1965 | 0.00313 | 1988 | 245.0 |
| 1966 | 0.00396 | 1989 | 267.0 |
| 1967 | 0.00503 | 1990 | 304.9 |
| 1968 | 0.00679 | 1991 | 349.2 |
| 1969 | 0.00897 | 1992 | 362.6 |
| 1970 | 0.01155 | 1993 | 404.2 |
| 1971 | 0.01241 | 1994 | 420.2 |
| 1972 | 0.01949 | 1995 | 396.8 |
| 1973 | 0.1108 | 1996 | 412.3 |
| 1974 | 0.8320 | 1997 | 419.3 |
| 1975 | 4.9 | 1998 | 460.3 |
| 1976 | 13.1 | 1999 | 508.8 |
| 1977 | 21.5 | 2000 | 539.5 |
| 1978 | 31.7 | 2001 | 634.9 |
| 1979 | 37.2 | 2002 | 672.0 |
| 1980 | 39.0 | 2003 | 691.4 |
| 1981 | 39.0 | 2004 | 609.5 |
| 1982 | 50.9 | 2005 | 559.8 |

Source: Central Bank of Chile

Appendix Table 6: Nominal rates of assistance to covered products, Chile, 1960 to 2005 (percent)

| | Apple | Beef | Maize | Milk | Sugar | Grape | Wheat | All |
|---|---|---|---|---|---|---|---|---|
| 1960 | 4 | -18 | -28 | 209 | na | 6 | 35 | 12 |
| 1961 | 0 | -13 | -42 | 204 | na | 1 | 20 | 9 |
| 1962 | -1 | 0 | -5 | 198 | na | -2 | 6 | 16 |
| 1963 | 33 | 3 | -18 | 198 | na | 34 | -7 | 13 |
| 1964 | 17 | -16 | -4 | 198 | na | 18 | -3 | 3 |
| 1965 | 14 | -21 | -2 | 81 | na | 11 | 22 | 4 |
| 1966 | -2 | -26 | -27 | 34 | na | -9 | 52 | 1 |
| 1967 | 37 | -27 | 1 | 17 | na | 37 | -7 | -8 |
| 1968 | 33 | -30 | -9 | 15 | na | 30 | -12 | -14 |
| 1969 | 31 | -25 | 3 | 3 | na | 30 | -19 | -14 |
| 1970 | 31 | -19 | -8 | 39 | na | 33 | -1 | -2 |
| 1971 | 49 | -16 | -16 | 13 | na | 39 | 17 | 1 |
| 1972 | 75 | -38 | -9 | -15 | na | 57 | -6 | -16 |
| 1973 | 11 | -32 | 31 | 13 | na | 3 | -68 | -16 |
| 1974 | 13 | -18 | -48 | 13 | na | 32 | -39 | -19 |
| 1975 | -1 | -1 | -51 | 25 | 69 | 3 | -35 | -13 |
| 1976 | -1 | 0 | -19 | 23 | -9 | -1 | -23 | -6 |
| 1977 | -2 | 0 | -17 | 0 | 10 | -1 | 96 | 15 |
| 1978 | -1 | 23 | 2 | 9 | 71 | -1 | 6 | 13 |
| 1979 | -2 | 0 | -8 | 54 | 55 | -1 | -16 | 3 |
| 1980 | -2 | 8 | -13 | 17 | 26 | -1 | 1 | 6 |
| 1981 | -2 | -1 | -9 | -3 | -17 | -1 | 7 | -3 |
| 1982 | -1 | -1 | 6 | -1 | 52 | -1 | 6 | 3 |
| 1983 | -3 | -1 | -6 | -1 | 52 | -2 | 3 | 2 |
| 1984 | -4 | 30 | -31 | 22 | 27 | -3 | 22 | 13 |
| 1985 | -2 | 43 | -28 | 80 | 91 | -1 | 20 | 27 |
| 1986 | -1 | 49 | -7 | 47 | 63 | -1 | 41 | 36 |
| 1987 | -1 | 27 | -3 | 60 | 44 | -1 | 24 | 25 |
| 1988 | -1 | 28 | 5 | 27 | 26 | -1 | -10 | 11 |
| 1989 | -1 | 18 | -19 | 13 | 21 | -1 | -4 | 5 |
| 1990 | -1 | -12 | -28 | -1 | 12 | -1 | 8 | -5 |
| 1991 | 0 | 20 | -8 | 10 | 24 | -1 | 40 | 15 |
| 1992 | 0 | 31 | 2 | 23 | 27 | -1 | 30 | 20 |
| 1993 | 0 | 21 | -4 | 36 | 35 | -1 | 25 | 19 |
| 1994 | 0 | 23 | 5 | 43 | 6 | -1 | 35 | 20 |
| 1995 | 0 | 26 | 5 | 18 | -4 | -1 | 17 | 13 |
| 1996 | 0 | 16 | 1 | 9 | 4 | -1 | 0 | 6 |
| 1997 | 0 | 10 | -4 | 22 | 13 | -1 | 26 | 12 |
| 1998 | 0 | 3 | 3 | 18 | 35 | -1 | 42 | 12 |
| 1999 | 0 | 7 | 6 | 11 | 63 | -1 | 40 | 13 |
| 2000 | 0 | 6 | 4 | 22 | 54 | 0 | 35 | 15 |
| 2001 | 0 | 2 | 0 | 10 | 36 | 0 | 1 | 6 |
| 2002 | 0 | 10 | 3 | 0 | 41 | 0 | 3 | 6 |
| 2003 | 0 | 3 | 0 | 5 | 26 | 0 | 18 | 6 |
| 2004 | 0 | -2 | 0 | -2 | 15 | 0 | 2 | 0 |
| 2005 | 0 | 0 | -2 | -1 | 15 | 0 | 4 | 1 |

Source: Authors' spreadsheet

Appendix Table 7: Value shares of primary production of covered[a] and non-covered products, Chile, 1960 to 2005

(percent)

| | Apple | Beef | Maize | Milk | Sugar | Grape | Wheat | Non-covered | Total |
|---|---|---|---|---|---|---|---|---|---|
| 1960 | 1 | 28 | 4 | 4 | na | 1 | 14 | 48 | 100 |
| 1961 | 2 | 27 | 5 | 4 | na | 1 | 15 | 46 | 100 |
| 1962 | 4 | 27 | 3 | 4 | na | 1 | 16 | 45 | 100 |
| 1963 | 3 | 29 | 4 | 4 | na | 1 | 23 | 36 | 100 |
| 1964 | 3 | 31 | 4 | 4 | na | 1 | 21 | 36 | 100 |
| 1965 | 2 | 26 | 4 | 5 | na | 1 | 14 | 48 | 100 |
| 1966 | 4 | 22 | 4 | 7 | na | 1 | 10 | 53 | 100 |
| 1967 | 2 | 21 | 4 | 8 | na | 1 | 13 | 52 | 100 |
| 1968 | 2 | 21 | 3 | 7 | na | 1 | 12 | 54 | 100 |
| 1969 | 3 | 22 | 1 | 8 | na | 1 | 14 | 51 | 100 |
| 1970 | 4 | 24 | 2 | 6 | na | 1 | 13 | 50 | 100 |
| 1971 | 3 | 24 | 3 | 9 | na | 1 | 11 | 50 | 100 |
| 1972 | 2 | 17 | 2 | 7 | na | 1 | 8 | 62 | 100 |
| 1973 | 4 | 17 | 3 | 9 | na | 1 | 5 | 61 | 100 |
| 1974 | 2 | 30 | 5 | 8 | na | 0 | 13 | 41 | 100 |
| 1975 | 2 | 13 | 8 | 8 | 3 | 1 | 20 | 45 | 100 |
| 1976 | 2 | 18 | 3 | 8 | 7 | 1 | 16 | 46 | 100 |
| 1977 | 3 | 17 | 3 | 8 | 4 | 1 | 7 | 57 | 100 |
| 1978 | 2 | 13 | 2 | 8 | 1 | 1 | 8 | 64 | 100 |
| 1979 | 2 | 17 | 4 | 5 | 1 | 1 | 10 | 60 | 100 |
| 1980 | 2 | 13 | 3 | 7 | 1 | 1 | 7 | 65 | 100 |
| 1981 | 2 | 13 | 3 | 7 | 3 | 1 | 5 | 65 | 100 |
| 1982 | 2 | 13 | 3 | 7 | 1 | 1 | 4 | 69 | 100 |
| 1983 | 2 | 14 | 5 | 7 | 2 | 1 | 5 | 64 | 100 |
| 1984 | 2 | 14 | 8 | 7 | 5 | 2 | 8 | 55 | 100 |
| 1985 | 2 | 9 | 7 | 4 | 3 | 2 | 9 | 64 | 100 |
| 1986 | 3 | 8 | 4 | 4 | 5 | 2 | 10 | 64 | 100 |
| 1987 | 3 | 9 | 3 | 4 | 4 | 3 | 10 | 64 | 100 |
| 1988 | 2 | 10 | 3 | 5 | 4 | 2 | 12 | 62 | 100 |
| 1989 | 2 | 11 | 5 | 7 | 4 | 2 | 11 | 57 | 100 |
| 1990 | 3 | 14 | 5 | 8 | 3 | 3 | 7 | 57 | 100 |
| 1991 | 4 | 10 | 3 | 6 | 3 | 2 | 5 | 66 | 100 |
| 1992 | 4 | 8 | 3 | 6 | 3 | 4 | 5 | 68 | 100 |
| 1993 | 2 | 9 | 3 | 6 | 3 | 4 | 4 | 69 | 100 |
| 1994 | 3 | 8 | 3 | 6 | 4 | 3 | 4 | 69 | 100 |
| 1995 | 3 | 9 | 3 | 7 | 4 | 3 | 4 | 67 | 100 |
| 1996 | 4 | 9 | 4 | 8 | 3 | 4 | 5 | 64 | 100 |
| 1997 | 3 | 9 | 2 | 7 | 2 | 5 | 4 | 67 | 100 |
| 1998 | 2 | 9 | 2 | 7 | 2 | 5 | 4 | 68 | 100 |
| 1999 | 3 | 7 | 2 | 7 | 2 | 5 | 3 | 71 | 100 |
| 2000 | 3 | 7 | 1 | 6 | 2 | 4 | 4 | 73 | 100 |
| 2001 | 2 | 7 | 2 | 8 | 2 | 3 | 6 | 70 | 100 |
| 2002 | 3 | 5 | 2 | 7 | 2 | 4 | 6 | 71 | 100 |
| 2003 | 3 | 5 | 3 | 6 | 1 | 4 | 5 | 72 | 100 |
| 2004 | 3 | 5 | 3 | 7 | 1 | 4 | 6 | 70 | 100 |
| 2005 | 3 | 6 | 3 | 8 | 1 | 5 | 4 | 69 | 100 |

[a] Each row sums to 100. [b] At farmgate undistorted prices, US$.

Source: Authors' spreadsheet

Appendix Table 8: Nominal rates of assistance to covered, uncovered and all agricultural products, to exportable and import-competing agricultural industries, and relative to non-agricultural industries, Chile, 1960 to 2005

(percent)

| | Covered products | Non-covered products | Total ag NRA (incl NPS)[a] | Exportable NRA[b] | Import-competing NRA[b] | All ag tradables | All non-ag tradeables | RRA[c] |
|---|---|---|---|---|---|---|---|---|
| 1960 | 12 | 8 | 23 | 5 | 15 | 12 | 22 | -9 |
| 1961 | 9 | 6 | 21 | 0 | 13 | 9 | 22 | -11 |
| 1962 | 16 | 6 | 24 | -1 | 20 | 13 | 44 | -21 |
| 1963 | 13 | 21 | 35 | 34 | 11 | 18 | 40 | -15 |
| 1964 | 3 | 10 | 25 | 17 | 2 | 7 | 40 | -24 |
| 1965 | 4 | 9 | 26 | 13 | 5 | 8 | 37 | -21 |
| 1966 | 1 | 1 | 12 | -4 | 3 | 1 | 28 | -21 |
| 1967 | -8 | 17 | 17 | 37 | -9 | 6 | 25 | -16 |
| 1968 | -14 | 14 | 14 | 33 | -13 | 2 | 26 | -20 |
| 1969 | -14 | 13 | 12 | 30 | -14 | 0 | 14 | -12 |
| 1970 | -2 | 17 | 17 | 32 | -2 | 8 | 14 | -5 |
| 1971 | 1 | 23 | 22 | 48 | -2 | 14 | 19 | -4 |
| 1972 | -16 | 24 | 19 | 71 | -16 | 11 | 38 | -20 |
| 1973 | -16 | 0 | 2 | 10 | -16 | -7 | 60 | -42 |
| 1974 | -19 | 10 | -1 | 16 | -20 | -8 | 29 | -29 |
| 1975 | -13 | 0 | -4 | -1 | -11 | -8 | 18 | -22 |
| 1976 | -6 | 0 | 0 | -1 | -5 | -4 | 14 | -16 |
| 1977 | 15 | 3 | 10 | -2 | 14 | 9 | 10 | -1 |
| 1978 | 13 | 4 | 10 | -1 | 13 | 8 | 6 | 2 |
| 1979 | 3 | 4 | 7 | -2 | 7 | 4 | 7 | -3 |
| 1980 | 6 | 5 | 8 | -2 | 9 | 6 | 6 | 0 |
| 1981 | -3 | 4 | 3 | -2 | 3 | 2 | 5 | -3 |
| 1982 | 3 | 4 | 5 | -1 | 7 | 4 | 5 | 0 |
| 1983 | 2 | 7 | 6 | -2 | 9 | 5 | 8 | -3 |
| 1984 | 13 | 11 | 14 | -3 | 21 | 13 | 12 | 1 |
| 1985 | 27 | 10 | 18 | -2 | 28 | 18 | 12 | 5 |
| 1986 | 36 | 8 | 19 | -1 | 31 | 20 | 10 | 9 |
| 1987 | 25 | 8 | 15 | -1 | 25 | 16 | 10 | 6 |
| 1988 | 11 | 5 | 8 | -1 | 13 | 8 | 7 | 2 |
| 1989 | 5 | 5 | 5 | -1 | 9 | 6 | 7 | -1 |
| 1990 | -5 | 5 | 1 | -1 | 1 | 0 | 7 | -6 |
| 1991 | 15 | 5 | 9 | 0 | 16 | 9 | 6 | 3 |
| 1992 | 20 | 4 | 10 | 0 | 18 | 10 | 5 | 5 |
| 1993 | 19 | 5 | 10 | -1 | 17 | 10 | 6 | 4 |
| 1994 | 20 | 4 | 10 | -1 | 17 | 10 | 6 | 5 |
| 1995 | 13 | 4 | 8 | -1 | 13 | 8 | 5 | 3 |
| 1996 | 6 | 5 | 6 | -1 | 9 | 6 | 5 | 0 |
| 1997 | 12 | 5 | 8 | -1 | 13 | 8 | 5 | 2 |
| 1998 | 12 | 4 | 9 | -1 | 13 | 8 | 6 | 2 |
| 1999 | 13 | 4 | 10 | 0 | 13 | 8 | 5 | 3 |
| 2000 | 15 | 5 | 10 | 0 | 15 | 8 | 4 | 4 |
| 2001 | 6 | 2 | 6 | 0 | 6 | 3 | 3 | 0 |
| 2002 | 6 | 1 | 5 | 0 | 5 | 3 | 2 | 0 |
| 2003 | 6 | 1 | 5 | 0 | 5 | 3 | 2 | 1 |
| 2004 | 0 | 0 | 3 | 0 | 1 | 0 | 1 | -1 |
| 2005 | 1 | 0 | 3 | 0 | 1 | 0 | 1 | 0 |

[a] NRAs including assistance to nontradables and non-product-specific assistance.

[b] NRAs including product-specific input subsidies and non-covered products.

[c] The Relative Rate of Assistance (RRA) is defined as $100*[(100+NRAag^t)/(100+NRAnonag^t)-1]$, where $NRAag^t$ and $NRAnonag^t$ are the percentage NRAs for the tradables parts of the agricultural and non-agricultural sectors, respectively.

Source: Authors' spreadsheet

Appendix Table 9: Nominal rate of assistance, non-agricultural sectors, Chile, 1960 to 2005

| | 1960-64 | 1965-69 | 1970-73 | 1974-82 | 1983-90 | 1991-95 | 1996-99 | 2000-05 |
|---|---|---|---|---|---|---|---|---|
| **Lightly processed food production** | | | | | | | | |
| Importable | 23.8 | 22.9 | 29 | 4.9 | 11.1 | 7.1 | 9.6 | 5.3 |
| Exportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nontradable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 11.6 | 12 | 14.4 | 3 | 6.2 | 4.1 | 5.5 | 3.1 |
| **Highly processed food production** | | | | | | | | |
| Importable | 59.2 | 36 | 41.8 | 26.6 | 19.1 | 11.3 | 10.8 | 5.5 |
| Exportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nontradable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 35.5 | 21.6 | 25.1 | 15.1 | 5.5 | 1.9 | 1 | 0.3 |
| **Non-ag primary producers** | | | | | | | | |
| Importable | 73 | 7.4 | -2.8 | 9.8 | 18.9 | 11.3 | 10.8 | 4.7 |
| Exportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nontradable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 3.7 | 0.4 | -0.1 | 0.5 | 0.9 | 0.6 | 0.5 | 0.2 |
| **Non-food manufactures** | | | | | | | | |
| Importable | 67.3 | 54 | 69.2 | 24.6 | 18.7 | 11.2 | 10.7 | 4 |
| Exportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nontradable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 47.1 | 37.8 | 48.4 | 17.2 | 12.9 | 7.5 | 6.8 | 2.5 |
| **Services** | | | | | | | | |
| Importable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exportable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Nontradable | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | 11.2 | 8.7 | 10.9 | 3.7 | 3.2 | 1.8 | 1.5 | 0.6 |

Source: Authors' calculations