ECONOMIC DEVELOPMENT, INSTITUTIONAL CHANGE,
AND THE POLITICAL ECONOMY OF AGRICULTURAL PROTECTION:
An econometric study of Belgium since the 19th Century

Johan F.M. Swinnen, Anurag N. Banerjee, and Harry de Gorter

Policy Research Group
Working Paper
Nr 8

May 2000

ABSTRACT

This empirical study uses one hundred years of annual data on eleven agricultural commodities from Belgium to measure the impact of structural changes coinciding with economic development and changes in political institutions on agricultural protection. The analysis shows that changes in agricultural protection are caused by a combination of factors. Governments have increased protection and support to farmers when world market prices for their commodities fell, and vice versa, offsetting market effects on producer incomes. Other economic determinants were the share of the commodities in total consumer expenditures (negative effect) and in total output of the economy (positive effect). With Belgium a small economy, there was no impact of the trade position. Some changes in political institutions have affected agricultural protection. Democratic reforms which induced a significant shift in the political balance towards agricultural interests, such as the introduction of the one-man-one-vote system, led to an increase in agricultural protection. The integration of Belgian agricultural policies in the Common Agricultural Policy in 1968 coincided with an increase in protection, ceteris paribus. Both institutional factors, related to changes in access to and information about the decision-making at the EU level, and structural changes in the Belgian agricultural and food economy may explain this effect.

Keywords: Agricultural protection, political economy, economic development, institutional change

The authors acknowledge support from the Research Council of the Katholieke Universiteit Leuven, the Foundation for Scientific Research (FWO), and the Cornell Western Societies Program. We thank Mona Habasch, Erik Mathijs and Godelieve Van Zavelberg for research assistance, Tim Mount, Steven Kyle and Eric Fisher for useful comments on the study, and Leen Van Molle for providing some of the raw data in more accessible format. We thank anonymous reviewers for useful comments on earlier versions of the paper.

Johan F.M. Swinnen (Policy Research Group, Dept. of Agricultural and Environmental Economics, Katholieke Universiteit Leuven and European Commission, Wetstraat 200, 1049 Brussels, Belgium), Anurag N. Banerjee (School of Economics and Business, Queens University, Belfast, UK) and Harry de Gorter (Department of Agricultural, Resource and Managerial Economics, Cornell University, Ithaca NY, USA),

ECONOMIC DEVELOPMENT, INSTITUTIONAL CHANGE, AND THE POLITICAL ECONOMY OF AGRICULTURAL PROTECTION:

An econometric study of Belgium since the 19th Century

1. INTRODUCTION

The Belgian government has regularly intervened in agricultural and food markets since Belgium became an independent country in 1830. However, the effect of the interventions (supporting consumers or producers), the intensity of support, and the range of commodities or subsectors to which the programs applied have varied substantially over time. Since 1850,[1] one can identify three 'waves' of increased protectionist demand by farmers in Belgium: the periods 1875-1895, 1929-1935 and more or less continuously since 1950. The supply of protectionist policies varied considerably between these periods. In the first period protectionism was limited in size and scope. Relatively small import tariffs were levied on livestock, dairy and meat products, and on oats. In the first years after the First World War government policies supported consumers. All import tariffs were abolished and maximum prices were introduced for grains. Agricultural exports were taxed and regulated. In the beginning of the 1930s agricultural policies shifted to support producers. Import quotas were implemented for grains and flour and import tariffs were levied on virtually all other farm products. Protectionism declined again in the second part of the 1930s. Immediately after the Second World War agricultural production and distribution was strongly regulated and consumers were protected by maximum food

[1] In 1830 the government continued the pre-independence Dutch policies of low import tariffs. In 1834 the government increased tariffs for grains "to protect farmers from a worsening economic situation" (Vander Vaeren, 1930), reversed in 1845 when the potato disease caused widespread food shortages, inducing the government to cut all tariffs on food and prohibit exports of staple foods.

prices. However, from 1949 onwards, agriculture and food policies became more beneficial for producers again. First wheat producers were supported and in the beginning of the 1950s other producers increasingly benefited from government policies. Since 1967 Belgian agricultural policies have been integrated within the Common Agricultural Policy (CAP) of the European Union (EU). Since then the level of protection has been high on average, although protection rates have varied substantially (see figure 1).

This paper attempts to explain the variation in protection between commodities and over time. Most empirical research on the political economy of agricultural subsidization/taxation is limited to the post-World War II period (Honma and Hayami, 1986; Krueger et al., 1992). In this case, much variation is lost, especially in the analysis of industrialized countries. Notable exceptions are Gardner's (1987) widely cited study on the causes of farm policy in the United States using long-run data, and Tracy's (1989) historical analysis of European agricultural policies. The latter studies show that insights can be gained from long run analyses in addition to studies focusing on cross-country differences.

Our analysis studies the determinants of the variations in agricultural protection within one country over a long time period, using annual data and disaggregation for 11 agricultural commodities. This approach is comparable to Gardner's (1987) empirical study of agricultural protection in the United States. However, his analysis focuses primarily on factors which affect the effectiveness of collective action of different groups, including the relative size and concentration of the agricultural producers, and on the deadweight costs of the policies, hypotheses developed in Becker (1983), Gardner (1983), and Olson (1985).

The focus of our paper is on the impact of the changing role of agriculture and food in the economy with economic development and changes in the relative income situation of farmers as the primary causes of change in agricultural protection, as well as institutional changes affecting decision-making. Changes in the structure of the economy affect the distribution and the size of political costs and benefits of agricultural protection and thus the government's political incentives in decision-making. Swinnen (1994, p.2) argues that "structural changes typically coinciding with economic development induce an increase in agricultural protection" and that "the empirically observed correlation between agricultural protection and economic development is caused by a multiplicity of factors". This is consistent with hypotheses from other political economy studies which have analyzed the impact of some of these factors and have concluded that governments adjust agricultural policies in response to changes in relative incomes, policy distortions, and economic structural changes which affect the political costs and benefits of agricultural protection for the government (Anderson and Hayami, 1986; Honma and Hayami, 1986; Riethmuller and Roe, 1986; von Witzke, 1990; de Gorter and Tsur, 1991; Bullock, 1992; Anderson, 1995; Swinnen, 1996).[2]

In addition, the long run data allow us to test whether institutional changes in the political system, such as changes in voting rights and the integration of agricultural policy-making in the EU has affected agricultural protection levels. There is a burgeoning literature on the impact of political institutions on economic performance (e.g. North, 1991; Przeworski and Limongi, 1993). However, only a few studies have studied the impact of political systems and rights on patterns of policies, in particular agricultural and food policies. All are cross-country studies and a

[2] See Swinnen and van der Zee (1993); and de Gorter (2000) for surveys.

general result is that there is no linear relationship between agricultural protection and political rights. Beghin and Kherallah (1994) and Begin et al.(1996) find that protection initially increases with growing democracy, but not beyond a certain level of political rights, while Swinnen et al. (2000) find no positive relationship between political rights and agricultural protection.

The impact of the Common Agricultural Policy decision-making structure is more widely discussed. Several authors have argued that the institutional framework of the EU decision-making, such as the unanimity rule and financial solidarity among member countries, have on average increased protection levels (Schmitt, 1984; Runge and von Witzke, 1986; Koester, 1992), while others have challenged this view (de Gorter et al. 1998).

The paper is organized as follows. Section 2 reviews the development of agricultural protection in Belgium; section 3 presents the conceptual model and section 4 hypotheses and empirical variables. Section 5 discusses the econometric specifications and section 6 the results.

2. THE HISTORY OF AGRICULTURAL PROTECTION IN BELGIUM

Tables 1 and 2 show the historical evolution of agricultural protection in Belgium as measured by the nominal protecton coefficient (NPC) and by the producer subsidy equivalent as a percentage of producer value (PSE%), respectively.[3] Before the first World War, NPCs were close to one (PSE% close to zero) for most products, with the exception of butter and oats. Only these two products received protection through import tariffs after the dramatic fall of agricultural incomes in the last part of the 19th century and the first years of the 20th century. The fall in grain farmers'

[3] See appendix for details on the calculation of the protection indicators.

incomes was caused by a dramatic increase in cheap grain imports from Canada, the United States, Argentina and Russia due to (1) the expansion of agricultural production, especially in the United States where land was abundant and cheap, and (2) technological innovations, such as agricultural machinery, which allowed for the exploitation of vast areas, and the steam boat, which dramatically decreased international transport costs (Tracy, 1989). Spill-over effects on other agricultural markets caused other farm incomes to decrease significantly. The Belgian government continued a free trade policy for all commodities except butter and oats, because of the strong opposition of a coalition of industrial labour (represented in the Belgian Socialist Party) and industrial capital (represented by the Liberal Party) against policies that would increase staple food prices (Van Molle, 1989).[4]

Market prices recovered substantially just before the first World War and remained high afterwards. During and immediately after the war, food was scarce and government policies were intended to protect consumers. The 1920s were generally considered good years for farmers. It was an exceptional period of net labour inflow and of large investments in agriculture. In contrast, the 1930s saw strongly declining farm incomes because of a reduced demand due to the general economic crisis and increased supply from the 1920s investments in agriculture. Government policy responded to these developments: import protection increased substantially in the 1930s, especially for animal products. For example, PSEs for butter increased from close to zero in the 1920s to around 40% in the 1930s (see figure 1). There was much more opposition from industry (including workers) to

[4] Oats and barley tariffs were opposed by the transport industry, the coal mines, where horse power was important, and the brewing industry. They prevented barley protection, but oats tariffs were introduced as a compromise, with more farmers producing oats and no opposition from brewers (Van Molle, 1984).

raising tariffs for breadgrains (PSEs for wheat actually fell significantly) in the early 1930s. A general strike in 1935 against a proposed grain import tariff even caused the government to fall. The tariff proposal was abolished and, instead, the next government introduced support for grain producers through per hectare subsidies. In general, Belgian agricultural and food policy between the wars was characterized by a shift from consumer protection to producer protection.

Similarly, immediately after the Second World War government measures were taken to control food prices and to guarantee food for consumers. Figure 1 illustrates how wheat and butter PSEs fell from 50%-60% in 1944 to less than 10% in a few years. However, from the end of the 1940s onwards government policies started shifting again to protect producers, first in crops where production recovered fastest from the war damages and where the first signs of production surpluses emerged, putting pressure on agricultural prices and incomes. Later on, also other producers get increased protection.

In 1968 Belgian agricultural policy gets integrated in the Common Agricultural Policy of the then European Economic Community with six member countries.[5] Products which are by then the most highly protected in Belgium (grains,[6] milk, sugar and beef) are also the products which will receive most protection under the CAP. Furthermore, from the data in table 1 and 2 it is not obvious that the integration in the CAP has increased agricultural protection in Belgium. In fact, the data in table 2 actually indicate that the average PSE levels after 1970 were generally lower than in

---

[5] The principles and instruments of the CAP were decided in the Stresa conference of 1958, but effectively the CAP started in 1967/68 with common guaranteed grain prices.

[6] Within grains, protection was higher for feed grains in the first part of the century, while this difference has diminished and even reversed after 1945. Initially, butter and oats production were also supported through subsidies. Since 1931, subsidies per unit output have become also important for other grains, sugar beet and cattle.

the 1960-1970 decade. However, as can be seen from figure 1, one reason for this is the very low PSEs of the mid 1970s caused by important increases in world market prices following the 1973 oil crisis.[7]

3. HYPOTHESES AND EMPIRICAL VARIABLES[8]

The above discussion suggests that the government's decisions on agricultural protection are affected by changes in external conditions, such as the income of farmers, structural changes in the economy, and changes in the political institutions. This section discusses a set of political economy hypotheses, based on Swinnen (1994) and other studies, and the indicator variables used to test them empirically.

The indicators used for the dependent variable are NPC and PSE%, as discussed above. We use both indicators since NPC could be calculated for more products and years, but PSE% is a more complete indicator of agricultural support.

---

[7] Important macroeconomic changes and exchange rate movements evidently affect the protection indicators. For example, with world market prices for many commodities expressed in US$, changes in the US$/Belgian Franc (BEF) exchange rate (which were large e.g. over the 1970s-1990s period) have important effects on the calculated NPC, even when domestic prices (in BEF) and world market prices (in US$) were stable. This exchange rate effect is captured by our analysis, since all variables are measured in real BEF. With fixed US prices, an exchange rate adjustment will affect the world market prices in BEF and hence the NPC. This effect is consistent with the political economy theory we test, which predicts an (offsetting) adjustment in the protection rate. Krueger et al. (1992) show that governments used sectoral price and trade policies to (partly) compensate producers for negative income effects caused by exchange rate policies. Since the world market price in BEF is included as explanatory variable, our regression model captures this effect. The use of an instrument variable for the world market price (see further) allows also to separate the "real" policy adjustment from the "mechanical" calculus effect of the world market price on the protection indicators..

[8] Data for the calculation of the explanatory variables are from publications of the Belgian National Institute for Statistics (N.I.S.), the Belgian Agricultural Economics Institute (L.E.I.) and from Blomme (1988), Bublot (1957) and Van Molle (1989). Most variables are calculated starting in 1877 because data are only available since then. The nominal rate of protection, requiring less data, is calculated since 1850. For some years data were not available for some variables or some products. For example, data for the two World War periods (1914-1918 and 1940-1945) are missing.

Variables measuring changes in income and economic structure

Agricultural protection is expected to increase as incomes in agriculture fall relative to the incomes in the rest of the economy. A fall in income of farmers increases the marginal utility of income of farmers and the effective demand for support. Ceteris paribus, governments can increase their political support by exploiting this difference in forthcoming marginal political support through increasing agricultural protection when agricultural income is falling in relative terms.

Commodity specific information on pre-policy relative incomes is unavailable. As the relative change in pre-policy incomes for agricultural producers is strongly affected by world market agricultural prices vis-à-vis other prices, we use the world market price of the agricultural commodity, deflated by the consumer price index, as an indicator for relative income developments of the commodities' producers vis-à-vis the rest of the economy.

The share of the commodity in consumer expenditures, measured by CONSHARE, is expected to have a negative impact on protection: protection to a sector is lower when the expenditure share of the sector's product in total consumer expenditures is more important. For example, an import tariff to protect a sector will increase prices and government revenues. In a small open economy, the loss for consumers due to increased consumer prices is partly offset by the gain in revenue due to the distribution of tariff revenues. The proportion of this offsetting gain is the same for all individuals if each individual's share in tax revenues is the same as his/her share in consumption. However, often this is not the case. For example, for the poorest people in society the share of basic foodstuff is higher than their share in total government revenues, including those obtained from the tariff. Most output of agricultural production is food products, which itself is a heterogeneous group of products. Some of the products are staple foods, while others are more luxury products, with a higher income elasticity. This income elasticity itself declines as the economy grows and the lowest incomes increase. In addition, as an economy grows, value added for food products increases, with the resulting increase in processing and distribution margin reducing the share of the raw agricultural material in the final price for food. Therefore, 'poor' people, experiencing small marginal income tax rates and few government benefits and having a higher than average marginal propensity to consume (staple) food, will oppose import tariffs more vigorously than 'rich' people. However, this resistance decreases when the share of food expenditures in total income declines.

Table 3 shows that the share of food in total consumer expenditures was fairly stable (between 60%-65%) over the period 1860-1920. Afterwards it declined slowly, but was still almost 50% in 1950. After 1950 it decreased strongly to less than 18% now. However, the aggregate numbers do not fully reflect the change in food expenditures. Table 4 shows how the share of bread in total consumer expenditures declined from 30% in 1853 to less than 8% by 1929. The other main staple food, potatoes, declined strongly over the same period as well. The decline in expenditures on bread and potatoes was mostly replaced by more expenditures on beef, pork and butter until 1950. Afterwards the share of most food item expenditures declined.

GNPSHARE measures the share of the value of each commodity in total GNP. Table 3 shows that the share of agriculture in total output has declined from around one quarter in 1880 to less than 3% in 1985. Within agriculture the share of crop production has decreased while dairy and meat production have become more important (table 5). The import of cheap overseas grain from 1877 onwards initially induced grain prices to collapse and has on a more permanent basis induced farmers to shift to animal production. The average producer value of grains, and especially food grains, declined strongly during the last 25 years of the 19th century. The producer value of wheat was halved and that of rye declined by one third. The production of oats and rye has virtually disappeared by now, while wheat output has stabilized. The production of meat, especially cattle and pigs, has become increasingly important. The government has stimulated this restructuring by supporting animal production and by investing in research, education and extension programs.

The estimated coefficient of the GNPSHARE variable may reflect the (net) effect of two, opposing, factors. First, ceteris paribus, sectoral protection will increase as the share of the sector in total output declines because with a decline in the share of the sector's output in the economy, the tax base (the other sectors' output) increases relative to the total expenditures for a given level of per capita transfer. This reduces the tax rate that is required to finance both the transfer and the accompanying social costs. This reduction in the required tax rate benefits all taxpayers and, hence, reduces the loss in political support per unit of transfer. In addition, social deadweight losses increase because of commodity policies. This first effect would imply a negative sign for the coefficient of GNPSHARE in the regressions.

Second, protection is expected to be higher for agricultural commodities that use more fixed production factors in the production process. An increase in the amount of fixed production factors in the sector will increase the vested interest and thus the political pressure from factor owners.[9] On aggregate, the total capital stock in Belgian agriculture has remained relatively stable in real terms over the past century (see table 6). The capital intensity, measured by the capital labor ratio in 1985 prices, was stable over a 50 year period between 1880 and 1929, but increased by a factor 5 after the Second World War. The strong increase in capital intensity coincided with a strong increase in agricultural protection (see table 1-2).

Data on product specific fixed factor investments are unavailable over a significant time period. However, correlations based on incomplete data suggest that the relative amount of fixed factors across commodities is correlated with the share of the value of the commodity in total output. Therefore, since the theory predicts an increase in protection with an increase in the amount of product specific capital, a positive sign of the coefficient of GNPSHARE would be consistent with this hypothesis.

Another structural variable which is expected to have an impact on the politically optimal level of agricultural protection is the share of agricultural employment in total employment. Protection is expected to increase to a sector with decreasing employment shares. As the number of individuals in a sector decrease relative to that of another sector, there are relatively fewer people to subsidize. For a given per capita transfer to the protected sector, the per capita tax on the rest of the economy decreases. This reduces each individual's opposition to protection.

---

[9] Further, an increase in industrial capital intensity reduces the share of labor in total production costs, and, hence, reduces the impact of the inflationary effect of food price increases on wages. This will mitigate the opposition of industrialists to agricultural protection This inflationary effect of agricultural price increases arrives through the demand side of the labor market. A second inflationary effect through an increase in the cost of living of workers is captured by the share of the commodity in consumer expenditures (CONSHARE).

However, there are now relatively more people who are taxed and fewer who benefit by the protectionist policy. Swinnen and de Gorter (1993) show that, under standard assumptions on the concavity of the utility and support functions, the combined effect is an unambiguous increase in the per capita transfer to the protected sector. Collective action models emphasize this factor for a different reason. They attribute the increase in agricultural protection importantly to the increased ability of farmers to organize politically as their numbers decline, and hence, free-riding problems become less important (Olson, 1985).

The agricultural population in Belgium fell from 43% of the total population in 1860 to only 21% by 1900 (table 3). Based on that indicator, Belgium was one of the most industrialized countries in Europe by the turn of the century. This percentage further declined with an average of 2% points per decade over the next 50 years. Between 1950 and 1980 the share of farmers in total employment fell rapidly. The share of agricultural production in GDP was less than the share of agriculture in employment over the first part of the century, but this was reversed from 1970 on, as the productivity of agricultural labor has increased dramatically since 1950. This increase in agricultural labor productivity is also reflected in a strong increase in the capital intensity in agriculture since 1950 (table 6).

We decided not to include this variable in the empirical model because (a) there are insufficient data to disaggregate employment by commodity, and (b) the aggregate agricultural employment share is highly correlated with some of the institutional variables discussed next. In the results section we discuss the implications of this correlation of explanatory variables for interpreting the results.

The self-sufficiency ratio (SSR), measured as the ratio of domestic production over consumption, is found to have a negative impact on agricultural protection in several studies: imported products receive higher protection than exported products. This effect is due to budgetary reasons (budget revenues for imported products and expenditures for exports, and increasing with the size of the trade) and due to distortions and terms of trade effects. Deadweight costs of protection increase with net exports, especially for large trading countries. Such countries will also experience a negative terms of trade effect. However, the terms of trade and distortion effects may have had less impact in Belgium which is a small country having little impact on international markets for most agricultural products.

Belgium has been an importer for most of the food products (table 7). Only for potatoes, eggs and poultry was the country more or less self-sufficient most of the time. Belgium imported between 65% and 80% of its wheat and barley consumption until the Second World War.

The SSR itself may be influenced by protection: high domestic prices induce an increase in net exports. For example, the import share for wheat and barley has dropped to around 30% as domestic supply has increased with highly protected prices. Similarly, Belgium has become a net exporter of beef/cattle, pigs/pork and butter. While Belgium still imported sugar in 1930, it now has a self-sufficiency ratio of almost 250%. In section 4 we explain how we test and account for this potential bi-causality effect between SSR and NPC.

Institutional variables

Policy making is affected by the institutions that determine the framework for decision-making. Since the data cover a period of more than 100 years during which important changes in Belgium's political institutions took place, additional variables have been included in the empirical model to capture the impact of institutional changes.

Four dummies are introduced to capture changes in voting rights. The variables D1877-1893, D1894-1899, D1900-1919, D1920-1948 (=1 during the time period and = 0 outside) capture, respectively, the introduction of Plural General Voting Rights System in 1893, of a proportional voting system in 1899, of the Singular General Voting System ("one man one vote") in 1919, and of Voting Rights for Women ("one person one vote") in 1948. The base for comparison is the post-1948 period.

Each of these political reforms represented a step towards universal voting rights. In terms of their impact on agricultural policy-making, one would expect that the 1893 and the 1919 political reforms, i.e. introduction of general voting rights, and equal voting rights among men, respectively, have been the most important reforms..

The first election after the 1893 electoral reform resulted in a major shift in the political power balance. It strongly reduced the parliamentary representatives of the pro-free trade Liberal Party (mostly supported by industrial capital) and provided an outright majority for the Catholic Party (53% of the votes) (Van Molle, 1979). The strategy of the Catholic Party was to "capture the rural areas" in reaction to the growth of socialist influence among industrial workers (Craeybeckx, 1973). Around 35% of the CP members of Parliament declared themselves members of the "agricultural group" whose official objective was to increase protection for agriculture. However, not only the Catholic Party did well in the 1893 election, but also the emerging Labour Party gained substantially with the more democratic electoral system. This party was strongly opposed to restrictions and tariffs on agricultural and food imports. As the Liberal Party, the Labour Party preferred the use of non-market policies, such as investments in rural infrastructure and in agricultural research education and extension, to support agricultural producers.

The 1919 one-man-one-vote reforms gave equal voting rights to small peasants, hired farm workers, landlords, industrial workers, and capital owners. Van Molle (1984) argues that this reform strengthened the rural interests in parliament and its influence on agricultural policy, although the reforms also increased political power of industrial workers, who in general opposed agricultural protection. However, the reform certainly shifted the political balance between large landowners and small tenants. This resulted in the 1929 Tenure Law which caused a major shift in land property rights from land owners to small farmers and tenants through restrictions on land rents and by providing more tenure security for tenants (Swinnen, 1998).

Finally, the 1948 extension of women voting rights for agricultural protection was expected to further strenghten the rural interests in parliament because of the strong influence of the Catholic Church - which actively supported the Catholic Party - among women. Catholic institutions were (and still are) very important in primary and secondary education and in health care: the Catholic Church owns many schools and hospitals. This, in combination with the rural background of most industrial worker families, made the Labour Party worry that women would vote disproportionately for the Catholic Party. This was the main reason why the Labour Party was the main opponent to women's voting rights until their introduction in 1948 (Craeybeckx, 1974).

DUMEC is a dummy variable which is 0 for the years before 1968, and 1 afterwards when Belgian policies where integrated in the Common Agricultural Policy. It is argued that institutional arrangements of the EU decision-making, such as the unanimity rule, the discrete nature of the decision-making process and the distribution of authority, costs and benefits between the EU and the Member States have induced increases in protection levels (Runge and von Witzke, 1986; Koester, 1992). The unanimity rule allows individual countries to bargain more effectively to increase protection for products that are important for the country. The difference in distribution of decision-making authority and the cost and benefits of the policies leads to what Schmitt (1984) has called 'the restaurant table effect'. Member Countries are inclined to increase transfer policies to (national) domestic producers as the bill is picked up by the EU budget, i.e. all the countries. This is argued to have increased the overall level of protection, although recent studies challenge this argument (de Gorter et al., 1998).

Intertemporal effects

The short-run effect of protection is that agricultural incomes increase. However, in a dynamic perspective, price supports lead to less competitive farms since they allow them to survive or, more general, reduce the incentive for restructuring. This will, in turn, increase the demand for protection in the next period and thus trigger a continuation of support policies. Furthermore, it is well known that policy rents get captured by the production factors. Protection induces factor price increases. This, in turn, will increase costs for farmers, and hence have a negative impact on their profitability, again increasing demand for protection. If the factor price effects occur with some delay, an intertemporal effect is likely to emerge. This factor is important in Belgium with around 70% of agricultural land leased – a share which was fairly constant over the past century, although important changes in the land tenure regulations have restricted land owners autonomy in adjusting land prices and have given strong property rights to tenants (Swinnen, 1998).

Although the structural change variables may capture some of the intertemporal effect, a vector of autoregressive variables AR(q), with q the number of lags, is included in the model to capture the residual effect of contemporaneous correlation. A positive sign of the AR coefficients would be consistent with the hypothesis that current protection stimulates future protection, although one should be careful with this conclusion since the AR may also capture the impact of missing variables.

4. THE EMPIRICAL MODEL

The empirical analysis uses annual data on protection in Belgium between 1877 and 1985 (PSE%) and 1990 (NPC) for 11 agricultural commodities (wheat, rye, barley, oats, sugar beet, potatoes, butter, cattle, pigs, poultry, and eggs). Data for the two world war periods are missing for all commodites, and for some commodities and explanatory variables data were not available for some of the early years (see table 1 and 2).

The empirical model has the following structure:

[1] $R_t = \alpha_0 + \alpha_1 * X_t + \alpha_2 * I_t + \alpha_3 * D_t + \varepsilon_{t,}$

where $\varepsilon_t \sim AR(q)$,

where R represents the dependent protection variables, X is the vector of variables measuring the income situation and the economic structure, I is the vector of political institution variables, and the AR(q) term as discussed in the previous section. Further, a vector (D) of product-specific dummy variables (DBAR, DRYE, DOAT, DPOT, DSUB, DBUT, DCAT, DPIG, DPOU, DEGG) is also included in the model to reflect fixed effects not captured by the other explanatory variables, and to capture effects caused by different price units for the different commodities.[10] The institutional variables, AR(q), and the product specific dummies are required to avoid systematic bias in the linear estimation procedure.

As discussed above, there is a causality problem as some of the explanatory variables (SSR, GNPSHARE, and CONSHARE) used to explain NPC or PSE changes may themselves be affected by changes in agricultural protection. As in Beghin and Kherallah (1994), we use Granger pairwise causality tests for these economic variables vis-à-vis the logarithmic transformation of NPC (logNPC) and PSE% variables. The tests reject the causality hypotheses for CONSHARE and GNPSHARE, but the hypothesis could not be rejected for SSR. To take care of any residual endogeneity effects we will estimate a system of equations, including a structural equation for the SSR variable. Furthermore, keeping in mind the non-robustness of Granger tests against monotonic transformations (Holmes and Hutton, 1988, 1990), we shall use lagged values of GNPSHARE and CONSHARE in the subsequent estimation to protect against potential bi-causality which is not captured by the tests.

First, we estimated the following system for NPC (analogous for PSE%) and SSR:

[2] $$LogNPC_t = \alpha_0 + \alpha_{11}*LogWPRICE_t^{\circ} + \alpha_{12}*LogGNPSHARE_t + \alpha_{13}*LogCONSHARE_t + \alpha_{14}*SSR_t + \alpha_2*I_t + \alpha_3*D_t + \varepsilon_t,$$

[3] $$SSR_t = \beta_0 + \beta_1*(SSR_{t-1}, SSR_{t-2}, SSR_{t-3}) + \beta_3*D_t + \beta_4* LogNPC_{t-1} + \xi_t .$$

Since we have no a priori information to exclude that the error terms of both equations are correlated, we assume that

[10] When the log of WPRICE is used in the estimation, the scale problem is transformed into a location problem.

[4] $\varepsilon_t \sim AR(q)$, $\xi_t \sim AR(p)$ and $(\varepsilon_t , \xi_t) \sim N(0,\Sigma)$,

and we use a Three Stage Least Squares procedure (3SLS) by estimating Σ and using an Iterated Generalised Least Squares estimate where the predicted variable of SSR from equation [3] is used as an instrument in equation [2]. This procedure is asymptotically efficient (Zelner and Theil, 1962).

Finally, as emphasised by e.g. Riethmuller and Roe (1986), and von Witzke (1986), decision-making in setting price and tariff interventions is often done before the actual world market prices are known to decision-makers and interest groups. Instead, the decisions and actions of the agents involved are based on expected price levels. We follow the methodology of Riethmuller and Roe (1986) in assuming that the price expectations of the agents can be estimated using the following AR process:

[5] $logWPRICE_t = b_1 * D_t + b_2 *(logWPRICE_{t-1},\ldots, logWPRICE_{t-k}) + u_t$,

where $u_t \sim N(0,\sigma^2)$.

As indicated in equation [2] the forecasted value $WPRICE_t°$ estimated from equation [5] is used in the 3SLS model. Based on AIC criteria, two lags (k=2) were used in the estimation.

Second, it would have been preferable to change all relevant structural variables from Belgian to EU level after 1967 when the CAP was introduced. However, while the necessary data were not available at the disaggregated level for all variables (GNPSHARE, CONSHARE, and SSR). Therefore, instead, we also estimated another regression to test whether EU membership, in particular the implementation of the CAP, has affected the relationship between these structural variables and the protection rate. In the second model interaction terms between DUMEC and the structural variables were introduced in the NPC (and PSE) equation [2] (see table 9). DUMEC itself was removed to avoid collinearity problems.

5. RESULTS AND DISCUSSION

Table 8 presents the 3SLS estimation results for the first model. While there is some variation in the estimated coefficients and t-statistics between the NPC and the PSE% regressions, there is no difference in the key conclusions which can be derived from the regression results. In general, these conclusions are consistent with the theoretical hypotheses.

Changes in the (forecasted) world market price (WPRICE) have a significant impact on the level of agricultural protection. Over the period of more than 100 years, the Belgian governments have used policies to increase protection and support to farmers when world market prices for their commodities fell, and vice versa. This result is consistent with the “relative income hypothesis” of Swinnen and de Gorter (1993), and de Gorter and Tsur (1991); with the “compensation effect” in Magee, Brock and Young, the “countercyclical transfers” of Bullock (1992), and with Peltzman (1976).

The share of the commodity in consumer expenditures (CONSHARE) has a significant negative impact on protection for the commodity. Policy-induced price increases of products, which have less impact on consumer welfare, are likely to meet less opposition. This result is consistent with empirical evidence from cross-country studies (Balisacan and Roumasset, 1987; Fulginiti and Shogren, 1992; Swinnen, 1996).

There is a significant and positive impact of the share of the commodity in GNP (GNPSHARE) on protection. As we have discussed in section 3, this variable captures two factors. The positive sign of the GNPSHARE coefficient suggests that the positive impact of the size of the 'vested interest' on the level of protection is stronger than the negative impact that the 'tax distribution' effect may have. This result is different from other empirical studies that typically indicate a negative correlation between the size of the agricultural sector and agricultural protection (e.g. Miller, 1991; Beghin and Kherallah, 1994). However, our result is consistent with the results of Swinnen et al. (2000) based on a recent empirical study of agricultural protection determinants across 37 countries.

Combined, the WPRICE and GNPSHARE results provide an explanation for the apparent paradox identified by Gardner (1992, p.95): "[while] intervention to assist farmers occurs when economic conditions turn against agriculture … it is conceivable that the richer an industry becomes the better placed it is to win political favors". Our results suggest that there is not necessarily a paradox: when economic conditions turn against agriculture governments are more likely to protect farmers, and more so when the vested interest is larger.

There is no significant effect of the self-sufficiency ratio (SSR) on agricultural protection. This result differs from many other empirical studies which have found that agricultural protection is higher for imported products and lower for exported products (e.g. Gardner, 1987; de Gorter and Tsur, 1991; Fulginiti and Shogren, 1992). Initially, Belgium was an importer for most agricultural products. Historically, reduction in net imports has coincided with a growth in protection for most of the commodities. Hence, over time the correlation between SSR and NPC is positive for most products Our model was explicitly structured to capture the bi-causality effects in this correlation. The SSR equations show no significant impact of the lagged protection variables on self-sufficiency, suggesting little feedback effect on SSR due to protection, at least not in the time dimension captured by the lagged variables. Therefore, our results suggest that SSR has less effect on protection in a small country such as Belgium, which has little impact on international markets for most of the products analyzed, compared to large trading countries.

The estimated coefficients of the political reform variables indicate no significant effect of the introduction of the Plural General Voting rights in 1893. This is an interesting result because in the first election after the 1893 electoral reform the pro-free trade Liberal Party was heavily defeated by the Catholic Party, of which a substantial faction supported agricultural protection. An explanation for the no-effect regression result is that the Labour Party also gained substantially in these elections. In coalition with the Liberal Party, they strongly opposed import restrictions and tariffs on agricultural commodities, which prevented the government from implementing such measures.

In contrast, our estimations suggest that the introduction of the Singular General Voting Scheme ("one man one vote") had a significant positive effect on agricultural protection. The extension of equal voting rights to small peasants and farm workers strengthened the rural interests in parliament (Van Molle, 1984) and, moreover, our results show that they had a significant positive impact on governments policies to protect farmers.

The positive coefficient of the D1920-1948 coefficient further implies that there was no positive impact of the extension of voting rights to women on agricultural protection. In fact, the data suggest that, if anything, the opposite occurred. Hence, despite the fear of the Labour Party, the extension of voting rights to women did not lead to a further strengthening of the rural interests, or at least it did not cause an increase in trade protection of agriculture.

These results provide some interesting additions to the results obtained by cross-country analyses of the impact of political reforms on agricultural protection

(Beghin and Kherallah, 1994; Beghin et al. 1996; Swinnen et al. 2000). As these studies, we find that there is no linear relationship between democratization and protection of agriculture: we find that some of the democratic reforms had a positive impact on agriculture protection, but others had no impact, or even the opposite. However, in contrast to the cross-country studies who merely speculate on the causes, our study can provide an explanation for why this is the case.

Only those political reforms which induced a significant shift in the political balance towards agricultural interests led to an increase in agricultural protection. More specifically, the early reforms (1893, 1899) which provided more voting rights for rural and agricultural interests, and thus increased the share of their representatives in parliament, at the same time increased the voting rights and political power of industrial workers. As a consequence, the reforms simultaneously reinforced the parliamentary factions opposing and those supporting agricultural protection, and as such having no net impact on the level of protection to agriculture.

The 1919 reforms disproportionately benefited small farmers and farm workers, reinforcing rural and agricultural interests in parliament and hence increasing their influence on the government. The same argument can also explain why further democratization by extending voting rights to women in 1948 did not have the same effect: the distribution of economic interests of women across sectors was most likely fairly closely correlated with that of their husbands and fathers. Furthermore, by 1948 only 12% of the population was employed in agriculture. Hence, in combination, these factors made that this democratic reform did not cause a significant shift in the power balance between agricultural and non-agricultural interests in parliament.

The positive and significant coefficient of DUMEC indicates that, ceteris paribus, agricultural protection in Belgium was higher after integration within the

CAP than before. One explanation is that the specific characteristics of the EU decision-making institutions had a positive impact on agricultural protection. Another explanation, based on the political economy of integration, is that protection has increased for those countries which had a lower than average pre-EU protection level with protection now being determined by EU-wide structural factors (de Gorter et al., 1998). Finally, integration in the CAP is strongly correlated with the dramatic increase in overall capital intensity of agriculture (see table 6): the correlation (r^2) between DUMEC and this variable is 0.85. Theory predicts that such increase in capital intensity (and the decline in agricultural employment which coincided) would cause an increase in protection to farmers. Therefore, the positive impact of DUMEC may also be caused by the dramatic increase in capital intensity of Belgian agriculture, and the reduction in employment, which occurred around the time of EU integration.

Further, table 9 presents the results of the 3SLS regressions with the interaction terms of the structural variables and DUMEC. Table 10 presents the results of the Wald tests whether the changes in coefficients are significant before and after 1968 when the CAP was implemented. The results indicate that there is a significant impact of the integration in the CAP on the impact of the structural variables but that this change in the impact of the variables is only significant for the CONSHARE variable, while there is no significant change for the GNPSHARE or the SSR variables. More specifically, the results indicate that before 1968 the share of the product in consumption expenditures had a strongly negative impact on protection (t-values higher than 3.2 in both PSE and NPC regressions), but that after 1968 there is no longer such negative impact. This result differs strongly from the impact of GNPSHARE where there is no such difference before and after 1968.

One explanation for these results is that consumers are less informed about decision-making at the EU level than at the national level and therefore have less influence on the decision-making. This is in contrast with producer groups who are well organized both at the national level and at the EU level.

Another explanation is that after 1968, with increasing incomes, declining real food prices, and innovations in food processing and marketing, the share of the agricultural product in consumer expenditures has declined to the extent that consumers become increasingly less concerned about agricultural protection. For example, the combined share of bread, beef, butter and sugar, food products derived from the most highly protected agricultural commodities in Belgium and under the CAP, had fallen to less than 8% of total consumer expenditures by 1973 and to less than 5% by 1985 (table 4). Furthermore, these data underestimate the decreasing share of the (raw) agricultural products in the consumer product, and thus the reduced impact of agricultural protection on consumer welfare. Hence, with this evolution, consumers may have started caring less after 1968 about the price effect of agricultural policy, and increasingly more about other aspects (quality, health, and later on environment, animal welfare, etc…). Again, this contrasts with the producer groups who remain heavily affected by the price effects of the policies.

Both arguments explain why there is a structural change in the coefficient of CONSHARE but not in the coefficient of GNPSHARE in the regressions in table 10 with the integration of Belgium in the CAP in 1968. In conclusion, both institutional effects, related to changes in the decision-making institutions and the associated changes in access to and information about the decision-making, which may have favoured proponents of agricultural protection, and structural changes may contribute to explain the effect of the DUMEC in the regressions.

The coefficients of the dummy variables capture both differences in price units of the various commodites and variation which cannot be attributed to the other variables. Some factors are not included in our model since it was not possible to find data or calculate consistent values for the time period and products considered here. These factors include supply elasticities, which affect dead-weight costs per unit of protection; the organisation and industrial structure of the processing industry, affecting the distribution of rents along the food chain and the political organisation of the sector; the degree of commercialisation, perishability and tradedness, which is affected by the characteristics of the commodity and the state of the technology, and which affect the government's ability to implement price and trade policies. From the regression it is not possible to distinguish between the impacts of these various factors.

Finally, the estimation results indicate that only one AR term needed to be included to capture residual effects of contemporaneous correlations. The coefficient of the (highly significant) AR(1) term is positive: 0.46-0.49 in the PSE equation and 0.63-0.66 in the NPC equation. This coefficient may capture the impact of missing variables in the model (which could be either positive or negative). However, the estimate is also consistent with the hypothesis that current protection stimulates future protection policies, even after accounting for structural and institutional changes, because (a) less competitive farms will survive, or more generally because the incentives for restructuring are reduced, and (b) input price increases, both of which, in turn, increase the demand for protection in the future. If so, the AR term being less than one implies that this dynamic impact of protection declines over time and phases out.

6. CONCLUSION

A quantitative empirical analysis of the determinants of agricultural protection, based on hundred years of commodity level annual data from Belgium, yields results that are consistent with theoretical hypotheses from Swinnen (1994) and other studies that the increase in government protection of agricultural producers with economic development is caused by a combination of factors. Changes in the relative income position of farmers and structural characteristics of the economy reduce the political costs and increase the benefits for politicians in supporting farm incomes. Belgian governments have increased protection and support to farmers when world market prices for their commodities fell, and vice versa, offsetting market effects on producer incomes. Protection has been higher for those commodities which represented a smaller share in consumer expenditures, as policy-induced price increases for those commodities had less impact on consumer welfare, and met with less opposition. Unlike in some other studies, the share of the commodity in GNP was positively related with protection, suggesting that the positive demand side impact of the size of the 'vested interest', i.e. the amount of fixed resources affected by the policies, on the level of protection is stronger than the negative impact of the ‘tax distribution’ effect. There was no significant effect of the self-sufficiency ratio on agricultural protection. This result may be due to the fact that the net trade position of the commodity, and the related market distortions, are less important factors in policy-setting in a country such as Belgium, which is small and has little impact on international markets.

Our study also showed important impacts of changes in political institutions on agricultural protection. Our results confirm cross-country analyses of the impact of political reforms on agricultural protection, that there is no linear relationship between democratisation and protection of agriculture: we find that some of the democratic reforms had a positive impact on agriculture protection, but others had no impact, or even the opposite. However, in contrast to other studies, our analysis also provides an explanation for why this is the case. Only those political reforms which induced a significant shift in the political balance towards agricultural interests led to an increase in agricultural protection. Early political reforms which provided voting rights for both industrial workers and larger farmers, and the most recent reform, extending voting rights to women, had no impact on agricultural protection as they simultaneously reinforced the parliamentary groups opposing and supporting agricultural protection. In contrast, the extension of equal voting rights to all men in 1919 had an important impact on agricultural protection. These reforms disproportionately benefited small farmers and farm workers, which significantly strengthened the group of parliamentary representatives favouring government protection of agriculture, leading to major changes in agricultural policy.

The variable representing the integration of Belgian agricultural policies in the CAP in 1968 had a positive impact on protection, ceteris paribus. Further, our results indicate that before the introduction of the CAP the share of a product in consumption expenditures had a strongly negative impact on protection but that after 1968 this is no longer the case, unlike other structural variables where we found no such structural break.

These results are consistent with arguments that the specific characteristics of the EU decision-making institutions cause higher agricultural protection. For example, consumers may be less informed about decision-making at the EU level than at the national level, and less organized at the EU level than producer groups, and therefore have less influence on the decision-making. The regression results may also be explained by structural changes occurring after 1968 which are not captured by the model. They are consistent with predictions that the dramatic increase in capital intensity of Belgian agriculture, and the associated reduction in employment, which occurred around the time of EU integration, would increase agricultural protection. Also, after 1968, with increasing incomes, declining real food prices, and innovations in food processing and marketing, consumers may have started caring less about the price effect of agricultural policy, and increasingly more about other aspects (quality, health, and later on environment, animal welfare, etc…), in contrast with the producer groups who remain heavily affected by the price effects of the policies. In conclusion, both institutional factors, related to changes in the decision-making institutions and the associated changes in access to and information about the decision-making, and structural changes may contribute to explain these results.

APPENDIX

The analysis uses two indicators of agricultural protection as dependent variables: the nominal rate of protection (NPC) and the producer subsidy equivalent (PSE).

1. Following the standard OECD procedure for calculating impacts of agricultural price and trade policies we measure the rate of protection as close to the producer as possible (OECD, 1987). NPCs and PSEs were calculated for sugar beet, cattle, pigs and poultry instead of for sugar or meat. For the most recent time period reliable and consistent data were only available for the derived products (sugar, beef, meat). For this period, the data were converted to the primary product base.

The NPC is the simplest indicator, measuring primarily price distortions, and is calculated as the ratio of domestic prices over world market prices (Tsakok, 1990). Domestic prices are taken from the national statistics (N.I.S.). For a consistent proxy of world market prices, we used import (export) prices, calculated as the ratio of import (export) values over import (export) quantities, as listed in the Belgian import-export statistics. Import prices are used for products with a negative trade balance, and export prices for those products that are mostly exported. Import and export values in the statistics are based on the average import price c.i.f. and export price f.o.b.. Since the implementation of the EU trade regime, some c.i.f. import prices are listed in EUROSTAT publications (mostly for grains and sugar). These prices are used for imported products. Under the EU trade regime, the import (export) total value/total amount ratio no longer provides a consistent proxy, because of the large amount of intra-EU trade. Depending on the product specific EU regime, import and export prices were calculated for different places of origin and destination. The lowest import price was taken as world market price. Transport costs were unavailable for most products and time periods. For the sake of consistency, transport costs are not included in the calculations. This has a downward bias on rates of protection for exported products[11] and may partly explain why the NPCs for poultry, and eggs - products that have received, at least relatively, little protection - are below 1 in the calculation (see table 1). One could argue that this offsets the opposite bias of not including the effect of higher feed costs for these products and therefore reflects more or less their true rate of protection, but we have no strong evidence to argue this either way[12.]

2. PSEs (as a percentage of commodity market value: PSE%) are a better measure of government support because they also capture government measures which do not affect domestic prices, such as direct subsidies. The PSEs were calculated following the standard procedure of the OECD studies on national policies and agricultural trade (OECD,1987) and converted to 1985 prices. The PSE is calculated as the sum of trade measures, direct subsidization, compensation payments, government expenditures on imputs, and expenditures on investment support. Trade measures (TM) are calculated as TM=(PD-PW)*DP, where PD, PW and DP represent domestic producer price, world market price and domestic production, respectively. Compensation payments consist mainly of government transfers to compensate farmers for losses due to animal diseases. Product specific expenditures are assigned to the products. Investment subsidies are divided among agricultural products based on their share in agricultural output.[13] Yearly data on

[11] The net impact on the NPC for imported products is not clear, as transportation costs should be added both on the domestic price as on the world market price and the net result depends on the location of import, production and consumption. Given the small size of Belgium and the well established transportation system, especially for the second part of the century, the bias will most likely be unimportant.

[12] The use of feed grains in dairy production is low for the last decades and is, compared to pigs, poultry and eggs, relatively minor in cattle production.

government expenditures on these policies since 1871 are taken from the budgets published in "Het Belgisch Staatsblad", the Belgian government's official journal. Production data are from Blomme (1988), Mitchell (1975) and L.E.I..

REFERENCES

Anderson, K.,1995. Lobbying Incentives and the Pattern of Protection in Rich and Poor Countries. Economic Development and Cultural Change. 43(2), 401-424.

Anderson, K., Hayami, Y. (eds.), 1986. The Political Economy of Agricultural Protection: East Asia in International Perspective. Allen and Unwin, Sydney.

Balisacan, A.M., Roumasset, J., 1987. Public Choice of Economic Policy: The Growth of Agricultural Protection. Weltwirtschaftliches Archive. 123, 233-248.

Becker, G.S., 1983. A Theory of Competition among Pressure Groups for Political Influence. Quarterly Journal of Economics. 89, 371-400.

Beghin, J.C, Kherallah, M., 1994. Political Institutions and International Patterns of Agricultural Protection. The Review of Economics and Statistics. 76(3), 482-489.

Beghin, J.C, Foster, W.E, Kherallah, M., 1996. Institutions and Market Distortions: International Evidence for Tobacco. Journal of Agricultural Economics. 47(3), 355-65.

Blomme, J., 1988. De Economische Ontwikkeling van de Belgische Landbouw, 1880-1980. Ph.D Dissertation. Department of Modern History, Katholieke Universiteit Leuven.

Bublot, G., 1957. La Production Agricole Belge. Etude Economique Séculaire 1846-1955. Ets. E. Nauwelaerts, Louvain.

Bullock, D.S., 1992. Objectives and Constraints of Government Policy: The Countercyclicity of Transfers to Agriculture. American Journal of Agricultural Economics. 74, 617-629.

Craeybeckx, J., 1973. De agrarische depressie van het einde der XIXe eeuw en de politieke strijd om de boeren I. Belgisch Tijdschrift voor Nieuwste Geschiedenis. IV, 190-230.

Craeybeckx, J., 1974. De agrarische depressie van het einde der XIXe eeuw en de politieke strijd om de boeren II. Belgisch Tijdschrift voor Nieuwste Geschiedenis. V,181-225.

Creten, L., 1982. De gezinsbestedingen in België 1853-1974. Een studie van de Belgische budget enquêtes. Dissertation. Department of Economics and Applied Economics, Katholieke Universiteit Leuven.

---

[13] In principle, this procedure creates some endogeneity problems in the analysis. However (1) due to lack of better alternatives we considered it the most appropriate procedure, and (2) because its share in total PSEs is small, our sensitivity analyses showed that this endogeneity effect for the overall analysis does not affect the results significantly.

De Gorter, H., 2000. Political Economy of Agricultural Policy. In Gardner, B., Rausser, G. (eds.), Handbook of Agricultural and Resource Economics. North-Holland. *Forthcoming.*

De Gorter, H., Tsur, Y., 1991. Explaining Price Policy Bias in Agriculture: A Politician-Voter Interaction Approach. American Journal of Agricultural Economics. 73(4), 1244-1254.

De Gorter, H., Pokrivcak, J., Swinnen, J., 1998. The 'Restaurant-table Effect': Europe and the Common Agricultural Policy. In Yildirim, T., Schmitz, A., Furtan, W.H. (eds.), World Agricultural Trade. Westview Press, Boulder, Co.

Eurostat. Agricultural Statistical Yearbook, 1969-1990. Luxembourg.

Fulginiti, L.E., Shogren, J.F., 1992. Agricultural protection in developing countries. American Journal of Agricultural Economics. 74, 795-801.

Gardner, B.L., 1983. Efficient Redistribution through Commodity Markets. American Journal of Agricultural Economics. 65, 225-234.

Gardner, B.L., 1987. Causes of U.S. Farm Commodity Programs. Journal of Political Economy. 95(2), 290-310.

Gardner, B.L., 1992. Changing Economic Perspectives on the Farm Problem. Journal of Economic Literature. XXX, 62-101.

Holmes, J.M, Hutton, P.A., 1988. A Functional Form, Distribution Free Alternative to Parametric Analysis of Granger Causal Models. Advances in Econometrics. 7, 211-225.

Holmes, J.M, Hutton, P.A., 1990. On the Causal Relationship Between Government Expenditures and National Income. The Review of Economics and Statistics. 72, 87-95.

Honma M., Hayami, Y., 1986. Structure of Agricultural Protection in Industrial Countries. Journal of International Economics. 20, 115-129.

Koester, U., 1992. Institutional Aspects of Agricultural Policy Reform in the European Community. In Becker, T., Gray, R., Schmitz, A. (eds.), Improving Agricultural Trade Performance Under the GATT. Wissenschaftsverlag Vauk, Kiel. 181-195.

Krueger, A.O., Schiff, M., Valdes, A., 1992. The Political Economy of Agricultural Protection in Developing Countries. A World Bank Comparative Study (5 volumes). Johns Hopkins University Press, Baltimore.

Landbouweconomisch Instituut (L.E.I.). Landbouwstatistieken, 1953-1990. Brussels.

Magee, S.P., Brock, W.A., Young, L., 1992. Black Hole Tariffs and Endogenous Policy Theory. Political Economy in General Equilibrium. Cambridge University Press, Cambridge.

Miller, T.C., 1991. Agricultural price policies and political interest group competition. Journal of Policy Modeling. 13, 489-513.

Mitchell, B.R., 1975. European Historical Statistics 1750-1970. The MacMillan Press Ltd, London.

Nationaal Instituut voor de Statistiek (N.I.S.). Jaarlijkse statistieken, 1890-1990. Brussels.

Nationaal Instituut voor de Statistiek (N.I.S.). Statistieken van de Buitenlandse Handel van de BLEU, 1910-1990. Brussels.

North, D., 1991. Institutions, Institutional Change and Economic Performance. Cambridge University Press, Cambridge.

OECD, 1987. National Policies and Agricultural Trade. Study on the European Economic Community. Paris.

Olson, M., 1985. Space, Agriculture and Organization. American Journal of Agricultural Economics. 67, 928-937.

Peltzman, S., 1976. Towards a More General Theory of Regulation. Journal of Law and Economics. 19, 211-240.

Przeworski, A., Limongi, F., 1993. Political Regimes and Economic Growth. Journal of Economic Perspectives. 7, 51-69.

Riethmuller, P., Roe, T., 1986. Government Intervention in Commodity Markets. The case of Japanese Rice and Wheat Policy. Journal-of-Policy-Modeling. 8(3), 327-49.

Runge C.F., von Witzke, H., 1986. The Market for Institutional Innovation in the Common Agricultural Policy of the European Community. Wissenschaftsverlag Vauk, Kiel.

Schmitt, G., 1984. Warum die Agrarpolitik ist wie sie ist, und nicht, wie sie sein sollte. Agrarwirtschaft. 33, 129-136.

Swinnen, J., 1994. A Positive Theory of Agricultural Protection. American Journal of Agricultural Economics. 76(1), 1-14.

Swinnen, J., 1996. Endogenous Price and Trade Policy Developments in Central European Agriculture. European Review of Agricultural Economics. 23(2), 133-160.

Swinnen, J., 1998. Land Leasing in Western Europe: A Historical Perspective. PRG Working Paper. Policy Research Group, Katholieke Universiteit Leuven.

Swinnen, J., de Gorter, H., 1993. Why Small Groups and Low Income Sectors Obtain Subsidies: the 'Altruistic' Side of a 'Self-Interested' Government. Economics and Politics. 5(3), 285-293.

Swinnen, J., van der Zee, F., 1993. The New Political Economy of Agricultural Policies: A Survey. European Review of Agricultural Economics. 20(3), 261-290.

Swinnen, J., de Gorter, H., Rausser, G., Banerjee, A., 2000. The Political Economy of Public Research Investment and Commodity Policies in Agriculture: An Empirical Study. Agricultural Economics. 22, 111-122.

Tracy, M., 1989. Governments and Agriculture in Western Europe 1880-88. Granada, London.

Tsakok, I., 1990. Agricultural Price Policy. A Practitioner's Guide to Partial Equilibrium Analysis. Cornell University Press, Ithaca.

Vander Vaeren, J., 1930. De voornaamste feiten uit eene eeuw geschiedenis van den Belgischen landbouw 1830-1930. Ets. Fr. Ceuterick, Leuven.

Van Molle, L., 1979. De Belgische katholieke landbouwpolitiek voor de Eerste Wereldoorlog. Belgisch Tijdschrift voor Nieuwste Geschiedenis. X, 417-459.

Van Molle, L., 1984. 100 jaar Ministerie van Landbouw. Agricontact. Ministerie van Landbouw, Brussel.

Van Molle, L.,1989. Katholieken en Landbouw. Landbouwpolitiek in België: 1984-1914. Universitaire Pers Leuven, Leuven.

Von Witzke, H., 1986. Endogenous Supranational Policy Decisions: The Common Agricultural Policy of the European Community. Public Choice. 48, 157-174.

Von Witzke, H., 1990. Determinants of the U.S Wheat Producer Support Price: Do Presidential Elections Matter? Public Choice. 64, 155-165.

Zelner, A and H. Theil, 1962. Three Stage Least Squares: Simultaneous Estimation of Simultaneous Equations. Econometrica. 30: 54-78.

Table 1. Average Nominal Protection Coefficients (NPCs)

	Barley	Butter	Cattle	Eggs	Oats	Pigs	Potatoes	Poultry	Rye	Sugarbeet	Wheat
1850-1876	1.04	0.98	n.a.	n.a.	1.03	n.a.	n.a.	n.a.	1.02	n.a.	1.02
1877-1890	0.98	1.00	0.97	0.84	1.00	n.a.	n.a.	n.a.	1.03	0.93	1.00
1891-1900	1.00	1.08	0.87	0.95	1.21	n.a.	0.57	n.a.	0.99	0.99	1.03
1901-1913	1.01	1.15	0.91	0.94	1.59	0.97	0.55	n.a.	0.99	0.85	0.98
1920-1930	1.09	1.04	1.13	1.05	1.07	1.27	0.94	0.76	0.98	1.23	0.92
1931-1939	1.21	1.49	2.02	0.94	1.41	1.11	0.78	0.69	1.20	1.11	1.15
1946-1960	1.14	1.16	1.25	1.04	1.19	0.94	0.67	0.54	1.19	1.26	1.37
1961-1970	1.32	3.38	1.78	1.09	1.31	1.13	0.75	0.58	1.32	1.87	1.51
1971-1980	1.33	3.00	1.79	0.92	1.33	1.09	1.07	0.94	1.29	1.19	1.34
1981-1990	1.80	2.24	1.29	0.80	1.32	1.32	0.84	1.06	1.64	1.55	1.62

"na" means average could not be calculated with some data (not necessarily all) for this period missing

Table 2. Average Producer Subsidy Equivalents as a Percentage of Output (PSE%)

	Barley	Butter	Cattle	Eggs	Oats	Pigs	Potatoes	Poultry	Rye	Sugarbeet	Wheat
1877-1890	-2.0	-0.2	0.2	na	0.4	na	-16.9	na	2.9	-0.6	-0.5
1891-1900	0.0	4.0	-3.0	na	5.0	na	-22.5	na	-1.3	-0.4	2.6
1901-1913	0.7	6.8	-5.6	na	20.7	-2.9	-66.5	na	-1.3	-15.0	-2.2
1920-1930	8.0	4.0	10.1	4.5	4.4	20.1	-2.1	-42.9	-3.4	11.8	-9.5
1931-1939	14.7	30.7	39.4	-5.1	25.2	-8.3	-1.4	-49.1	18.7	15.2	21.0
1946-1960	11.4	13.4	1.4	1.6	15.0	-3.4	-1.1	na	17.3	4.4	25.8
1961-1970	24.5	68.4	35.1	3.2	27.7	7.6	-4.6	-86.5	44.5	59.2	34.4
1971-1980	18.8	65.2	37.4	-7.5	18.6	7.3	-6.7	-7.5	18.4	11.6	18.6
1981-1985	20.3	46.0	19.8	-25.1	13.7	18.4	-2.8	1.8	20.3	29.6	18.3

"na" means average could not be calculated with some data (not necessarily all) for this period missing

Table 3. Share of Agriculture in Population, Total Output and of Food in Total Expenditures

	% Agricultural Population	% Food Expenditures	% Share of Agriculture in Total Output (*)
1860	42.6	62.2	n.a
1870	36.1	61.9	n.a
1880	29.0	61.5	23.8
1890	22.0	61.2	n.a
1895	n.a	n.a	16.3
1900	21.0	62.7	n.a
1910	16.0	63.2	13.8
1920	15.0	64.7	19.8
1930	17.0	55.6	12.7
1939	14.4	49.7	10.0
1950	11.1	48.7	9.8
1960	8.0	38.6	6.8
1970	4.6	29.0	4.4
1980	3.0	17.8	3.2
1985	2.9	17.8	2.8

(*) Gross value added at factor costs
Source : Blomme (1988) and N.I.S.

Table 4. Food Expenditures as Share of Total Consumer Expenditures (%).

	Bread	**Potatoes**	**Beef**	**Pork**	**Poultry**	**Butter**	**Eggs**	**Sugar**	**Beer**
1853	30.08	10.72	1.71	2.04	0.33	4.76	1.25	0.56	0.72
1891	18.38	7.20	4.07	4.36	1.26	6.61	1.75	0.77	1.00
1928	7.92	3.11	5.34	5.04	2.29	8.50	2.25	1.00	1.29
1947	6.90	2.15	4.41	3.13	3.77	4.90	1.77	0.93	0.98
1961	5.06	1.01	3.12	1.54	6.06	2.88	1.01	0.68	0.96
1973	3.65	0.64	2.75	1.49	4.65	0.65	0.88	0.30	1.10
1985	1.09	0.17	2.10	1.12	3.78	0.51	0.31	1.11	1.36

Source : Creten (1982) and N.I.S.

Table 5. Average Producer Value in 1985 Prices (Million BF)

	Barley	**Butter**	**Cattle**	**Eggs**	**Oats**	**Pigs**	**Potatoes**	**Poultry**	**Rye**	**Sugarbeet**	**Wheat**
1877-1890	2655.5	n.a.	19391.8	n.a.	9189.2	n.a.	10777.7	n.a.	19718.	4857.7	13164.2
1891-1900	2436.4	n.a.	19946.3	n.a.	12842.4	n.a.	10226.8	n.a.	15129.	5713.7	8013.7
1901-1913	2361.1	18464.3	28253.5	n.a.	16146.9	34261.3	14016.5	n.a.	12202.	5560.4	10090.6
1920-1930	2225.4	26682.4	18160.1	34236.8	16174.0	27360.4	38444.9	2368.2	12791.	6758.5	10636.3
1931-1939	1108.1	20084.1	15707.9	12174.8	8821.7	19573.1	22863.8	1561.2	5178.7	3203.7	6395.0
1946-1960	4146.1	26264.7	52826.4	n.a.	6650.4	17206.9	n.a.	n.a.	3031.8	n.a.	11103.4
1961-1970	7030.5	27512.7	69923.2	15826.1	4188.8	30942.8	9048.2	5097.6	1246.3	10335.5	12335.4
1971-1980	7049.6	17484.4	69072.4	11712.9	1733.0	45295.1	7306.4	4138.5	538.7	11747.1	9981.9
1981-1990	6399.5	14437.8	50287.7	6763.7	750.6	41581.8	6472.9	3659.2	226.5	11171.4	10060.2

Table 6. Capital Stock and Capital Intensity in Agriculture

	Capital Stock (Billion BF)		Capital/Labor Ratio (1000 BF/ Labor Units)	
	Nominal prices	1985 prices	Nominal prices	1985 prices
1880	9.2	1,187	14.8	1,908
1895	6.7	1,070	10.5	1,674
1910	8.9	1,242	14.0	1,944
1929	68.6	1,002	135.5	1,979
1950	206.7	963	465.1	2,166
1960	318.3	1,225	951.6	3,662
1970	521.0	1,490	2,733.5	7,816
1980	917.0	1,288	7,654.4	10,755
1989	939.0	886	9,884.2	9,325

Source: Own calculations based on Bublot, Blomme and NIS.

Table 7 Average Self - Sufficiency Ratios (in %)

	Barley	**Butter**	**Cattle**	**Eggs**	**Oats**	**Pigs**	**Potatoes**	**Poultry**	**Rye**	**Sugarbeet**	**Wheat**
1877-1890	35	93	82	93	n.a	n.a	92	n.a	80	98	37
1891-1900	27	92	88	97	90	n.a	114	n.a	83	92	20
1901-1913	21	92	89	90	87	n.a	100	95	80	90	17
1920-1930	27	94	92	n.a	85	90	137	146	85	n.a	25
1931-1939	25	97	94	n.a	94	99	91	129	70	n.a	26
1946-1960	44	99	97	109	85	101	95	n.a	74	107	49
1961-1970	68	105	89	133	84	118	97	127	81	131	66
1971-1980	67	106	92	165	79	169	95	106	88	209	64
1981-1990	76	115	121	119	71	150	118	94	71	243	70

Table 8: Three Stage Least Squares Estimation Results

	Dependent	LogNPC		Dependent	PSE%	
	Adj R2	0.728		Adj R2	0.731	
	DW	2.081		DW	2.191	
	Obs Used	566		Obs Used	569	
Variables	*Coeff*	*T-values*	*Prob*	*Coeff*	*T-values*	*Prob*
Constant	2.310	4.894	0.000	2.292	6.472	0.000
LogWPRICE°	-0.135	-2.950	0.003	-0.177	-5.214	0.000
LogGNPSHAR	0.130	4.702	0.000	0.060	3.428	0.001
LogCONSHAR	-0.126	-2.258	0.024	-0.034	-3.424	0.001
SSR°	-0.004	-0.166	0.868	0.015	0.585	0.559
D1877-1893	-0.183	-1.602	0.109	-0.013	-0.174	0.862
D1894-1899	-0.200	-1.843	0.066	-0.054	-0.713	0.476
D1900-1919	-0.081	-0.901	0.368	-0.037	-0.648	0.517
D1920-1948	0.097	1.352	0.177	0.103	2.272	0.023
DUMEC	0.123	2.478	0.013	0.087	2.307	0.021
DBAR	-0.034	-0.350	0.726	-0.085	-1.484	0.138
DRYE	0.040	0.441	0.659	0.033	0.608	0.543
DOAT	-0.016	-0.166	0.868	-0.069	-1.195	0.232
DPOT	-0.840	-5.593	0.000	-0.891	-8.743	0.000
DSUG	-0.371	-2.499	0.013	-0.500	-5.057	0.000
DBUT	-0.359	-1.604	0.109	-0.674	-4.250	0.000
DCAT	-0.628	-2.261	0.024	-0.958	-4.910	0.000
DPIG	-0.879	-3.487	0.001	-1.090	-6.124	0.000
DPOU	-1.038	-4.086	0.000	-1.610	-9.435	0.000
DEGG	-0.876	-5.024	0.000	-0.917	-7.467	0.000
AR(1)	0.664	17.637	0.000	0.488	12.287	0.000

Table 9: Three Stage Least Squares Estimation Results

	Dependent	LogNPC		Dependent	PSE%	
	Adj R2	0.727		Adj R2	0.734	
	DW	2.051		DW	2.205	
	Obs Used	566		Obs Used	569	
Variables	*Coeff*	*T-values*	*Prob*	*Coeff*	*T-values*	*Prob*
Constant	2.397	5.263	0.000	2.402	6.965	0.000
LogWPRICE°	-0.148	-3.289	0.001	-0.198	-5.665	0.000
LogGNPSHAR*(1-DUMEC)	0.117	4.258	0.000	0.048	2.428	0.016
LogGNPSHAR*DUMEC)	0.100	3.907	0.000	0.040	2.234	0.026
LogCONSHAR*(1-DUMEC)	-0.184	-3.268	0.001	-0.128	-3.382	0.001
LogCONSHAR*DUMEC)	-0.029	-0.457	0.648	0.033	0.735	0.463
SSR°*(1-DUMEC)	0.004	0.319	0.750	-0.001	-0.145	0.885
SSR°*DUMEC	-0.002	-0.034	0.973	0.017	0.394	0.694
D1877-1893	-0.094	-0.846	0.398	0.029	0.381	0.703
D1894-1899	-0.110	-1.038	0.300	-0.002	-0.027	0.979
D1900-1919	-0.008	-0.096	0.924	0.029	0.487	0.627
D1920-1948	0.135	1.915	0.056	0.170	3.356	0.001
DBAR	-0.091	-1.000	0.318	-0.111	-1.937	0.053
DRYE	0.032	0.389	0.698	0.022	0.443	0.658
DOAT	-0.070	-0.768	0.443	-0.091	-1.589	0.113
DPOT	-0.855	-6.070	0.000	-0.909	-9.377	0.000
DSUG	-0.471	-3.198	0.002	-0.566	-5.635	0.000
DBUT	-0.411	-1.902	0.058	-0.737	-4.564	0.000
DCAT	-0.722	-2.661	0.008	-1.065	-5.271	0.000
DPIG	-0.970	-4.020	0.000	-1.164	-6.429	0.000
DPOU	-1.182	-4.784	0.000	-1.729	-9.620	0.000
DEGG	-0.909	-5.492	0.000	-0.967	-8.075	0.000
AR(1)	0.635	16.599	0.000	0.464	11.400	0.000

Table 10: Wald tests for Structural breaks due to EU integration (*)

Null Hypothesis: Coeff (Z*DUMEC) = Coeff (Z*(1-DUMEC))				
	PSE% Equation		LOGNPC Equation	
Z =	*Chi-square*	*Prob*	*Chi-square*	*Prob*
GNPSHARE	0.749	0.387	2.594	0.107
CONSHARE	15.314	0.000	7.353	0.007
SSR°	0.178	0.673	0.010	0.919
Jointly tested	18.405	0.000	11.632	0.009

(*) see table 9

Figure 1: Agricultural protection in Belgium from 1885 to 1985
(PSE% of butter and wheat)