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**¿POR QUÉ NO TODOS LOS AGRICULTORES COOPERAN?
COOPERATIVISMO AGRARIO EN ESTADOS UNIDOS Y
EUROPA OCCIDENTAL, 1880-1930**

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Determinants of agricultural co-operatives in Western World, 1880-1930

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Abstract: This paper examines the determinants of farmers' co-operation in the production and marketing of agricultural products. Despite their important advantages for farmers, co-operatives spread slowly in the Western countries before 1930. The regression results show that the propensity to co-operate increased in countries with high human capital, in sectors where small family farms predominated and in products that were mostly commercialized in the international market. Density of production was also an important determinant of co-operation. Distance to the main market is negatively related to co-operation, suggesting that co-operatives were less likely to prosper in the New World producing countries that commercialized their products in Western Europe.

Introduction

The development of regional and national markets and technical innovations in the second half of the nineteenth century led farmers to look at co-operation as a means of adapting themselves to increasing competition.² Co-operation has important advantages for farmers. While using the benefits of small farming (mainly, low supervision costs), co-operatives allowed farmers to achieve economies of scale in processing and marketing and to improve the methods of production, conservation and processing of products. Through co-operatives, the rural population can collectively purchase cheap inputs and machinery, and to access to instruction, technological innovations, credit and mutual assistance in case of bad harvests, pests or meteorological disasters. Processed and/or standardized products produced by a co-operative can be sold at higher prices, increasing

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² League of Nations (1926: 6)

the competitive position of small farmers.³ Considering that co-operatives contributed to the technological advance of the sector, the presence of co-operatives has been associated with agricultural growth and higher standards of living of the rural population.⁴

Despite these various and important advantages, co-operatives spread slowly in the Western countries before 1930. The history of success of co-operatives in the production of butter in Denmark contrasted with the only few co-operatives founded in other countries and products.⁵ This article discusses the factors explaining why co-operatives were only successful in some countries and products, looking at the extension to which agricultural co-operatives expanded in 12 western countries before 1930. It focusses on co-operation for the production and marketing of four commodities: butter, wine, citrus fruit and wheat (the main fields of co-operative expansion), for which the productive and marketing characteristics that influenced the propensity to co-operate substantially varied. Processing and quality control were important factors in the determination of final price in butter and wine. Problems of overproduction were important in the case of wine and citrus fruit and seasonality and transportation problems focussed the attention in the trade of wheat from New World producing countries, given the fact that they had to be transported in bulk immediately after the harvest.

The article is arranged as follows. Next section revises literature on co-operation in agriculture. Section 3 explains the extension to which co-operatives diffused in the production and marketing of butter, citrus fruit, wheat and wine in Western agriculture during the period 1880-1930, measured as the share of co-operatives' production in total output. Section 4 summarizes factors determining the extension of co-operatives in these sectors. An econometric analysis on the main determinants of agricultural co-operation is considered in section 5. Last section concludes.

***“Co-operation is born of necessity”?* Theories of success and failure**

³ These advantages of co-operatives have been emphasized by Berget (1902: chapter 1). See also Carmona and Simpson (2003: 234); Federico (2005: 133)

⁴ According to Loubère (1990), co-operative expansion in France during the first third of the twentieth century contributed to the technical “revolution” in the sector. On the contrary, the weak expansion of collective production in Spain during the first third of the century explains, according to Sabio Alcutén (1995: 283), the stagnation in the adoption of wine technological innovations

⁵ Federico (2005: 171); Simpson (2000)

A wide literature has analyzed factors explaining differences in the diffusion of co-operatives across countries. Contemporary observers attributed the weakness of co-operation in some regions to the apathy, ignorance or individualism of small farmers. The diversity of nationalities found in New World countries was also referred as the main cause of the limited development of co-operation.⁶ On the contrary, high level of social cohesion was considered to favour farmers' associations by the first studies on co-operation.⁷ Recent studies have also looked at social, political and cultural factors as important determinants of the success or failure of farmers' organisations. Human capital and the absent of risk have been also mentioned as important conditions to organise a successful co-operative. Following the pioneer studies, Henriksen (1999) concluded that co-operation expanded before 1914 in countries with a high degree of trust among farmers. Thus, violence and conflicts between Catholics and Protestants prevented a greater diffusion of dairy co-operatives in Ireland.⁸

Economic factors are also important. As considered by Hoffman and Libecap (1991), co-operatives were more successful in perishable products that needed a rapid transformation after the harvest, or in those in which quality guarantee was an important factor to determine the final price. Co-operation slowly expanded in non-perishable products, as in cereals, according to this literature. Some studies have also suggested that co-operatives were more successful in homogeneous products, but in fact it hardly developed in some of them, such as eggs, or fruits other than citrus fruits.⁹ As Table 1 shows, more than half of the co-operatives that there existed in 1945 corresponds to the dairy sector and most of them concentrated in Europe.

⁶ *Year-Book of Agricultural Co-operation* (1932: 413). Fay (1925a: 124), for instance, argues that the weak diffusion of dairy co-operation in France resulted from the lack of spirit of association. The *Year-Book of Agricultural Co-operation* (1932: 413) mentioned the lack of education among the rural population as a factor to explain the weak co-operative expansion in Argentina

⁷ Henriksen (1999: 57)

⁸⁸ O'Rourke (2007a, 2007b)

⁹ In the United States, most of the co-operatives expanded in the dairy and the horticultural sectors. Henriksen (1999) also emphasized that the diffusion of co-operation in the dairy sector in Denmark contrasted with the weak development in other agricultural products

[Table 1]

The opposition of traders and large landowners has frequently been cited as an explanation for the weak diffusion of co-operation.¹⁰ However, these groups could possibly take advantages from co-operatives. Thus, in a context of shortages in labour, some French landowners saw co-operatives as a way to retain small growers at the land, in order to guarantee skilled labour for their properties.¹¹ Landowners, indeed, promoted co-operation among growers, providing them with capitals and management skills. Similarly, wine traders promoted and supported co-operation because production in a great number of small, scattered and badly prepared facilities made them unable to bring a large quantity of homogeneous wines.¹² When existed, opposition from traders was combated in various forms. For instance, most of the grain co-operative elevators in the United States introduced the “*penalty clause*” (that imposed a fine to farmers that sold their wheat outside the co-operative) to fight against the private elevators’ practise of temporarily increasing the prices paid by the wheat delivered to their stations as a way to displace a new co-operative elevator.¹³ Similarly, dairy producers’ obligation to deliver the whole milk output to co-operatives was seen by Henriksen (1999) as a comparative advantage of cooperatives to improve the quality of the product.

Inefficient management and “*the small and uneconomic size of the business units with insufficient members and inadequate working capital*” have been both cited as an explanation of failures of co-operative associations.¹⁴ In fact, O’Grada (1977) and O’Rourke (2007a) has shown that the weak diffusion of dairy co-operatives in Ireland resulted from the low density of milk production that discouraged the introduction of

¹⁰ Galtier (1958, III: 29, 76) and Berget (1902: 28) suggested that the weak diffusion of co-operation among Spain and France’s winegrowers resulted from the opposition of traders

¹¹ Clavel and Baillaud (1985: 84). For problems caused by shortages of labour in the wine sector, see Mandeville (1914: 33)

¹² Mandeville (1914: 18-19; 23-25; 33; 35)

¹³ Kenkel (1922: 23).

¹⁴ Forrester (1925: 20); Berget (1902: 28). In some regions farmers were unaware of the benefits of co-operation to improve their economic conditions, because most of them did not offer any comparative advantage, mainly because of their difficulties to commercialize agricultural products. According to Carmona and Simpson (2003: 234), this explains the high number of failures of Spain’s co-operatives during the first third of the twentieth century

separators and co-operatives, which needed a minimum quantity of milk to obtain adequate returns. In the case of wine, Simpson (2000: 118) pointed out that co-operatives developed later in the regions of low-yielding ordinary wines of Puglie and La Mancha, because weak production in both regions obliged to have between 700 or 1,000 hectares of vines for the installation of a single average size co-operative.

Land tenure has been also mentioned as an important factor for co-operating. Simpson (2000: 119) pointed out that farm societies appeared later in regions of sharecropping because the short duration of most contracts discouraged long-term investments. Following to O'Rourke (2007a), this factor explains why co-operatives weakly expanded in the Catholic Ireland, where sharecropping and conflicts about land ownership prevailed. Catalonia, however, seems to constitute an exception because of the long duration of the sharecropping contracts of the *rabassa morta*.¹⁵ In Europe, most of the co-operatives were formed by small farmers, which led to look at the problems to raise sufficient capitals to acquire machinery and buildings as a main obstacle to the founding of co-operatives. Indeed, in some Mediterranean countries and in Canada, financial support from the Government has been sometimes considered fundamental for co-operative expansion.¹⁶

According to Centner (1988: 96), market failures such as oligopoly, asymmetric information (especially concerning the quality of the product), and restricted bargaining, A great number of scattered farms generally sells to a small number of buyers. A farmer is generally a weak bargainer because, as pointed out by Erdman (1958: 180), “(a) he does not know in what grade his product falls; (b) he does not know the relative value of different grades; (c) he does not know what his local price should be even when central market prices are known, and frequently he cannot even interpret wholesale market quotations; (d) he cannot follow market conditions closely enough to know at any given time whether market tendencies are up or down; and (e) he is slow in judging a proposition put in a new way.” ON the other hand, the holdup problem makes, as

¹⁵ Thus, Simpson (2000: 119) has shown that most of the wine co-operatives that existed in Spain before 1936 were located in Catalonia which was possible for the characteristics of the *rabassa morta* contracts

¹⁶ Mandeville (1914: 30-31); Galtier (1958, vol. 3: 29, 78)

considered by Centner (1988: 97), that “*where producers have investments in production facilities that cannot be used for other purposes, such as trees, vines, of livestock facilities, the absence of long-term sales contracts may leave producers with an inferior bargaining position.*” Another important stimulation for co-operating were the complaints against intermediates and middlemen, who absorbed most of the farmers’ profits.¹⁷

Farmers had no incentives to form a co-operative while receiving high returns, while co-operation expanded in periods of agricultural depression and low prices. Thus, Mandeville (1914) and, more recently, Berger and Maurel (1980: 98) and Carmona and Simpson (2003: 241), have emphasized that low prices and market overproduction was an important incentive to the establishment of co-operatives in the wine sector. Indeed, in the presence of falling relative incomes of farmers after 1900, and especially during the Great Depression, governments of advanced countries looked at co-operatives as a way to solve surplus production and falling prices without a direct intervention into markets. Some countries began to support co-operatives through favourable legislation, long-term credits and indirect financial aids (fiscal exceptions, for instance), helping small farmers to raise the capitals needed to initial investments in machinery and buildings. In France, co-operatives were especially encouraged as a public instrument against crisis in the agricultural sector, and the Government promoted the founding of farmers’ societies to control and regulate the market in an attempt to prevent low prices.¹⁸ An important problem that faced most farmers consisted on the scarcity of funds before the harvest was sold, which normally occurred during a brief period of the year. Most co-operatives were unable to make payments to members until selling most of the output, while members urged to be paid when products were delivered, forcing co-operatives to negotiate new credits. Farmers therefore needed governmental loans or co-operatives advances to continue business.¹⁹

¹⁷ This was one of the main complaints of the Grange, a movement formed after the United States’ Civil War and often cited as a precedent of the wheat farmers’ organizations; Kenkel (1922: 13)

¹⁸ For the case of France, see Loubère (1990: 140); Clique (1931: 16); Lachiver (1988: 489); Mandeville (1914: 36); Tardy (1935: 312); the initial expansion of wine co-operation in France was possible through the public promotion obtained by the Law of 1906 and the collective loans of the *Credit Agricole*

¹⁹ For the case of grains and wine, see Kenkel (1922: 49) and Cotta (1935: 70)

Co-operation in butter, citrus fruits, wheat and wine

The pioneers: butter co-operatives

Modern co-operation among farmers began in the 1880s with the emergence of co-operative creameries in Denmark. After the first co-operative had been created in 1882, its number rapidly increased, with new foundations accounting for more than 600 in 1886-1890. The introduction of the centrifugal separator in 1878 had allowed the processing of a higher quality and standardised butter on large scale factories, or creameries. The separation of cream from milk was made more rapidly and a high volume output was obtained. By the beginning of the twentieth century, co-operatives dominated butter production, with more than 1,000 co-operatives processing the milk of 80 per cent of Danish cows in 1903. In 1909, co-operatives employed 86 per cent of milk output and 83 of the total number of cows, while the number of non-co-operative dairies substantially dropped.²⁰ In 1909, co-operatives creameries processed 77 per cent of butter output and this figure rose to 86 and 89 per cent in 1925 and 1929, respectively (table 2).

[Table 2]

The expansion of dairy co-operation in Denmark focussed great attention because it was followed by a great rise of exports to Britain. Sales in the international markets multiplied by five between 1880 and 1900 and the share of the Danish butter in the British import market rose from 13 per cent to more than 40 per cent in the same period (table 3).²¹ According to Henriksen (1999), the success of co-operatives creameries over private organizations based on the members' obligation to deliver the whole milk output and the co-operatives' option to refuse milk without a minimum quality. As a consequence of these rules, production substantially improved, and falsification, very common through

²⁰ Henriksen (1999); the number of non-co-operative dairies fell from 264 to 90 between 1900 and 1909; Wolff (1912: 77). The spread of co-operation in Danish butter can be also explained by the services provided by these organizations to members, such as the better use of the by-products (Fay, 1908: 156).

²¹ Faber and Hertel (1931: 45)

the addition of margarine to butter, was prevented. Thus, Denmark specialized in a high quality product, raising its export share, while those of Ireland and other countries sharply declined (see below).²²

[Table 3]

Centrifugal cream separator was followed by the expansion of co-operatives in other countries, although the level of diffusion before 1930 substantially varied across countries (table 2). Besides in Denmark, co-operatives dominated butter processing in Finland, Sweden, Australia and New Zealand, as accounted by the share of co-operatives in total production of butter in each country, but they hardly expanded in non-exporting countries, such as Germany or Italy.

In Sweden, a country with comparative advantage in the dairy products, the invention of cream separator was followed by the founding of some co-operatives, but the movement diffused much more slowly than in Denmark. In 1890, number of associations only accounted for 73.²³ In the 1890s more than 300 new creamery co-operatives were organized, but by 1900 most of the processing plants were still private creameries. Expansion of co-operation only occurred in the first two decades of the twentieth century. The number of co-operatives rapidly rose to account for 565 in 1920. These co-operatives were responsible for the manufacture of 72 per cent of total milk output in 1925 (table 2), despite they only represented 41 per cent of the total establishments for butter production.²⁴ The importance of co-operative in the production of Swedish butter increased even more in the following decade and, in 1936, co-operative creameries received 88 per cent of the milk and manufactured 92 per cent of the butter produced.²⁵ Co-operative expansion in this country was not followed by an expansion of exports. The share of Swedish exports in international markets substantially fell from 11 to 6 between

²² Gide (1926: 121); Henriksen (1999)

²³ Milk and creamery products represented 43 per cent of the value of agricultural production in Sweden. The number of private creameries in Sweden amounted to 1,562 in 1890; Ytterborn (1938: 185); Gjöres (1927: 166)

²⁴ Private creameries were small and used primitive methods of operation; Ytterborn (1938: 190)

²⁵ Gjöres (1927: 167)

1890 and 1900, maintained stagnant until 1915 and dropped to 3 per cent by 1925 (table 3). This was also the case of Finland, where butter exports substantially declined in spite of the great expansion of co-operation. The Finish movement had started later than in Denmark (the first co-operative was established in 1901) but, in 1925 and 1928, 92 and 98 per cent of total output was produced by co-operatives, respectively (table 2).²⁶

Co-operative creameries in two other exporting countries (Australia and New Zealand) also developed later than in Denmark. The invention of cream separator and, especially, the introduction of refrigeration at the beginning of the 1880s, led to a growing butter industry in both countries.²⁷ Exports from Australia and New Zealand expanded especially after 1900, increasing from 2 per cent to 15 per cent of total imports to Britain between 1890 and 1900. As a consequence of the Imperial Preference, exports rose furthermore in the 1920s to account for 32 per cent of total (table 3). The development of the industry coincided with a great expansion of co-operation. In 1893, New Zealand, aiming at promoting the formation co-operatives for dairy production, established a National Dairy Association, although it was not after 1914 when the movement successfully developed.²⁸ After World War I, the movement expanded rapidly and in 1925, the share of co-operatives in total butter production in New Zealand reached up to 80 per cent. In Australia, this figure accounted for 91 per cent in the same period (table 2).

The factory system, which improved the quality of butter and their possibilities to increase exports, did not completely dominated butter processing in countries where the density of milk production was low. Private or co-operative manufacture of butter needed a sufficient number of cows to succeed, that ascended to 300 to 400 in Denmark, or to

²⁶ *Year-Book of Agricultural Co-operation* (1932: 309)

²⁷ For Australia, see Drane and Edwards (1961: 20-30) and Frost (1997: 33-34); for New Zealand, see *Year-Book of Agricultural Co-operation* (1930: 257). Drane and Edwards (1961: 30) and Belshaw (1927: 282) have emphasized the importance of two other important technological innovations. The Badcock test, introduced after its invention in 1892, allowed an accurate and reliable measurement of fat content in milk. On the other hand, the pasteurization process, introduced in the 1890s, eliminated the need for preservatives in butter

²⁸ *Year-Book of Agricultural Co-operation* (1926: 59-60)

400 to 600 in the United States.²⁹ As shown in table 4, the average number of cows per co-operative in Denmark or Finland was 892 and 605. Indeed, while members of Danish and Finish co-operatives owned an average of 6 to 7 cows, this figure only reached to 2 to 4 in countries where butter co-operatives hardly developed, such as Germany and France.

The low density of cows was one of the problems explaining the low expansion of co-operative creameries in Ireland. In this country, where 288 dairy associations existed at the beginning of twentieth century, co-operatives were never as important as in Denmark, where they accounted for 1,200 in the same period. In 1907 only 37 per cent of the butter was processed in creameries and by 1920 this share augmented to half of the milk processed.³⁰ Co-operatives creameries also spread slowly in the Netherlands. Factory production had begun to expand very slowly after 1877, but only 43 per cent of the Dutch output of butter was produced in creameries twenty years later. In fact, the percentage of butter produced on farms was still 25 and 10 per cent in 1912 and 1920, respectively.³¹ The first co-operative dairy in this country had been founded in 1886 at Warga (Friesland), but co-operative production accounted only for 25 per cent of total production in 1899. Moreover, only half of the 686 co-operative creameries, responsible for 55 per cent of all butter, worked by steam power in 1908.³² The diffusion of the factory system initially led the Netherlands to almost double its exports, but in the 1890s they had reduced by more of 40 per cent and continued to fall afterwards, resulting in a substantial loss of market share (table 3).³³ By 1925, Dutch co-operatives only accounted for 65 per cent of total output (table 2).

Co-operatives not only needed a sufficient number of cows to survive. Farmers also ought to live no very far from the dairy to sent fresh milk each morning. In regions where scattered farms predominated, such as some United States and Ireland producing areas, auxiliary dairies were established near to the farms in order to treat fresh milk before

²⁹ For Denmark, Henriksen (1999: 61); for the United States, Powell (1913: 136)

³⁰ O'Grada (1977: 289); O'Rourke (2007a: 399)

³¹ Bureau of Foreign Commerce (1902: 98-99); Pirtle (1926: 295-296; 302)

³² International Institute of Agriculture (1911: 377); Bureau of Foreign Commerce (1902: 98-99); Adams and Fant (1910: 10-12)

³³ This decline has been explained by the practise of adulteration consisting of adding margarine and other fats to butter; Pirtle (1926: 301); Van Zanden (1994: 123)

delivering to co-operatives creameries. Auxiliary dairies allowed farmers to separate the milk from the cream, reducing the costs of long-distance transportation, and eliminating the possibility of damage, allowing scattered dairy producers to deliver their product to a private or co-operative creamery.³⁴

In spite of these auxiliary dairies, co-operative creameries hardly developed in the United States. Although centrifugal separator started to being used in the 1890s, only 56 per cent of all butter was produced in factories by 1919.³⁵ More than 2,000 co-operative creameries were established during the period 1895-1900, but most of them failed to survive, because they had been established in regions with an insufficient number of cows.³⁶ Thus, in 1911 only 34 per cent of creameries were farmers' co-operatives (table 5) and they were generally small.³⁷ The percentage of butter produced in co-operatives in the United States continued to account for a third during the 1920s. However, most of the creamery co-operatives were located in the Central and Northern-central states, where the density of milk production allowed an adequate supply of milk to the co-operative, and especially in the states of Minnesota and Wisconsin, where co-operatives accounted for two-thirds of all butter production in the 1920s (table 5).³⁸ The lack of winter milk was also a determinant factor for the weak diffusion of dairy co-operatives in France. Thus, according to Tiéfaine (1901), in 1892 only 7 per cent of total butter output was produced in one of these societies.³⁹ In 1908, this figure only ascended to 2 and to 8 per cent at the beginning of the 1930s (table 2). The weak diffusion of private and co-operative creameries was accompanied by a fall of French butter exports from about a quarter of butter imports to Britain by 1890 to 10 per cent at the eve of World War I and to 1 per cent in 1925 (table 3).

³⁴ Fay (1925a: 157). Dairy development in the United States was also favoured by the introduction in the late nineteenth century of hand separators, small machines for removing the cream from fresh milk, that allowed farmers to deliver to the dairy home-made cream instead of milk; Larson *et al.* (1922: 317-319).

³⁵ Federal Trade Commission (1921: 66)

³⁶ In Kansas, for instance, almost all of the 500 co-operatives established between 1885 and 1900 were closed because of the insufficient quantity of milk; Jesness (1923: 47-48)

³⁷ Bartlett (1931: 59)

³⁸ See also Powell (1913: 135); Knapp (1969: 216)

³⁹ Dairy co-operatives were abundant in the surroundings of Paris, but most of them were dedicated to the sale of milk; International Institute of Agriculture (1932: 1967)

Creamery co-operatives hardly developed in non-exporting countries. In Germany, the quantity of milk collectively processed only amounted to 20 per cent of total output (table 3), in spite of the fact that the number of co-operatives had doubled between 1908 and the early 1930s.⁴⁰ Similarly, the more than 3,200 Italian dairy co-operatives that existed at the beginning of the 1930s were only responsible for 25 per cent of the butter and cheese output (table 3).⁴¹

The limited development of wine co-operatives

First winemaking co-operative in France was established at the beginning of the twentieth century, but a rapid expansion of the co-operative movement had to wait to the mid-1920s, coinciding with the public support received by these associations.⁴² During the overproduction crisis of 1900-1908, the numerous attempts to increase collective winemaking had failed, according to Clique (1931: 16), mainly because of the restricted financial resources of small growers. Aiming at overcoming this problem, in 1906 the Government began to provide growers with long-term cheap loans through the *Caisse Nationale de Credit Agricole* to purchase the properties and machinery needed to collectively produce and storage wine.⁴³ However, only 13 co-operatives were in operation two years later (table 6).⁴⁴ The number of co-operatives only started to increase after 1908 to reach up to 79 at the eve of World War I, and most of them were located in Midi, a region producing ordinary wines.⁴⁵ Main incentives to the founding of wine co-operatives during this period, according to Mandeville (1914: 33), based on the shortage of private wine cellars and containers for product storage, which resulted in an increasing

⁴⁰ International Institute of Agriculture (1911); *Year-Book of Agricultural Co-operation* (1932: 270).

⁴¹ Most of the production of these dairy co-operatives (about 80 per cent) consisted of cheese, Walter (1936: 30). In Italy, some of these dairy co-operatives had been created thanks to the fiscal exceptions approved at the end of the nineteenth century and the legislation for the promotion of co-operation, but the expansion of co-operation paralysed during the interwar years; International Institute of Agriculture (1914: 145, 149-151, 188-189)

⁴² For the beginnings of the co-operative movement in the France's wine sector, see Clique (1931: 15); Galtier (1958: 338); Lachiver (1988: 482)

⁴³ Loubère (1990: 140); Clique (1931: 16); Lachiver (1988: 489); Mandeville (1914: 36); Tardy (1935: 312)

⁴⁴ Warner (1960: 33).

⁴⁵ Lachiver (1988: 482); Galtier (1958: 338)

quantity of *non-logés* wines (surplus produce).⁴⁶ The post-*phylloxera* reconstruction of vines after the late nineteenth century had doubled the area devoted to wines in the Midi region.⁴⁷ Most of the financial resources had been devoted to vine re-plantations, while the number of facilities were inadequate to storage the abundant harvests that resulted from the planting of high-yielding post-*phylloxera* vine varieties. Thus, a great part of output had to be sold immediately after the harvest, when market was glutted and prices low, augmenting the decline in prices.⁴⁸ In fact, during this period wine co-operatives were considered as a solution to avoid the sale of young wines at very low prices.⁴⁹

[Table 6]

In 1920, there existed 92 co-operatives in France, although they only contributed to around 2 per cent of total output (table 6) and their number expanded even more in the following years. During this time, the quantity of surplus produce and falling prices worsened in regions producing ordinary wines. In 1917-1925, constant prices of French wines dropped by 70 per cent, and the crisis in the sector worsened afterwards (figure 1). Co-operatives were seamed by the State as an instrument to solve growers' difficulties without a direct intervention into markets, which only began in 1930.⁵⁰ In 1927 the number of winemaking associations in France had increased to 353 and most of them (260) were located in the Midi.⁵¹ Warner (1960) explained this diffusion as a result of the situation of permanent overproduction and the support obtained from the Government.⁵² Beside the long-term loans that had been granted from the mid-1900s, the Government provided co-operatives with short-term funds, in an attempt to solve the farmers' shortage of capital immediately after the harvest. Most co-operatives were unable to make payments to members until most of the output was sold, while members urged to be paid

⁴⁶ Mandeville (1914: 33) pointed out that the co-operative movement was encouraged not only by the shortage of particular cellars, but also by the high cost of scattered winemaking, the lack of labour and credit, as well as the difficulties to sell the wine

⁴⁷ Mandeville (1914)

⁴⁸ Simpson (2000: 111); Clique (1931: 184). Capital shortage also resulted in difficulties to preserve wines in good conditions, Cotta (1935: 63)

⁴⁹ Tardy (1935: 311); Gastu (1935: 318); Mandeville (1914: 36-41)

⁵⁰ Warner (1960: 70)

⁵¹ Galtier (1958: 338)

⁵² Simpson (2000: 111)

when grapes were delivered. This forced co-operatives to negotiate loans in order to be able to make advances to growers.⁵³ Moreover, some members could be tempted to sell their production outside the co-operative at lower prices, augmenting markets' saturation and falling prices.⁵⁴ In 1931, French Government began to provide co-operatives with advances and short-term loans in an attempt to hold wines in the co-operative a few months after the harvest, attracting therefore winegrowers to co-operation.⁵⁵ As a result of this policy, the number of co-operatives doubled in the 1930s, accounting for 827 in 1939. However, wine co-operatives produced only 25 per cent of total output in 1945 (table 6).

[Figure 1]

Winemaking co-operatives in France not only constituted a governmental instrument to solve the problem of falling prices. According to Loubère (1990), co-operative expansion in France during the first third of the twentieth century contributed to the technical "revolution" in the sector. Because financial resources of individual winegrowers were low, the rising producing costs of the post-phylloxera viticulture could only be afforded through collective winemaking. Moreover, co-operatives allowed cultivation to be separated from processing, resulting in an improvement of winemaking and the possibility to invest most of growers' resources in cultivation.⁵⁶ Co-operatives also allowed farmers to gather capitals, knowledge and instruction. With a sufficient quantity of harvest, production costs decreased and productivity rose. Conservation of wine in good conditions was assured and the costs of searching markets reduced, augmenting commercialization possibilities. Through co-operation farmers could obtain higher prices, not only because storage allowed them to sell their wines when prices were high, but also because a most homogeneous and higher quality wine could be obtained.⁵⁷

⁵³ For the Italian case, see Cotta (1935: 70)

⁵⁴ Gómez Herráez (2003: 174)

⁵⁵ For instance, in 1934, short term financial aids benefited to 566 French co-operatives (95 per cent of total) and accounted for 3.7 per cent of total value of output; Tardy (1935: 314) and own calculation *Annuaire Statistique de la France* (1958)

⁵⁶ Loubère (1990: 97; 137)

⁵⁷ Mandeville (1914: 18-19; 35)

In spite of all these advantages, in the two other European wine-producing countries, Italy and Spain, co-operation developed even weakly than in France. In both countries, first co-operatives were established in the last third of the nineteenth century. Their number increased at similar rate than in France before 1914, but then co-operation developed slowly. As a result, the number of wine co-operatives in the mid-1920s accounted for around 80-90 in Italy and Spain, respectively, a few number compared to the 350 that existed in France at that time (table 6). In Italy, first wine co-operative had been founded in 1870 but, although co-operation rapidly expanded at the beginning of the twentieth century to reach 150 co-operatives in 1913, the number of associations diminished to 80 in 1924 and only a few co-operatives were established during the 1930s, a period of diminishing prices (figure 1). Italian wine co-operatives only produced 2 per cent of total output after World War II.⁵⁸ In Spain, first wine co-operative had been established in 1890 in Tarragona, a region producing ordinary wines.⁵⁹ At the beginning of the 1920s, there existed 88 co-operatives in this country, as many as in France (92), although they were responsible for only 5 per cent of total wine output (table 8). However, the movement expanded weakly during the 1920s and 1930s, in spite of the overproduction crisis of the Spain's wine sector in 1922-1927, with wine prices in constant pesetas declining by 50 per cent (figure 1). Until 1935, only a few co-operatives were created (table 6). Like in France, the main problem of growers consisted of shortages in containers to storage young wines during the harvest, especially during surplus campaigns. Although the wine growers' lobby developed an important movement of promotion of co-operation, the slow development of Spain's wine co-operation can be explained, according to Galtier (1958, vol. 3: 29, 76), by the weak public support. Wine co-operatives hardly obtained public support through credits during the first third of the twentieth century.⁶⁰ Indeed, the share of wine co-operatives in Spain only accounted for 8.6 per cent by 1950 (table 6).

⁵⁸ Cotta (1935: 71); International Institute of Agriculture (1914: 168-169); Dalmasso (1966: 15-19)

⁵⁹ Simpson (2000)

⁶⁰ Tarín and Carrión (1935: 331). Catalonia concentrated 80 per cent of the Spain's wine co-operatives in 1923, Tarín and Carrión (1935: 332-334); See also Pan-Montojo (2003: 328) and Simpson (2000). The fact that before 1950 co-operatives only expanded in Catalonia can be explained by the campaign organized by a local lobby, the *Unió de Vinyaters*, against industrial alcohol that also included an active work to promote co-operatives and claims to obtain economic aids and credit for co-operation. Furthermore, in spite the weak financial support of central Administration, the number of new co-operatives foundations increased in

Wheat and fruit pools: integration into marketing

Producers of wheat in the New World looked at co-operatives as a way to solve the marketing problems that had arisen in the export trade from the late nineteenth century. In the New World producing areas, wheat trade peaked in some weeks a year, which resulted in annual car shortage caused by the heavy seasonal demands of the grain trade. Railway companies had built line elevators in an attempt to solve this problem, but farmers were not allowed by the companies to load grain over the elevator's platforms or make use of flat warehouses for temporary storage, which forced growers to accept the terms of the line companies as to prices and grades.⁶¹ The *Report of the Elevator Commission of the Province of Saskatchewan* of 1910 also pointed out that the monopolistic position of a few large firms in the Winnipeg Grain Exchange: "*the larger milling and elevator companies operating elevator in the country, and owning and controlling most of the terminals as well, have overwhelming advantages over all the other members (i.e. commission merchants and track buyers)... it is evident that the grain business of Western Canada is in the hands of a powerful monopoly, in which a few large milling companies are supreme and the large elevator companies hold the second and the only other place.*"⁶² Complaints against the abuses of the private-owned elevators increased in wheat producing areas and the monopolistic position of railway companies and line elevators resulted in demands from wheat growers for public protection.⁶³

Growers therefore looked at co-operatives as a way to solve these marketing problems, so that most studies have considered the emergence of co-operative grain marketing as defensive in character. However, wheat growers confronted some problems to form wheat co-operatives such as "*their ignorance of the details of the grain business, their*

this region thanks to the financial aid provided by the *Mancomunidad*, a local institution; see Tarín and Carrión (1935: 332-334); Garrido (2007: 189)

⁶¹ For Canada, see Mackintosh (1924: 8; 11). The Manitoba Grain Act of 1900 was approved to remedied this problem, but violations continued until an amendment was introduced in 1903, Mackintosh (1924: 11-15)

⁶² Cited in Mackintosh (1924: 47)

⁶³ Canadian growers began to form "protective" organizations, such as the Territorial Grain Growers' Association created in 1902. This and other similar organizations united in the Canadian Council of Agriculture; *Year Book of Agricultural Co-operation in the British Empire* (1928: 91); Mackintosh (1924: 14)

isolation from each other and their distance from secondary and ultimate markets.”⁶⁴ In spite of these difficulties, wheat growers were able to form associations to manage in common a local elevator where wheat was cleaned, graded and stored. In the United States, a great number of these co-operative elevators were formed in the North Central States between 1895 and 1900, and foundations continued thereafter.⁶⁵

After the foundation of co-operative elevators, growers integrated into marketing by the formation of export associations. The first of them was founded in 1906 in Manitoba under the name of the Grain Growers’ Grain Company. Other two organizations were created in the Canadian prairie provinces of Saskatchewan and Alberta in 1911, after receiving government financial assistance. The Saskatchewan Co-operative Elevator Company and the Alberta Co-operative Elevator, formed by 60,000 grain growers, were responsible for nearly 20 per cent of the total grain shipments of the three Prairie Provinces. In 1917 the Grain Growers’ Grain Company and the Alberta Co-operative Elevator merged into the United Grain Growers.⁶⁶ This integration into marketing looked at guaranteeing the survival of the farmers’ movement. Most of the local farmers’ elevators failed to survive “*on account of the competition of companies which had access to the Winnipeg markets*”, so that farmers decided to establish “*a cooperative commission business within the existing organization of the grain trade.*” In Canada, the amount of grain handled by the farmers’ organizations increased from an average of 3.3 per cent in 1907 to 25 per cent in 1915 and about a quarter of the grain growers of Western Canada were members of a co-operative grain company.⁶⁷

The disruption caused by World War I in the world market for wheat encouraged the control of the wheat trade by the government. Thus, government-controlled pools were established in the United States, Australia and Canada for the compulsory acquisition and

⁶⁴ Mackintosh (1924: 20)

⁶⁵ Kenkel (1922: v; 16)

⁶⁶ *Year Book of Agricultural Co-operation in the British Empire* (1928: 93); Mackintosh (1924: 50-57); The respective governments advanced 85 per cent of the capital to both organizations, *Year Book of Agricultural Co-operation in the British Empire* (1928: 93). The Grain Growers’ Grain Company began as a commission company and only until 1912 entered into the country elevators’ business, in Mackintosh (1924: 106)

⁶⁷ Mackintosh (1924: 85; 87; 106-107)

marketing of the crop.⁶⁸ The re-introduction of the open market after the war coincided with a slump in prices, but demands from growers for the re-establishment of governmental pools failed. As a result, growers in the three countries decided to organize voluntary co-operative pools, but the movement only succeeded in Canada. The pools, formed as a federation of farmers' local elevators, paid to members a sum in account immediately after the harvest and made a final payment after selling the crop, securing to each member the average price obtained by the co-operative.⁶⁹

The Alberta Wheat Pool was created in 1923 with 48 per cent of total wheat acreage. A year later, the Saskatchewan and the Manitoba Pools were founded with 50 per cent and 30 per cent of the total wheat acreage. These three pools agreed to create a central selling organization, the Canadian Co-operative Wheat Producers, in 1924.⁷⁰ The growth of the pools was substantial in the following years. The percentage of the crop marketed by them rose from 38 per cent in 1924/5 to 53 per cent in 1925/6 (table 7). The development of wheat pools in Australia and the United States were, however, more limited. Although two-thirds of the Australian growers, producing 53 per cent of the total harvest, participated in a pool in 1921-1922, Australian farmers slowly returned to the "open market" and the wheat pooled fell to 41 per cent in 1922-3 to 19 per cent in 1926-7.⁷¹ In the United States, only about 3 per cent of the crop was marketed by farmers' pools in 1922-1923, although this figure rose to one third in 1936.⁷² This can be explained by the fact that the costs of operation of co-operative elevators in the United States were higher than those of line elevators. As accounted by Boyle (1925: 21), other weaknesses of the pools were "*delays in paying farmers, (...) speculative losses through holding, and big promises which cannot be fulfilled.*"

⁶⁸ In Canada, the monopoly of the crop was given to the Canadian Wheat Board in 1919-1920, *Year Book of Agricultural Co-operation in the British Empire* (1928: 93). In Australia, the first governmental pool was set up in New South Wales in 1914 by the Wheat Acquisition Act, that declared that all harvest was to be acquired by the Crown, Beasley (1928: 7, 11)

⁶⁹ League of Nations (1926: 13). According to Boyle (1925: 21), pools made growers an advance of 60 or 70 per cent of the crop value before wheat was sold

⁷⁰ *Year Book of Agricultural Co-operation in the British Empire* (1928: 99)

⁷¹ Beasley (1928: 40-41)

⁷² Boyle (1925: 21); Hedges (1941: 1)

[Table 7]

An exceptional case of a great diffusion of co-operation in wheat in a non-exporting country was that of France, where farmers' associations developed in a context of governmental intervention into cereal markets.⁷³ As a consequence of the surplus problems that had caused the abundant harvests of 1932 and 1933, France began a policy of storage of surplus production in farmers' facilities. Thus, the number of wheat co-operatives reached up to 1,100 in 1939, and contributed with 85 per cent of total output.⁷⁴ This contrasted with the situation in other European countries. In Spain wheat market was also substantially intervened by the state, but public agencies were in charge of storing surplus produce, while co-operatives only accounted for one per cent of total production as late as in 1960.⁷⁵

Solution of marketing problems was an important motivation for wheat growers in the New World producing countries to form co-operatives. The same was the case of the citrus fruit industry, where farmers tried to control the marketing of the product through co-operatives, although the diffusion was irregular among producing countries. Thus, the citrus industry in California was dominated by these growers' marketing associations that trade a high quality product. This contrasted with the case of Spain, other major producer and exporter of citrus fruits, where associations were absent and quality was poor.⁷⁶

The citrus industry faced a number of problems in California. Before co-operation, orange markets frequently glutted. Oranges were a luxury product, "*unknown to many Americans*" and growers faced a diminishing demand, while citrus fruits cannot be hold over one season to another, so that the entire harvest must be marketed during the year of production.⁷⁷ Beside problems of overproduction, the orange industry faced a problem of slow transportation and poor refrigeration facilities, which, jointly with the lack of

⁷³ Some co-operatives had been created in France before World War I, but most of attempts during this period had failed; Hirschfield (1957: 23)

⁷⁴ This share continued at the beginning of the 1950s, Hirschfield (1957: 24)

⁷⁵ UNACO (1961: 25)

⁷⁶ Garrido (2007: 5). Oranges exported from the United States were valued by an average of \$4.15 a box, compared to the \$1.15 a box for Spain's fruit; Morilla Critz, Olmstead and Rhode (1999: 324)

⁷⁷ Meyer (1950: 72); Mckay and Mackenzie Stevens (1924: 7); Coulter (1911: 195-196)

standardization resulted in high marketing costs. Prior to the establishment of growers' associations, the marketing system was dominated by a few large shipping and marketing firms that shipped oranges to wholesalers in the eastern markets. Later, these firms developed the business of packing and marketing oranges for the growers on a commission basis, but growers frequently obtained poor results.⁷⁸

The Orange Growers Protective Union of Southern California constituted the first growers' attempt for the co-operative marketing of the fruit. It was founded in 1885 as a defensive response to the "*dishonesty*" of commission houses, as well as to the falling prices caused by overproduction and the inability to cover producing and marketing costs. The association assumed the control of the sale of members' fruit, sending representatives to main Eastern consumer cities. In spite the fact that the Protective Union reach to control around 50 per cent of the California citrus crop in 1885, it was dismantled next year. Meyer (1950: 53-57) pointed out that the opposition of agents, that purposely flooded markets to prevent the pool's sales, the managerial inexperience, and the incapacity to provide members with packing facilities were some of the problems that led this association to fail. Next attempts to form a co-operative marketing association were to wait until 1893, following a period of five years of high prices. That year the Pachappa Orange Growers' Association was organized as a packing house that aimed at standardizing and selling oranges.⁷⁹ Following the Pachappa organization, other local associations were established, such as the Claremont Fruit Growers Association, which created a sales force in Eastern markets.⁸⁰

These local associations began to federate into central organizations at the end of the nineteenth century.⁸¹ The Pachappa association, jointly with various local orange growers' co-operatives, created the Southern California Fruit Exchange in 1895. The Exchange was responsible for the marketing of 32 per cent of total crop during its first

⁷⁸ Mckay and Mackenzie Stevens (1924: 4, 7); Comish (1929: 14-16)

⁷⁹ Comish (1929: 16-17); Mckay and Mackenzie Stevens (1924: 9); Meyer (1950: 59-61);

⁸⁰ Meyer (1950: 65-66); Hirsch (1947: 41)

⁸¹ Mckay and Mackenzie Stevens (1924: 10)

year, and 50 per cent in 1900.⁸² In 1905 this organization adopted the name of California Fruit Growers Exchange.⁸³ By 1910, the Exchange marketed 60 per cent of the California and Arizona output.⁸⁴ In 1923 the California Fruit Growers Exchange included 192 local packing units, 75 per cent of which were co-operative packing associations and the rest being large individual shippers or commercial packing companies.⁸⁵ By 1924, the California Fruit Growers Exchange marketed 70 per cent of the citrus fruit in California and this figure continued until 1960.⁸⁶

Factors explaining co-operative diffusion

As shown in the last section, co-operatives successfully developed in butter manufacture in countries where a high density of cows led to the establishment of profitable factories. The experience of Canadian wheat pools also shows that specialization in the export of a specific product favoured the development of farmers' societies. Thus, co-operatives were mainly adopted in export countries and most of the output of these societies was commercialized abroad (see especially in the case of Danish butter and Canadian wheat) or where commercialization took place in markets substantially distant from the producing areas (Californian oranges). Principal markets of New World wheat and California oranges were some 3,000 miles distant, which implied the presence of marketing problems, especially when commercialization was characterized by seasonality.⁸⁷ Besides the need for export to consuming centres, concentrated production of one commodity in one area was pointed out by Forrester (1925: 8) as a determinant factor for the development of co-operation. Wheat co-operatives were successfully

⁸² Lloyd (1919: 10); Growers and speculators merged into the California Fruit Agency, an amalgamation of the co-operative exchange with the majority of speculative buyers and shippers that controlled approximately 90 per cent of marketable orange and lemons produced in California. However, the California Fruit Agency was dissolved in 1904, Comish (1929: 18); McKay and Mackenzie Stevens (1924: 12). Developing furthermore the idea of a federation of local co-operatives, the Pachappa association had created the Riverside Fruit Exchange in 1893. The Exchange acted on a pool basis and owned its own salesmen forces in the Eastern markets. Almost 200 citrus growers, representing 90 per cent of Riverside's crop, joined this organization, Meyer (1950: 62-65; 78; 82; 84-85)

⁸³ McKay and Mackenzie Stevens (1924: 10); Hirsch (1947: 41)

⁸⁴ Olmstead and Rhode (2003: 23)

⁸⁵ McKay and Mackenzie Stevens (1924: 15)

⁸⁶ Forrester (1925: 36); *Agricultural Cooperation* (1924: vol. 11, no.2: 23); Olmstead and Rhode (2003: 23)

⁸⁷ Erdman (1958: 180)

formed where one crop system dominated, such as the case of the Prairie Provinces of Western Canada, while they failed in other cereals exporting countries, such as United States, Australia, where only part of farmers' incomes came from wheat and the United States the crops' diversification was prevalent.⁸⁸ Concentration explains also why pools were formed in the United States citrus industry but not in wheat. Thus oranges were raised by few producers in a small area compared to that of the grains growers who were scattered through 45 states. Moreover, many growers were also members of co-operative irrigation districts.⁸⁹

On the other hand, the triumph of co-operation in the production of butter in Denmark and other Scandinavian countries has been explained by the homogeneity of population. In these countries, rural population was formed by small proprietors, which allowed a high level of trust. On the contrary, Canada, as a new settlement country, has a "*heterogeneous fluctuating population*" spread over a vast area, with farms twenty times bigger than those in Denmark.⁹⁰ Despite dispersion of production and the fact that in the wheat Pools "*you will find rich and poor, wise and ignorant; Anglo-Saxon, Teuton, Slav- a dozen of creeds and languages*" (Davisson, 1927: 23), co-operation greatly expanded among wheat farmers in Canada. Moreover, the success of co-operation among California orange growers and Canadian wheat producers shows that co-operatives not only expanded among small farmers.

Success of butter and orange co-operatives and Canadian wheat pools based both on the obligation of supply the entire output to the co-operative and the penalties imposed to members in case of fraud.⁹¹ This contrasted with the case of Australian Pools or wine co-

⁸⁸ Mackintosh (1924: 2); Fay (1925a: 458)

⁸⁹ Olmstead and Rhode (2003: 24)

⁹⁰ Fay (1925a: 457)

⁹¹ In the Canadian wheat pools, members were also obligated to deliver their total crop during a number of years; League of Nations (1926: 14); Davisson (1927: 24) *Year Book of Agricultural Co-operation* (1930: 210); for the case of oranges, see McKay and Mackenzie Stevens (1924: 20); for the case of co-operative creameries in the Netherlands, see Adams and Fant (1910: 12); "*There are some 80,500 Pool growers in Saskatchewan. They are to be found thin-spread over a veritable empire of 200,000 square miles of Saskatchewan soil. The vast bulk of members has never seen each other, and never will. A legal 5-year contract binds them into common action, as though their grain grew on a single farm*" (Davisson, 1927: 27)

operatives, in which any binding contract was arranged, which coincided with the failure of the farmers' organizations.⁹² Farmers also looked at co-operatives aiming at guaranteeing the quality of the product and finding markets.⁹³ They also pursued other goals by forming a co-operative, such as gaining superior marketing power, controlling prices or exercising influence on the government and obtaining public protection. Governmental support was not always essential for co-operative expansion, albeit European associations as well as Canadian wheat pools obtained public support in the form of grants and/or cheap loans.⁹⁴ Breaking the monopoly of middlemen and large marketing firms was also an important goal for co-operatives. As considered by Davisson (1927: 54), the main aim of the Canadian wheat Pools as to keep “*every unessential hand away from the grain, between farm and mill, to get back to the growers a fairer share of the consumers' dollar, without disturbing the price of the bread.*”

Solving problems that arose in the marketing of agricultural products was another important objective for farmers. Integration into marketing has been already explain for wheat and oranges in New World countries. In some butter exporting countries, federations of the co-operative creameries were responsible for the export of butter. In Denmark, the co-operative societies were organized into nine export federations which handled about 98 per cent of the butter exported to Britain.⁹⁵ In Finland, co-operative creameries created Valio in 1906 as a central organization responsible for the marketing of 90 per cent of butter exports.⁹⁶ In contrast, only a small proportion of the dairy production was exported for co-operative marketing societies in other countries. In Ireland, the Co-operative Agency Society was established in 1892 to assist co-operative creameries in the marketing of butter, but it sold only 10 per cent of total output and

⁹² *Year Book of Agricultural Co-operation* (1930: 231); Simpson (2000: 119)

⁹³ This was an important stimulus for the formation of French dairy co-operatives, according to Cleary (1989: 55)

⁹⁴ Fay (1908: 154). Comish (1926) pointed out that growers believed that united action might bring favourable tariff rates to the citrus fruit industry of California. Co-operation among farmers to obtain public protection has been also used to explain the diffusion of wheat pools in Canada, see Fay (1925b: 29)

⁹⁵ Coulter (1911: 72). For butter export associations, see also Faber and Hertel (1931: 80-84)

⁹⁶ Sales of butter were pooled and the price was based on the grading marks of the State Butter Control; other 6 per cent of the Finish butter was exported by Enigheten, a central organization of creameries in the Swedish-speaking areas of Finland; *Year-Book of Agricultural Co-operation* (1932: 309-311)

farmers generally marketed their butter through the Agency when prices were low.⁹⁷ In the United States, co-operative creameries generally consigned butter to a commission firm or selling agency.⁹⁸ They tried to combine into federations or marketing organizations, but these organizations only marketed 0.8 per cent of all butter produced in co-operatives in 1920 and 10 per cent in 1930.⁹⁹

Determinants of co-operation in agriculture

In the econometric model, the dependent variable is the share of co-operatives' production in total output. In order to explore the effects of education in the propensity to co-operate, the variable *Human capital* has been introduced in the model. It is measured as the share of primary and secondary pupils on total population and data have been taken from Mitchell (2007). Decennial census data were converted into annual data by interpolation. The advantage of co-operatives for small farmers has been studied using the variable *Farm size*. The average size of dairy holdings in Australian dairy industry, corresponding to 1955-56, has been obtained in Drane and Edwards (1961: 11). Netherlands' average size of dairy landholdings have been taken from Pirtle (1926) and those of Finland, used also for Denmark, from Marshall (1958). Canada's landholdings size has been obtained in the *Selected Historical Data from the Census of Agriculture*. For the United States' average size of dairy, grains and fruits farms have been calculated from Schmidt (1941: 9). For the rest of countries and/or products, data have been taken from the *FAO Report on the 1970 world census of agriculture*.

As shown in section 2, co-operatives dominated the processing and marketing of products in countries that sold most of the output in international (or long distance) markets. That was the case of the butter produced in Denmark, Australia and New Zealand, but not that of the wine produced in co-operatives.¹⁰⁰ Although France and Spain were important

⁹⁷ Coulter (1911: 68-69)

⁹⁸ Powell (1913: 147)

⁹⁹ Elsworth (1936: 38)

¹⁰⁰ In Denmark, private creameries did not work for the international market; League of Nations (1926: 7) In New Zealand, the dairy sector was responsible for over one third of the value of exports by 1924-25, in *Year-Book of Agricultural Co-operation* (1926: 58)

exporting countries of wine, co-operatives in both countries focused mainly on the production of ordinary wines to be consumed in the domestic markets.¹⁰¹ Thus, in order to check the influence of exports in co-operation the variable *Exports* have been included. Data on exports were taken from Mitchell (2007), except for the case of the United States that has been obtained in the Department of Agriculture's *Yearbook*. On the other hand, the variable *Yields* was included to look at the effect of the density of production in the levels of diffusion of co-operatives. Data on production and yields were calculated from Mitchell (2007). Both yields and exports have been converted into percentages of yields (exports) of the highest yields (exports) in each crop's sample.

Following the considerations of Hoffmann and Libecap (1991), the effects of the products' characteristics on co-operation has been studied with the dummy *perishability*. In order to explore the effects of economic conditions in the propensity to co-operate, two variables have been included: *Per capita GDP* and a variable of agriculture size (*agricultural employment*) that was measured as the agricultural share in total active population. Data on the economically active population of agriculture and total labour force were obtained from Mitchell (2007). Per capita GDP was taken from Maddison (1995).

Table 8 shows the regression estimates. Co-operation is positively related with *Human capital*. The variable *Land size* has a negative sign and it is significant in model 4, which implies that co-operation expanded in sectors and producing areas where small family farms predominated. Density of production was an important determinant of co-operation as accounted by the positive and highly significant sign of the *Yields* variable. The regression results confirm the hypothesis that co-operation increased in countries, sectors and products that mostly commercialized their output in the international market. However, the variable *Distance to the main market* has a highly significant negative sign in model 4, which implies that propensity to co-operate fell when main markets were significantly distant (New World producing countries delivering their products to Europe). Contrary to the Hoffmann and Libecap's hypothesis, the dummy *perishability*

¹⁰¹ Boulet and Laporte (1975: 4); Simpson (2000: 119); Pan-Montojo (2005: 321)

has not any significant impact in the propensity to co-operate. To finish, protection is related positively with *Per capita GDP* and *Agriculture employment*, suggesting the co-operatives increased in richer countries with a large farmers' population.

Conclusions

This paper has looked at co-operatives, an organizational innovation that arose after the late nineteenth century in Western countries to cope with problems in the processing and marketing of agricultural products. The paper shows that, despite their important advantages, co-operatives spread slowly in the Western countries before 1930.

In an attempt to explore the main factors explaining the irregular expansion of co-operatives among countries and products, the importance of co-operation has been measured by the share of co-operatives' output in total production for four products and 12 countries during the period 1880-1930.

Besides in Denmark, co-operative creameries dominated butter processing in Finland, Sweden, Australia and New Zealand, albeit co-operative expansion in these countries only began after World War I. On the contrary, dairy co-operatives hardly expanded in regions with a low density of cows and in non-exporting countries. Main incentives to the founding of wine co-operatives were the shortage of private cellars and containers for product storage, which resulted in an increasing quantity of surplus produce. However, co-operation among winegrowers was very limited in main producing countries, France, Spain and Italy. Producers of wheat in the New World looked at co-operatives as a way to solve the marketing problems that had arisen in the export trade. However, co-operatives only succeeded in Canada, while in the United States and Australia co-operatives failed after more than two decades of different attempts to form wheat pools. Solution of marketing problems was also an important motivation for citrus fruit growers but, while the citrus industry in California was dominated by these growers' marketing associations, associations were absent in Spain. In both wheat and citrus fruit, after horizontal integration among farmers, co-operatives integrated vertically into marketing forming federations that integrated forward for the selling of the product.

The experience of Canadian wheat pools has shown that specialization in the export of a specific product favoured the development of farmers' societies. Co-operatives were mainly adopted in export countries and most of the output of these societies was commercialized abroad (butter and Canadian wheat) or where commercialization took place in markets substantially distant from the producing areas (Californian oranges). Moreover, wheat co-operatives were successfully formed where one crop system dominated, such as the case of the Prairie Provinces of Western Canada. Although the triumph of co-operation in the production of butter in Denmark and other Scandinavian countries has been explained by the homogeneity of population, in Canada co-operation greatly expanded also, in spite of its heterogeneous population spread over a vast area and producing wheat in large farms. Success of butter and orange co-operatives and Canadian wheat pools based both on the obligation of supply the entire output to the co-operative and the penalties imposed to members in case of fraud. Governmental support was not always essential for co-operative expansion, albeit European associations as well as Canadian wheat pools obtained public support in the form of grants and/or cheap loans.

The regressions results show that the propensity to co-operate increased in countries with higher human capital. Density of production was an important determinant of co-operation as accounted by the positive and highly significant sign of the *Yields* variable. Co-operation increased in countries, sectors and products where family small farms predominated and in products that were mostly commercialized in the international market. However, the distance to the main market was negatively related to co-operation, suggesting that co-operatives were less likely to prosper in the New World producing countries that commercialized their products in Western Europe.

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Table 1
World co-operative diffusion by products and continents: number of co-operative and members, 1945

	Europe		America		Others	
	Co-op.	Members (‘000)	Co-op.	Members (‘000)	Co-op.	Members (‘000)
Milk	26,338	3,162	2,508	610	781	145
Livestock	3,448	728	1,224	563	52	8
Wine	2,172	220	47	7	188	6
Fruits and veg.	1,152	115	1,263	144	255	21
All others	9,216	1,379	4,131	1,138	17,771	4,997

Source: Bureau International du Travail (1945); own elaboration.

Table 2
Butter production in co-operative creameries in various countries, percentage of total output

	1908	1925	1930
Denmark	77 ^a	86 ^a	89 ^a
Italy			25
Finland		92	
France	2 ^b		8 ^b
Australia		91	
Netherlands	55	65	
United States	2 ^c		39 ^d
New Zealand		80 ^e	90 ^f
Belgium			
Germany			20
Sweden		72 ^g	71 ^g

Source: own elaboration from International Institute of Agriculture (1911), League of Nations (1926), *Year-Book of Agricultural Co-operation* (1932: 274).

Notes:

^a Data in column 1 refer to 1909, in Faber and Hertel (1918: 42). Data of third column correspond to 1929 and refers to the percentage of milk transformed by co-operative creameries, taken in International Institute of Agriculture (1932: 86).

^b For column 1, the percentage has been calculated with data on milk output of 1913 from *Annuaire Statistique de la France* (1933), the only data available on the French production of milk. The contribution of dairy co-operatives to the treatment and manufacture of milk was probably less important. Milk production in France increased from 77 million hectolitres in 1902 to 128 in 1913. Data in column 3, correspond to 1929, International Institute of Agriculture (1932: 198).

^c Data correspond to 1918, Federal Trade Commission (1921: 63).

^d Data correspond to 1936, Trelogan and Hyre (1939: 15).

^e Over 90 per cent of the New Zealand exports came from co-operative dairies

^f *Year-Book of Agricultural Co-operation*, 1930: 259

^g Ytterborn (1938: 190)

Table 3
Exports of butter of various countries (percentage of total exports)^a

	1860	1880	1890	1900	1910	1915	1920	1925
Denmark	1	13	41	44	40	43	42	41
Sweden	0	3	11	6	8	8	n.d.	3
Norway	0	1	0	1	1	n.d.	n.d.	n.d.
Germany	17	5	5	1	0	0	4	3
Netherlands	39	35	8	8	0	n.d.	12	12
Belgium	10	2	2	2	0	n.d.	n.d.	n.d.
France	12	23	26	10	8	10	1	1
United States	10	12	4	2	0	2	7	1
Australasia	0	0	2	15	24	19	19	32
<i>Australia</i>						10	10	10
<i>New Zealand</i>						9	9	22
Russia	0	1	0	6	14	n.d.	n.d.	n.d.
Ireland						18	16	8
Others	12	5	1	5	6	n.d.	n.d.	n.d.

Source: Data for the period 1860-1910 refer to imports into Britain; for 1860-1910 see O'Grada (1977); for 1915-1925, Pirtle (1926); own calculations

Table 4
Average size of butter co-operatives in various countries

	Cows per member		Members per co-operative		Cows per co-operative	Size of dairy farms (hectares)
	1923-25	1924	1923-25	1924	1923-24	
Germany		4 ^a		97		
France		2.4		540		
Belgium	2,7	2.4	23	108	63	
Denmark	6,3	7	141	150	892	
Finland	6,4	6,1 ^a	94	131 ^b	605	
Ireland		7	149	159		
Netherlands			241			10.1
Italy				80		
Switzerland	5,3		29		155	
Sweden			115 ^f	119 ^c		
United States			209 ^e	331 ^d		

Source: For 1923-1925, Ihrig (1928: 232). For 1924, Fay (1925a: 158).

Notes:

^a 1931

^b 1931, *Year-Book of Agricultural Co-operation*, 1932: 309.

^c 1925, Ytterborn (1938: 190).

^d 1933-4, *Year-Book of Agricultural Co-operation*, 1935: 147.

^e 1925. In 1915 the average number of members per co-operative was 82, *Year-Book of Agricultural Co-operation*, 1935: 128.

^f 1920, Gullander (1948: 104).

Table 5
Co-operative creameries in main United States producing regions, 1911 and 1936

	1911	1926	1930	1936	
	Number	Percentage of total output	Percentage of total output	Number	Percentage of total output
Total number of creameries	6,300				
Co-operative creameries	2,120	34	35	1,444	39
Minnesota	608	66	67	618	69
Wisconsin	347	72	63	234	63
Iowa	313	44	48	266	55
Michigan	101	29	35	44	35
Indiana	77	5	12	-	
Illinois	55			9	21
New York	118			-	
Pennsylvania	92			-	
Vermont	55	49	62	-	

Source: Powell (1913: 135); Elsworth (1936: 36); Trelogan and Hyre (1939: 15); own elaboration.

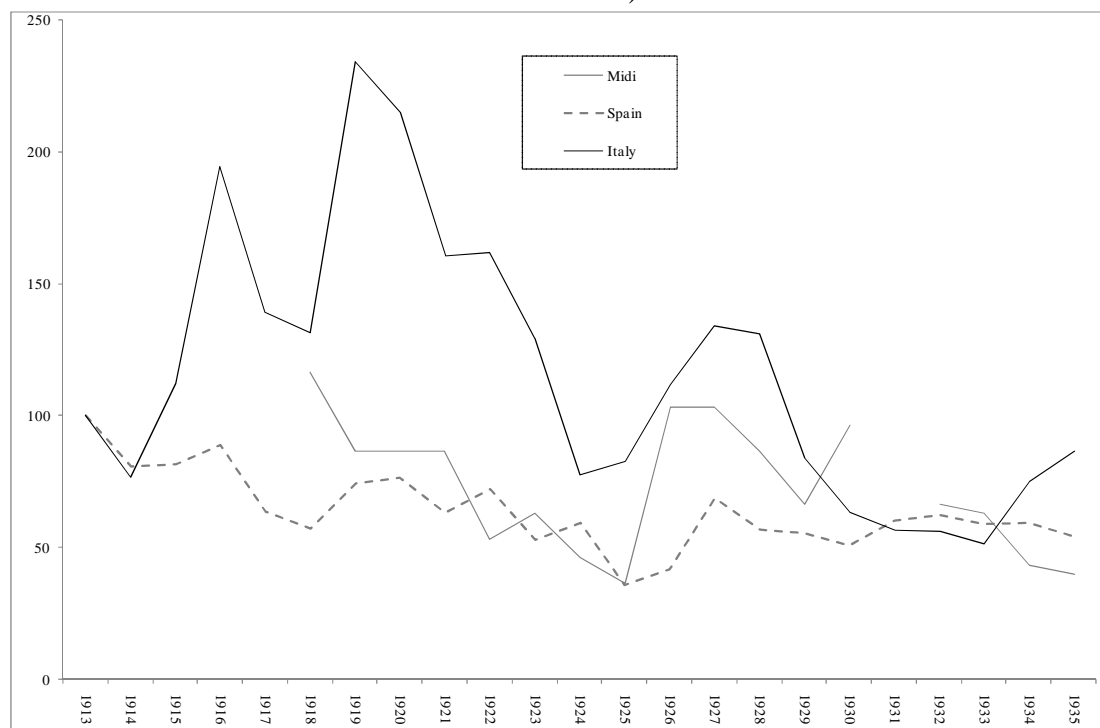
Table 6

Wine co-operation in France, Spain and Italy: number of co-operatives, and production as a percentage of total output, 1908-1951

	France		Spain		Italy	
	No. Co-op.	Output (percentage)	No. Co-op.	Output (percentage)	No. Co-op.	Output (percentage)
1908	13	(0.3)				
1911	31					
1913/1914	79				150	
1920/1921	92	(1.9)	88	4.5		
1924					80	
1927/1928	353					
1932/1933	595				128	
1938/1939	827				147	
1941					(117)	(20)
1943	852					
1945/1947	858	25	154			
1951	997	27	193	8.6	161	

Sources: For France Loubère (1990: 139; 147); Cleary (1989: 46); Lachiver (1988: 482); *B'OIV* (1929), no. 19: 84; Tardy (1935: 315); Simpson (2000: table 5); for Spain, Pan-Montojo (2003: 328); Tarín (1946-47); UNACO (1961: 25); for Italy, Cotta (1935: 71), Simpson (2000: 110), Galtier (1958, III: 29).

Figure 2
Price of wine in constant terms in France and Spain, 1913-1935 (index numbers, 1913=100)



Sources: For Italy, Istituto centrale di statistica (1976); for France see Pech (1975); for Spain see Fernández (2008); own elaboration.

Table 7
Percentage of the crop handled by wheat and citrus fruit co-operative pools

	1921/2	1922/3	1923/4	1924/5	1925/6	1926/7
Wheat pools						
Canada				38	53	
Australia	53	41				19
United States		3				
Oranges						
California						

Sources: For Canada, see *Year Book of Agricultural Co-operation in the British Empire* (1928: 100). For Australia, *Agricultural Cooperation* (1923): Jan. 15: 4; Beasley (1928: 40-41). For United States, Boyle (1925: 21); Hedges (1941: 1)

Table 8

Determinants of co-operation: Random-effects GLS regression results.

	Dependent variable: co-operative production as a percentage of total output			
	(1)	(2)	(3)	(4)
Human capital	4.534* (1.934)	1.987* (0.955)	1.547 (0.916)	5.210*** (1.624)
Land size	-.258 (.156)			-.320** (.128)
Distance to main market	-.003 (.002)	-.003** (.001)	-.002* (.001)	-.004*** (.001)
Production (%)		-.597*** (.142)	-.637*** (.180)	-.670*** (.169)
Exports (%)		.278* (.133)	.289* (.125)	.356** (.121)
Agricultural employment (%)	1.644** (.681)	2.356*** (.577)	2.271*** (.556)	2.105*** (.547)
Per capita GDP	.006 (.008)	.023*** (.006)	.023*** (.006)	.019** (.006)
Butter dummy	31.207** (12.185)		8.060 (14.039)	-.903 (12.994)
Perishable dummy	-30.204* (14.691)	-19.039 (12.724)	-8.450* (15.727)	-14.436 (14.262)
Export dummy	14.722 (15.784)			
Citrus dummy			37.268 (16.502)	-24.688 (15.608)
Constant	-96.717* (46.423)	-128.076*** (39.823)	-133.610*** (38.765)	-143.726*** (39.048)
N. observations	40	39	39	39
R-sq: within	0.20	0.24	0.34	0.53
Prob > chi2	0,0003	0,0000	0,0000	0,0000

Notes: Standard errors are in parentheses. ***, **, and * denote statistical significance at the 1, 5, and 10 percent levels.