

CULTURE, CONFLICT AND COOPERATION: IRISH DAIRYING BEFORE THE GREAT WAR*

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A recent literature argues that 'hierarchical religions' such as Catholicism hamper the formation of trust, thus reducing the propensity to cooperate and damaging economic performance. This article looks for a link between Catholicism and the propensity to cooperate in the pre-1914 Irish dairy industry. Although the propensity to cooperate was higher in Denmark than in Ireland, and in Ulster than elsewhere in Ireland, Catholicism did not make cooperation more difficult in Ireland. Political conflict over land reforms and constitutional matters was to blame, not religion. Denmark's homogeneity, not its Protestantism, led to the success of cooperation there.

In recent years, a series of influential papers have argued that culture and, in particular, religion, can have an important impact on economic performance via its influence on trust and cooperation. A classic example is the paper by La Porta *et al.* (1997), henceforth referred to as LLSV. LLSV generate a measure of 'trust' across countries, based on responses to a World Values Survey (WVS) question which asked 'Generally speaking, would you say that most people can be trusted or that you can't be too careful in dealing with people?' The percentage of respondents answering 'most people can be trusted' to this question in each country is used by LLSV as their measure of trust, and LLSV find that this variable has a striking positive relationship with a variety of efficiency indicators: government efficiency, as measured by variables such as the absence of corruption or bureaucratic quality; measures of civic participation and the performance of large firms; and social indicators such as the quality of infrastructure, health or education. Furthermore, LLSV find that the level of trust is influenced by the nature of a country's religion, and in particular find 'a strong negative association between trust and the dominance of a strong hierarchical religion in a country, most notably Catholicism' (p. 333).

This argument struck a chord with the profession, as a result of the interest which was then (and is still) current in 'social capital'. The WVS trust variable seemed to provide a measure of social capital which was comparable across countries and which meshed with the theoretical reasons why social capital should matter for economic performance. In

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particular, in the context of repeated game theory models, trust in each other might lead agents to converge efficiently on mutually beneficial cooperative behaviour, rather than to engage in behaviour which might be individually beneficial in the short run but lead to 'bad' prisoners'-dilemma-type equilibria in the longer run. Furthermore, the empirical finding that 'hierarchical religions' such as Islam and Catholicism were negatively related to trust matched Putnam *et al.*'s (1993) argument that hierarchical religion impeded the development of horizontal relationships across society, which were important in encouraging trust. It may also have struck a chord with economists due to the lingering affection which persists for Max Weber's famous thesis linking Protestantism with capitalism, despite the very different nature of the mechanisms being posited (in Weber's case, a link between Protestantism and traits such as thrift, frugality, hard work and risk-taking; in the present case a link between Protestantism and trust in others) and the sustained criticism which Weber's thesis has received at the hands of historians and social scientists; see Iannaccone (1998) and the references cited therein.

Very similar arguments were put forward by Knack and Keefer (1997) and Zak and Knack (2001), who used the same WVS trust variable, and found that it was strongly and positively correlated with both aggregate economic growth and aggregate investment rates. Again, their interpretation was that trust boosted performance through its ability to promote mutually beneficial cooperative behaviour. Not surprisingly, since they use the same measure of trust as LLSV, they also found that Protestantism was associated with greater trust, and that Catholicism and Islam were associated with less trust (p. 1283). Again, 'hierarchical religion' was found to be bad for economic performance, as a result of its deleterious effect on social capital.

These papers thus provide a theoretically-based and empirically supported argument that culture, and in particular religion, can influence economic outcomes, despite economists' well-known traditional aversion to such cultural arguments. Schematically, the argument can be represented as in Figure 1, where there are three links shown: that between culture (and in particular hierarchical religions) and trust; that between trust and cooperative behaviour; and that between cooperative behaviour and economic performance. Essentially, the three papers provide evidence in favour of the first of these three links (from I to II), and also show that there is a relationship between trust and performance (II and IV). However, they are unable to provide information on two intermediate stages in the argument, namely on the links between trust and cooperation (III), and cooperation and performance (since they lack a measure of cooperative behaviour across countries).

Another problem with this literature is highlighted by a second paper by La Porta *et al.* (1999). This paper directly explores the impact of religion, and other variables, on a range of measures of government performance (thus jumping directly from I to IV in terms of Figure 1). Other determinants of performance considered in this paper

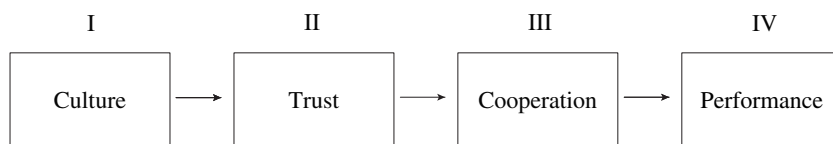


Fig. 1. *The LLSV Argument*

include the legal traditions of the country concerned, *per capita* income, latitude and ethnolinguistic fractionalisation (henceforth EF), and the specific problem which arises is that several of these independent variables are highly correlated with each other across countries. In particular, Catholicism is highly and positively correlated with a country's having a French legal tradition, which makes it difficult to separate out the effects of the two. The general conclusion, when 'horse races' are run between these variables, is that EF is a strong (and negative) determinant of government performance, as are different legal traditions, while religion tends to lose its significance as an independent explanatory factor.

Several more recent papers have explored various aspects of the relationships indicated in Figure 1 and have in different ways cast doubt on the basic argument of LLSV. Glaeser *et al.* (2000) focus much more closely on the determinants and measurement of trust, by combining survey with experimental evidence. Their results undermine the LLSV interpretation of the WVS trust variable, in that their respondents who self-reported as trusting were in fact trustworthy but not trusting. They also found that trustworthiness declined when partners were of different races or nationalities. Knack (2002) confirms the finding that social trust is associated with positive government performance across US states in the late 1990s (II to IV) but reports that Catholicism is associated with higher social trust rather than lower social trust (p. 781) (I to II). Barro and McCleary (2003) jump directly from I to IV, finding that economic growth is a positive function of religiosity and, in particular, a belief in the afterlife, but a negative function of church attendance. They also find that Protestantism (and Hinduism, Islam and Orthodox Christianity) have negative effects on economic growth, relative to Catholicism, and comment that '(s)ome of these signs are surprising' (p. 775). Most recently, a paper by Guiso *et al.* (2006) on the link between culture and economic outcomes finds very little difference between the impact of Protestantism and Catholicism, based on a range of US and international evidence.

The present article differs from the existing literature in that it focuses in depth on the determinants of cooperation, a variable not explicitly considered by other papers. It does so by exploiting the fact that in the decades before World War I, creameries producing butter had the choice of organising themselves on a privately owned or a cooperative basis. It also exploits the fact that there were significant differences in the propensity to adopt the cooperative form between Protestant Denmark, where the vast majority of creameries became cooperative, and Ireland, where most creameries remained private; and, even more usefully, that there were large differences in the propensity to cooperate within Ireland itself. In Protestant Ulster, the majority of creameries were cooperative, whereas in the Catholic South, the majority of creameries were privately owned. These facts allow me to test for a link between items I and III in Figure 1, namely culture (as proxied by religion) and cooperation.

In doing so, I will primarily rely on county-level variation within Ireland. This allows me to deal with one possible objection which has already been raised to the results in La Porta *et al.* (1999), namely that religion and legal traditions are strongly correlated across countries and, indeed, that there may be a range of other country-specific factors which in principle might be driving their results. In my case, I am dealing with counties which were part of the same state, the United Kingdom of Great Britain and Ireland, and which therefore operated within the same legal and institutional framework.

However, Irish counties did not just differ in terms of their religious composition, but in terms of other political and economic characteristics as well. I will be particularly interested in testing a hypothesis that has already been mentioned in the context of La Porta *et al.* (1999) and Glaeser *et al.* (2000), namely the argument that EF hampers cooperative behaviour. Two recent papers argue this in a particularly strong fashion. Alesina and La Ferrara (2000) use US survey data to show that participation in a variety of associations declines as ethnic or racial fragmentation increases. In a very different context, Easterly and Levine (1997) show that ethnic diversity in Africa is associated with bad government policies, which in turn lead to bad economic outcomes. Their conclusion is that 'polarization leads to rent-seeking behaviour and reduces the consensus for public goods, creating long-run growth tragedies' (p. 1241).

This article thus looks at the impact of both culture and political polarisation on the propensity to cooperate in nineteenth-century Ireland. Since I do not have early twentieth-century survey data indicating levels of trust across counties at my disposal, I will have to content myself with exploring the statistical links between I and III, although there are qualitative grounds to believe that trust was indeed a factor involved in the decision to set up a cooperative creamery. (After all, it implied that one farmer's income depended on how well and honestly his neighbours did their work.) It is also impossible to provide a careful statistical examination of the links between III and IV, since the right county-level data on economic performance are hard to come by. Nonetheless, more scattered (and largely qualitative) evidence does suggest that cooperation was an efficiency-enhancing organisational form and I will summarise this evidence during the course of the article.

The primary focus of the article is thus on the determinants of the propensity to cooperate and on whether there is indeed a robust negative relationship between this variable and hierarchical religion (in this case Catholicism). I begin with some historical background, describing the different evolutions of the Irish and Danish dairy industries during the late nineteenth century, and highlighting the different experiences of the cooperative creamery movements in each country. I briefly explore the links between III and IV, making the case that cooperation was in fact an efficient organisational response to technological change, drawing on the opinions of contemporary observers, as well as on recent research by Ingrid Henriksen (1999). I then proceed to my main task and analyse the determinants of the propensity to cooperate within Ireland, focusing on the distinction between Protestant Ulster and the Catholic South, and trying to distinguish between the cultural, economic and political determinants of this organisational choice. Finally, I conclude with some implications of my findings for the literature on culture, trust and social capital.

1. Dairying in Denmark and Ireland before the Great War

Late nineteenth-century Denmark and Ireland were both largely agricultural, and both competed for the lucrative British market for such animal products as bacon, eggs and, especially, butter. It was a competition which, by common consent, the Danes won hands down.¹ As late as the 1870s, the Irish dairy industry dwarfed the Danish one but

¹ Crotty (1966) and Lee (1989) among others have compared the two countries during this period.

Table 1
Butter Exports, Prices and Cooperatives, 1850–1914

Year	Exports, 1000 tons		Share of British imports		Official prices, s. per cwt.		Number of co-ops	
	Denmark	Ireland	Denmark	Ireland	Denmark	Ireland	Denmark	Ireland
1850	2	28	n/a	n/a	39.2	63.0	0	0
1860	2	37	0.6	46.6	57.1	88.5	0	0
1870	7	37	6.8	38.3	82.8	120.0	0	0
1881	12	34	10.3	24.5	107.4	108.3	0	0
1885	18	32	12.5	20.7	95.1	86.3	74	0
1890	43	29	31.7	22.0	101.8	86.6	711	1
1895	52	34	33.2	19.3	102.9	87.4	934*	64
1900	61	35	36.6	16.8	111.9	95.8	1029	240
1905	80	29	34.5	12.1	110.8	99.5	1087	331
1910	89	30	35.2	11.9	109.7	102.6	1164	391
1914	95	36	37.2	15.2	134.3	108.5	1168	445

Sources: Exports: Johansen (1985, pp. 199–201), Solar (1989–90, pp. 159–60); Shares of British market: Solar (1989–90), Nüchel Thomsen and Thomas (1966, p. 152), Ó Gráda (1977, p. 206); Prices: Danish *Statistiske Meddelelser* (various issues), Irish *Agricultural Statistics* (various years); Cooperative numbers: Danish figures kindly supplied by Ingrid Henriksen, IAOS Annual Reports (various years).

Notes n/a = not available. * obtained by interpolation between figures for 1894 and 1896. Shares of British butter imports are calculated assuming that all Irish exports went to Britain and that all UK imports were consumed in Britain. Before 1887 the UK import statistics include substantial margarine imports, mostly from Holland; thus Ireland accounted for over 50% of British butter imports in 1860.

the 1880s proved a crucial turning point: Irish butter exports were overtaken by Danish exports in the late 1880s and were almost two-thirds lower by 1914 (Table 1). Both Ireland and Denmark exported almost all their butter to Britain; Ireland's share of British butter imports dropped from over 50% in 1860 to only 12% in 1910, while Denmark's increased from 0.6% in 1860 to 37% on the eve of World War I.

Losing market share might not have been so bad had it indicated that Ireland was moving into a high-quality niche and substituting high prices for volume. The reverse was the case. Official average butter prices in the two countries are available from 1846; in principle these should capture not only overall movements in butter prices, but changing average qualities as well. According to the data, Irish prices were well above Danish prices in mid-century, the gap was rapidly eliminated during the 1870s, and average Danish prices exceeded Irish ones from the early 1880s (Table 1). The gap averaged 14.8% between 1905 and 1914: 14.8% of the value of butter production on the eve of the Great War was equivalent to 1% of Irish national income.

About half of this average price gap was due to Irish butter being inferior to Danish butter, within given product classes; the remaining half was due to an inferior Irish product mix.² The latter problem was due to the fact that not enough Irish butter was produced in modern creameries, using the new cream separator technology invented

² On average, between 1905 and 1914, Danish creamery butter fetched between 6.4% (for first quality butter) and 7.3% (for second quality butter) more than Irish creamery butter in Britain; this presumably reflected quality differences within these product classes (source: *UK Agricultural Statistics* (various years)). In principle higher transport costs between Britain and Ireland could also have been to blame for lower average Irish prices but in fact Anglo-Danish price gaps were higher than Anglo-Irish ones for most of the period.

in Scandinavia in the late 1870s. This technology not only extracted a greater proportion of the fat from the milk but it could efficiently extract fat from milk which had been shaken in transit, and (crucially) it extracted the cream more quickly and hygienically, leading to higher quality butter. Separators were rapidly introduced into Denmark, and the vast majority of butter was being produced using the new methods by 1914. However, as late as 1907 only 37.2% of Irish butter was produced in creameries, according to a witness to the 1911 Irish Milk Commission. 50% of total output was farmers' butter, produced on farms using traditional methods; the remaining 12.7% was 'factory butter', i.e. farmers' butter which was bought up by factory owners and blended to produce a more uniform consistency. Creamery butter fetched 15% more than factory butter and 16% more than farmers' butter.

In this article, I am primarily concerned with the first problem identified above: that is, the fact that even when the Irish did introduce the new creamery technology, they achieved lower prices than did their Danish counterparts, indicating that Irish creamery butter was inferior in quality to Danish creamery butter. Here the crucial distinction between the two countries concerns their relative adoption of a second, organisational innovation: the cooperative creamery. Employing cream separators was only financially viable when they were processing the milk from a large number of cows. In the context of early twentieth-century Denmark, minimum efficient scale has been estimated as corresponding to the output of roughly 400 cows (Henriksen and Hviid, 2004). However, the average mid-sized Danish farm only possessed between 6 and 14 cows (Henriksen 1999, p. 61). This was a problem in Ireland also, since both countries had small farms, as well as very similar aggregate cattle densities.³ In order for creameries to be viable, therefore, they had to process the milk output of several farms (somewhere on the order of 50 in the Danish context). In principle this could be done by privately owned creameries as well as by cooperatives. However, cooperatives offered several important advantages over their private counterparts. Indeed, they continue to do so today, as evidenced by the fact that in 1991, the cooperative market share for dairy products was no less than 81% in the US (Hansmann, 1996, p. 120). There are several reasons why ownership of the creamery by the farmers supplying it with milk was (and still is) beneficial.

Hansmann (1996) argues that ownership of firms will be assigned in such a way that minimises 'the sum of (1) the costs of market contracting for those classes of patrons that are not owners and (2) the costs of ownership for the class of patrons who own the firm' (p. 22), where patrons are defined as all persons who transact with the firm. The theory thus explains the prevalence of agricultural cooperatives as being due to some combination of

- (a) high costs of market-based transactions between agricultural processors and their suppliers and
- (b) low costs of ownership of agricultural processors by their suppliers.

³ In Ireland in 1906 there were 228 cattle per 1000 acres, while the figure was 194 cattle per 1000 acres in Denmark (Irish *Agricultural Statistics* 1906). In Ireland, 50% of agricultural holdings in 1906 were smaller than 15 acres, and 72% were smaller than 30 acres in size (*ibid.*). In Denmark in 1901, 53% of holdings were less than 5 hectares (12.4 acres) and 72% were less than 15 hectares (37.1 acres) in size (Danish *Statistisk Aarbog* 1913).

There are at least two arguments in the literature as to why such cost considerations might in practice favour dairy cooperatives.

First, for Hansmann (1996, pp. 134–40) the key factor explaining the success of agricultural cooperatives generally is the unusually low costs of ownership by agricultural suppliers. In the context of a late nineteenth-century creamery, its suppliers were all dairy farmers, reliant on their output of milk for the majority of their income. They thus had every incentive to monitor the creamery's activities closely. Moreover, high transport costs for milk ensured that a creamery's suppliers lived close to the creamery; for example, in 1898 the average length of milk collection routes for a sample of 206 Danish creameries was less than 3 miles (Henriksen and Hviid 2004). It was thus easy for farmers to monitor the creamery effectively, for example by participating in the governance of a cooperative creamery, electing members to its boards and voting on important issues at general meetings. A high incentive and a high ability to monitor combined to imply low agency costs. The fact that the farmers supplying a creamery were from a small area and were all producers of the same commodity, milk, also meant that they had relatively homogeneous interests, which made collective decision making easier.⁴

A second argument, which was advanced by the cooperative movement's nineteenth-century advocates, concerns the costs of market-based transactions between a creamery and its suppliers. In principle, there might have been some costs due to a creamery's monopsony power in a region and this was an argument which was sometimes used by cooperation's advocates; but there were other more subtle costs of market-based transacting that seem to have been even more important in practice. The way that creameries worked was that they bought in milk supplies from several farmers; the milk was blended and separated; and butter was manufactured from the resulting cream.⁵ This butter was then sold by the creamery, for a price that reflected its quality and thus the average quality of the creamery's milk supplies (by which I will here mean its cleanliness, freshness and taste). The price paid to farmers for their milk reflected this butter price realised by the creamery, as well as the average amount of milk required to produce a pound of butter (which depended on the average fat content of the milk). Farmers' incomes thus depended on two conceptually distinct factors: the average fat content of the creamery's milk supplies and the average quality of the milk.

The basic problem facing creameries was to ensure that the milk which they bought from *all* their milk suppliers had both a high butter fat content and a good taste; crucially, sour milk from even one or two suppliers could reduce the overall quality of the creamery's output.⁶ This would lower the price of the creamery's butter, and lower the price which the creamery was able to pay suppliers for their milk, even for a given

⁴ As already mentioned, nineteenth century Denmark and Ireland were both notable for the predominance of small and medium-sized farms, with farms in an area tending to be of similar size. This also made collective decision making easier: see Legros and Newman (1996) and Banerjee *et al.* (2001).

⁵ The technical economies of scale involved in butter-making were such that it would not have been viable for a creamery to separate the milk of an individual farmer and make butter just with that.

⁶ The emphasis here is on the taste and freshness of the milk, not its butter fat content. As will be seen, the 1880s and 1890s saw the invention of instruments allowing creameries to measure the butter fat content of milk, which in principle allowed each farmer to be paid according to his milk's fat content. But the butter price realised by the creamery depended on the taste and freshness of all the suppliers' milk; paying a low-quality supplier less was not a good solution since his supplies would negatively effect the butter price of the creamery as a whole and thus the incomes of all the cooperative's members.

average milk fat content. In turn, obtaining high quality milk from all their suppliers required that all suppliers make the necessary investments in equipment (for example, by purchasing steel milk cans, which were more hygienic than wooden containers), time and effort, in order to ensure that their milk was clean and fresh-tasting. Proper feeding of the cattle was also important, since while some fodder crops, such as turnips, gave the milk (and hence the butter) a sour taste, other feedstuffs, such as rapeseed cake, had a good effect on the texture and taste of the butter (Svendsen, 1886, p. 112).

Creameries were locked in to particular locations as a result of their large investments in plant and equipment; moreover, they needed a minimum number of milk suppliers in order to be viable as a result of the fixed costs thus occurred. This made it difficult for private creameries to sanction farmers unwilling or unable to produce high quality milk, since the creameries could not always credibly threaten to turn them away. By turning a farmer away, a creamery might indeed increase the average quality of its milk supplies and hence of the butter it produced; but this would come at the cost of operating at a lower scale of production, which was damaging for profitability. Creameries could thus be faced with an uncomfortable choice between accepting low quality milk and producing low quality butter; or operating at an inefficiently low scale. This problem was particularly acute in areas where other creameries were able and willing to accept milk from farmers that had been turned away elsewhere (because they themselves were anxious to cover their fixed costs of production).⁷ In this case, not only was the sanction of refusing a farmer's milk supplies costly to the creamery; it was also costless to the farmer and thus useless.

Cooperative creameries, by contrast, were owned by the farmers themselves, who were the residual claimants. The statutes of the typical cooperative committed members to

- (a) supply all their milk not used in the household to the cooperative;
- (b) do so for a given period, typically the length of the loan raised to finance the construction of the creamery (e.g. 15 years);
- (c) not adulterate the milk, and observe specific standards in relation to both cleanliness and feeding the cows;
- (d) share in the profits of the creamery, typically in proportion to the amount of milk delivered in a year;
- (e) share in any losses or outstanding debt of the creamery, again according to a pre-specified formula.⁸

Commitments (a) and (b) guaranteed the creamery sufficient suppliers to cover its fixed costs (a cooperative would not set up until it had sufficient members to begin with and these commitments meant that it could count on members remaining with the creamery), while commitment (c) guaranteed the creamery an adequate quality of milk supplies. These commitments were backed up in the cooperatives' regulations with clearly specified penalties for those farmers in breach of contract (Henriksen and Hviid, 2004). Thus, farmers who left the cooperative early (i.e. started selling their milk

⁷ See the evidence of Harald Faber cited below on this point.

⁸ The discussion refers to the classic cooperative creamery, as found in Denmark. See Henriksen and Hviid (2004)

to anywhere other than the cooperative) would be forced to pay their share of the remaining debt; lose their share of the cooperative's assets; and (frequently) pay an additional fine to the creamery. Farmers who adulterated their milk, or failed to supply clean milk, faced substantial fines, while the cooperative gave itself the right (but did not place itself under the obligation) to expel such members, which again would involve forcing them to pay their share of the gross debt of the creamery and stripping them of their share of the cooperative's assets. These financial penalties were very substantial. For example, in one case in 1889 a farmer who had delivered poor quality milk was fined a (not atypical) sum of Kr. 382.43 (Henriksen and Hviid, 2004), which compares with an annual agricultural wage of Kr. 400 in 1890 (Ølgaard, 1976, p. 34).

The net result of these contracts was that farmers were effectively locked into an exclusivity arrangement with their creamery. In such a situation, they became as dependent on the creamery as it was on them, and the incentives which they faced to supply the creamery with adequate amounts of clean milk were greatly enhanced. First, as co-owners of the creamery, they had a direct financial stake in its profitability. This would not be the case for farmers supplying a private creamery. According to a witness to the 1910 Departmental Committee on the Irish Butter Industry, in the case of private creameries '(t)here is... no community of interest between the owner and the suppliers. The seeds of friction are always there, and the imposition by the proprietor, of regulations which are accepted as a matter of course in a co-operative creamery, at once leads to dissatisfaction and to reduced milk supply' (BPP, 1910, p. 476). Second, if they failed in their supply commitments they would face serious financial penalties and, in particular, run the risk of losing their assets (on top of being forced to pay back their share of the remaining debt). Again, these very heavy sanctions were not available to private creameries. Third, if their actions threatened the financial viability of the creamery, and thus threatened the financial interests of the creameries' owners – that is to say, their neighbours – they risked facing a variety of social sanctions. Farmers who owned the creamery would have a greater incentive to monitor their neighbours and, if necessary, impose sanctions upon them, than would farmers who simply supplied a privately owned creamery.⁹ And fourth, if they were excluded from the cooperative, not only did this mean a substantial and immediate financial penalty; it also meant not being able to supply their local creamery in the future. If there were no other creamery within easy reach, or if the closest creamery was also a cooperative (in which case it would not buy his milk, since he was not a member and could not become one), then the defaulting farmer would find himself unable to sell his output in the future, which might mean being forced out of business altogether.

The first three sets of incentives operated for all cooperative creameries, regardless of the nature of neighbouring creameries. However, the last consideration suggests that cooperatives' already considerable power to sanction their members, and thus to ensure themselves adequate, high-quality milk supplies, was even stronger when neighbouring creameries were cooperative as well. Exclusion might still be a costly option for a cooperative creamery but in such an environment it would be catastrophic

⁹ According to an official UK report on Danish agriculture, '(a) member of a Danish Co-operative Society, deliberately violating the rules, would certainly have a very uncomfortable time of it in his district. Every one feels that the creamery or the slaughterery has been organised to develop the people's industry, and that with its success or failure the welfare of the people must stand or fall' (DATII, 1904, pp. 78–9).

for the defaulting farmer. Consider the following extract from the evidence of Harald Faber, a Danish Government Commissioner, to a British Government Committee investigating the butter industry:

Have you never had any difficulty in Denmark with certain farmers sending dirty milk to the creameries? – Yes, but the creameries deal with that themselves. – How do they deal with that? – They refuse it; send it back. – Is there no likelihood of their going to any other creamery with it? – No. They could not do that. – Why could they not do that? – In the first place these creameries are co-operative creameries; the farmer is under an obligation to send his milk to that creamery. – And will that creamery absolutely refuse to take milk from a farmer unless he is associated with the creamery? – They don't take milk from anybody but members. – It never happens that they take milk from anybody outside? – Not in a co-operative creamery. It could not be done. – Have you any proprietary dairies? – Yes, a couple of hundred. – Would they be inclined to take it? – *That is the reason we have not so many. They cannot so well refuse.*¹⁰

Not only did proximity to other cooperatives make a cooperative's incentive structure more effective; it was clearly easier to tie one's hands and not admit milk from non-members when your neighbours also committed themselves to not accepting milk from your members. The logic suggests that an initial shift towards cooperatives might have a snowball effect, increasing the desirability of having cooperatives elsewhere. All this is consistent with the very rapid transition to the cooperative organisational form in Denmark between 1888 and 1894.

1.1. *Cooperation and Performance*

The Danish experience suggests that cooperatives provided the superior institutional form, since they conclusively displaced their private competitors which had earlier been dominant. In 1888 there were 388 cooperative creameries and 468 private creameries in Denmark: cooperatives thus accounted for a minority (45%) of the total. However, by 1894 the situation had completely changed. There were then 907 cooperative creameries, and just 215 private creameries: cooperatives now accounted for 81% of the total, a proportion which was to remain roughly constant until the Great War, and which is strikingly similar to the share of cooperatives in US dairy output today.¹¹ Not only did cooperatives overtake private creameries in terms of overall numbers; many private creameries opted to become cooperative themselves (Henriksen, 1999). This is important, since it shows that the prior existence of private creameries was not an insuperable obstacle to the development of the cooperative creamery movement. Among the many advantages of the cooperative creameries was their ability to diffuse new innovations, such as better winter feeding practices which helped to ensure a year-long supply of milk (Henriksen and O'Rourke, 2005), and new technologies (invented in the late 1880s and 1890s) that allowed creameries to measure the butter fat content of the milk, thus enabling them to pay more for higher fat milk (which in turn

¹⁰ BPP (1910), p. 409. The italics are mine.

¹¹ Henriksen (1999, p. 58).

increased the incentive facing farmers to selectively breed their cattle for high butter fat content).¹²

There is also indirect evidence that cooperative creameries were more efficient in Ireland. First, private creameries there were also becoming cooperative. For example, in 1902 creameries in Castletown, Effin, Templebreddin and Cappamore were taken over from the Maypole Company by cooperatives; Rathnaveen, Donoughmore and Berrings were taken over from J. & J. Lonsdale Ltd.; and there were also creameries taken over which had previously belonged to the Northern Creamery Company and two private individuals (Bolger, 1977, p. 199). Second, we have indirect evidence on the average butter fat content of cooperative and private creameries. As will be seen later, creameries were far more likely to be cooperative in Ulster than in the rest of the island; and Ulster creameries used less milk per hundredweight of butter than creameries elsewhere. In the year ended 30 September 1904 (the last year for which data are available), Ulster creameries produced 3.83 cwt. of butter per 1000 gallons of milk delivered, as opposed to 3.54 in the rest of the country. This advantage was due to a higher average butter fat content in Ulster, which in turn suggests that the high levels of agricultural cooperation there had a beneficial impact on farming practices.

Third, what of the freshness and taste of the milk, which influenced butter quality and hence the price which the butter could be sold at? Here, the evidence yet again suggests that cooperative creameries had an edge in Ireland. The Annual Report of the Irish Agricultural Organisation Society (IAOS, the main Irish cooperative organisation) for the year ending 30 June 1914 gives detailed cooperative creamery statistics for the year 1913. These report sales of butter in both quantity and value terms, as well as the average price obtained for butter by individual creameries. The implicit price obtained from the quantity and value data is the same as the reported price for many but not all of these creameries. The average price of butter obtained by the cooperative creameries (where prices are weighted by the creameries' butter output) was 112.5 shillings per hundredweight (s./cwt.), and the weighted average of the implicit prices was 129.3 s./cwt. Both prices compare favourably with an official average price for all creameries (private and cooperative) of 110.3 s./cwt, suggesting that the average price achieved by the private creameries was below this nationwide average price, and therefore well below the price achieved by cooperatives.¹³ Even if average cooperative prices were only 112.5 s./cwt., as opposed to 129.3 s./cwt., this would imply average private creamery prices of just 108.9 s./cwt assuming that the 1913 cooperative creamery share was the same as in 1906 (39%), and even lower private creamery prices if the cooperative share was higher in 1913 than in 1906.¹⁴

Finally, crude time series analysis also suggests a positive link between cooperation and the average quality of creamery butter, as measured by its price. I regressed the log

¹² Private creameries were at a disadvantage relative to cooperatives in introducing these new technologies since farmers did not trust private creameries to implement the tests fairly (Henriksen and Hviid, 2005).

¹³ *Irish Agricultural Statistics* 1906. Unfortunately the IAOS report does not explain the discrepancy between the reported price and the implicit price, nor does it give guidance as to which of the two prices should be preferred.

¹⁴ Unfortunately there are no data on the cooperative share of creameries in Ireland between 1907 and 1914.

of the real Danish creamery butter price on the log of cooperative density there (defined as the number of creameries per 1000 milch cows) and a time trend. The regression yielded an elasticity of real creamery butter prices with respect to cooperative density of 0.237, significant at the 1% level. The same regression for Ireland yielded an almost identical elasticity estimate – 0.243 – although since there were only ten observations in the Irish case, the coefficient was statistically insignificant.¹⁵

The first Danish cooperative was established in 1882, although proprietary creameries had already been in existence for some years. The number of Danish cooperatives increased dramatically over the next decade, and by 1914 there were almost 1200 in the country, of which over a half had been established by 1890 (Table 1). Diffusion was almost complete by the turn of the century. Irish cooperatives started later (in 1889), their numbers jumped from 1896 (70) to 1903 (356) and continued to increase up to the War, at which stage there were 445 in existence.¹⁶ Thus diffusion in Ireland was slower, and the innovation was never as widespread, as a glance at the maps of Ireland and Denmark early in the twentieth century will confirm (Ó Gráda, 1977, p. 290; Bjørn, 1988, p. 373). The share of creameries which were cooperative was roughly twice as high in Denmark as in Ireland (just over 80%, as opposed to 39% in Ireland in 1906).

What can explain these contrasting performances?

2. The Causes of Cooperation in Ireland: Hypotheses and Evidence

What determined the diffusion of the cooperative organisational form in Ireland; in other words, what were the determinants of the propensity to cooperate?

A first hypothesis is that the propensity to cooperate may have been determined by efficiency considerations, and in particular by the distribution of landholdings. Where there were fewer, bigger farmers in an area, private creameries might have been more viable, in that bigger farms were likely to be more efficient and produce higher quality milk. The incentive effects of cooperation might thus not have been required, or at least as badly required.¹⁷ Cooperatives might therefore be observed more often in areas with predominantly small landholdings, and this is a testable proposition since there exist data on the size distribution of landholdings. Given that farms smaller than 5 acres were essentially irrelevant for the milk supply, my measure of small farms is the share of farms over 5 acres accounted for by farms under 30 acres.¹⁸

¹⁵ The Danish regression used data from 1888 to 1914. Danish creamery butter prices were obtained from Ingrid Henriksen, and were deflated by the wholesale price index given in Johansen (1985), p. 300. Irish creamery butter prices were only available from 1905 onwards, and were taken from the Irish *Agricultural Statistics*. They were deflated by the Board of Trade wholesale price index given in Mitchell (1988), p. 728. Sources for cooperative numbers in the two countries are those given in Table 1, while milch cow numbers were taken from Christensen (1985), p. 60 and Mitchell (1988), pp. 205–6. Danish livestock numbers were given at approximately 5-year intervals and so missing cooperative density numbers had to be interpolated.

¹⁶ IAOS *Annual Reports* (various years).

¹⁷ The argument is not that larger Irish farms were able to supply the entire milk requirements of a creamery; virtually no Irish farms were large enough to do so at this time. The argument is simply that larger farms were more likely to be efficient and produce good milk, even in the absence of the sanctions for poor producers defined by the network of contracts which constituted a cooperative creamery.

¹⁸ I also tried using the share of farms over 5 acres accounted for by farms under 50 acres, and obtained almost exactly the same results, but since the fit of the equation was superior using the share of farms under 30 acres, I report those results here.

The next three hypotheses, by contrast, involve non-economic factors and are the primary focus of this article. The first is the one suggested by LLSV and others, namely that culture was an important determinant of the propensity to cooperate, via its influence on trust. Cooperation required, almost by definition, a large amount of trust within a community. Farmers would only be willing to place their economic welfare in each others' hands if they trusted each other to do a professional job, both in running the cooperative and in adopting sound farming practices (since one farmer's bad practices implied costs for everyone). If trust was indeed important in setting up a cooperative and, if the findings of LLSV also applied to the late nineteenth and early twentieth centuries, then cooperation may have been more difficult to sustain in Catholic areas than in Protestant areas. The obvious test of this is to see if the propensity to cooperate was related to the proportion of Roman Catholics in an area.

Some care has to be taken in implementing such a test econometrically, however, since another factor which might make horizontal cooperation easier is religious homogeneity, following the arguments of Alesina and La Ferrara (2000) and Glaeser *et al.* (2000). This suggests that the impact on the propensity to cooperate of raising the proportion of Catholics in a county might depend on whether the county in question had a Protestant or a Catholic majority. Imagine for the sake of argument that Catholicism was indeed negatively related to the propensity to cooperate but that religious homogeneity was positively related to trust and cooperation. In that case, raising the proportion of Catholics in a majority Protestant county would have two effects, working in the same direction: it would make the county more Catholic, and less homogeneous. However, an increase in the Catholic share in a majority Catholic county would make the county more Catholic but also more homogeneous, and these two effects might have opposite impacts on the propensity to cooperate. The econometric analysis thus allows the Catholic share of the population to have different effects in majority Protestant and majority Catholic counties.

A second hypothesis suggested by the literature on EF is that linguistic fragmentation could hamper trust and cooperation, and this can be tested by looking at the impact on cooperation of the share of the Irish-speaking population in each county. Irish-speakers were a minority everywhere at this stage, meaning that the larger the share of Irish-speakers, the more linguistically fragmented was a county, and I test whether this fragmentation was related to the propensity to cooperate.

A final hypothesis is suggested by the work of Alesina and La Ferrara, and Easterly and Levine, and that is that religious and political strife within Ireland, connected with the Land Wars of the 1870s and 1880s, as well as with the so-called 'National Question,' may have undermined the willingness or ability to cooperate. The Land Wars concerned the attempts by (largely Catholic) tenant farmers to expropriate their (almost exclusively Protestant) landlords, and the late 1870s and early 1880s saw a series of boycotts, rent strikes and violence against both property and persons. Such land-related violence had long died away by 1906, which is the year I am studying, but it brought about a bitterness in inter-communal relationships which proved enduring. Indeed, the years from 1886 to 1891 saw a second wave of land agitation, known as the 'Plan of Campaign,' and this is precisely when Horace Plunkett starting agitating for cooperative creamery production. Moreover, he was doing so precisely in those southern parts of the island where the Plan of Campaign was most active.

The problem for Plunkett was that he, like other leaders of the cooperative movement was a Protestant and a Unionist, and came from a family which held large estates in County Meath. He was therefore associated with the landlord class in the minds of the farmers he was trying to convince. This was an important difference between Ireland and Denmark: the Irish cooperative movement was a 'top down' movement, set up initially by patriotic aristocratic reformers, rather than by farmers on the ground. The IAOS went to some trouble to include Catholics in leadership positions, it defined itself as interdenominational and a-political, it refused to take a position on divisive issues such as the Home Rule question, and at the local level many Catholics were involved in its activities. Nevertheless, between 1894 and 1915, 21 out of the 49 people to have served as committee members of the IAOS were landlords (King, 1996, p. 73), and the perception that the IAOS was a landlord organisation stuck.

Not surprisingly, there is evidence that Plunkett's efforts met with resistance from supporters of the Plan of Campaign (King, 1996, p. 76). Indeed, Michael Davitt, the great Land Leaguer, was a bitter opponent of the cooperative movement (Kennedy, 1978, p. 66). As R.A. Anderson, Plunkett's right-hand man (and another Protestant) put it, Plunkett's 'audiences were composed of suspicious, needy farmers...depressed by hard times, endless hardships, often rack-rented. And, almost to a man, they were Roman Catholic; they expressed hatred and distrust of England, they hated the landlords much and the land agents even more' (Anderson, 1935, p. 39). On one occasion Anderson was prevented from addressing a local meeting on the subject of cooperation, when a local solicitor discovered that the cooperative movement was apolitical and non-denominational. The solicitor informed Anderson that cooperation 'would not suit Rathkeale. "Rathkeale," said he pompously, "is a Nationalist town – Nationalist to the backbone – and every pound of butter made in this Creamery must be made on nationalist principles, or it shan't be made at all." This sentiment was applauded loudly and the proceedings terminated' (Plunkett, 1982, pp. 190–1).

These tensions relating to the Land War, and more generally to conflicts over religion and national identity, resulted in an almost universal opposition to the cooperative movement on the part of the provincial press, with newspapers such as the *Skibereen Eagle*, *Wexford People*, *Waterford Star* and *Cork Constitution* denouncing cooperative creameries as a landlord plot (Bolger 1977, p. 187; Kennedy 1978, p. 63). A typical headline from February 1896 reads 'Vigorous Condemnation of the Cooperative Association by the Borrisokane Nationalists', who took the position that cooperation was merely a landlord device to 'extract further benefits from tenant farmers' (Kennedy, 1978, p. 67). That meeting in Borrisokane was chaired by a local priest, and despite the active involvement of Catholic clergymen in many cooperative societies, Liam Kennedy (1978) has convincingly shown that reserve and even opposition were increasingly common reactions by Catholic priests to the cooperatives as time went on. In 1908, Bishop Clancy of Elphin was reported as repeating many of the traditional criticisms levelled against the cooperative creameries – they endangered the art of home butter-making, attracted idlers and drinkers, deprived calves of fresh milk, and so on (Bolger, 1977, p. 188). What is striking about this Irish Catholic condemnation of cooperation is that in other countries, such as France, the Church was actively engaged in promoting cooperation, and indeed cooperation was very much in line with the social teaching of Leo XIII (Kennedy, 1978; King, 1996).

Moreover, even after the land wars had been effectively settled by a series of Land Acts transferring ownership of the land to the tenants, divisions between Catholics and Protestants flared to life again in the decade or so before World War I, as Catholics demanded Irish independence, or Home Rule, and Protestants – both the workers and farmers of Ulster, but also the landlords of the south – demanded the continuation of the Union with Britain. Once again, the Unionist sympathies of many of its leaders spurred opposition to the IAOS, despite the best efforts of the organisation to remain neutral as regards constitutional matters. Plunkett himself tried to inhabit the rapidly vanishing middle ground but his political naivety and reluctance to engage in self-censorship made him many enemies. He took a seat for South Dublin as a unionist in 1892 but his willingness to collaborate with nationalists cost him Unionist support and he lost his seat in 1900. In 1904, he responded to Nationalist attacks on his movement with a book, *Ireland in the New Century*, which attacked the influence of the Roman Catholic Church and the tactics of the Nationalist party. The result was a series of resolutions passed by county councils calling for the banning of ‘this filthy book’, a reprimand from Cardinal Logue for the ‘enemies of the Church’, and a withdrawal from cooperative activities by many previously supportive clergymen (Bolger 1977, p. 95). According to John Redmond, the leader of the Irish Nationalists, the book made it plain that ‘the real object of the movement in question is to undermine the Nationalist Party and divert the minds of our people from Home Rule, which is the only thing which can ever lead to a real revival of Irish industries’ (cited in Ehrlich, 1981, p. 278). Indeed, this fear that the cooperative movement was just another British ploy to ‘kill Home Rule with kindness’ was to be heard increasingly in the years ahead (Smith-Gordon and Staples 1917, pp. 46–47). Nationalist hostility could have concrete as well as rhetorical consequences. For example, in 1907, T.W. Russell, a convert to Home Rule, took over from Plunkett as head of the Department of Agriculture and Technical Instruction for Ireland, and almost immediately withdrew financial support for the IAOS as a result of yet another public row between Redmond and the cooperators.

The stress in the Irish literature on the divisive effects of the Land Wars and the ‘National Question’ is mirrored by an emphasis in the Danish literature on the importance of social cohesion there. This was greatly enhanced by Denmark’s loss of Schleswig-Holstein to Prussia in 1864, which not only gave rise to a bout of national soul-searching, but meant that the Danish Monarchy was now, for the first time in centuries, an ethnically homogeneous state. In particular, it no longer had a sizeable German minority, which in turn meant that the poisonous linguistic and national disputes which had led to war in 1848–50 as well as 1864 no longer featured on the national political agenda.¹⁹ For Charles Kindleberger (1951) this was the decisive factor in Denmark’s success:

...co-operation in Denmark flourished, because of the social cohesion which enabled the farmers to create the necessary institutions, when the occasion demanded economies of scale in marketing along with labor-intensive production. The prevalence of freeholds bespeaks equality of status, which makes communication freer in all directions. Education increases the quantity and

¹⁹ For a fascinating account of Denmark’s gradual transformation from a multinational to a national state, see Østergård (2006).

quality of communication. Together with a high degree of communication, a closely held set of values, and internal social mobility – all of which are inter-related – Denmark had social cohesion. It was this factor which enabled her to create institutions needed to take advantage of an economic opportunity. (Kindleberger 1951, p. 45)

Similarly, Henriksen (1999, p. 60) has argued that Danish farmers' 'ability to identify with one another' was crucial for cooperation in that country; could it be that political and religious divisions undermined that ability in Ireland? According to this hypothesis, if many Catholics in Ireland were opposed to cooperation, it was not because of their Catholicism *per se*, but because of their reluctance to collaborate with an organisation perceived to be dominated by Protestants, Unionists and landlords. This hypothesis will be tested by looking at the relationship between *inter-communal divisions* associated with the Land Wars, and the extent of cooperation. The measures used refer to the extent of vertical conflict between landlords and tenants between 1880 and 1882; the argument is that such conflict exacerbated tensions between Catholics and Protestants generally, and heightened Nationalist suspicion of the inter-denominational cooperative movement, thus reducing the propensity to cooperate.

In order to test the hypotheses outlined above, I collected data on the number of creameries in each of the 32 Irish counties in 1906, a year for which data are available on the numbers of private as well as cooperative creameries. (An Appendix gives data sources and descriptive statistics.) I also collected county-level data on the share of Roman Catholics in the total population in 1901; the share of Irish-speakers in the total population in 1901; and the size distribution of landholdings in 1906.²⁰

Finally, Rumpf and Hepburn (1977, p. 52) provide data on the number of 'agrarian outrages' (i.e. crimes against persons or property) per 10,000 of population at the height of the Land Wars (1880–2). To be sure, this was a long time before 1906, but the dates were chosen since 1880–2 is when the bulk of Land War-related crime occurred. The question is whether regions which had a history of such violence were different from those that did not; in particular, the hypothesis to be tested is that where landlord–tenant (and hence inter-communal) tensions were historically higher, resistance to the inter-denominational IAOS was greater, and the propensity to cooperate was lower.

The big cultural and political divide within Ireland was, and remains, the divide between the northern province of Ulster and the rest of the island. Ulster was predominantly Protestant and Unionist, and six of the nine Ulster counties remain part of the UK today. There were Protestant majorities in these six counties in 1901; in the other three Ulster counties (Cavan, Donegal and Monaghan) Protestants accounted for between 27 and 36% of the population, a substantial proportion. The other three provinces (Leinster, Connaught and Munster) were overwhelmingly Catholic, and favoured Home Rule.

²⁰ The population variables were collected for 1901 since there was a population census in 1901 (as well as in 1911). I also ran the regressions using 1906 values for these variables, which were generated by interpolation between 1901 and 1911; not surprisingly, the results were unaffected. I have presented here the results using 1901 data since these are 'real' data, in contrast to the interpolated data which are merely informed speculation.

There were 154 creameries in Ulster in 1906, of which 126, or 81.8%, were cooperatives. In the rest of the island, there were 563 creameries, of which just 156, or 27.7%, were cooperatives. On the face of it this seems a striking confirmation of the LLSV hypothesis that culture affects the ability to engage in mutually beneficial cooperative behaviour and that hierarchical religions such as Catholicism undermine this ability by reducing trust. Creameries in Protestant Ulster were overwhelmingly cooperative. Indeed, the proportion of cooperatives in Ulster in 1906 (just over 80%) was virtually identical to that in Denmark during the same period, or in the US today. Creameries in the rest of Ireland, on the other hand, were overwhelmingly private. On the other hand, the data are also consistent with the alternative (but not necessarily mutually exclusive) hypothesis that Nationalist antipathy to the IAOS blocked the spread of cooperation in southern Ireland, and thus with the argument that social and political divisions within Ireland were a deterrent to cooperation.

The difficulty in explaining why the propensity to cooperate was so much higher in Ulster than in the rest of the country is that Catholicism and landlord–tenant conflict were highly correlated with each other, and took on values more favourable to cooperation in Ulster than elsewhere. Ulster was not only more Protestant than the rest of the country, but had experienced less landlord–tenant strife during the Land Wars and was Unionist rather than Nationalist. There were 7.6 agrarian outrages per 10,000 population during 1880–2 in the average Ulster county, as opposed to the 28.3 per 10,000 population recorded elsewhere in Ireland. Similarly, small farms (below 30 acres) were more common in Ulster (where they accounted for 72.4% of holdings above 5 acres) than elsewhere (where they accounted for 58.9%). Which of these different factors mattered in explaining Ulster's Danish level of cooperation, and the predominantly private creamery sector in the rest of the island?

Table 2 runs a series of OLS regressions explaining the propensity to cooperate (i.e. the share of creameries that were cooperative) in each county.²¹ Column (1) tests the various hypotheses outlined above, relating the propensity to cooperate to the share of Catholics and Irish speakers in a county, as well as to the share of small farms and the number of agrarian outrages per 10,000 inhabitants during the Land War. An Ulster dummy variable is also included in case there are unobserved differences between Ulster and the other three Irish provinces which are driving the results. As expected, there is a strong positive correlation between the share of small farms and the propensity to cooperate, and a very strong negative correlation between a history of agrarian outrages and cooperation. Linguistic fragmentation, as measured by the share of Irish speakers in a county, has no discernable effect on cooperation, which is hardly surprising given that there were no ethnic or national differences between Irish speakers and English speakers in those western counties where Irish was still widely spoken. This variable is therefore dropped from subsequent regressions. The Ulster dummy variable is statistically insignificant, and indeed very close to zero, suggesting that the other variables fully account for Ulster's greater propensity to cooperate.²²

²¹ There are only 24 observations since there were no creameries at all in eight counties.

²² It should be noted that this result does not depend on the inclusion of the farm size variable, since it persists when I drop that variable. Rather, it is the result of the inclusion of the agrarian outrages variable.

Table 2
Determinants of the Cooperative Share (OLS regressions)

	(1)	(2)	(3)	(4)	(5)	(6)
Share of farms between 5 and 30 acres in total farms over 5 acres	0.97216** (0.39895)	0.97215** (0.36445)	0.99658*** (0.34301)	0.96641** (0.41337)	0.99727*** (0.33715)	0.85639** (0.35593)
Catholic share (Catholic-majority counties)	0.42777 (0.69870)	0.41334 (0.61902)				
Catholic share (Protestant-majority counties)	0.15611 (1.03569)	0.14016 (0.94390)				
Catholic share squared			0.63515 (0.41881)	1.1261 (2.37236)		
Share of Irish speakers	-0.03446 (0.45763)					
Agrarian outrages per 10,000 population Ulster	-1.71336** (0.63950)	-1.72084*** (0.51514)	-1.73816*** (0.51099)	-1.67536*** (0.53641)	-1.45226** (0.54189)	-1.08477*** (0.34285)
Constant	9.6665 (66.94829)	10.48958 (57.76718)	-9.05937 (35.74056)	-19.32374 (59.52337)	35.54988 (30.15200)	30.33046 (29.29010)
Observations	24	24	24	24	24	24
R-squared	0.62	0.62	0.61	0.61	0.58	0.56

Robust standard errors in parenthesis. * significant at 10%; ** significant at 5%; *** significant at 1%.

Somewhat surprisingly, in light of the difference between Ulster and the rest of the country, Catholicism has no impact on the propensity to cooperate. Consistent with my prior expectations, raising the share of Catholics in the population has a more positive effect on cooperation in majority Catholic counties than in majority Protestant ones, but the effects are tiny in both cases and statistically completely insignificant (and note that the coefficients are positive rather than negative). Nor is this result due to the inclusion of an Ulster dummy variable, since it survives the omission of that variable in regression (2). I therefore tried entering Catholicism into the specification in different ways: as a straightforward linear term in regression (3), and in a non linear form (i.e. including a quadratic term) in (4). In no case does this cultural variable have the negative effect on cooperation which the LLSV analysis would imply; rather, it is always statistically insignificant. I therefore conclude that cultural factors were unimportant in explaining differences in the propensity to cooperate across counties; rather, the factors that seem to matter are economic (the size distribution of farms) and political (a history of land war violence). Once these two variables have been accounted for, there is no positive Ulster effect on the propensity to cooperate – (5); and indeed, while the coefficient on the Ulster dummy is statistically insignificant in that equation, it is negative rather than positive. I am therefore left with the pared-down specification in (6), in which these two variables alone are found to explain over 55% of the variation in the data.²³

Equation (6) suggests that both variables are economically as well as statistically significant. For example, the coefficients in (6) imply that raising the share of small

²³ Note that standard tests reveal no evidence of either spatial error dependence or spatial lag dependence.

farms by one standard deviation (16) increases the share of creameries in a county that were cooperative by 13.7 percentage points. The impact of landlord–tenant conflict is even greater: raising the number of agrarian outrages per 10,000 of population by one standard deviation (15.2) reduces the cooperative share in a county by 16.5 percentage points. According to this equation, the 54.1 percentage point difference in the propensity to cooperate between Ulster and the rest of the island can be decomposed as follows: 22.5 percentage points, or 41.5%, was due to the lower level of Land War violence in Ulster; 11.5 percentage points, or 21.3%, was due to a higher share of small farms; and 20.1 percentage points, or 37.2%, was due to other factors.²⁴

The findings regarding Catholicism are striking. At first sight, the contrast between Ulster and the rest of the country seems like an obvious example of the impact of culture on economic behaviour. However, in the Irish context religious differences were also differences in national identity, with Protestants (on the whole) feeling British and Catholics (on the whole) feeling Irish. Moreover, landlords tended to be Protestant, while in the South their tenants were mostly Catholic. The results suggest that it was this coincidence between religious, national and class divisions within Ireland that was crucial for the slow spread of cooperation outside Ulster, not the cultural characteristics of Catholicism *per se*. It was these divisions which led to tensions between Catholic tenant farmers and Protestant landlords being so virulent at the time of the Land Wars; and these tensions persisted even after the Land Wars themselves had been resolved by the British Government. In turn, tension between the two communities (which by the early twentieth century had to do more with the question of Irish independence than with the land question) made it more difficult for the cooperative movement to progress, and this effect was strongest in areas where the history of tension was highest. Such areas were all outside Ulster.

3. Conclusions

At first sight, the contrast between Protestant Ulster and the Catholic South (as well as between Denmark and Ireland as a whole) seems a striking confirmation of the LLSV hypothesis that culture matters for the ability to cooperate, and that hierarchical religions such as Catholicism undermine both trust and cooperation. However, on closer examination it appears that politics, not culture, was responsible for the lower Irish propensity to cooperate. Suspicion between Catholics and Protestants, and tenants and landlords, spilled over into Nationalist suspicion of the cooperative movement and hindered its spread, despite the efforts of the IAOS to remain apolitical. To this extent, the results are more consistent with the stress on EF in Alesina and La Ferrara (2000) than with the cultural perspective of LLSV, Knack and Keefer (1997) and Zak and Knack (2001).

Denmark benefited from several relevant advantages that Ireland did not enjoy during this period. In particular, it was an extremely homogeneous country, ethnically,

²⁴ It should be noted that the farm size distribution in Ireland was remarkably stable during the late nineteenth and early twentieth centuries – for example, the share of farms between 5 and 30 acres in all farms larger than one acre was 57.0% in 1870, 56.9% in 1880, 56.4% in 1890, 56.0% in 1900, and 56.0% in 1906 (CSO, 1997, p. 285; *Agricultural Statistics* 1906). It would not be plausible, therefore, to argue that the share of medium-sized farms in Table 2 is endogenous to the diffusion of cream separators or cooperative creameries.

religiously and linguistically. There was no conflict over who should own the land, since land reform in Denmark had been underway since the late eighteenth century; already by 1835 there were 41,695 peasant proprietors in Denmark, as opposed to 24,795 tenant farmers, and by the early twentieth century Danish farmers were essentially all owner-occupiers.²⁵ Nor was there any ethnic conflict, or disputes over where national boundaries should lie (all such controversies became redundant following the loss of Schleswig-Holstein in 1864). The results suggest that this homogeneity of Danish society is what explains the success of cooperation there (as we saw earlier, there was a remarkably similar share of farms below 30 acres and 15 hectares in the two countries). Indeed, taking the coefficient in regression (6), and moving from the average Irish value of outrages per 10,000 of population to an assumed Danish value of zero, would increase the share of cooperatives in Ireland by 24.4 percentage points, which is 58.1% of the gap between the average Irish and Danish propensities to cooperate (39% and 81% respectively).

Interestingly, one Danish county, Hjørring in northern Jutland, had fewer cooperative creameries (and consumer cooperatives) than the national average; it turns out that ideological attitudes in the county, particularly in eastern Hjørring, were different than in the rest of the country. Relative to the rest of the country, more people there voted for the conservative party, as opposed to the liberal peasants' party; and more adhered to the Church of Denmark's evangelical branch, as opposed to mainstream Lutheranism (Henriksen, 1999, pp. 71–2). This is consistent with arguments that social cohesion in the rest of Denmark was a major factor in the success of the cooperative movement there.

Similarly, there is abundant qualitative evidence that Irish Catholicism was not in itself incompatible with cooperative behaviour. Notably, the decades before World War I saw the rapid spread of the Gaelic Athletic Association, which promoted hurling and Gaelic football at the parish level, and was very much a grassroots, 'bottom up' organisation. It was also an organisation that was explicitly Catholic and Nationalist, and which used peoples' feelings of identity to promote its activities, rather than trying to transcend those feelings. In this respect, it resembled those European cooperative movements which harnessed peoples' religious or nationalist beliefs for their own ends, rather than the IAOS (Kennedy, 1978, p. 73; King, 1996; Yeracaris, 1970).²⁶

If the basic argument of this article is correct, then when Southern Ireland's '1864' occurred, with partition in 1922, the propensity to cooperate there should have increased, as the state became more homogeneous – and this is precisely what occurred. In 1926, there were 580 creameries in the state, of which 400, or 69%, were cooperative, a very large increase in the share relative to 1906. Furthermore, of the 180 private creameries, 114 were controlled by the Condensed Milk Company

²⁵ Jensen (1937), pp. 125–6.

²⁶ Why there was never a sectarian Irish Catholic cooperative movement before 1914 remains unclear. In France, for example, there were rival republican and Catholic cooperative societies (Cleary, 1989; King, 1996), and Yeracaris (1970) has similar evidence for Greece. The small scale of the country might be one explanation; the success of Plunkett in attracting many Catholics to his movement is probably another; a third is that peoples' more sectarian impulses might have been channelled into the GAA or Gaelic League (and, on the other side of the tribal divide, into groups such as the Orange Order). But these are merely hypotheses.

(Bolger, 1977, p. 215). When that company came under financial pressure in the mid-1920s, the Free State government set up, at the behest of the IAOS, the state-owned Dairy Disposal Company. The DDC bought the CMC, and later other private creameries as well, with the express intention of subsequently releasing them into cooperative ownership. It turns out that Nationalist politicians such as Patrick Hogan, the Minister for Agriculture responsible for this legislation, were well-disposed towards cooperation once this was in the context of an independent, homogeneous state.

Culture and the ability to cooperate was not the problem in late nineteenth- and early twentieth-century Ireland; political divisions and the willingness to cooperate across those divisions was.

Data Appendix

Number of cooperative creameries per county. *Source: Reports of the Irish Agricultural Organisation Society, Ltd. for the Year Ending 30th June, 1907.* Dublin: Sealy, Bryers and Walker (1908).

Private creameries per county. *Source: Agricultural Statistics, Ireland, 1907.*

Share of farms between 5 and 30 acres. *Source: as above.*

Share of Roman Catholics in population. *Source: Census of Ireland (1901).*

Share of Irish speakers in population. *Source: as above.*

Outrages per 10,000 of population in 1880–82: Rumpf and Hepburn (1977, p. 52).

Appendix Table 1

Summary Statistics, County Data 1906

	Mean	Median	Std. Dev.	Min.	Max.
Cooperatives	8.8	4.5	10.2	0.0	37.0
Private creameries	13.6	1.0	28.1	0.0	108.0
Catholic share	74.0	81.5	18.3	26.6	89.6
Share of Irish speakers	13.4	5.7	15.8	0.7	50.1
Share of farms between 5 and 30 acres in farms greater than 5 acres	62.6	66.4	16.0	37.1	85.8
Agrarian outrages per 10,000 population	22.5	19.5	15.2	2.0	52.0

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