

**WHAT CAUSES A CABINET TO CHANGE ITS MIND?  
The British Farmer and the State 1818-2004**

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## **ABSTRACT**

The two centuries from 1818 to 2004 cover profound social and economic changes in what was, for much of the period, the most powerful country in the world. Britain led the way in moving capital and labour out of agriculture and into newer industries, such as coal-mining, textiles and transportation. The changes were accompanied by deep institutional changes, especially in the franchise. The rate of change is remarkable: within seventy years Britain was almost completely democratic, in contrast to the 'rotten boroughs' and virtual feudalism of the pre-1832 unreformed Parliaments. The changes are mirrored in the role given to agriculture within society, and in particular the amount and type of economic rent transferred from the consumer and the taxpayer to the farmer. This thesis uses two centuries of data and 'survival analysis' statistical techniques to show that Olson's celebrated theory of collective action can be substantiated in a dynamic context. I show that as the share of farmers in the workforce diminishes, and their relative wealth shrinks, the probability of the Cabinet increasing protection grows. The reverse is also the case, showing that the Cabinet responds positively to pressures from a group whose utility was diminishing.

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## DEDICATION

I dedicate this thesis to my wife Mary, who puts up with a great deal, and my son Marcel, sine qua non.

## **CO-AUTHORSHIP STATEMENT**

This thesis was researched and written by Stephen Peplow, under the supervision of Professor Kathy Baylis.

## 1 INTRODUCTION

The British Cabinet consists of the Prime Minister and selected ministers. It is the supreme policy-making organ within the government of the day, and its decisions rarely fail to pass into law. While the proceedings of the Cabinet are opaque, the ebbs and flows of power that cause a Cabinet to make a particular decision bear on the country, and are therefore a matter of legitimate curiosity.

A further legitimate curiosity is the large amount of protection, or economic rent, that agriculture continues to receive from the Cabinet. How is it that agriculture, hardly an infant industry, has managed to retain economic rents out of all proportion to its economic importance? In 1960, agriculture's share of GDP was 4 percent, shrinking to only 1.7 per cent by 1987. Yet in those three decades, public support for agriculture had swollen from 257 million pounds a year to 1.63 billion pounds a year (Burrell et al., 1990). This is rent-seeking of the highest order, and such success surely deserves investigation, especially as the usual claim that per capita income in agriculture lags that in other industries does not hold (Hill and Ingersent, 1975:102)

In this thesis, I review two centuries of British agricultural rent-seeking, and the circumstances under which the Cabinet gave or removed rents. I match the pressures on the Cabinet for change with related Acts of Parliament, the tangible result of sufficient pressure. This thesis asks: What are the combination of circumstances which caused the Act to be proposed, drafted, and then survive passage through both Houses of Parliament?

Passing legislation is not undertaken lightly, and so the pressures for change must be correspondingly heavy. Each parliament faces demands for various legislative changes, and each act has an opportunity cost of another piece of legislation the cabinet could have backed and shepherded through parliament. Armed with knowledge of both the pressures and the tangible response of the Cabinet, can we tie the two together, and quantify the probability of a Cabinet policy-change?

Strak (1982) points out that 'the opportunities for government interference in the production and trade of agricultural products are so widespread and ....the method of policy formulation and implementation is one which would encourage that potential for intervention.' In these circumstances it is hardly surprising that agriculture and the State have had a long and tangled relationship. Yet, despite this and the central part that the growing of crops plays in human welfare, there is, as Tom Gardner (1979) writes, 'a prima facie case for holding the view that government does not impose a pattern upon agriculture as part of a grand strategy'. In that case, what causes changes in the Cabinet's perception of the role and importance of agriculture as a sector? And, following on from this question, why does the Cabinet care at all about a relatively insignificant share of the economy, and more cynically, the electorate? Formally, the primary research questions are as follows: can we quantify the probability of a Cabinet change? And if we can, are the pressures for adoption of protection different from the pressures for relief from protection?

In Chapter 2 Historical, I break the time-period into three phases, each dominated by a particular group within society. I show that there are two themes which have motivated changes in protection. These are the enlargement of the franchise; and agriculture's diminishment as an economic sector. Other writers, such as Swinnen et al (1996), have studied protection over a time-span of nearly a century, but this is the first to review an even lengthier period in the history of the hegemonic power of the time.

The thesis is structured as follows. A Literature Review follows this Introduction. Chapter 2 is an historical overview, in which I describe the fundamental social changes and their effect on political life. In Chapter 3, I develop a model that links the 'hazard' of a policy-change to the welfare of groups within the electorate. Chapter 4 presents the theory behind Event History Modeling (EHM), a 'survival analysis' statistical technique used with the model developed in Chapter 3. The second section of Chapter 4 is the estimation of the model. Chapter 5 is a discussion of results, and Chapter 6 the conclusion. The

appendices contain notes on the data, including a time-line of relevant agricultural legislation, and sources of data.

## **LITERATURE REVIEW**

The literature on agricultural protection is very large, reflecting both the long history of agricultural rent-seeking and the large sums of money involved. Here I present a review of the literature from two sections of the literature. The sections are agricultural economics and political science respectively. I have drawn on both approaches to agricultural rent-seeking in the formulation of my ideas. The literature from agricultural economics has provided examples of statistical, quantity-based approaches, such as that of Swinnen et al (2001), while political science has provided glimpses into why Cabinet and voters might not behave in the ways predicted by agricultural economists. As an example of the latter, I discuss below McLean's 'heresthetic' theory concerning the actions of Sir Robert Peel.

### **1.1 Agricultural Protection and Economics**

There is an extensive literature on the 'farm problem', which is the dilemma that any State faces over whether or not to provide an economic rent to its farmers. The debate has, in developed countries at least, become more heated in recent years, but not necessarily any more lucid. One could read an editorial in the London Times discussing the Corn Laws and, if ignorant of the date of publication, easily believe that the writer was discussing agricultural policy in the European Union. At the heart of the debate is one question: is agriculture, and therefore the farmers who cultivate the fields, somehow so special that it should be insulated from the forces of the market? A large number of arguments have been presented on both sides, from the hard-headed to the nostalgic. Certainly farmers themselves have not been slow to make hay with whatever trend seems to be most in vogue, shifting their self-presentation accordingly, and

fulfilling Martin J Wiener's thesis that there is in British culture an obsession with illusory rural values (Wiener, 1981). For example, in the 1930s farmers considered themselves to be guardians of the nation's core moral values, in a countryside free from the corruption and decadence of the city. In the post-war period farmers were striving (successfully) to feed the nation. Most recently, they are the stewards of the countryside, busily (but perhaps grudgingly) keeping up both environmental standards and dry-stone walls.

The success of British farmers in gaining economic rents might be an interesting but unimportant topic for social inquiry were it not for the large size and the rents, and their continuing growth on a per-farmer basis. How is it that an economically negligible sector employing less than three per cent of the labour force has managed to acquire such influence? In a wide-ranging survey, Federico (2005) presents an analysis of agriculture's place in the economy, and notes that of all economic sectors, agriculture has experienced the most intervention (Federico, 2005:187). He cites Lindert (1991) and the theory of the 'developmental pattern' in attempting to explain why agricultural protection appears to be related to the level of national income. The British case would appear to follow this pattern, with agriculture starting off, as it must, as the dominant economic sector. The growing importance of trade in value-added goods reduces employment in agriculture, and at the same time improvements in technology (such as "high farming") raise yields and reduce employment on the land. A smaller, impoverished agricultural sector is then once more able to press for special privileges. Federico (2005:216) finds that the level of protection is inversely related to GDP, to various measures of the comparative advantage in agriculture (such as share of agricultural products in exports) and also to share of agriculture in GDP or employment, both measures of the size of the sector. This finding would accord with the British case, but only at certain times, in particular the second half of the 19<sup>th</sup> Century. The argument would not hold for the 1960s for example, when protection and GDP were both rising. Federico (2005:216) also finds that protection is positively related to the farm/non-farm income gap and to the geographical concentration of farmers. I have used his first finding by

modeling the utility function of farmers as a comparison between farm income and GDP; but the second finding I have not tested. Intuitively it is correct, but this may be just an accident of geography, in that the large arable farms most successful in demanding protection are in East Anglia, not far from London. If it happened that the most fertile areas of Britain were in Cornwall, remote from London, then Federico's point would be worth investigating. Federico's conclusion is that agricultural protection is a luxury good which only countries with a small agricultural sector can afford. So far this would match the British experience, but does not explain recent reductions to protection, such as Agenda 2000, while GDP continues to increase. In some ways, Honma and Hayami (1986) find a similar result, but go further by proposing a quadratic relationship between protection and agricultural sector size by employment. Their claim is that maximum protection occurs when employment in agriculture is about six per cent of total workforce. This is an interesting result, and agrees superficially with the British case, but there remain some methodological questions over their work. It would be interesting to re-work their methodology and compare protection over a long time-period in other European nations, especially during the last decades of the 19<sup>th</sup> Century, when different nations responded quite differently to unexpected and large wheat imports from the United States (Kindleberger, 1951).

Similar to this paper in taking the long view, Swinnen et al. (2001) explore the determinants of protection for eleven major agricultural commodities in Belgium over the century from 1877 to 1990. A useful insight is that protection is positively related to the share of the product in GNP, and negatively to the share in consumption and to world price, which they used to proxy for trends in the farm to non-farm income ratio. The implication is that consumers are more concerned about protection when the protected commodity costs them more, and when their economy is open. The reverse also holds, although it dwindles to no relationship when food is very inexpensive. These results would not have been surprising to proponents of free trade in the 1840s, whose key argument was that protection for wheat damaged the rest of the economy (Wordie, 2000). The argument was

that other countries depended more on agriculture than did the British, and so a denial of Britain as an export market meant less money available with which to purchase British value-added industrial exports. This theory had particular cogency during the middle of the 19<sup>th</sup> Century, which is characterized by a rapidly increasing dependence on overseas trade, described in more detail below. Swinnen et al. (2001) further speculate that in contemporary Belgium, food is so cheap that agricultural protection is no longer a matter of public concern. This may well be the case, but the authors do not consider the concern being raised by non-farmers over the negative externalities of highly-subsidised industrial agriculture. Agricultural protection can be defined in terms both of an economic and environmental rent. I have endeavoured to take non-farmer response to environmental rents into account by the use of citations from the London Times newspaper in the estimation of the model, described in more detail in Chapter 4.

In the U.S. context, Bruce Gardner (1987) finds a negative relation between his estimate of net gains by product and variables such as the geographical concentration of production, the average product per farm, and the degree of import competition. He interprets these as proxies for the cost and benefits of setting up a lobby. A serious flaw with his model is that it cannot account for the 1933 increase in support for American farmers, a year which also marked a sea-change in British attitudes towards protection, and the abandonment of the 'cheap food' policy (Jones and Pool, 1940). It would be interesting to compare the American and British responses to the depression of the 1930s and their actions with regard to agriculture. An obvious difference is that the United States is a net exporter, while Britain has historically been a net importer, certainly of the hard wheat needed for bread-making, and for both countries the increase in protection was a departure from economic rationality (Magee et al, 1992). That is obvious, but what is less obvious is the type and extent of the forces causing the departure.

On the institutional factors behind protection, Olper (2001) shows that the degree of democracy present in a country has a positive but weak effect. He shows this effect in a sample of 35 countries in the 1980s. Protection is affected

much more by the quality of institutions, such as property rights, and lobbying is not worth the costs if property rights are not respected. Olper's approach is cross-sectional rather than longitudinal, and so differs from the thesis, and it would have been interesting to see his results using longer time-series. Certainly, as this thesis shows, democracy has, and has to have had, a powerful effect. Olper (2001) further observes that the organisation of lobby-groups may be easier in agriculture than in other sectors: land cannot move to another sector, unlike labour or capital. This is an interesting point in view of the spatial isolation of farmers, and social trends in the Britain of the 1920s, discussed in more detail in the historical review in Chapter 2 below. Olper's argument would appear to be resonant with that of Olson (1965), in view of the shrinking of the agricultural sector and the consequent need to self-organise, but contradicted by Wilson (1977). In a useful but somewhat neglected study, Wilson (1977) compares British and American agricultural politics between 1956 and 1970, and has a clearly-argued chapter on the National Farmers' Union (NFU). He proposes that Olson's (1965) theory of groups does not necessarily hold in the case of the NFU, although the prima-facie evidence would seem to be the opposite. The strength of the NFU provides one of the covariates in the estimation of the model, and Wilson's argument can be tested there.

De Gorter and Swinnen (2002) note that the theoretical and empirical analysis of the influence of political institutions on agricultural policy is only just beginning. Most models incorrectly assume the behaviour of the median voter in a democratic political system, but this does not always hold. For example, in the context of this thesis, rural constituencies were grossly over-represented in the House of Commons before the 1832 Reform Bill (Schonhardt-Bailey, 1991) and arguably are still over-represented (Smith, 1990). In the European Union, the right of veto held by each member-state projects the influence of farmers well beyond their absolute numbers, as Keeler (1996) points out. However, in an Olsonian twist, the enlargement of the EU has decreased the ability of European farming unions to self-organise as there is now a greater number of divergent claims. Whether or not the 1992 MacSharry Reforms of the Common Agricultural

Policy could have been forced through without the certainty of future EU enlargement is an interesting counter-factual question. Some writers, such as Moyer and Josling (2002) argue that it was only the anticipation of even greater budgetary pressure under the unreformed CAP which forced the more reluctant members, such as France, to submit to reforms. In comparison, the official British attitude has been one of preferring fewer subsidies to more, provided everyone is treated equally, an attitude not always shared by her farmers. The British attitude is a reflection of the larger farms and greater agricultural efficiency of British farmers, who are therefore less reliant on state aid (Greer, 2005).

### **1.2 Theories of protection from political science**

The politics of protection, especially the Corn Laws, has attracted many scholars, such as McLean (1999), from disciplines other than Economics. In his theory of the 'heresthetic', McLean discusses how successful politicians structure their strategy so that others are induced to follow them, citing Riker (1986: p. ix):

"But the winners induce by more than rhetorical attraction. Typically they win because they have set up the situation in such a way that other people will want to join them---even without any persuasion at all. And this is what heresthetic is about: structuring the world so you can win."

McLean's argument is that Peel, aware that the Repeal of the Corn Laws had to be passed to avoid further starvation in Ireland, arranged for the essential support of the Duke of Wellington and thus 'structured the world'. McLean rejects arguments based on neo-classical economics, but does give ground to another possible theory for the Repeal of the Corn Laws. This is the Evangelical 'muscular Christianity' of the time, which contained the notion that the spreading of the free trade doctrine was akin to a religious requirement (Hilton, 1988).

A more pragmatic solution is put forward by Schonhardt-Bailey (1991a) who argues that it was portfolio diversification by landowners away from agriculture that allowed Repeal. She shows that the competing attractions for capital, such as railway construction, mining, and investment in colonial ventures made domestic agricultural not especially remunerative. This theme is taken up

in the thesis, and quantified to show the diminishing importance of agricultural land rents to Members of Parliament. A conclusion is that the diminished importance, and the fear of damaging non-agricultural interests by giving an economic rent to agriculture, allowed both Repeal and repressed any possibility of a return to protection for nearly a century. In another interesting contribution, Schonhardt-Bailey (1991b) discusses lobbying in 19<sup>th</sup> century, and the effect of lobbying on the passage of protectionist legislation.

Institutional preservation is the solution given by Lusztig (1988), who proposes that Peel and the Duke of Wellington agreed to Corn Law Repeal because this was the only way, they thought, that the institution of the Conservative Party could be preserved. Peel needed Wellington's support in the House of Lords to win passage of the Repeal legislation, and naturally his moral support. The 'Iron Duke', Britain's iconic saviour of thirty years before, possessed tremendous gravitas, and any attempt without his support would be futile. There is some evidence that Wellington thought as McLean suggests (Trevelyan, 1922), and there is nothing in his character or previous actions which would lead one to suppose that he might favour Repeal on any other grounds apart from the preservation of his Party. He told the House of Lords:

"I did think that the formation of a Government in which Her Majesty would have confidence was of greater importance than any opinion of any individual upon the Corn Law or any other law." Trevelyan (1922) describes Wellington during the debate over Repeal as 'pulling his hat over his eyes, stretching out his legs, and reclining there silent and fortunately very deaf'.

More recently, Wordie (2000) reviews agriculture and politics in a series of essays, tracing the period 1815 to 1939. He presents several interesting insights, particularly concerning the 1906 General Election, which was fought almost exclusively over protectionist issues. He suggests that one of the reasons that we now consider the effect of the Corn Laws to have been harmful is that anti-protectionist campaigners in 1906 used the spectre of the return of the Corn Laws, still within living memory at that time. Wordie suggests that most 'ordinary' people during the period of the Corn Laws had limited understanding of how

much extra in tax they were in fact being forced to pay. It was only when the Anti-Corn Law League began in earnest in the late 1830s that there was a general realization of the economic rents going to farmers. Wordie's research thus supports the second hypothesis of the thesis: there is an accretion of organization eventually reaching a threshold.

Moving forward to the European Union and the Common Agricultural Policy (CAP), Milward (1992) suggests that the power of the Brussels agricultural lobby contributed to the survival of the CAP. This is interesting, because the first signs of loss of power came shortly after this book's publication. On a related note, Grant (1997) has useful descriptions of the EU policy process, and especially the workings of DGVI, the EU Agricultural Commission. Moyer and Josling (2002) discuss agricultural policy reform, with specific reference to the EU, the United States, and the GATT.

In an interesting approach, Baldwin and Robert-Nicoud (2002) argue that policy is influenced by pressure groups which incur lobbying expenses to create economic rents. The net result is that it is not governments that 'picks losers', but losers who pick government policy. Certainly in the years following the Second World War, the agricultural lobby, led by the NFU, spent heavily on organizational expenses, such as research, so that it became virtually the only representative that the Cabinet would listen to (Holderness, 1985). Swinnen and De Gorter (1994) develop a model that reconciles the apparent contradiction between models of the self-interested politician and of governments motivated by social concerns. Anderson (1995) compares patterns of protection in rich and poor countries. Britain's 'hegemonic' position in the second half of the 19<sup>th</sup> century is a plausible explanation for Britain's decision not to protect her agricultural sector. Hegemony theory, business cycles, and international tariffs are discussed by McKeown (1983), who concludes that hegemony theory is a weak explanation for tariff regime change. He notes that in Britain before 1914 'the domestic balance of power so favored the low-tariff advocates that even depressions could not suffice to alter public policy' (McKeown, 1983:91). This point is discussed further below, and is tested in the empirical section of Chapter 4.

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## 2 HISTORICAL OVERVIEW<sup>1</sup>

In this Chapter, I discuss the political influence of British agricultural and landed interests within the context of wider and dynamic social changes. The Chapter begins with a Narrative Overview, and this is followed by a discussion of three groups within society: landowners; farmers and non-farmers. The three groups were each dominant at a particular time, and the research question of the thesis can be partially answered by tracing their rise and fall. To define 'dominance' or 'power', I use Weber's description: "the probability that one actor within a social relationship will be in a position to carry out his will despite resistance' (Weber, 1968), extending the 'one actor' to a group of actors united by at least one aim.

The rise and fall of the numerically small but very wealthy and politically powerful landowning class seems to have been overlooked in the economics literature, but the changing fortunes of this group had, I suggest, a powerful effect on the rest of British society. The dominance of the landowners lasted from feudal times until shortly after the First World War, when a combination of events, described below, caused their power to evaporate almost overnight. By the 1920s their potency had gone, and their role in British life was subsequently relegated to being figurehead 'ornamentals' (Cannadine, 1991). Farmers took over from landowners as the dominant group in negotiations with the Cabinet over economic rents, and their ascendancy is remarkable, as they inserted themselves, in the form of the National Farmers' Union, into the very decision-making apparatus of the government itself, helping to set prices as members of the Annual Review Boards of the late 1940s and beyond. Their eclipse came in the 1980s as non-farmers awoke to the size of the economic rents being extracted from them, and the waste, profligacy and environmental damage being caused by farm subsidies. The non-farmer is still the dominant group, and it is difficult to see how this might change, although change remains of course entirely

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<sup>1</sup> A version of this chapter will be submitted for publication.

possible<sup>2</sup>. From within a paradigm, the possibility of change is difficult to even begin to imagine, as Kuhn (1962) has memorably argued.

I now present a narrative overview of the two centuries covered by the thesis, and then explore the periods of dominance in more detail.

## 2.1 Narrative

There are two key themes which run through the two hundred years covered by the thesis. These are the increase in democratic representation, and the reduction of importance of agriculture in the national economy. Seen over a sufficiently long timespan, the greater voice given to the non-farmer and the diminished economic power of the agricultural interest go towards explaining phenomena such as Peel's Repeal in 1846, and the failure of the Cabinet to support agriculture during the recessions of the last decades of the 19<sup>th</sup> Century.

At the beginning of the timespan, Parliament was dominated by landowners, or landed elites, who controlled the great majority of the agricultural land. It is difficult to exaggerate the strength of the link between land and political power in 19<sup>th</sup> Century Britain, and as Cannadine (1999, p18) puts it, 'From land to status to power the line ran, and rarely the other way'. Such people earned the majority of their income traditionally from agricultural rents. Their outlook on agriculture was that of the rentier, and indeed very little agricultural land was farmed by owner-occupiers. This situation, which had lasted for centuries, began to be upset by the 1832 Great Reform, and Britain's growing non-agricultural sector. The Great Reform gradually allowed into Parliament those of a less exalted background, and industrial growth encouraged the landed elites to diversify their portfolios away from agriculture. Members of Parliament thus did not resist the reductions in economic rent which occurred in 1841 and 1846 as strongly as they might otherwise have done. They had other interests, and there was a growing perception that protecting agriculture might damage those other

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<sup>2</sup> The 'purpose' of agriculture is now the production of non-marketed environmental goods, and subsidies are paid for this, something not readily imaginable a century ago. Currently there is growth in the payment of subsidies for 'energy' and 'biomass' crops, such as willow. The purpose of agriculture, and hence its rent-seeking, change yet again.

interests by limiting the foreign exchange available to other countries for the purchase of British manufactures.

By the end of the 19<sup>th</sup> Century, the dominance of the landed elites in politics was almost played out as the franchise was extended, although they continued to hold large estates. It was the link between landownership and political power which had been broken by the Reform Acts. The landowning class was subsequently damaged beyond repair by the imposition of death duties in 1892, and heavy loss of life in the First World War. The combination led landowners to sell off their estates, and much of the farmland which then came onto the market was bought by former tenants. The transition from tenancy to owner-occupancy, and an agricultural depression, caused the farmers to self-organise, and the growth of membership of the National Farmers' Union at this time was remarkable.

The depression of the 1930s put pressure on the Cabinet of the day to depart from the Gold Standard and to permit, for the first time in nearly a century, some import tariffs on agricultural and other goods, but with 'Imperial Preference'. As Jones and Pool (1940) remark with prescience, "...the 1930s will almost certainly mark the beginning of a new phase in the development of British agriculture, the substitution of a positive State policy in relation to agriculture for the predominantly laissez-faire view that held the field from 1846 to 1931" (Jones and Pool, 1940:339).

The positivism of the State policy has certainly continued, and there can be few economic sectors so closely connected with the State as agriculture. But the large amounts of rent being paid to comparatively few farmers (see below), the BSE and other health crises, the images of "wine-lakes" and "butter-mountains" have at last awoken the non-farmer, and the Cabinet has responded to this new and very powerful expression of discontent.

## 2.2 Phase 1 1828-1920 Decline of Landowners

As I have noted above, the link between landownership and political power in 19<sup>th</sup> century Britain was tight in the extreme. Landownership was concentrated in a few aristocratic families, all 'conscious of themselves as God's elect' (Cannadine, 1999 p2). The extent of the concentration was only revealed in the 1870s when a second Domesday Book was compiled, on the authority of the House of Lords. Their Lordships had expected that the survey would show a wide dispersion of ownership, and thus deflect criticism from men such as the Anti-Corn Law campaigner John Bright who had claimed that one hundred and fifty men owned half the land in England. In fact, Bright's claims were not far off, as the *Spectator* showed in 1876 when it published a list of 710 territorial magnates who owned one quarter of the acreage of Britain (Beckett, 2000 p696).

The link between land and political power began to be broken by successive Reform Acts which gradually eroded the dominance of landowners within Parliament. Figure 2.1 below shows the reduction in the aristocratic composition of the Cabinet and the concurrent increase in franchise, with the majority of the change occurring in the 19<sup>th</sup> Century.

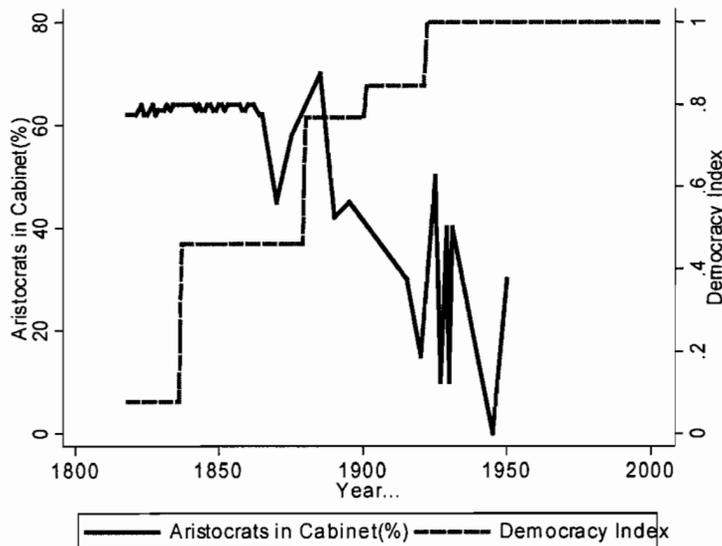


Figure 2.1 Increase in franchise and aristocratic membership of the Cabinet.  
Data: Polity IV; Stanworth and Giddens (1974).

The franchise was first widened in 1832 to include men with real property worth forty shillings or more, a change deplored by the Duke of Wellington because 'it would drive gentlemen out of politics' (Sutherland, 1988:29)<sup>3</sup>. The effect was to limit the power of landowners within Parliament to increase the economic rent transferred to agriculture. The power was self-serving because an increase in economic rent implied an increase in land rent. The increase in land rent was a benefit to the landowners because historically farmers have been tenants, with the great majority of farmland being held by a comparatively small number of landed families. Both Houses were dominated by agricultural and landed interests (Jubb, 1955) and they acted together to protect their wealth. As Spring (1977:6) shows, agricultural landownership and overall wealth were highly concentrated and correlated at this time.

Landed wealth was certainly increased by the Corn Laws. Figure 2.2 below shows the domestic price of wheat against the landed price of foreign wheat. It is clear that wheat farmers enjoyed considerable protection for the bulk of the phase (Williamson, 1990). Also plotted is a cost of living index (Lindert and Williamson, 1983). Naturally, the index follows the wheat price closely, because bread was a large proportion of the cost of living at that time.

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<sup>3</sup> The duke was outdone by Lord Bathurst, who cut off his aristocratic pig-tail with the words 'Ichabod, for the Glory is departed'.

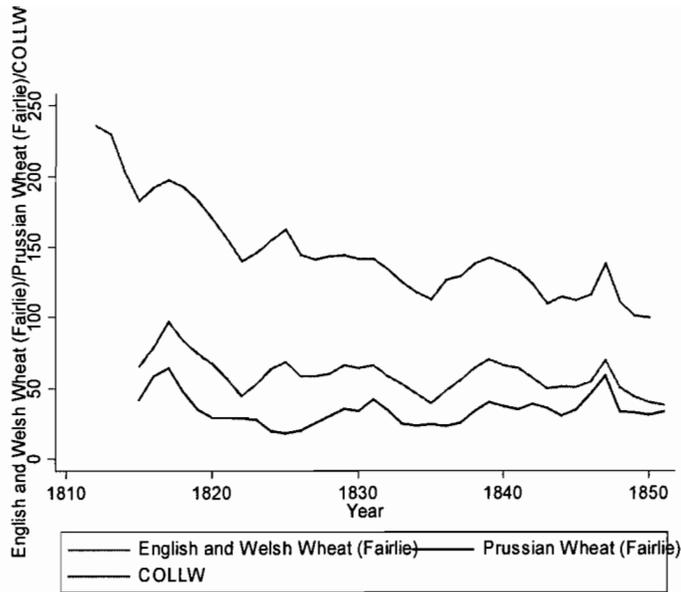


Figure 2.2. Comparison of English and Prussian wheat prices, and cost of living (Lindert and Williamson, 1983).

At the same time as enfranchisement widened the electorate, Britain became more dependent on overseas trade, as Figure 2.3 shows. Here, the sum of exports and imports is divided by GDP, in current money.

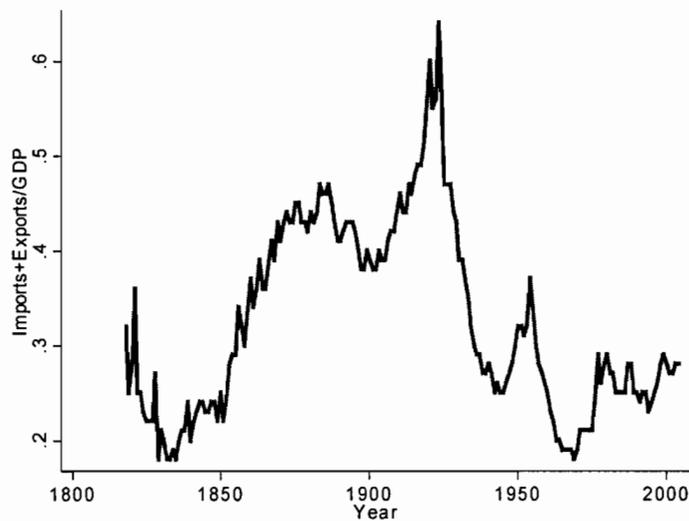


Figure 2.3 Physical trade divided by GDP. Sources: Imlah; Feinstein (1972); World Bank.

The actual potential for gains from trade may not have been evident at the beginning of the 19<sup>th</sup> Century but, as I have indicated above, claims for such growth was one of the main arguments of the free-traders. Sir Robert Peel perhaps understood other deeper changes, including recognition that landownership might not be the sole prerequisite for political power; and that free trade might make everyone better off. In a path-breaking study, Williamson (1990:139) shows that Peel was right: the Corn Laws explain why, as Williamson puts it, 'common labor's standard of living lagged behind from Waterloo to 1850'. Peel was also influenced by the free traders within the Board of Trade, who convinced him that the revenue from tariffs would not be diminished by the reduction of consolidated rates (Brown, 1958).

Britain's growth in trade is reflected in the changing composition of the economic interests of Members of Parliament, plotted in Figure 2.4. Here I have analysed the main sources of economic income for each Member and divided them into 'Agricultural' and 'Commercial'.

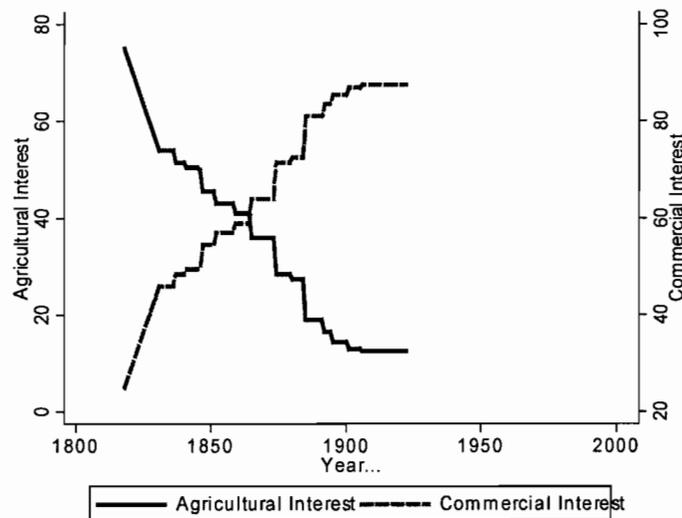


Figure 2.4 Agricultural and Commercial Interests within Parliament. Source: Stanworth and Giddens (1974).

Within Commercial the sectors of industrial production and communications, such as railway construction, are included. From this, it is apparent that the economic interests of Members of Parliament were swinging

away from agriculture, whose economic value was also shrinking. Figure 2.5 shows output of agriculture and industry at 1913=100 input factor costs.

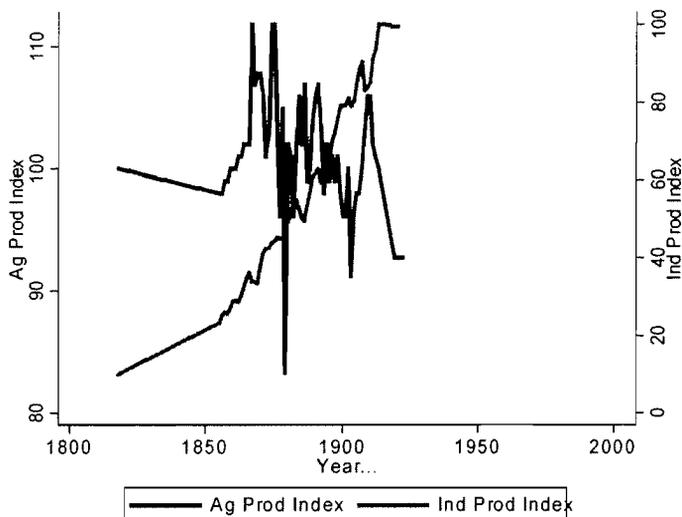


Figure 2.5 Agricultural and Industrial Production 1913=100. Source: Feinstein (1972).

For Member of Parliaments, voting choices were therefore constrained by an increased need to represent the interests of the electorate, and changed personal economic interests. As the franchise increased, Members of Parliament achieved both goals by diversifying their own investment portfolios away from agriculture and into ventures such as mining and railways, both of which contained land as an input. Schonhardt-Bailey (1991) has presented some evidence of this, but there are no data to provide a more formal analysis. I have constructed a utility function for Members of Parliament based on the data available, which is discussed in Chapter 4.

In these circumstances, the failure of the Cabinet to protect agriculture in the depression of the late 1870s is rational. The majority of the electorate was dependent on 'cheap food', and it was a stated policy of both political parties to continue the cheap food policy. Certainly, it would not have been in the personal economic interests of Members of Parliament to have ended the long period of

free trade, especially when non-agricultural sectors were providing large and increasing profits.

The Cabinet had also to concern itself with the increase in the electorate coming from the working class, that is those citizens most vulnerable to increases in food prices:

	Electorate (,000s)	% Enfranchised	%Working Class
1868-80	2,300	6.9	0
1885-1900	5,555	14.6	1
1906-1910	7,487	16.6	7
1922-4	21,429	48.7	18.5
1929-50	31,684	65.8	24.5

Table 2.1 Increase in electorate and percentage working-class. Source: Stanworth and Giddens (1974).

The failure to protect domestic agriculture led to what Kindleberger calls 'the liquidation of agriculture as the most powerful economic group in Britain' (Kindleberger, 1951:33). Figure 2.6 shows the rapid fall in agricultural land rents, in shillings per acre. The fall is in itself notable, but so is the height from which rents fell. Rents climbed after the Repeal, in contrast to what one might reasonably expect, as British farmers adopted 'high farming', or what we might today call 'an integrated system'. In addition, the Crimean and American Civil Wars limited imports.

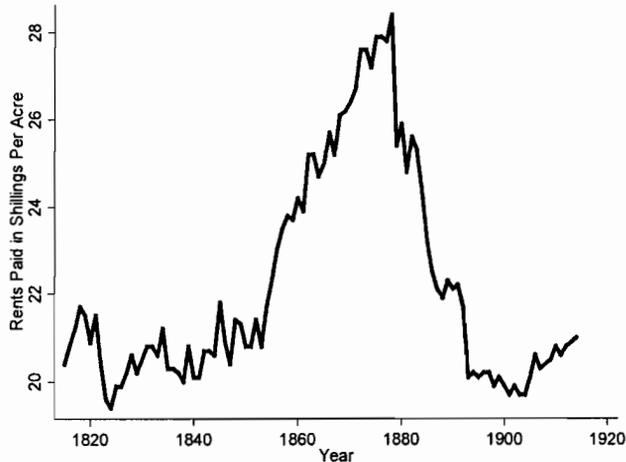


Figure 2.6 Land rents in England, in shillings per acre.

Source: Turner (1997).

Despite the depression, the Cabinet remained firm in its 'cheap bread policy' and no relief was forthcoming, apart from the 1896 halving of the rates assessed on agricultural land (Collins, 2000:942). The rates were further reduced in 1921 and eliminated entirely in 1929, when farming was once more in difficulty. Relief from rates can therefore be seen as a means to transfer an economic rent to farmers but without directly increasing the costs of food to consumers. Rates are levied by local authorities to pay for the upkeep of roads and suchlike, and no amalgamated figures as to the amount collected appears to exist. It is therefore not possible to calculate the amount of tax relief enjoyed by farmers, although Jones and Poole (1940) give a figure of 1.5 million pounds per year from 1929.

By the end of the 19<sup>th</sup> Century, the enlargement of the franchise had removed the unduly large representation of landowners in Parliament, but for this class worse was to come, as their future as a class was doomed by the 1892 reform of death duties. The amount paid by inheritors shows a remarkable rise, from 8.3 million pounds in 1887 to 27.4 million pounds in 1913. The duties were imposed as part of what was clearly class warfare, as David Lloyd-George attempted to destroy what he considered an unduly privileged elite. No doubt he could not have foreseen the subsequent effect on the landed estates of a

combination of heavy death duties and the disproportionate toll on the sons of the landed interest in the First World War (Cannadine, 1999).

One class which took early advantage of the sales of some of the smaller estates was the wealthier bourgeoisie, grown rich from Britain's industry. Most businessmen did not buy farmland in order to farm, but used their land as a positional good, in an attempt to increase social prestige (Cannadine, 1999). The estates purchased by the *arrivistes* were generally small, but their appearance in rural life marks the beginning of the dissolution of the historic tight web of social relations, satirized by Dickens:

*O let us love our occupations,  
Bless the squire and his relations,  
Live upon our daily rations,  
And always know our proper stations.*

### **2.3 Phase 2 Agricultural Clientelism 1920-1984**

During this phase, agricultural interests, as opposed to landed interests, made a determined surge to influence, and their success in rent-seeking is remarkable considering the virtual abandonment of agriculture in the previous phase. The phase offers a case-study in the organization of a pressure-group, and the NFU stands as an exemplar of Olson's theory of pressure-group organization (Olson, 1965).

The transfer of landownership which resulted from the imposition of heavier death duties, and the large proportion of landed heirs who were casualties in the war<sup>4</sup>, was astounding: in 1921 *The Estates Gazette* noted that one quarter of England must have changed hands (Sutherland, 1988:46). Sales were perhaps increased by a spreading feeling, not surprising considering contemporary events in Russia, that large-scale land ownership was no longer

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<sup>4</sup> An editorial from the Times: 'The sons are perhaps lying in far away graves...and the old people, knowing there is no son or near relative to keep up the old traditions, or so crippled by necessary taxation that they know that the boy will never be able to carry on after they have gone, take the irrevocable step'.

legitimate (Cannadine, 1999; Collins, 2000: 933). Ownership of land and political power in Britain had been bound together so tightly and for so long<sup>5</sup> that their eventual separation represented large social changes. Figure 2.7 shows the share of tenanted agricultural land, and its decline over time can be taken as a proxy for the diminishing political power of the landed interest.

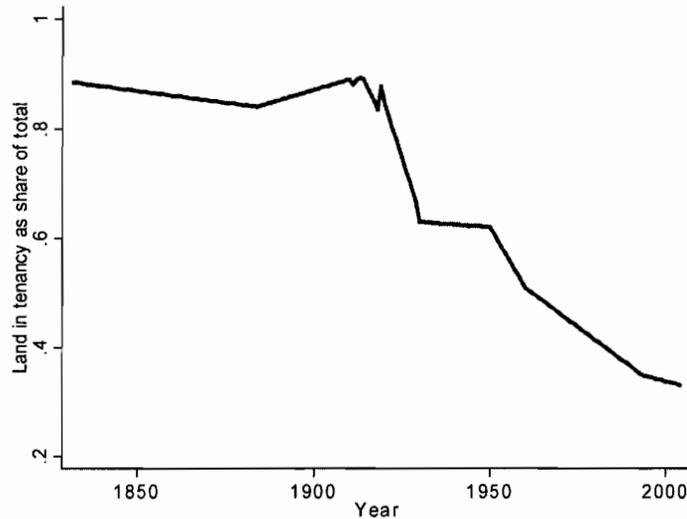


Figure 2.7. Land in tenancy as share of total agricultural land.

Most of the purchasers of farms from the estates were former tenants who now, as owners, began in earnest to form organisations to further their interests. Such organisations had been almost unknown in the 19<sup>th</sup> century, and their lack commented upon by contemporaries (Kindleberger, 1951:43). An early union formed of 'farmers and growers' in 1908 was the National Farmers Union (NFU). A feature of the new organisations was their refusal to accept non-farming landowners as members. Some of the new owners may have had cause to regret their decision to take on debt to purchase their land, because at almost the same time as the Estates Gazette was commenting on the purchases, agricultural prices began to drop. A system of price guarantees had been in place since the 1917 Crop Production Act, enacted in response to a potential food shortage from renewed German submarine attacks, and in 1921 the Cabinet consolidated these measures in an Agricultural Act. However the Act was repealed the next year, as

<sup>5</sup> As late as 1908 Herbert Asquith was the first Prime Minister not to be a landowner. A predecessor, Disraeli, had borrowed money to buy land on becoming Prime Minister.

the Exchequer was faced with heavy outgoings as prices fell. The combination of struggling new owners, their growing self-organisation, and the election of Stanley Baldwin's Nationalist government in 1931, amid the departure from the Gold Standard and the Great Depression, made a departure from the long period of free trade almost inevitable. In the face of all this, it is not surprising that farmers, no longer under the protective, if paternalistic, blanket of the landowner, self-organised. The consequent growth of the National Farmers' Union was remarkable, as Figure 2.8 shows. The NFU is reluctant to provide membership statistics, and the data for the figure have come from a number of sources.

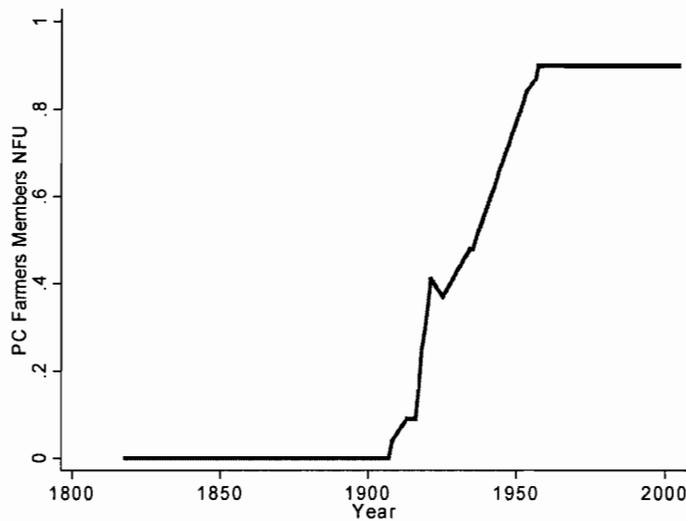


Figure 2.8 Percentage of farmers members of the National Farmers' Union. Main source: Winter (1996).

The 1931 and 1933 Agricultural Acts, and the 1932 Wheat Act, were passed at a time of a rapid fall in world prices, a fulfillment of Lindert's observation that, in democracies, sudden agricultural decline is associated with increased protection (Lindert, 1991). The 1932 Wheat Act is also notable for being the first 'deficiency payment' (Mollett, 1950:20). Funds were raised on flour-milling and wheat imports, the Cabinet being careful not to use public funds at a time of 'equal sacrifice' (Cooper, 1989:146). Protection continued throughout the Second World War, and was formalised and consolidated in the important

1947 Agriculture Act. The key point throughout is the reluctance of the Cabinet to raise food prices to support farmers.

During the Second World War, the NFU had become almost an arm of the government, encouraging its members to follow national food-production instructions, and supplying statistics and advice back to the government (Holderness, 1985). The clientalist relationship continued after the War, and was embodied in the 1947 Agriculture Act and its system of annual price reviews. The guaranteed prices provided by the Cabinet were negotiated on an annual basis up to Britain's accession to the European Union in 1973, with the NFU representing agriculture as a whole. As the 'farming vote' was then considered to be very important in deciding the outcomes of General Elections, successive Cabinets used the annual price review as a tool to 'buy' the agricultural vote. In reality the farming vote may have been less important than the Cabinet perceived (Wilson, 1977 p23).

Britain's entry to the European Union<sup>6</sup> in 1973 reinforced agriculture's economic strength<sup>7</sup> because the EU subsidy system favoured productivity, and British farmers were then 'obtaining yields in most commodities at or near the top of the range of productivity in the world' (Holderness, 1985: 37). At this time, the farm sector employed 6 per cent of the total labour force, a level at which Honma and Hayami (1986) predict

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<sup>6</sup> I use the current term 'European Union' to mean Common Market, EEC, etc throughout this paper.

<sup>7</sup> Swinnen et al. (2001:34) have shown that Belgium's entry to EU in 1968 increased protection for agriculture.

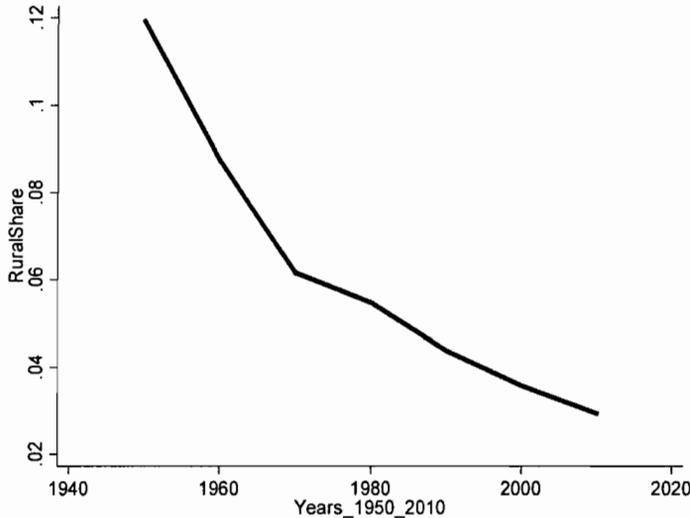


Figure 2.9 Agricultural employment as a share of total employment.

that farmers receive the greatest protection. Certainly the amounts of rent received by British farmers did increase in the late 1970s and 1980s, causing a reaction from non-farmers which eventually led to major reforms of the EU's Common Agricultural Policy.

#### 2.4 Post-productivity 1984-2004

In 1983, in an article in *Farmers Weekly*, Oliver Ralston wrote: 'One day, the tax-paying public is going to wake up with a start and decide that it is fed up with the Common Agricultural Policy. Until this actually happens, of course, I shall continue accepting subsidies with alacrity and gratitude.' At about the same time, a carpet manufacturer in Blackburn, England, published calculations showing that he could, using top-quality materials, carpet the whole of the EU for less than the money paid out in subsidies to European farmers (North, 2001). During the two decades covered by this phase---which has by no means ended---the taxpayer and the non-farmer have self-organised against transfers from them to a diminishing number of farmers.

Certainly the amounts of money transferred are large. The proportion of the EU budget spent on agriculture was 55.7% in 1994 (Piccinini and Loseby,

2001) and this figure, consistently high over the years, has led to significant public demands for reform. An attempt was made in 1984 to curb production through the use of 'stabilisers', but these were ineffective because not all member-states enforced them<sup>8</sup>. More effective measures were provided by the 1992 'MacSharry Reforms', named for the Agricultural Commissioner of the time. Production subsidies began to be replaced by area subsidies, a recognition that the role required of farming was no longer production at any cost. The new 'post-productivist' framework has continued, agriculture losing more production subsidies as a result of the Agenda 2000 reforms (1999) and the Mid-Term Review (2003). One important set-back for the agricultural lobby has been the imposition of cross-compliance mechanisms, which deny production subsidies to farmers who fail to meet national 'good farming practice' standards.

The EU reforms do not, however, necessarily reduce the total amount of money going to the farmer. Indeed, the total amount has increased quite dramatically. The difference is that Britain has become much richer, and the new 'post-productivist' subsidies are paid for by the tax-payer rather than the consumer.

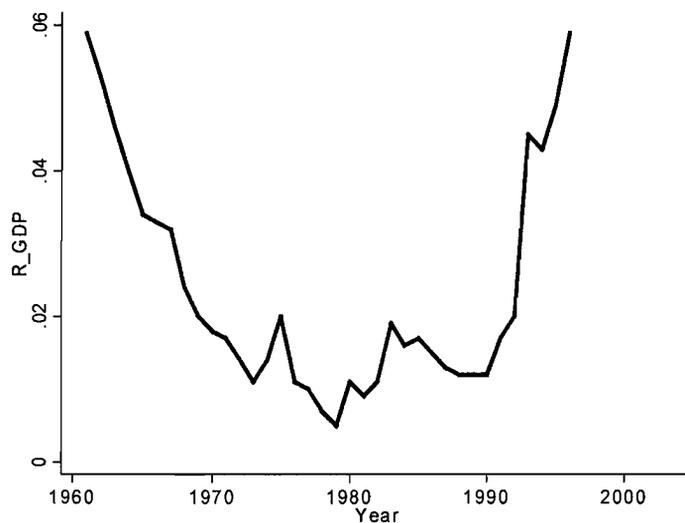


Figure 2.10 Economic rent flowing to agriculture as a share of GDP.

<sup>8</sup> The French memorably described the EU's cutbacks as 'peasant genocide'.

All this suggests that the political strength of agricultural interests within the EU, while still formidable, appears to have weakened. Farming unions remain strong within their own member-state, but cannot agree on a joint policy at EU level (Smith, 1990). Farming unions have been joined in Brussels by environmental NGOs such as Friends of the Earth and the Royal Society for the Preservation of Birds, whose membership is larger than that of all British political parties combined.

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### 3 THE LOG RELATIVE HAZARD MODEL<sup>9</sup>

The purpose of the model is to link the probability of a Cabinet change in the level of agriculture's economic rent to opposing pressures from landowners, farmers, and non-farmers. I use a hazard model, which shows the probability of a change at any time  $t$  as a function of one or more factors representing influence, income and institutional structure. The social changes discussed above, such as degree of enfranchisement, are naturally included as covariates. I make three assumptions. First, each member of each group is a utility maximiser, and will vote for the political party he or she considers most likely to meet that objective.

Second, each group's voting function is identical and  $\frac{\partial v^i}{\partial u^i} > 0$ . Third, economic rent is always transferred to farmers from non-farmers, and not the reverse.

This chapter consists of the following. First, I define the utility functions of the three groups, together with what I call their 'pressure functions'. The pressure functions reflect the potential that each group has for influencing a Cabinet decision. The parameters are the degree of democratic representation, the numerical share within the electorate, and level of political self-organisation, but exclude the utility of each group. The pressure functions allow the testing of Olson's (1965) free-riding thesis. Under this thesis, a group shrinking in numbers is more likely to have solved the 'free-rider problem' and hence be able to lobby Parliament. In addition, a group that is declining economically will find the opportunity cost of taking political action less than a group which is prospering. As an example, farmers suffering from low crop prices are more likely to leave their fields and march on Whitehall than farmers who are able to sell their crops at a high price. The degree of political organization is defined as  $J^i \in [0,1], i = LO, F, N$ , with  $J=1$  reflecting complete organization.

A critical feature of the last two centuries has been the enfranchisement of the adult population, As I have shown in Chapter 2, the voting power of the landowners within Parliament diminished as the franchise widened. The gainers

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<sup>9</sup> A version of this chapter will be submitted for publication.

were the other two groups, who together make up the rest of society. I represent the level of democracy by  $\varphi \in [0,1]$  with a fully democratic state being reflected at unity. The share of power held by the landowners is therefore  $1 - \varphi$ .

I develop the Cabinet's objective function, and from this I discuss the political organization of the non-farmer, a phenomenon of interest for the thesis. Finally, I describe the model in terms of log relative hazard. (A more detailed description of Event History Modeling, and the estimation of the model, are both provided in the subsequent chapter).

### 3.1 Utility and Pressure Functions

#### 3.1.1 Landowners

The utility of the landowners depends on two sources of income, land rent (LR) and non-agricultural investments (I). LR will naturally include some portion of any economic rent being paid to farmers because production subsidies, border tariffs and other rents are subsumed into land values, and hence land rents. The landowner will consider the expected value of rent transfer, as described below. First, note that he will anticipate some reduction in income from I as a result of a imposition of R, for the reasons stated in Chapter 2 above. At  $t+1$ , the landowner's expected wealth (EW) is:

$$EW_{t+1} = \gamma [LR_t + \Delta R_{t+1}] + (1 - \gamma) [I_t - \Delta R_{t+1}] \quad 3.1$$

where  $\gamma$  is the share of agricultural land in the landowner's portfolio. As  $\gamma$  shrinks, the importance of the loss of income from investments from the imposition of an economic rent becomes more important<sup>10</sup> In Chapter 4, I explain how the allocation is generalized, and its change over time, which is important in explaining the reluctance, or perhaps impotence, of the landowners to press for agricultural protection in the late 19<sup>th</sup> Century.

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<sup>10</sup> There are some difficulties for this assumption, mainly due to the particular nature of land in social relations, and also, more practically, in the settlement system of the time. There were legal obstacles over the disposal of estates, such as the strict settlement system, which restricted the options of landowners (Habbakuk, 1994) and limited for example the sale of estate in order to make commercial investments.

For landowners (LO) the sign of  $\frac{\partial v^{LO}}{\partial R}$ , where R is economic rent depends on portfolio allocation, for example positive for those landowners primarily dependent on income as rentiers. The 19<sup>th</sup> Century saw a gradual portfolio re-allocation out of agriculture and into other interests, typically coalmining and railways, and so the effect might be expected to turn more negative over time. Figure 2.4 above shows the shifting balance of interests of Members of Parliament, and Figure 2.5 the country's production in the agricultural and commercial sectors. The data from these two sources have been combined to indicate the utility of the 'average' Member of Parliament.

### 3.1.1 The Farmer

Farmers are dependent on two sources of income: profit from production of agricultural commodities; and any economic rent which they may obtain as a result of putting pressure on the Cabinet. This is the important difference between farmers and landowners over the imposition of an economic rent: farmers favour<sup>11</sup> an economic rent, because it augments total income, but a landowner with diverse interests may lose more from a reduction in income from other sources than would be gained from the consequent increase in land rents.

The utility of farmers is defined as land rent:

$$u^F = (\text{land\_rent}) \quad 3.2$$

and  $\frac{\partial u^F}{\partial R} > 0$  because land rent includes economic rents as well as profits from the sale of farm production, and farmers will maximize both revenue streams.

Consequently,  $\frac{\partial v^F}{\partial R} > 0$ . Both revenue streams bear opportunity costs: taking political action means less farming. But if profit from farming is sufficiently low, then the opportunity cost of engaging in political action is acceptable. I propose

that it is the loss of utility which causes farmers to self-organise to gain a rent transfer.

Farmers wishing to pressure the Cabinet for a rent transfer clearly need some organisation to collect and transfer their demands. The development of such an organisation, the National Farmers' Union, is an interesting reflection of social and economic changes within Britain. A consequence of the concentration of land ownership into the estate system, was the high rate of tenancy among farmers. As a result, the farmer looked to the landowner for help during hard times, and there is evidence of rent remissions and other assistance. When estates were broken up, the buyers were mostly the tenants, who gained autonomy but at the expense of a mortgage plus the loss of support from the landowner. The increased exposure to risk encouraged farmers to form their own support groups, notably the National Farmers' Union. As the Historical Chapter above notes, rentiers were specifically excluded from NFU membership, while tenant farmers were admitted on an equal footing with owner-occupiers. The high degree of what Keeler (1996) calls 'density' has made the NFU an important political force. Membership in the NFU is used in Chapter 4 below as a proxy for degree of organisation among farmers in presenting political demands.

### 3.3 Non-farmers

Non-farmers are defined as those who receive no economic benefits from agriculture, and are the taxpayers and consumers who are liable to pay for economic rents which the Cabinet fixes upon. Economic rent has to be paid from either higher food prices or higher taxation, implying a loss of utility through a reduction in disposable income.

$$U^N = (\text{nom\_earn}) \tag{3.3}$$

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<sup>11</sup> It is true that livestock producers might be adversely affected by a rise in grain prices, for example. However, the tendency has been to shift production towards the protected commodity, rather than to complain about the protection.

and so  $\frac{\partial u^N}{\partial R} < 0, \frac{\partial v^N}{\partial R} < 0$ . Non-farmers who feel that the rents being

transferred to farmers are too high have only two possible recourses: street rallies and associated rioting; or electoral pressure. As Blaug (1952) describes, some food riots took place in the years immediately following the re-imposition of the Corn Laws in 1815. In the years prior to the 1832 Great Reform Act, such forms of protest were the only recourse available. With passage of the Act, and the subsequent Reform Acts of the 19<sup>th</sup> Century, electoral pressure became, at the least, possible. However, to apply electoral pressure on the Cabinet, consumers require a means of translating individual desires into a collective force. An indicator of degree of self-organisation is given by media coverage, reflecting the 'national attention' given to agricultural issues. Details of the variable measuring the national attention are given below in Chapter 4. Here, I define the pressure function of non-farmers as being dependent on share in the electorate, degree of democracy, and degree of self-organisation.

### 3.4 The Cabinet's Objective Function

The Cabinet's objective is to maximise the number of votes it will receive from two sets of voters. The first set is Members of Parliament, voting at divisions within Parliament, and containing the power-base of the landowners. The second set consists of farmers and non-farmers, who vote only at General Elections.

The Cabinet maximises its current power within Parliament and with the electorate by allocating transfers of economic rent within the three groups, in the most efficient manner available to it. The Cabinet's 'purchase' of votes at the lowest cost to produce the greatest output is similar to the decision-making process of a factory-manager substituting between inputs, and so I use a Cobb-Douglas model. The Cabinet's objective function is therefore to maximize the following Cobb-Douglas model:

$$V^T = \max \prod (j^i * u^i)^{\alpha^i} \quad 3.4$$

where  $u$  is the utility of each group: landowners, farmers, and non-farmers. The variable  $j$ , discussed above, is the 'pressure' that the group may exert on the

Cabinet, through factors such as level of democracy; share in population; and political organization. The exponent  $\alpha^i$  may be thought of as the 'weight' that the Cabinet places on the group  $i$ . For example, at the beginning of the time-period of the thesis, the response of the Cabinet to the population through voting was almost zero, because of the low level of franchise; and as a result the Corn Laws were passed. At this time, the exponent for landowners would be larger than that for the other two groups. By 1921, the political power of the landowners had dwindled away, as Chapter 2 showed, and so the exponent might be expected to approach zero.

This is a dynamic model, because many of the variables, particularly those contained within the utility functions, are in a state of almost constant change. For example, a succession of poor harvests, or the opening of American railroads, decreases farmer utility, making votes from the agricultural sector relatively less expensive. In this situation, the Cabinet may favour farmers to win votes at less expense, typically by an increase in protection. This effect is tested empirically in Chapter 5, below.

### 3.5 Log Relative Hazard Model

Event History Models, discussed in more detail in the following chapter, are typically written in the format:  $h(t|x) = h_0(t)e^{x\beta}$ . The log relative hazard (LRH) is therefore a function of the linear predictor  $x\beta = \beta_1x_1 + \dots + \beta_kx_k$  (Cleves et al., 2002). When written in log form, Equation 3.4 resembles the linear predictor given above, but with the exponent now a coefficient. In this form, the LRH is reflecting changes in vote-production, and a change is, I argue, likely to trigger a redistribution of rent. I now discuss the Cabinet's options.

The Cabinet has three possible courses of action: leave protection unchanged, on the assumption that the vote-production equation discussed above is already maximised; increase protection; decrease protection. For the first case,  $LRH=0$ , and for the other two cases  $LRH>0$ . However, the course of *increase protection* and the course of *decrease protection* are different events,, and so while  $LRH>0$  in both cases, the equations must be estimated separately

for the two different events. The covariates remain the same, but the regression is against two different outcomes and therefore the coefficients may be expected to be different, quite possibly with the opposite sign.

Chapter 4, following, presents the theory behind Event-History Models, and provides a description of the dataset. The model discussed above is then tested using the dataset.

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## 4 EVENT HISTORY MODELING AND ESTIMATION<sup>12</sup>

This chapter has three aims: to describe the theoretical basis for Event History Modeling (EHM), to describe the dataset which will be used for the model, and then to apply the theory and the dataset to the testing of the two hypotheses.

The term Event History Modeling refers to the social science application of techniques drawn from engineering and bio-statistics, in particular survival analysis. EHM's origins continue to be reflected in some of the terminology. For example, when the event of interest occurs, it is a 'failure'. EHM is a broad and developing topic, and so the discussion below is limited to the theory relevant to the estimation. More complete treatments are provided by Steffensmeier and Jones (1997) and Cleves et al. (2002).

### 4.1 The purpose of EHM

Many interesting social changes unfold over time, and the length of time taken for an event to occur is itself of interest. For example, if two warring states share a border, does that fact affect the length of the war? Why do some families remain trapped in poverty, while others find a way out? Does the marital status of a male teenager's parents affect the age when he first has sex? All these cases have time as the dependent variable: how much time elapses before an 'event' takes place. And, given that we know the amount of time, what can we deduce from the 'covariates' which have an influence over the amount of elapsed time? Further, can the information about the fact that no event takes place before conclusion of the observations be used?

One might be tempted to use OLS to resolve the above question, but there is a problem which lies in the lack of normality shown in the distribution of the dependent variable. To take a medical example, suppose one was interested in the survival of patients after a particularly risky operation. Some might die during or shortly after the operation, others might survive for many years. There is no reason to suppose any normality here, and assumptions required for the

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<sup>12</sup> A version of this chapter will be submitted for publication.

distribution of the error term in OLS would be defeated in such cases, because linear regression has the distribution:

$$time_j \sim N(\beta_0 + \beta_1 x_j, \sigma^2)$$

OLS is certainly robust to deviations from normality, but in many of the situations of interest the dependent variable, time to an event, is quite dissimilar to the normal. Durations are frequently asymmetric and often bimodal.

The core difference between EHM and OLS is straightforward: EHM uses a distribution which is not reliant on the normality assumption. There are three approaches within EHM to solving the distribution problem: the parametric, semi-parametric, and non-parametric methods. Which method is most appropriate depends on how much is known about the 'shape' of the risk of failure over time. Before moving on to compare the three approaches, I describe three terms: the survivor function; the hazard function; and the cumulative hazard function<sup>13</sup>.

## 4.2 The survivor function

Define  $T$  as a non-negative random variable which denotes time to an event, in the current case years between the installation of a Cabinet and a change in agricultural protection.  $T$  has a probability density function,  $f(t)$ , which can be integrated to give the cumulative density function  $F(t)$ . The survivor function is its complement,

$$S(t) = 1 - F(t) = \Pr(T > t_i) \tag{4.1}$$

where  $t_i$  is the year in which an event occurred. The survivor function thus provides the probability of surviving beyond time  $t$ , or alternatively the probability that there is no failure event prior to  $t$ . The survivor function is a monotonic non-increasing function of time, illustrated by the 'survival' of Cabinets with no event past time  $t$ . Observe that for discrete, annual data, the survivor function has to be a step-function, and thus has a derivative of zero everywhere except at the times of events, where the derivative is undefined. This constraint on taking the

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<sup>13</sup> This nomenclature betrays the medical ancestry of EHM, and is now deeply embedded in the literature

derivative is discussed below in the context of the Cox Proportional Hazards Model (CPHM).

### 4.3 The hazard function

The hazard function  $h(t)$  is also known as the conditional failure rate, the intensity function, the inverse Mills ratio, and, in medical usage, the force of mortality (Cleves et al., 2002) and it is the instantaneous rate of failure. Because it is an instantaneous rate of failure, it has units  $1/t$ . The hazard rate is a limiting probability, conditional upon prior survival, and can be written

$$h(t) = \lim_{\Delta t \rightarrow 0} \frac{\Pr(t + \Delta t > T > t | T > t)}{\Delta t} = \frac{f(t)}{S(t)} \quad 4.2$$

The hazard rate may vary from zero, meaning that there is no risk at all, to infinity, meaning that a change is certain. The hazard rate is central to EHM, reflecting as it does ‘the underlying process that determines the shape of the hazard function’ (Cleves et al., 2002).

Integration of the hazard function yields the cumulative hazard function:

$$H(t) = \int_0^t h(u) du \quad 4.3$$

This is sometimes more readily interpretable than the hazard rate, especially when the data is discrete, and the hazard rate is therefore not available through the taking of derivatives. The cumulative hazard rate for the Parliamentary data is shown in the plot below.

Figure 4.2 Cumulative Hazard Rates for Events which increased protection (Type=1) and Events which decreased protection (Type=2).

### 4.4 Distribution functions in EHM

As noted above, OLS is unsuitable for the analysis of data in which the length of time between events is not normally distributed. There is therefore a requirement for some other distribution which is not disturbed by the non-normality.

If we consider that the intensity of the occurrence of an event, or its hazard rate, is some function of various covariates, then we can write

$$h_j(t) = g(t, \beta_0 + x_j \beta_x) \quad 4.4$$

The residuals are now included in the distributional assumption we make for the hazard function that we choose.

Now, we could find some mean hazard and use that as a baseline, measuring how much our individual lifetimes vary from the mean at each time  $t_i$ , and define the mean as  $h_0(t)$ . Then we could write

$$h_j(t) = \text{somefunction}(h_0(t), \beta_0 + x_j \beta_x) \quad 4.5$$

As Cleves et al. (2002) put it, 'the hazard subject  $j$  faces is *somefunction()* of the hazard that everyone faces, modified by  $x'$ '. The decision to be made by the analyst is which *somefunction()* to use. The choice depends on how much the analyst knows about the 'shape' of the hazard function, and whether or not the shape of the hazard function is of interest in itself. In terms of this thesis, the shape is of interest and goes towards the testing of the two hypotheses. First, if the shape of the hazard function is different for Parliaments in which the Cabinet reduced protection, as compared to those which increased protection, then this information would tend to suggest a qualitative difference in forces. Second, by comparing hazard rates over time periods which are defined by type of change, rather than the beginning of a Cabinet, the non-farmer groups long-term reaction to the Cabinet's transfers to farmers can be observed.

The choice of the distribution function is therefore fundamental, because an incorrect choice may seriously distort the results. EHM presents three categories of model defined by distribution function: the parametric, the semi-parametric and the non-parametric methods.

In the parametric method, the analyst specifies a distribution function, and then fits the data using that function. The risk of failure may be increasing, decreasing over time, or flat, and the parametric method assumes that the analyst knows which of these three is valid. The Weibull and the exponential are examples of parametric models. In the exponential model,  $h_0(t) = c$ , a constant,

and the hazard rate is flat. For many social science applications this is an unrealistic assumption, and this is certainly the case in the current application. We have no reason to suppose that the Cabinet is more likely to change protection at the beginning or end of its time in office, or have a 'flat' hazard rate. Moreover, finding out how risk changes over time may be a substantive goal of the analysis, as it is here.

The semi-parametric method attempts to strengthen the role of the data itself, rather than relying on the analyst's intuition, and removes the distributional assumption entirely. Instead, the key insight is that an analysis may be performed using the ordering of the survival times, rather than the duration times themselves. A logistic regression is often used, with the refinement that the regression is conditional on survival. A well-known example of the conditional logistic model is the Cox Proportional Hazards Model (CPHM) (Cox, 1972).

Semi-parametric models still retain some assumptions, such as that the covariates take a certain form. It is possible to move even further into allowing the data to 'speak for itself', and this is achieved by non-parametric models. Examples of such models are Kaplan and Meier (1958), Nelson (1972) and Aalen (1978).

EHM makes a distinction between continuous and discrete time models, and it is the latter which is generally of interest in most social science applications, including this one.

#### **4.5 Discrete-time processes**

Each 'subject', in the current case each Parliament, has a line, or observation, for each discrete time, in this case one year. There are as many lines as there are discrete times. In the current case, the minimum is one line for a Parliament which lasted only one year, and the maximum is the ten years for the coalition Parliament of the Second World War. Each observation has its own covariates, for example GDP per capita in that year. This allows us to examine change over time more clearly.

Some writers consider the discrete time process as being the only valid application of EHM, mainly because in most social science applications the data is clearly not continuous but is highly aggregated (Box-Steffensmeier and Jones, 2004). In the current application, for example, the data is available only on an annual basis. If two events of interest occurred within the same year, such as a low wheat price and a change in protection, it might not be apparent which came first.

By treating the probability of a change (or 'failure') at time 't' as being conditional on survival as well as covariates, the hazard rate shown in Equation 1.2 becomes:

$$h(t) = \Pr(T = t_1 | T \geq t_1, x) \quad 4.6$$

where x is a matrix of covariates.

The dependent variable in each year is binary: 0 for no change, and 1 for a change. To connect the binary dependent variable to the covariates requires a distribution function, as discussed above. The logistic distribution is commonly used:

$$\log\left(\frac{\lambda_i}{1-\lambda_i}\right) = \beta_0 + \beta_1 x_{1i} + \dots + \beta_k x_{ki}$$

This can be rewritten directly in terms of the probability of a change in time t, and is usually easier to interpret:

$$\hat{\lambda}_i = \frac{e^{\beta'x}}{1 + e^{\beta'x}}$$

However, this model does not account for duration dependency, or the effect of the passage of time. This can be seen by putting the covariates to zero, or their mean, leaving:

$$\hat{\lambda}_i = h_0(t) = e^{\beta_0}$$

a constant, which provides a flat baseline hazard. But we have no prior knowledge of what the baseline hazard might be, and so assuming that it is flat is problematic. Royston and Parmar (2002) have provided a spline-based smoothing function which is midway between a specified parameterisation of the baseline hazard, as for example in Weibull models, and the overfittedness of the Cox model. The baseline hazard is modeled with the use of splines, which smooth out the sharp changes in baseline hazard which come with the use of discrete data. The cost of this convenience is the requirement for the analyst to decide the location of the splines, and this, as Box-Steffensmeier and Jones (2004, p93) note, is a 'perennial and controversial issue', and is discussed further below. The Royston-Parmar Model is for estimation in this thesis, primarily because of the option that the Royston-Parmar model provides for the retrieval of a meaningful hazard rate.

The Cox Proportional Hazards Model (CPHM) is one of the most frequently used EHM models, perhaps 'due to its elegance and computational feasibility' (Cleves et al., 2002). The CPHM was proposed by Sir David Cox, and some writers regard it as 'one of the greatest statistical achievements of the twentieth century' (Box-Steffensmeier and Jones, 2004). The CPHM is attractive because it makes no assumptions about the shape of the hazard over time, and the baseline hazard is left unestimated. The CPHM does this by examining only times at which 'failures' occur, and then conditioning on those times. The baseline hazard then cancels out (Kalbfleisch and Prentice, 1980; Cleves et al., 2002), under the assumption that whatever its shape, it is the same for all subjects. The CPHM gives the hazard rate for the  $j$ th subject as

$$h(t|x_j) = h_o(t) \exp(x_j \beta_x) \quad (4.7)$$

Now, because each subject's hazard is just a multiplicative replica of that of any other subject

$$\frac{h(t|x_j)}{h(t|x_m)} = \frac{e^{(x_j\beta_x)}}{e^{(x_m\beta_x)}}$$

(4.8)

in other words, the ratio between the hazard rates of subject j and subject m is assumed to be the same. The CPHM examines only times at which a 'failure' occurred and then conditions only on those times. As a result the baseline hazard drops out of the calculations: times at which there was no failure are of no interest. The proportional hazards assumption is strong, but it is possible to test for proportionality, a test which 'is all too often left undone' (Box-Steffensmeier and Jones, 2004). The cost of not being required to define a baseline hazard is a loss in efficiency, and 'if we knew the functional form of  $h_0(t)$ , we could do a better job of estimating  $\beta_x$ ' (Cleves et al., 2002).

The fact that the CPHM does not estimate the baseline hazard rate does not mean that it is not possible to determine the baseline survivor or baseline cumulative hazard function. Earlier I described the non-parametric Kaplan-Meier model, which allows the data to 'speak' entirely for itself. A CPHM with covariates set to zero is the same as the Kaplan-Meier, and is shown below for times to first change of agricultural protection. The graph is merely a display of the density of 'failure' times. However, retrieving the baseline hazard rate,  $h_0(t)$ , is still not possible, even though  $h_0(t)$  is merely a function of the derivative of the survivor function. The function describing 'failure' times is a step function, and the derivative is everywhere zero except at failure times, where it is undefined. It is possible to smooth the function and then take the derivative, and this is the essence of the Royston-Parmar model described above. However, as Cleves et al. (2002) point out, 'the estimate of  $\beta_x$  that you obtained was based on the original functions, and not on the smoothed variants', a comment which reflects the perennial controversy over the placement of the splines referred to above. The point is that the location of the splines in the Royston-Parmar method, or any other similar smoothing method, is a subjective intervention by the analyst. An

alteration in the placement of the splines can affect the slope of the hazard rate at the time of 'failure', leading to a different interpretation.

In the CPHM, equation 4.8 above says that the  $\beta_x$  remain constant over time, but in the case of duration data this is clearly not the case. For example, the per capita GDP is observed to be changing in every year of a Cabinet's tenure. We need some way to incorporate Time-Varying Covariates (TVCs) into the CPHM. This is achieved by an extension of the partial likelihood function

$$L_p = \prod_{i=1}^K \left[ \frac{e^{\beta' x_i(t_i)}}{\sum e^{\beta' x_j(t_i)}} \right]^{\partial_i} \quad (4.9)$$

$$\log L_p = \sum_{i=1}^K \partial_i \left[ \beta' x_i(t_i) - \log \sum_{j \in R(t_i)} e^{\beta' x_j(t_i)} \right]$$

Maximising the log-likelihood function given above yields estimates of the  $\beta$  parameters. The CPHM coefficients for TVCs can be interpreted as the change in the log-hazard ratio for those observations which have a unit change at time t compared to the value of the covariate for those other observations in the risk set at time t. As Box-Steffensmeier and Jones (2004) note, 'the Cox model is particularly well suited to include TVCs because the partial likelihood function is determined by the ordered failure times, but not by the actual duration times. Because of this, calculations of the hazard ratio are only made at failure times'.

Above it was noted that the CPHM uses ordered 'failure' times and not the actual duration times. For example, in a certain Parliament there might be a change in protection at two years since installation and in another at three years. Under the CPHM, the number of years is immaterial: it is the order of 'failure' which matters. But it could very well be the case that more than one Parliament has a change in protection after the same length of time, and therefore there are 'ties' in the ordering. How then to account for 'ties', when the number of years since the installation of a Cabinet and first change in agricultural protection is the same? There are several methods to solve this problem, notably that of Efron (1977) and Breslow (1974). The Breslow method is computationally easier, and is

the default in Stata. The method is an approximation of the marginal probability of each of the tied events occurring before the other (Cleves et al., 2002).

Above I noted that the CPHM, as executed in Stata, was able to incorporate information resulting from a 'repeated event', in this case the same Cabinet changing agricultural protection more than once. As the following section demonstrates five Cabinets changed protection twice. This is useful information, because one would imagine that the information gained from the analysis of the first change should be employed in the analysis of the second. This can be done by 'stratifying' the Parliaments into two groups: those with one change, and those with two changes. In terms of risk pools, the second change cannot occur until the first occurs, and there is some sequence. By separating all the times to first event in one stratum, and all the times from first event to second event in another, we construct a conditional risk set model (Jones, 2007). This enables an analysis of time to first events only, and a time from first event to second event only. After all, there is no reason to suppose that the two risk pools have the same hazard rates, and if they do have different hazard rates then that fact in itself is of interest.

## **4.2 Estimation**

The section begins with an overview of the dataset with summary statistics, and a presentation of the 'events', or changes in agricultural protection of interest. It is the number of years that elapse between a change in legislation, coupled with covariates, which is of interest, and so I describe the legislation in some detail. I also explain how I have calculated the amount of economic rent paid by the non-farmer. The estimation of the model follows

### **4.2.1 Description of the dataset**

This thesis is concerned with agricultural protection in the United Kingdom between 1818 and 2004, and especially the role played by different sectors in society in influencing a Cabinet's change of agricultural protection levels. During these years there were 18 changes in government policy towards farmers. These

are coded with a 1. The years in which there was no change are coded with a zero. The column reflecting changes is therefore just a list of zeroes and ones, mostly zeroes. The changes are associated with another column, which records a 1 if the change was in favour of farmers, and a 2 if the change benefited non-farmers. For example, the Repeal of the Corn Laws in 1846 was clearly a 2. Separating the changes into strata by event type enables a comparison of the probability of the two different types of change: protection up or protection down. Extensive use is made of this categorical variable in the estimation, where it is called 'Type'. Table 4.1 below presents legislation concerning changes in protection, and indicates which events were Type 1 and which were Type 2:

**Table 4.1 Legislation On Agricultural Protection**

Those marked \* are counted as 'Events' and used in the estimation.

1815 Reimposition of the Corn Laws. (Occurs before start of the 1818-2004 time-period of the thesis).

\*1828 Sliding scale of wheat import duties replaced the fixed threshold of the 1815 Corn Laws. Type=2.

\*1842 Wheat import duties reduced. Type=2

\*1846 Repeal of the Corn Laws. Type=2

\*1896 Act granting exemption for landowners from local rates, effectively providing a subsidy to farmers. Type=1

1917 Corn Production Act: guaranteed prices for wheat and oats for six years. Guaranteed prices proved nominal because market prices were higher, and so there was no economic rent.

\*1920 Agricultural Act modifying and extending for an indefinite term guaranteed prices of the 1917 Act.

\*1921 Agricultural Act repealed when agricultural prices dropped precipitously and Cabinet realised how much support would cost. (The "Great Betrayal")

1924 Agricultural Wages (Regulation) Act. Minimum wages legislation.

\*1924 Decision to subsidise the beet sugar industry (to help arable in the eastern counties) Type=1

1928 Agricultural Credits Act established the Agricultural Mortgage Corporation to make loans at moderate interest for the purchase or improvement of land.

1928 Agricultural Produce (Grading and Marketing Act)

1931 Horticultural Products (Emergency Duties) November

\*1931 Agricultural Marketing Act. Type=1.

1932 Import Duties Act 10% on all products excluding wheat, maize, meat, livestock and wool. (Note: the three Acts of 1931, 1932, 1933 were all protectionist, and I have aggregated them to 1931.)

1932 Wheat Act. First use of deficiency payments. Standard price of 10s a quarter.

\*1933 Agricultural Marketing Act. Type=1

\*1937 Agriculture Act deficiency payments for barley and oats introduced, and raised the standard quantity for wheat from 27 million to 36 million cwt. Type=1.

1939 Agricultural Development Act (May). Increased grants, tried to bring ag up before hostilities.

\*1947 Agriculture Act. Annual price review with the participation of farmers' representatives became obligatory. Type=1

\*1957 Agriculture Act. Minimum guaranteed prices could not be reduced by more than 4% in any one year. Indirect undertaking by the Cabinet not to suddenly reduce the amount of aid given as production grants (Hill and Ingersent p257). Type=1

\*1964 Annual Review White Paper reduced deficiency payments by imposing standard quantities (Hill and Ingersent, 1977 p258). Type=2.

\*1971 Variable Import Levy for beef. Type=1

1973 Britain joins to EEC.

\*1984 Wheat 'Stabilisers' reduce production subsidies. Type=2

\*1992 MacSharry Reforms of the EU Common Agricultural Policy begin the process of 'decoupling' subsidies from production. Strongly resisted by farming lobbies. Type=2

\*1999 Agenda 2000. Further decoupling. Type=2

\*2003 MTR. Introduction of 'Single Farm Payment' further removing the incentive to produce agricultural output. Type=2.

The dependent variable of interest is the number of years between changes.

Statistics for the elapsed time are: mean 12.13 years; standard deviation 12.12; skewness 2.3.

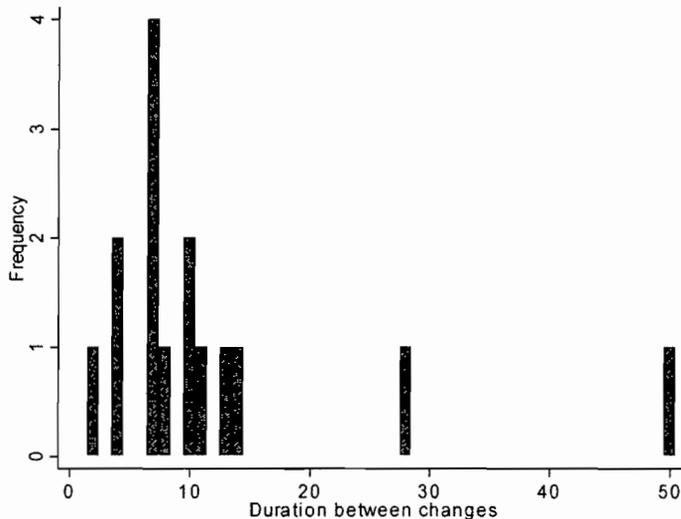


Figure 4.1 Histogram of the changes, displaying their non-normality.

#### 4.2.2 Description of covariates

Here I define the covariates I have used. Sources of data is presented in Appendix 1.

$\varphi$  measures democratic representation. The data I used is provided by Polity IV. To make the Polity IV scores suitable for use in the regression, I have normalized the scores so that zero represents the lowest score, and unity the highest.

$\alpha$  is the share in the portfolio of the landowner of income from agricultural sources. This is typically rent from tenant farmers. No data specific to Members of Parliament is available on this amount, but Schonhardt-Bailey (1991) indicates that from about 1832 onwards Members of Parliament were more responsive to

their constituents. I know the relative balance between agricultural and commercial production within the economy, and I know the relative balance of agricultural and commercial interests within Parliament. From these I have constructed the utility of the landowner, on the assumption that the relative shares of income from agricultural and other business sources followed the same trend as the rest of the nation. The ratio between agriculture and commercial is provided in the national accounts (Feinstein, 1972) and I used this ratio for  $\alpha$  and  $(1-\alpha)$ .

$\rho$  is population share. I have used census data.

$J$  is the degree of political organisation. For farmers I have used membership of the NFU as a share of all farmers. For non-farmers I have used the annual number of citations in the London Times for key words such as wheat, corn, agriculture. The Times provides a searchable database for years until 1985. A database for subsequent years is available from Lexus-Nexus. Unfortunately the search parameters are slightly different in the two databases. For consistency I normalized the Lexus-Nexus score for 1985 to be the same as that for the Times.

UF (Utility of the Farmer): Land Rent over GDPPC. Unfortunately, figures for farming income are not available for years before 1855. However, the correlation between farming income and land rent is 0.83, so I have used land rent as a proxy for farm income. Official British agricultural statistics provide land rent as if the nation was one large farm paying rent to a landlord, meaning that for owner-occupiers the rent is the opportunity cost of the capital used on the farm. I have divided by GDPPC to provide the farmers' relative prosperity.

UN(Utility of Non-farmer): nominal earnings less rent

ULO (Utility of Landowner):  $(\text{Agricultural Prod} * \text{Ag MPs} + \text{Industrial Prod} * (1 - \text{Ag MPs}))$ . Agricultural and Industrial Production figures are provided by Feinstein (1972) indexed at 1913=100.

#### 4.2.3 Calculation of Economic Rent

The non-farmer paid for wealth transfers to farmers during two periods of the time-span of this thesis. These were from 1818 to 1846; and from 1932 to 2004. It should be noted that while the farmer did not receive all of the money transferred because of deadweight losses, this makes little difference to the non-farmers perception of loss of utility from the transfers.

In the first period, which includes the Corn Laws, foreign wheat was subjected to import duties, which raised the price of bread, an important dietary element at that time. During the second period, the Exchequer guaranteed prices to farmers, making up the shortfall between guaranteed price and market price. Britain entered the European Union in 1973, with a more complicated system of intervention prices and subsidies.

The model for this thesis requires the transfers ('R') which reflect the cost to the non-farmer of paying economic rent to the farmer. The problem is how to reconcile different method of taxation and with limited historical data. I describe the construction of the index by period of taxation.

The Corn Laws were reimposed in 1815, as the Historical Chapter has described. The Laws were relaxed twice (1828 and 1842) before being repealed in 1846. The effect was that British wheat farmers were protected from imports of cheaper foreign wheat, especially from large grain exporting nations such as Prussia. Jeffrey Williamson (Williamson, 1990) has calculated the impact of the Corn Laws prior to Repeal. He has found that the ad valorem equivalent tariff rate was as follows:

1815 to 1827	72.8%
1828 to 1841	58.5%
1842 to 1845	24.1%

These are much higher rates than those assumed by Susan Fairlie (Fairlie, 1960), but Williamson has the benefit of better data and improved statistical techniques.

To find how much economic rent was paid, I have used as a basis Prussian wheat, cif London. I have then multiplied the price per quarter with Williamson's ad valorem rate, as given above. This represents how much extra the non-farmer was paying for wheat.

To calculate consumption, I have added domestic wheat production with net imports. Multiplying total consumption with the ad valorem duty provides the total rent paid by non-farmers, in pounds.

For the second period, 1932-2004, I have used the amount of money received by the farming industry in the national accounts, under Income and Expenditure. This figure includes production grants, deficiency payments, and more lately, agri-environmental subsidies.

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## 5. RESULTS<sup>14</sup>

The discussion which follows focuses on results gained from 'Parliamentary' subject testing, that is using each of the 47 Parliaments within the time-period as a 'patient'. The Parliaments can be thought of as falling into three sets: the 20 in which there was no change; those in which there was a change in favour of the farmer (Type 1); and those in which there was a change in favour of the non-farmer (Type 2). The 20 no-change Parliaments are in the risk-set in both regressions, and considered as censored observations. The 'Type 1' regression has as risk-set the censored Parliaments, and those Parliaments in which the nine pro-farmer changes occurred. Similarly, the 'Type 2' regression has as risk-set the censored Parliaments and those Parliaments in which the 14 pro-nonfarmer events took place.

Here I discuss the results by group, comparing pro-farmer (Type1) and pro-nonfarmer (Type2) results. I present the regressions for each type first, with a discussion. In the final chapter of the thesis, Conclusion, I connect the results presented below to the various themes of the thesis.

### 5.1 Results for the Type 1 (Pro-farmer) regression

Type 1 events are those which benefit the farmer, such as increases in economic rent transfer. In this context, an interesting result shown in Table 5.1 is the negative sign and significance at the 90% confidence level of Agricultural Share, which represents the share of farmers in the economically active population.

_t	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Dem	-4.471585	4.944626	-0.90	0.366	-14.16287	5.219704
Ln_Tenancy	2.482006	3.3156	0.75	0.454	-4.01645	8.980463
ln_agshare	-10.84061	6.03065	-1.80	0.072	-22.66047	.9792494
lnL_R	-1.150051	1.547468	-0.74	0.457	-4.183033	1.882932
lnrent	-1.103996	.781923	-1.41	0.158	-2.636537	.4285444
ln_TimesCi~m	.5146154	1.637165	0.31	0.753	-2.694169	3.7234
lnearn	-.8417216	1.034095	-0.81	0.416	-2.86851	1.185067
Dummy_Ph1	1.898324	3.102029	0.61	0.541	-4.181541	7.978189

<sup>14</sup> A version of this chapter will be submitted for publication.

Table 5.1 Regression for Type 1 pro-farmer legislation

The negative sign implies that as the share of farmers shrinks, so the probability of the Cabinet agreeing to a rise in economic rent increases. This result is confirmed by the negative sign for Land Rent, the variable which measures the welfare of farmers. This is so because landowners set land rents at a level which captures expected future earnings from land, or Ricardian rents. The negative sign for Land Rent implies that as relative wealth shrinks, then farmers are more likely to receive protection from the Cabinet. Together, the two results show that a shrinking and less wealthy farming community is more likely to receive favourable treatment from the Cabinet. Similarly, Rent, which is the amount of money transferred to farmers as a result of a Cabinet decision, has a negative sign. The implication is that the less economic rent the farmers receive, the more likely they are to receive protection. This result may be construed as resulting from the Cabinet's vote-maximisation: the Cabinet attempts to balance current demands for favourable policy outcomes with how much rent has been provided in the past. Less statistically robust, but still of interest, is the positive sign for Tenancy. Tenancy contains two measures of interest. First, Tenancy in itself measures the proportion of farmland which is let out. As I showed in Chapter 2, the proportion has been dwindling since 1921. The positive sign for Tenancy implies that as more farmers own their farms, rather than being tenants, they tend to have a greater impact on Cabinet decision-making. Second, the correlation between Tenancy and membership of the National Farmers' Union is high at 0.8, and so I infer that the degree of self-organisation has a positive impact. The negative sign for Earnings, which measures the economic welfare of non-farmers, is puzzling. On the face it, the negative sign implies that a reduction in the welfare of the non-farmer leads to an increased probability of protection for the farmer, which seems an unlikely proposition. A possible explanation is the correlation (0.8) between Rent and Earnings, resulting from the interdependency in earlier times of agriculture and the rest of the economy. For example, agriculture performed well in the 1850s along with the rest of the British economy

as trade and exports increased. Similarly, agriculture suffered badly during the Depression of the 1930s.

The indicator variable Phase 1 marks the first Phase of the time-period of the thesis, and runs from 1818-1920. The results are not conclusive. Similarly, the inclusion of an indicator variable for the periods of time when Britain was at war, as presented in Table 5.2 below, has no statistical significance at all.

In comparison to the Type 2 results discussed below, the effect of variables reflecting the political process are more significant for Type 1. The results are presented in Table 5.2 below. Democracy has a negative sign, which seems intuitively correct: the effect of the increase in franchise was to reduce the probability of protection. The three other variables, Majority, TTG (unexpired duration of term in office), and the interaction between Majority and unexpired time left in office, have greater significance in comparison with the Type 2 results. The coefficients are very small, and open to various interpretations. One such interpretation might be that the greater the majority, the greater the probability of an increase in protection, perhaps as a reward to the farming lobby for votes in the last General Election. The negative sign for the interaction term implies that the closer the election, the less likely is an increase in protection. The single term representing unexpired term has the same sign, but has very little statistical significance. This finding would accord with the negative sign for Democracy: an economic rent transfer to any group has to be paid for by somebody. Increasing the transfer to farmers is more likely to be politically dangerous for the Cabinet the closer the next election.

_t	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnDem	-5.151044	4.450895	-1.16	0.247	-13.87464	3.572551
Ln_Tenancy	.3323245	1.662136	0.20	0.842	-2.925402	3.590051
ln_agshare	-11.55706	7.154392	-1.62	0.106	-25.57941	2.465292
lnL_R	-.7029112	1.566664	-0.45	0.654	-3.773515	2.367693
lnrent	-.9976025	.8606114	-1.16	0.246	-2.68437	.689165
ln_TimesCi~m	.2398179	1.588241	0.15	0.880	-2.873076	3.352712
lnearn	-.8452461	1.173923	-0.72	0.472	-3.146093	1.455601
Majority	.0100086	.0094662	1.06	0.290	-.0085447	.0285619
TTG	-.1092598	.8897076	-0.12	0.902	-1.853055	1.634535
Maj_TTG	-.0019409	.002036	-0.95	0.340	-.0059313	.0020495

Table 5.2. Type 1 profarmer legislation including 'political' variables

I have already made reference to the study by Swinnen et al. (Swinnen et al., 2001) of agricultural protection in Belgium over nearly a century. One finding was that agricultural protection diminished as the Belgian economy grew. The rationale is that domestic exporters of non-agricultural goods wish to avoid cases where their exports are subject to import restrictions applied by agricultural exporting countries, and also wish to ensure that those countries can earn foreign exchange by selling agricultural goods. Table 5.3 shows that the opposite case obtains in Britain, as implied by the positive sign for Trade Dependency, which indicates that as Britain became more dependent on physical trade, then the probability of protection increased. The reasons for this somewhat puzzling result are not apparent, but may result from the increasing reliance of the British economy on 'invisibles' as opposed to physical imports and exports.

_t	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnDem	-6.440958	4.769252	-1.35	0.177	-15.78852	2.906604
Ln_Tenancy	1.071092	1.998822	0.54	0.592	-2.846528	4.988712
ln_agshare	-13.79119	7.58809	-1.82	0.069	-28.66357	1.081197
lnL_R	.2797219	2.099595	0.13	0.894	-3.835408	4.394852
lnrent	-.4338145	1.044198	-0.42	0.678	-2.480405	1.612776
ln_TimesCi~m	.1276332	1.571845	0.08	0.935	-2.953127	3.208393
lnearn	-1.722971	1.718315	-1.00	0.316	-5.090806	1.644865
ln_TradeDep	3.238409	3.442416	0.94	0.347	-3.508602	9.985419

Majority		.0121184	.0100596	1.20	0.228	-.007598	.0318348
TTG		.12479	1.046179	0.12	0.905	-1.925684	2.175264
Maj_TTG		-.0022768	.0021329	-1.07	0.286	-.0064573	.0019037

Table 5.3. Type 1 regression including trade-dependency

## 5.2 Conclusion for Type 1 Pro-farmer Results

The results for Type 1 regression, in which the risk-set consists of 'censored' Parliaments and Parliaments in which pro-farmer legislation was passed, show that a shrinking agricultural sector has an increased probability of gaining protection from the Cabinet. The relatively high statistical significance of the share of agriculture in the workforce, and its negative sign, points to this, as does the negative sign for Land Rent, which indicates the economic prosperity of agriculture. So far, this is in line with Olson's propositions regarding collective action (Olson, 1965). There are certainly some puzzling results, such as the positive sign for Trade Dependency and the negative sign for Earnings, but these may be resolved with some further work. I turn now to analysis of results for the non-farmer.

## 5.3 Results for the Type 2 (pro-nonfarmer) regression

Table 5.4 below presents the same regression given in Table 5.1, but with a risk-set including censored Parliaments and those Parliaments in which there was a change of legislation in favour of non-farmers. A striking change is the reversal of many of the signs, in particular those which reflect farmer welfare. The positive signs for Agricultural Share, Land Rent and Rent all imply that a wealthier and larger agricultural sector is likely to receive less protection. In terms of vote-maximisation by the Cabinet, this means that the Cabinet will reduce the welfare of farmers to gain votes from non-farmers. The negative sign for Earnings supports this conclusion. However, the regression for Type 1 also showed a negative sign for Earnings. This apparent anomaly may vanish when the relative sizes of the coefficients (0.84 against 2.72) and the slightly greater statistical significance of the Type 2 regression are taken into account.

_t	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnDem	.4425434	1.480375	0.30	0.765	-2.458939	3.344026
Ln_Tenancy	4.467248	23.06527	0.19	0.846	-40.73985	49.67434
ln_agshare	2.391688	8.143279	0.29	0.769	-13.56885	18.35222
lnL_R	2.680434	3.596317	0.75	0.456	-4.368218	9.729087
lnrent	1.201432	.9941869	1.21	0.227	-.7471386	3.150003
ln_TimesCi~m	-.4596662	.4709764	-0.98	0.329	-1.382763	.4634306
lnearn	-2.721607	2.652519	-1.03	0.305	-7.920448	2.477235
Dummy_Ph1	-2.936413	23.72965	-0.12	0.902	-49.44568	43.57285

Table 5.4. Type 2 pro-nonfarmer regression

In contrast to the relatively strong results obtained for the 'political' variables in the Type 1 pro-farmer regression, the results for Type 2 are much weaker, and in fact none of them really have any statistical significance at all. These results are presented below in Table 5.6. This may be because the Cabinet does not take much notice of the agricultural vote when making pro-nonfarmer decisions, a point which I deal with in more detail in the following chapter.

_t	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnDem	.3002485	1.55986	0.19	0.847	-2.75702	3.357517
Ln_Tenancy	9.808814	24.31301	0.40	0.687	-37.84381	57.46144
ln_agshare	3.073313	8.789044	0.35	0.727	-14.1529	20.29952
lnL_R	2.230809	3.62409	0.62	0.538	-4.872277	9.333895
lnrent	1.346401	1.020181	1.32	0.187	-.653117	3.345919
ln_TimesCi~m	-.4739196	.478993	-0.99	0.322	-1.412729	.4648894
lnearn	-3.025444	2.785548	-1.09	0.277	-8.485018	2.434131
Majority	-.000847	.0236281	-0.04	0.971	-.0471572	.0454632
TTG	1.387371	11.90477	0.12	0.907	-21.94555	24.72029
Maj_TTG	.0005981	.0045485	0.13	0.895	-.0083169	.0095131

Table 5.5. Type 2 pro-nonfarmer regression with 'political' variables

During the analysis of the Type 1 regression, I included a variable for trade-dependency, and noted that it had a positive sign, in contradiction to what might be expected. For Type 2 trade dependency also has a positive sign, but of smaller magnitude and much less significance. There is no obvious reason for this result.

_t	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnDem	.2169682	1.590085	0.14	0.891	-2.899542	3.333478
Ln_Tenancy	10.13717	23.48944	0.43	0.666	-35.9013	56.17563
ln_agshare	3.15454	8.948383	0.35	0.724	-14.38397	20.69305
lnL_R	2.069055	3.645645	0.57	0.570	-5.076277	9.214388
lnrent	1.519524	1.296102	1.17	0.241	-1.020789	4.059836
ln_TimesCi~m	-.4898242	.4836684	-1.01	0.311	-1.437797	.4581484
lnearn	-3.212777	2.877262	-1.12	0.264	-8.852108	2.426553
ln_TradeDep	1.260374	5.393249	0.23	0.815	-9.310199	11.83095
Majority	-.0006465	.0241472	-0.03	0.979	-.0479742	.0466811
TTG	1.332355	11.39425	0.12	0.907	-20.99997	23.66468
Maj_TTG	.000395	.0047031	0.08	0.933	-.0088229	.0096129

Table 5.6. Type 2 pro-nonfarmer regression with trade-dependency

#### 5.4 Conclusion for Type 2 pro-nonfarmer regression.

In general, the results for the Type 2 pro-nonfarmer regression show reversed signs for sector-specific variables, compared to Type 1. For example Agricultural Share, Land Rent and Rent are now all positive. However, the results are by no means mirror images, in particular because of the relative statistical insignificance of the political variables in the Type 2 regression. Because these variables did supply some limited information for Type 1 events, the lack of significance for Type 2 may have some meaning. One intriguing possible explanation is that the time-scale in which Type 2 changes are made is different from the time-scale for Type 1, and is therefore not captured by the short-term analytical structure represented above.

#### 5.5 Further notes on the results

A small island such as Great Britain is likely to experience food insecurity during time of war, and this is reflected in legislation. For example, the Corn Production Act of 1917 was a direct response to increased German submarine attacks. I included an indicator variable (1=War, 0 otherwise) but this had no significance. This might be because the First World War had already lasted for three years before the Corn Production Act was enacted, and because an unusually prescient Ministry of Agriculture took measures to increase domestic production well before the outbreak of the Second World War.

I have represented the degree of 'national attention' by counting the number of times agriculture (with various key-words) was cited in the London Times on an annual basis. The results presented above imply that the more farmers are discussed in the national newspaper of record, the greater is the probability of an increase in protection. There are several reasons for this, related to statistical method and changes in national opinion. For statistical method, there may have been some changes in the source which are not apparent. For example, changes in the number of pages of the newspaper (for example during war-time paper shortages) would clearly affect the basis for calculation of citations. Over two centuries, certain key-words change their meaning as their context shifts. For example, 'intensive agriculture' tends currently to have a negative connotation. This perhaps was not the case in 1940, when farmers were being forced to plough ancient pastures and citizens were 'digging for victory'.

## **Bibliography for Chapter 5**

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Swinnen, J.F., A.N. Banerjee, and H. de Gorter "Economic Development, Institutional Change and the Political Economy of Agricultural Protection. An Econometric Study of Belgium since the 19th Century." *Agricultural Economics* 26 (2001):25-43.

## 6. CONCLUSIONS

The hypotheses to be tested in the thesis are that the pressures which cause the Cabinet to change policy over economic rents for agriculture can be quantified; and if so then the pressures for increase of protection differ from those for reduction of protection. The results presented above answer both hypotheses positively. In particular, Olson's (1965) proposition that the smaller the group, the greater its potential for successful self-organising seems to be borne out. As Olson showed, the larger the group, the greater the 'free-rider' problem, the reverse being that the individual rewards for action were more attractive when the group was small. The greater propensity for the Cabinet to legislate in favour of increased protection when farmers were losing both share in the workforce and also individual welfare bears out Olson's claim, and also the vote-production model presented by this thesis. This is because the votes of a group suffering an economic decline become 'cheaper' as the group's distress increases. In the case of farmers, protection afforded by the Cabinet become of greater importance compared to farm income, making it easier for the Cabinet to secure agricultural votes. The Cabinet maximises its votes by 'buying' more of the cheaper agricultural votes.

Similarly, Olson's insights into the ways in which groups maintain integrity are confirmed by the Tenancy variable discussed above. As I have discussed, Tenancy can also be taken as a proxy for self-organisation, reflected in the success of the National Farmers' Union in signing up for membership virtually all active farmers. Membership is maintained by success in negotiating as well as Olson's 'selective benefits', such as advantageous insurance rates.

The confirmation of Olson's proposition in a dynamic context is interesting in itself, but perhaps more interesting is what is left unsaid by the regressions above. As I have noted, the 'political' variables---Democracy, Majority, and the interaction between Majority and unexpired term---have some significance for the Type 1 pro-farmer regression, but none for the Type 2 pro-nonfarmer. This result is in itself enough to show that the processes which brought about change were

different in the two cases. But why? Why isn't the Cabinet equally concerned about the electorate's view of increasing or decreasing protection? I have not (so far) been able to test for this, but there is a possibility of a further confirmation for Olson. This is because Olson's theory can be interpreted in terms of a group forming when it is in the interests of individuals to band together, even if very temporarily. Non-farmers could be seen as such a group when they possess a uniting displeasure at high economic transfers to farmers. If the per-capita cost of the transfer is high enough, then we might expect to see some self-organisation in protest. Such self-organisation has taken place, especially during the late 1830s and in the 1980s. In the former case, the Anti-Corn Law League was very successful in forcing an end to the Corn Laws, and in the latter case several environmental and citizens' groups united to put pressure on the Cabinet to reduce Common Agricultural Policy subsidies. The self-organisation suggested by these events is not reflected in the regressions because the 'patient'---that is the Cabinet---'lives' only for a maximum of seven years. The views of non-farmers may, I suggest, be carried forward regardless of which Party is in office. In short, there is the possibility of non-farmer self-organisation which is not captured by the regressions above, but which is hinted at by the statistical insignificance of political variables in the Type 2 regression.

In Chapter 2 Historical, I broke the time-span of the thesis into three phases, and claimed that each phase could be viewed as a sort of paradigm, in which the received relationship between the farmer and the state was substantially the same. There is some statistical support for this claim, reflected in some statistical significance shown by indicator variables for the phases, as shown below:

_t	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
lnDem	-1.4378	1.876998	-0.77	0.444	-5.116648	2.241049
Ln_Tenancy	68.95165	45.87587	1.50	0.133	-20.9634	158.8667
ln_agshare	17.69044	14.38271	1.23	0.219	-10.49915	45.88002
lnL_R	10.94194	8.323545	1.31	0.189	-5.371912	27.25578
lnrent	3.601477	2.164032	1.66	0.096	-.6399479	7.842901
ln_TimesCi~m	-2.490072	1.501929	-1.66	0.097	-5.433799	.4536546
lnearn	-9.509482	6.008207	-1.58	0.113	-21.28535	2.266387
Dummy_Ph1	64.30935	46.29669	1.39	0.165	-26.4305	155.0492
Dummy_Ph2	15.8705	8.475487	1.87	0.061	-.7411501	32.48215

Table 6.1. Regression showing statistical significance of divisions into phases

Phase 1 lasts from the beginning of the time-period, 1818, to the end of landowner power in 1920. Phase 2 lasts from 1920 to 1984, and Phase 3 lasts from 1984 to 2004. This is an interesting result which I shall be exploring further, especially with regard to the influence of possible exogenous variables. An obvious example of such a variable is the degree of restriction on overseas trade. During the years immediately following the Repeal of the Corn Laws in 1846, domestic agriculture benefited from high international wheat prices caused by the Crimean War and the American Civil War; similarly prices were high during the First World War as supply was restricted. It does seem likely that exogenous events such as these had an effect on the importance that the Cabinet afforded to agriculture, and therefore its willingness to change policy. As I noted in the Introduction, government policy towards agriculture seems pragmatic at best, and policy formulation is a reactive rather than proactive. This finding implies that the Cabinet faces some costs when making a policy change, and that the Cabinet is aware of the costs. For example, the Cabinet's time in office is limited and passing new legislation is a considerable undertaking. Spending Parliamentary time on agricultural issues means that other matters, of perhaps greater importance to the electorate as a whole, are neglected. There is some empirical support for this view, in that no major political party has made agriculture an important part of its election manifesto, and with one partial exception, agriculture has never been an 'issue' at General Elections. The partial exception was the 1906 General Election which was fought over tariff reform. Even here, domestic

agriculture was a secondary issue, as those campaigning for a return to protection were candid about the need to import colonial agricultural production under 'Imperial Preference'. In summary, farmers are seen as a resource which the Cabinet can call on in an emergency but are otherwise best left alone, because the known cost of making incremental changes in policy are usually greater than the potential, and perhaps illusory, benefits of 'tinkering'. It may well be that this finding extends to economic sectors other than agriculture, which would not be surprising.

The thesis has shown clearly both that the probability of a Cabinet changing agricultural protection can be quantified, and that the processes which lead to an increase are different from those which lead to a decrease. In addition, some of the propositions put forward by Olson have been substantiated in a dynamic context over two centuries. The thesis has also opened up the intriguing possibility of long-term 'waves' of consumer self-organisation, and the demarcation into phases of agriculture's relationship with the state.

## **Bibliography for Chapter 6**

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## **Appendix 1: Data Sources**

**Food Consumption:** 1900 to 1965 Feinstein (1972)

### **Public Spending on agriculture:**

1937 MAFF Production Grants

1960-1988 from Agrifacts (Burrell et al., )from Annual Review and Determination of Guarantees, Annual Review of Agriculture, Agriculture in the United Kingdom, 1988

1991-2001 Annual Abstract of Statistics Table 20.1 Item 11 Code LUOU

Rent

1818-1846 Prussian Wheat Prices in shillings and pence a quarter (Susan Fairlie), multiplied by the ad valorem calculated duty by Jeffrey Williamson: this gives the amount above the international price that the British consumer was paying. Then the domestic production of wheat and the net trade in wheat were added together to find total British wheat consumption. Consumption multiplied by per-quarter of wheat rent gives the consumer's transfer to agriculture in millions of pounds (with conversion factors of course).

I then have the economic rent on a per capita basis. I divide this by the average real incomes (EH History, Officer). This provides the share of real income that was transferred to farmers as an economic rent.

### **Farm Incomes**

This is defined as the money available to the farmer and spouse after deduction of expenses---Britain is considered as a 'national farm'. From 1855 to 1938, Feinstein (Table 23); from 1938 to 2004, DEFRA. Note that this variable includes economic rent. In Feinstein's table, the income is 'total factor income', and in the DEFRA tables, production grants and the like are a line-item under income.

## **Land Rent**

The gross rent of farmland and buildings. For 1855 to 1938 Feinstein (Table 23), subsequent years DEFRA. For 1818 to 1855, figures do not exist. I found that the correlation of the rent series calculated by Turner et al.(1997) had a correlation of 0.92 over the years that the two series had in common (1855-1914). I therefore normalized the Turner series against the Feinstein series for the years prior to 1855.

## **Food as a share of TCE (FSHARE)**

1900-1945: Stone and ....

1946-1986: Appendix 9, Table 9.1 (original source: Central Statistical Office: United Kingdom National Accounts)

## **Acts of Parliament**

Acts of Parliament: through the 'Portcullis' website of the British Government: searching for the key-words "wheat", "corn" in the titles of Acts of Parliament.

## **Times Citations**

Times Citations: via Lexis-Nexus, searched the Times of London database by year for number of times that the key-words "wheat" and "corn" occurred.

## **Wheat Prices**

Wheat Prices:

1815-1820: Richard Unger

for 1821 to 1980: p756 Prices 17 "Average Prices of British Corn—England and Wales" In pounds per cwt.

## **Agricultural Rent**

For 1815-1914: Agricultural Rent in England 1690-1914 Turner Beckett and Afton

For 1961-1988: MAFF Farm Rents in England and Wales

## **Employment in Agriculture**

1815 to 1951 British Economic Growth 1688-1959 Deane and Cole  
Population Census