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# From Sickness to Death: The Financial Viability of the English Friendly Societies And Coming of the Old Age Pensions Act, 1875-1908

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# From Sickness to Death: the Financial Viability of the English Friendly Societies and Coming of the Old Age Pensions Act, 1875-1908[†]

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**Abstract:**

Traditional theories of the origins of the welfare state have emphasized the financial weakness of Britain's largest provider of mutual insurance in the late 19th century, the friendly societies. These theories share common implications with contemporary theories of institutional change popularized by Douglas North and others. Of prime importance is the contention that ageing memberships and declining popularity forced mutual insurers, a prominent feature of the Victorian age, into financial distress and tacit support of state pension schemes.

This argument, though supported by secondary sources from the period, has never been quantitatively scrutinized. This paper, inspired by the path-breaking work of Emery and Emery (1999) on North American friendly societies, seeks to partially remedy this gap. Using data from the Ancient Order of Foresters archives, it does this in two ways. First, it isolates the determinants of late 19th century friendly society membership in a cross-sectional regression framework. Second, it computes two empirical tests of financial viability for each society lodge: the implicit share of risk loading and the probability of ruin. These values improve upon conventional literature by more precisely defining financial insolvency and by more accurately capturing the financial decisions facing lodges. Results suggest that though the friendly societies were the domain of the old, they were more financially resilient than has been previously assumed. These findings cast doubt on traditional theories of the origins of the welfare state, suggesting a stronger role for political consensus and compromise in the understanding the 1908 Act.

"The great things in life are almost always the quiet, unnoticed growths amongst the rank and file of the people."

Eltweed Pomeroy

*The English Friendly Societies, 1902*[1]

## I:      Introduction: The Significance of 1908

The 1908 Old Age Pensions Act marks a decisive shift in British welfare state policy.  State expenditure on the elderly and poor has increased dramatically as a share of GDP since 1908, and the non-contributory pensions established by the 1908 legislation paved the way for the 1925 contributory pension. Similarly, the passage of the 1911 National Insurance Act evolved from the debate preceding the 1908 Act. Though it would be hyperbolic to claim that 1908 initiated a British advance towards Socialism, the Act's importance in the eventual growth of the British welfare state should not be understated.

1908 will thus serve as a benchmark in this study.  The year's symbolic power is significant: it marks the transition from a Britain sceptical of state involvement in public affairs to one willing to accept its offers of help; it coincides with the institutional death of the self-help movement that defined Victorian Britain; and, in some ways, it foreshadows the relocation of British working-class policymaking from the industrial North to the chambers of Parliament in London.  Hennock, in a long essay on the German precedent of British social reform, echoes these sentiments: "For the [history of pensions policy] as for so many other aspects of British social reform, it is 1908 that marks the decisive turning point."[2]

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[1] Found amongst assorted documents at the LSE library archives, June 10, 2009
[2] Hennock, *British Social Reform and German Precedents*, 1987, pp. 112

Britain's appetite for social reform did not, of course, miraculously transform in the eve of a new year; the roots of the 1908 Act are many and diverse. Many explanations have been presented, some of which will feature heavily in this paper. Industrialists have explained welfare state policy in terms of the need to rid competitive markets of unproductive, sickly, or aged workers.[3] Socialists and others sympathetic to the poor have emphasized the association between poverty and old age and the debilitating effects of the poor law on economic and social performance.[4] Comparative historians have argued that Britain's experiment with social welfare reform was a response—as much out of fear as awe—to Germany's institutionalization of compulsory state insurance and pensions schemes as early as 1883.[5] Around this constellation orbits other, more specialized explanations for the emergence of the British welfare state. Prominent among these alternative hypotheses is the contention that the friendly societies, one of the primary sources of mutual aid in Victorian England, were increasingly insolvent in the late 19th century and were unable to maintain their traditional opposition to state interference.[6]

This paper does not seek to refute or seriously challenge the three principal hypotheses mentioned above. It will provide a quantitative test to the last—the insolvency of the friendly societies. The friendly societies were the strongest and most politically influential of the providers of sickness and old age insurance in Victorian England. They were also highly symbolic organizations, promoting in their ritualistic meetings and antiquated garb an ethos of self-help and individualism that implicitly opposed state intervention in social welfare. The death of the friendly

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[3] See: Wilensky, *The Welfare State and Equality: Structural and Ideological Roots of Public Expenditure,* 1975
[4] See: Thane, *Old Age History*; Charles Booth, *The Aged Poor in England and Wales*
[5] Hennock, *Social Reform*
[6] Gilbert, *National Insurance*

societies and their replacement with state institutions thus reinforces the significance of 1908 in Britain's social history.

This paper's decision to focus on the friendly societies extends beyond social and historical import. The friendly societies also allow for compelling hypothesis construction. Inspired by literature on institutional change in the tradition of Douglass North, Oliver Williamson and others, this paper takes as its starting point the suggestion that economic institutions change upon fluctuations in relative prices, or the ability to complete economic transactions. As the largest insurance institutions in England prior to state intervention, the friendly societies represent the habitat in which such fluctuations in economic efficacy would have taken place. In this limited way, the financial viability of the friendly societies acts as a proxy for the probability of state intervention in the insurance market.

## II.	The Structure and Style of the English Friendly Societies

In the catalogue of remedies for the challenges of 19th century working-class life, the friendly societies enjoy a minor fame as the primary carriers of the ethic of self-help. Neave describes the friendly societies as the "largest and most representative working-class organization" in late 19th century Britain.[7] His comments are complemented by Gilbert, who declares that "the friendly societies epitomized the Victorian ideals of thrift and respectability, of individual responsibility and self-help."[8] Though these descriptions betray some nostalgia for a more individualistic and fraternally vibrant past, they are at least symbolically true. In almost

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[7] Neave, *The Friendly Societies in England,* 1996, pp. 41
[8] Gilbert, *The Decay of Provident Institutions and the Coming of Old Age Pensions,* 1965, pp. 551

every public utterance, representatives of friendly societies took time to elaborate upon the values on which they were founded.

These values were embedded in the structure of the friendly societies.  Most societies collected annual or semi-annual dues which were then used to provide sickness and death benefits to members who had amassed a certain amount of contributions.  Contributions were usually fixed, though in later years some societies began charging higher fees for older entrants.[9]  It is notable that membership in a society usually required an application and the written approval of the Grand Master of the local lodge; this served both as a social and medical deterrent, ensuring that high-cost members were unable to join.  Societies typically met monthly, at the local public house or in a private lodge, to discuss business, drink spirits, enjoy the merriments of socializing, and share news from family and friends.  Some historians have suggested that the societies existed as much for social as for economic purposes, and in some smaller villages formed the backbone of secular social life.[10]  The 1793 Act for the Encouragement and Relief of the Friendly Societies, for example, defined a friendly society as:

> "A society of good fellowship for the purpose of raising from time to time, by voluntary contributions, a stock or fund for the mutual relief and maintenance of all and every member thereof, in old age, sickness, and infirmity, or for the relief of widows and children of deceased members."[11]

It is unlikely that many societies performed all of these tasks, and the friendly societies of the 19th century were undoubtedly more formally developed than those of the late 18th century, the subject of this definition. Nonetheless, the vast majority of societies provided some form of

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[9] Gosden, *The Friendly Societies in Britain*, 1961
[10] Logan, interview at Foresters' archives, June 3, 2009
[11] Act for the Encouragement and Relief of Friendly Societies, 1793, quoted in Neave, *Friendly Societies in England,* pp. pp. 42

sickness insurance for workers who could afford to pay regular contributions, and often provided a respectable funeral upon death.

Though the friendly societies maintained an image of self-help and mutualism, they were often viewed with suspicion from both the higher and lower classes, in particular members of the clergy.  Religious figures invoked disgust and curiosity at their ritualistic behaviour, which mimicked and sometimes mocked the formalism of the church.  Clergy, for example, sometimes expressed concern that upon death friendly society members replaced a proper Christian funeral with a secular one.  The societies' propensity for drinking during their gatherings also inspired criticism from the church, as shown by the following quotation of a clergyman:

> "All who are familiar with friendly societies know very well that they mean a great deal more than the mere payment of certain premiums and the reception in time of need of certain equivalent benefits.  They know that they are clubs in another sense of the word also.  The name is associated in their minds with bands and banners, and processions with scarves and rosettes, with public house dinners and all their natural concomitants.  Too often the Club-day in a village means a day of drunkenness, a day on which respectable people shut up their houses and keep indoors, or take the opportunity of paying a visit to friends at a distance"[12]

The perception that the friendly societies engendered a cultish sub-culture of debauchery was largely inspired by their fondness for unusual names and rituals.  The affiliated orders of the societies—a largely 19th century phenomenon—almost always labelled themselves with a title invoking ancient times and culture: the Independent Order of Oddfellows; the Ancient Order of Foresters; the Ancient Order of Rechabites; or the Knights of the Maccabees.  The regalia and cultish rules surrounding

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[12] Quoted in Neave, *Friendly Societies in England,* pp. 56

these names inspired another clergyman to describe the affiliated branches as "half-heathen clubs utterly unlawful for a Christian man."[13]

The friendly societies also enjoyed a mixed reputation with members of government and the political establishment. Many societies listed members of parliament and the royal family as honorary, non-contributory, members, though most societies refrained from declaring outright political allegiances. As Gosden points out, the relationship between the friendly societies and the political elites of Victorian England was discontinuous and constantly evolving.[14] In the early period of friendly society growth between 1815 and 1830, criticism of the societies emphasized the negative effects of mutual combination on village and town life. A letter held in the Home Office records from a London engineer makes the point:

> "As long as bodies of journeymen are allowed to constitute themselves into societies under any denomination of benefit while the present laws of management of such societies exist, your memorialists have no hope of having the evils [of mischievousness and drunkenness] redressed."[15]

The fears generated by mutual combination under crude and arcane rituals characterized much of the early public and political reaction to the friendly societies. Even in this atmosphere of suspicion, however, the friendly societies boasted significant political influence. Because of the continuous stream of contributions required to join a society and take advantage of its support, membership in a friendly society was censored towards the better off. Gilbert, for example, claims that "like Victorian England herself, the friendly society movement was rich, influential, and

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[13] *Ibid,* pp. 58
[14] Gosden, *Friendly Societies*
[15] *Ibid,* pp. 156

conservative."[16]  Workers in unstable industries or with too little wages to pay the annual contributions would either have been expelled from the society for lack of payment—a common practice—or would not have joined in the first place.  In times of difficulty, such workers' only recourse was the poor law.

The relationship between the friendly societies and the political establishment transformed during the campaigns surrounding the poor law reform of 1834.  The self-identification of many friendly societies as bastions of thrift and self-help must be understood in opposition to the apparent hedonistic decay associated with the poor law.  On many occasions, members of parliament or local government upheld the friendly societies as an alternative to the poor law.  The societies' requirement of regular contributions mandated that members maintain work when able, and some evidence suggests that societies encouraged members to work rather than receive benefits in order to maintain the viability of the lodge and the dignity of their morals.[17]  The political use of the societies as an alternative to the poor law re-emerged in the campaign for old age pensions in the late 19th century.

### III.    The Friendly Societies and the Campaign for Old Age Pensions

In a seminal 1965 paper, Bentley Gilbert argued that the friendly societies were increasingly insolvent in the late 19th century due to the aging of their memberships and the inability to attract new, younger, and healthier recruits.[18]  Gilbert suggests that the de facto pensions that societies were providing their older members were insufficiently funded by

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[16] Gilbert, *Provident Institutions,* pp. 552-553
[17] Gosden, *Friendly Societies*
[18] Gilbert, *Provident Institutions*

contributions and were exposing lodges to the possibility of bankruptcy and dissolution, which further exacerbated the slowdown of member initiations.  This financial crisis led many friendly societies to seek external sources of support.  Though the friendly societies were staunchly opposed to state intervention in the mid-19th century, their deteriorating financial condition led many of them to tacitly support state pensions at the turn of the century in order to reduce their financial burden.  According to Gilbert, this shift in psychology amongst the friendly societies was a necessary, if not sufficient, condition for the passage of pension reforms in Parliament, and was a key force in the passage of the 1908 Old Age Pensions Act.  In Gilbert's words: "So, on the first day of January 1909, old age pensions began in Great Britain with the acquiescence, if not the enthusiasm, of the friendly societies who had been a so important factor in their planning."[19]

This argument finds justification in several documents from the period.  The societies' initial opposition to state pension schemes has been clearly noted, being labelled as grandfatherly legislation by one influential observer.[20]  The following passage, delivered in 1891 by the Grand Master of the Independent Order of Oddfellows, the largest of Britain's friendly societies at the time, ably reflects the mood of many societies towards state intervention in their affairs:

> "Any scheme [for state pensions] must be a sound one, and framed within the true principles of actuarial and vital statistics—not a combination of honorary members' contributions, collections, eleemosynary aid, occasional grants for benevolent funds, government subsidy, or by interference in the shape of proportional rebate by employers of labour.  We resent state interference in our affairs, and we feel that this would necessarily be the result of any state subsidy."[21]

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[19] *Ibid*, pp. 563
[20] Williams, *The Development of Old Age Pensions Policy in Britain, 1878-1925,* 1970
[21] Quoted in Moffrey, *Century,* pp. 63

The Grand Master's tone highlights the centrality of actuarial sophistication in early debates about friendly society insolvency. Exhortations of knowledge in actuarial analysis are common in many late 19th century friendly society reports. A short essay on the actuarial sciences found in the 1875 Report of the Chief Registrar of Friendly Societies, for example, exudes a tone of paternalism towards those societies unversed in the details of actuarial science:

> "When a society by its rules offers benefits in exchange for certain fixed contributions, it is to be supposed that it looks upon those contributions as being enough to provide for the benefits; otherwise it would be dishonestly holding out promises which it cannot keep"[22]

The new science of actuarial analysis, with its incomprehensible tables and robust reams of statistics, was accepted with varying degrees of jubilance in friendly society lodges.

Just as the friendly societies clustered between those with and without an understanding of actuarial reports, the societies' representatives were divided on the issue of state pensions. The following passage from a representative of the Independent Order of Oddfellows delivered in the early 20th century—fewer than fifteen years after the previous passage was delivered—summarizes the change of tone within many of the societies:

> "That any well-considered and suitable scheme propounded by the legislature for the relief of the aged and infirm, benefiting our unfortunate brethren, will receive the cordial support of the Manchester Unity, provided that the pension is independent of the poor law, and does not create any power of government interference in the general management of the affairs of the Unity."[23]

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[22] Report of the Chief Registrar, National Archives, Kew, 1875
[23] Quoted in Moffrey, *Century*, pp. 80

Here, the speaker invokes images of the poverty of old age and the misfortunes of those without proper relief.  The audience is expected to sympathize with the poor—again, from the dignified perch of a friendly society—and to recognize the need to distance the poor from the debilitating forces of the poor law.

In Gilbert's argument, the friendly societies' primary function in the history of old age pensions was to deflect support away from a contributory pension scheme modelled after the German experience towards a non-contributory one.[24]  The tension between advocates of contributory schemes and those in favour of non-contributory, tax-funded, pensions springs from the origins of the debate.  Both sides furiously presented their arguments.  A commentary by Charles Booth, noted poverty activist and an ardent supporter of non-contributory pensions, makes clear the fundamental issue:

> "It is impossible to conceive any plan by which contributions can be drawn from the masses of the people alongside of Friendly Society contributions without interfering with the Friendly Societies; nor could the Government enter into a sort of partnership with them, which is not only undesirable but would never be accepted."[25]

Indeed, arrangements were mentioned at various times which would have joined the friendly societies into an agreement with the government but never amassed significant support.[26]

The argument that the friendly societies helped shape the 1908 legislation by their resistance to contributory pensions and their later support of non-contributory ones is buttressed by contemporary accounts. The feeling of financial insecurity amongst many societies was acute,

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[24] Gilbert, *Provident Insitutions*
[25] Quoted in Gilbert, *Provident Institutions*, pp. 561
[26] Gosden, *Friendly Societies*

although this was not unique to the later 19<sup>th</sup> century.[27]  As early as the late 18<sup>th</sup> century friendly societies were reported to be dissolving due to financial stress.  The extent and character of friendly society insolvency must therefore be more closely examined.

**IV.    The Viability of the Friendly Societies: An Empirical Test**

This paper will apply two quantitative tests to the hypothesis that the friendly societies were financially unviable institutions by the end of the 19<sup>th</sup> century and early 20<sup>th</sup> century.  The first will attempt to explain the determinants of friendly society membership across counties and across time.  The motivation for this test is the literature on the demand for insurance, and is framed in the context of the debate surrounding the relative merits of economic, demographic, and social explanations of friendly society membership.  Fundamentally, it seeks to differentiate between purely economic reasons for joining a friendly society and the demographic and social influences that shaped membership across space and time.  The second test will reassess the financial viability of the friendly societies.  It will be placed in the context of uncertainty regarding the actuarial estimates of insolvency in the 19<sup>th</sup> century and will attempt to provide new estimates that bypass the shortcomings of previous ones.  The combination of these tests will offer an empirical characterization of the friendly societies in late 19<sup>th</sup> century Britain not yet established in the historical literature.

These quantitative tests can be situated around the symbolic dichotomy of an *old man's society* and a *young man's society*, articulated perhaps for the first time in detail in Emery and Emery.[28]  The old man's society exists to protect elderly men from the infirmities of their age.  The

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[27] Ibid

[28] Emery and Emery, *A Young Man's Benefit*, 1996

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sickness benefit is therefore a deferred annuity: it allows men to contribute to a fund in their healthy youth in order to draw from it in their sickly old age.  This view characterizes the friendly society as a sort of miniature pension scheme for the Victorian working class.  The young man's society exists for entirely different reasons.  The young man has no family or life savings, and is seldom sick; his membership in the friendly society is therefore driven by a desire to create a social and financial benefit structure from which he can draw in times of need.

**Figure 1: Foresters Total Membership and Number Admitted, 1875-1910**
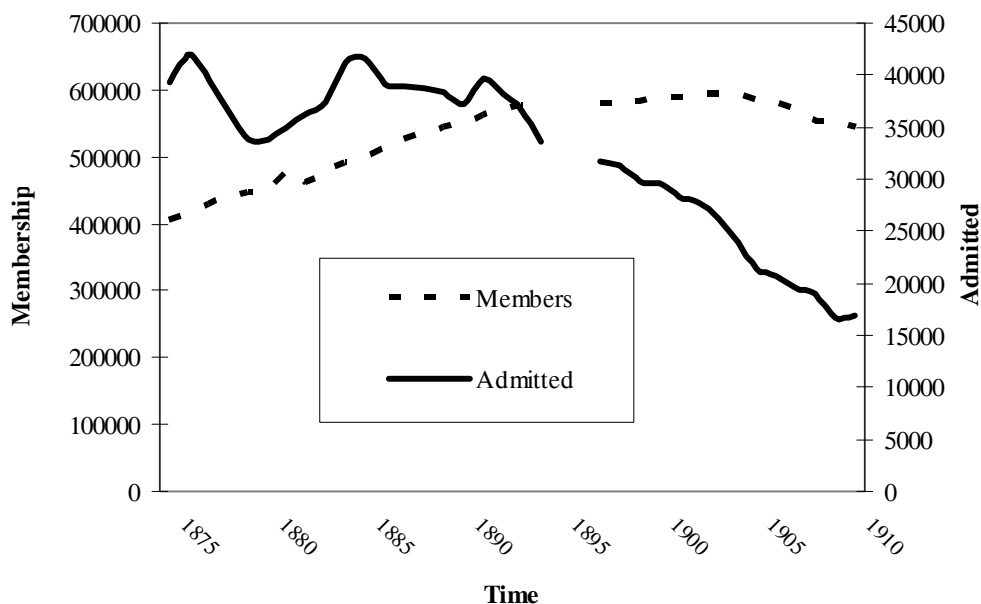


A first attempt to extract the relative merits of these hypotheses is shown in Figure 1, which graphs total membership and annual admissions for the Ancient Order of Foresters, Britain's second-largest friendly society, for the years 1875 to 1910, excluding 1894 and 1895 for which data was not available.[29]  As shown in the figure, while total Foresters' membership increased steadily throughout the late 19th

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[29] Data source: Ancient Order of Foresters archives, accessed May 2009

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century, admissions began declining as much as a decade earlier, around 1890. The data presented in Figure 1 offers some credibility to the hypothesis of the old man's society: even as admissions fell steadily, total membership increased as rising life expectancies led the society to age. In order to draw meaningful conclusions from the analogy, however, and to assess the financial viability of the societies in the context of the analogy, a more rigorous test is needed. Though Figure 1 offers some heuristic evidence in support of the perceived crisis within the friendly societies at the turn of the 20th century, it does not offer perspective on the dynamics of the crisis.

Why were fewer men joining societies in the late 19th century? Various hypotheses have been proposed: Both Gosden and Moffrey have suggested that the societies held a much lower stature in the social hierarchy of late Victorian Britain than in earlier periods as modern technologies replaced the quaint excitement of mutualism and fraternization.[30] Gilbert has suggested that the insolvency of the friendly societies at the time discouraged would-be members from joining.[31] Without personal testimonials, these hypotheses cannot be tested directly. Quantitative techniques, however, allow for indirect tests that can isolate some of the forces driving the rise and eventual demise of the friendly societies. A brief discussion of data sources will introduce the empirical tests.

*Data Sources: Problems and Possible Solutions*

Data on the friendly societies can generally be found in three contexts: governmental, national, and local. The most commonly used data for historical research are the annual records of the Chief Registrar of Friendly Societies, which were compiled from returns mailed in from

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[30] Moffrey, *History*; Gosden, *Friendly Societies*
[31] Gilbert, *Provident Institutions*

society lodges nationwide.  These included the number of members in the society, the value of its assets, and its location.  The coverage of the data is therefore determined by the number of records sent to the Chief Registrar, and is highly inconsistent.

**Table 1: Response Rates to Chief Registrar by County**

| County | Response Rate |
|---|---|
| Essex | 0.28 |
| Somerset | 0.33 |
| Suffolk | 0.34 |
| Hereford | 0.34 |
| Hertfordshire | 0.35 |
| Worcester | 0.39 |
| Norfolk | 0.39 |
| Warwick | 0.40 |
| Gloucester | 0.42 |
| Cornwall | 0.44 |
| Stafford | 0.44 |
| Huntingdonshire | 0.44 |
| Nottingham | 0.44 |
| Salop (Shropshire) | 0.45 |
| Rutland | 0.48 |
| Berkshire | 0.49 |
| Wilts | 0.49 |
| Buckinghamshire | 0.49 |
| Devonshire | 0.49 |
| Hampshire | 0.50 |
| Monmouth | 0.50 |
| Surrey | 0.50 |
| Dorsetshire | 0.51 |
| Oxfordshire | 0.51 |
| Cumberland | 0.52 |
| Bedfordshire | 0.52 |
| Cambridge | 0.52 |
| Northampton | 0.55 |
| Westmoreland | 0.55 |
| Cheshire | 0.55 |
| Kent | 0.56 |
| Middlesex | 0.57 |

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|---|---|
| Lancashire | 0.57 |
| Sussex | 0.57 |
| Yorkshire | 0.57 |
| Leicester | 0.58 |
| Durham | 0.58 |
| Derbyshire | 0.59 |
| Northumberland | 0.59 |
| Lincoln | 0.64 |

Table 1 shows the response rate for each county in year 1875, calculated as the number of returns received by the Chief Registrar in time for publication divided by the number of returns sent out to each county. The relatively low response rates and their wide diffusion across counties, makes measures of the volume of friendly society membership impossible to estimate from the Chief Registrar's dataset; in order to make such estimates, untenable assumptions about unreturned forms would be required. The records of the Chief Registrar also do not contain sufficient information to make estimates of society insolvency for two reasons. First, they do not include information on the size of sick claims of the lodge each year, the fundamental ingredient for an insolvency test. Second, they provide little information on how funds were used within the society. For example, the Chief Registrar's reports do not give information on the cost of maintaining the society each year—operating costs—or on the composition of the societies' assets—whether liquid or illiquid. In light of these shortcomings, another data source is needed to perform the quantitative tests of this paper. The obvious choice is the records of the societies themselves. The affiliated orders—societies with both a national and local presence—provide the most comprehensive data and the most potential for national generalization.

The affiliated orders such as the Foresters and Oddfellows were international, complex, and highly organized institutions by the late 19th century. The Foresters kept annual record books at the district level that

documented the financial progress of each court for each year.[32]  The accuracy of district classifications has received significant attention: Gosden notes that courts listed under Middlesex, for example, could actually be located in Northampton but registered in the London district.[33]  Accordingly, Gosden reclassified the data for his major work on the history of the friendly societies.  The extent of this problem, however, is likely small, and this paper does not correct for the bias involved.  The district records hold information on the number of members in each court, the total worth of their funds, the number of members initiated in each year, the number of members who left in each year, and the total amount of sick claims paid out by each court in the year.  The way in which this data is constructed carries a number of advantages.  Unlike the data found in the Chief Registrar of Friendly Societies, the Foresters' data reflects a complete population of Foresters courts and therefore can be used to test the determinants of friendly society membership.  District accounts, however, give too little information about the financial operations of the courts to make meaningful insolvency estimates.  They provide no information on annual expenditure for operating costs or the composition of assets, sick payments, and income.  The annual balance sheets of the local courts are therefore the only source suitable for this sort of analysis.

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[32] A note on terminology: most affiliated orders referred to their local branches as lodges, while the Foresters referred to them as courts
[33] Gosden, *Friendly Societies*

**Table 2: Court Balance Sheet Summary Statistics**

| Court Name | Court Number | Location | Years (not always consecutive) | Geography |
|---|---|---|---|---|
| Prince of Wales | 3100 | Stowmarket | 1887-1914 | Town |
| Anchor of Hope | 3603 | Ipswich | 1894-1911 | Town |
| Eleanor Rummyn | 3182 | London | 1879-1910 | City |
| Pettiword | 9056 | Ipswich | 1904-1915 | Town |
| Pride of Reading | 4961 | Reading | 1885-1915 | Town |
| Brounlow | 6444 | Berkhamstead | 1879-1895 | Rural |
| Equity | 2992 | Cambridge | 1878-1911 | Town |
| Perseverence | 6089 | Bedmond | 1880-1912 | Rural |

The annual balance sheets of Foresters courts have received little or no scholarly attention. The reason for this is undoubtedly logistic: of the roughly three thousand courts that made up the Foresters at the end of the 19th century, very few of the annual balance sheets are still available in the Foresters' archives for the late Victorian period. The balance sheets for the eight courts included in this study were the only ones available for the relevant dates, though several more were available for the mid-20th century. Table 2 shows the names, locations, and available years of the eight courts used.[34] Though the courts are scattered across the country, the scarcity of balance sheets makes national generalization difficult. One clear problem is survivor's bias: the possibility that the balance sheets that still exist were associated with societies with long life spans and relatively few financial problems. If this bias were strong, any estimate of financial viability that confirmed the soundness of the court would be inapplicable to other courts. There are two reasons, however, why the problem of survivor's bias might be insignificant. First, as noted by Logan, societies failed to keep annual balance sheets for a number of reasons, not all of which were related to

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[34] It should be noted that the available years refers to the availability of some, but not all information; classification of courts as rural, town, or city, was made by Logan in accordance with the Foresters' rules

financial insecurity.  For example, in a small village the secretary of a court might pass away leaving no one with the necessary skills to keep competent records; or the entire court might move locations or merge with another court, thus removing the need for a distinct balance sheet. Though both of these occurrences were likely to be rare, they are illustrative only, and are intended to capture the ephemeral nature of the lifespan of a normally operating court.  More importantly, there seems to be no indication that the courts for which balance sheets are available were abnormally successful in terms of life expectancy.  Most of the balance sheets cease in the years of World War I, around the time when the friendly society movement in general began to decline significantly. The problem of survivor's bias should be noted but does not undermine the basic results of the paper.

**Table 3: Court Balance Sheet Averages**

| Court Name | Avg. Court Age | Avg. Sick Pay (in £) | Avg. Membership | Avg. Sick Pay per Member (in £) |
|---|---|---|---|---|
| Prince of Wales | 38.4 | 418.56 | 518 | 0.81 |
| Anchor of Hope | 32 | 175.05 | 177 | 0.99 |
| Eleanor Rummyn | 32.8 | 140.73 | 162 | 0.87 |
| Pettiword | 3.5 | 110.83 | 161 | 0.69 |
| Pride of Reading | 23 | 441.93 | 530 | 0.83 |
| Brounlow | 10 | 131.58 | 182 | 0.72 |
| Equity | 31.5 | 283.68 | 327 | 0.87 |
| Perseverence | 25.8 | 171.23 | 238 | 0.72 |

The annual balance sheets vary minimally across time and space, though some courts provide more information than others, likely the result of varying degrees of accountancy skills.  In general, they provide detailed annual accounts of the flow of funds in and out of the society, the age structure of the society, the amount of sick payments made to each member of the society, and miscellaneous information on the size and structure of the society.  Due to time constraints in digitizing the balance

sheets, not all of this information was used in this study.  Notably, information on the age structure of the courts, only available for certain years and certain courts, was excluded from the analysis.  Table 3 shows all-year averages for each court of the primary values included in the digitized dataset, including the average number of years the courts was in operation during the sampling period, the court's average sick pay, the average membership, and sick pay per member.  Not shown in Figure 3, but central to the paper, are values relating to the courts' operating costs, including income from contributions, interest, and other sources.  As shown in the table, average sick pay per member per year was relatively stable between courts, never greater than 1 or less than 0.69.  Average sick pay varied both with the court membership and the court age: as courts grew older, they attracted more members and paid out more sick benefits per member, reflecting the tendency for older courts to pay out more sick benefits.  These trends will receive greater scrutiny in subsequent sections.  The next section will present the justification for and methodology of a test of the determinants of friendly society membership.

*Test 1: Society Membership*

Two strands of literature have emerged on the topic of the demand for friendly society membership.  Gosden has attributed the growth of societies in the early 19th century to the growing requirements of the industrial labour market.[35]  Other authors have emphasized the role of income growth in driving society membership: as workers became richer, they diverted more of their resources into luxury insurance schemes.[36]  Other questions hover around this basic dichotomy: Was friendly society

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[35] Gosden, *Friendly Societies*
[36] Gorsky, *The Growth and Distribution of English Friendly Societies in the Early Nineteenth Century*, 1998; Benson, *Coalminers, Accidents, and Insurance in Late 19th Century England,* 2009

membership more concentrated in regions with certain industries such as mining or textiles? Were Protestants more likely to join societies than Catholics? Were societies the domain of the young or the old? Were friendly societies more concentrated where use of the poor law was minimal? A paucity of data at a meaningful level of spatial precision makes investigation of these hypotheses difficult. Some studies, however, have made important progress.

Using data from the poor law returns of 1803 and 1813-15 and various censuses, Gorsky presents correlation statistics between friendly society membership and several other variables. His primary findings are that friendly society growth is strongly correlated with the concentration of the mining and manufacturing sectors and that the timing of friendly society growth coincided strongly with the economic explosions of the industrial revolution.[37] Gorsky's reliance on correlations, however, which can produce spurious results and do not control for unseen or contingent effects, severely hinders his argument. This paper seeks to improve upon this by using regression analysis to examine the determinants of membership into the Ancient Order of Foresters in the later parts of the 19th century. As the Foresters' district-wide data is provided at a cross-sectional, county level for a series of years, it represents a sort of panel. With this in mind, the following cross-sectional regression model with time dummies was run:

$$Members = \rho_0 + \rho_1 Pop + \rho_2 Old + \rho_3 Wage + \rho_4 Med + \rho_5 Bach + YEAR$$

Where MEMBERS is the log of the number of members registered in a Foresters friendly society in each of the forty British counties for the years 1875, 1880, 1885, 1890, 1895, 1900, 1905, and 1910; POP is the log of the population of each county in 1871 as reported in the 1871 census and compiled by Mitchell;[38] OLD is the proportion of the population in each

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[37] Gorsky, *Growth*
[38] Mitchell, *British Historical Statistics*, 1988

county over the age of sixty from the 1861 census, and is meant to capture the possibility that friendly societies primarily attracted older, more sickly workers; WAGE is the agricultural wage in each district for 1867-1870 from Hunt, and serves as a proxy for the income effect of insurance demand;[39] MED is the number of medical men per 10,000 persons in each county from the 1861 census, and accounts for the possibility that friendly society membership was constrained by the level of medical development of a town or region; BACH is the proportion of unmarried men in each county as reported in the 1861 census, and is meant to capture the young man's effect—the possibility that younger men sought out friendly society membership in order to protect against financial and social insecurity; and YEAR represents a dummy variable for each of the years, excluding 1875. The yearly dummies pick up any time-sensitive factors that are not absorbed into the other stationary variables.

A defence of the use of data from the 1861 census is required. It is improbable that the age structure of a county in 1861 would approximate its age structure in 1910, from which some of the data is compiled. Data from the 1861 census would therefore be ill-suited for an analysis of the determinants of friendly society *admissions* in 1910. It is important to note that the dependent variable in the above regression is the log of the total membership of the district, and is therefore strongly connected to historical growth in membership. Friendly societies in general, and in particular the Foresters, experienced rapid growth in the early 1860s, the effects of which lingered for most of the century.[40] The regression therefore seeks to capture the demographic conditions at the time of significant society growth, the effects of which could still be felt at the early 20th century.

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[39] Hunt, *Industrialization and Regional Inequality: Wages in Britain*, 1986
[40] Gosden, *Friendly Societies*

**Table 4: Membership Regressions**
Dependent variable: MEMBERS

|      | Coefficient | T-statistic | P-value |
|------|-------------|-------------|---------|
| POP  | 1.103       | 19.73       | 0       |
| OLD  | 9.008       | 2.15        | 0.033   |
| WAGE | 0.088       | 3           | 0.003   |
| MED  | 0.15        | 3.77        | 0       |
| BACH | -0.043      | -3.42       | 0.001   |
| 1880 | 0.313       | 1.76        | 0.079   |
| 1885 | 0.369       | 2.08        | 0.039   |
| 1890 | 0.54        | 3.03        | 0.003   |
| 1895 | 0.601       | 3.35        | 0.001   |
| 1900 | 0.591       | 3.32        | 0.001   |
| 1905 | 0.596       | 3.35        | 0.001   |
| 1910 | 0.528       | 2.97        | 0.003   |

R-squared: 0.61; Adj R-squared: 0.60; N=320

Table 4 shows the regression results.  All of the variables are found to be statistically significant at the 95% level with the exception of the 1880 yearly dummy.  As the dependent variable is the log of total membership, a one unit change in each of the coefficients can be interpreted as a change of one percent in the membership of the court. Foresters membership was significantly higher in regions with older populations in 1861 and was slightly lower in districts with a higher proportion of bachelors.  The agricultural wage, an imperfect proxy for wages in other occupations, has a relatively small effect in increasing Foresters membership.  Though weak, this finding lends some credibility to the argument that workers responded to the income effect: as wages increased, insurance against sickness became more desirable.  It is, of course, possible that the coefficient on wages is picking up by proxy a sort of industry effect: perhaps industries with higher wages, such as mining or manufacturing had close traditional ties to the friendly societies and also higher agricultural wages due to market competition.  This argument is partially buttressed by Gorsky's finding that society membership was greater in mining and manufacturing than agriculture.

The positive coefficient on the proportion of medical men suggests that friendly societies operated within a medical infrastructure that facilitated their growth. Indeed, many friendly societies paid their own doctors out of their sickness fund. There is a possible identification problem with this result: the proportion of doctors in a district reported by the census examiners may be strongly related to the visibility of the friendly society movement in that district. If the friendly societies acted as intermediaries between the census examiners and the doctors they observed, or if less visible forms of medicine operated outside of the realm of the friendly societies, these results would be biased.

A few conclusions can be gathered from the results in Table 4. Most notably, the friendly societies seem to be the domain of the old. The coefficients on OLD and BACH in this regression seem to disprove the claim that societies existed primarily to provide a support mechanism for young workers who have no other social or financial network. Counties with older populations and fewer bachelors grew their memberships during the boom of the 1860s, the effects of which lingered throughout the 19th century. This contrasts with Emery and Emery's view of the old man's society, and suggests that the friendly societies were vulnerable to the rising life expectancies of the late 19th century. The effects of these demographic forces on the financial viability of the Foresters will be addressed in the next section.

*Test 2: Insolvency*

It is widely believed amongst historians of the Victorian period that the friendly societies were increasingly insolvent as the 19th century progressed. This argument is almost exclusively based on the accounts of 19th century actuaries, the majority of which were published in the years between the 1875 Friendly Societies Act and the Old Age Pensions

Act of 1908.[41]   The methods used by the actuaries were constantly
evolving; indeed, the friendly societies were one of the first institutions to
use sophisticated actuarial analysis.

Numerous flaws in the methods used by 19th century actuaries
have been observed.  While the actuarial techniques used to address the
insolvency of the friendly societies were well-suited for funded insurance
programs, they were ill-suited for the pay-as-you-go schemes that
societies actually ran.[42]  Societies kept their record books such that each
year's sick payments were balanced against contributions in that year; the
contributions of new, younger members thus paid for the sickness of the
old and decrepit.  Actuaries of the period, however, used experience
tables, filled with information on expected life expectancy and the
probability of sickness, to estimate the *total* liability of a lodge.[43]  On the
income side of the actuarial tables lay all of the lodge assets in present
and in future, adjusted for the interest rate.  If predicted benefits were
sufficient to meet predicted liabilities, then the lodge was deemed solvent;
if predicted benefits were less than predicted liabilities, than the lodge
was reported to be insolvent.  In the reports of the Chief Registrar of
Friendly Societies for the later years of the 19th century, more societies
reported actuarial deficiencies than surpluses.[44]

Emery and Emery have observed five primary analytical flaws in
these 19th century assessments.  First, and most well-known in
contemporary writings, was the unpredictability of the interest rate.  For
example, when the third valuation of the Independent Order of
Oddfellows, Manchester Unity was published, it was accompanied by a
lengthy explanation of why the second evaluation was inaccurate due to

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[41] See: Neison, *Sickness*, 1882; Moffrey, *Century*
[42] Emery and Emery, *A Young Man's Benefit*, 1997
[43] *Ibid*
[44] Report of the Chief Registrar

unforeseen changes in the interest rate.[45]  This acknowledgement
dampened the spirits of the Oddfellows, who prided themselves in their
progressive pricing practices and protection against insolvency.
Estimates reliant on assumptions about the interest rate are especially
unreliable along the long time horizons necessary for estimating the
future liabilities of a friendly society.

A second problem with the actuarial estimates that Emery and
Emery note is that they do not take into account the addition of new
members to the society.  In a pay-as-you-go system, the addition of new
members is the strongest antidote to financial insolvency.  The patterns in
Figure 1 show, however, that Foresters' admissions began to fall around
1890 though actuarial accounts from as early as 1875 show large
deficiencies.[46]  It should be noted that while admissions were declining
steadily since 1890, total membership rose well beyond that year, only
declining in the early years of the 20th century.

A third critique of historical actuarial estimates is that they do not
take into account the possibility that members could change their
membership dues over time. Lodges were highly democratic, and while a
significant faction of members was strongly opposed to the curious
estimates of the actuaries, many found them deeply concerning.  The
estimates made by contemporary actuaries and used by Gilbert and
others in historical argument assume away the ability of the members
themselves to address the problem of insolvency.  This point gains
credibility when allied with the poignant contemporary testimony of
Moffrey and others, who proclaim the financial 'crisis' of the friendly
societies and offer proposals for its remedy.[47]

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[45]  Moffrey, *Century*
[46]  Nieson, *The rates of mortality and sickness according to the experience for the five years, 1871-1875, of the Ancient Order of Foresters Friendly Society*, 1875
[47] Moffrey, *Century*

A fourth problem with the actuarial estimates is that they do not take into account member exodus from a society. Annual data from both the Oddfellows and the Foresters report the number of members who quit a local court and their reason for quitting. In the majority of cases by far the reason for leaving was lack of payment, though Logan has suggested that members of a society might exit without paying funds in order to avoid the embarrassment of leaving for other, less socially acceptable, reasons.[48] Statistics vary by year and region, but suggest strongly that member exits were non-trivial in the financial accounts of many friendly societies.[49] Once a member left, his liabilities would immediately be stricken from the lodge balance sheets, while his past contributions would remain. This produces an upward bias on the estimates of insolvency produced by contemporary actuaries.

A final critique levelled by Emery and Emery against the estimates of the 19th century actuaries is their negligence of the variation in claims rates across years and the possibility of default of a lodge. In essence, the actuarial estimates only provide an indication of the long-term status of the lodge and not the likelihood of failure in any given year. They, for example, do not take into account the possibility of excessively large claims in a particular year that could bankrupt a lodge, or the possibility of very small claims which could add funds to a society's balance sheets. These criticisms, in concert, present a unified and convincing case against the estimates of the 19th century actuaries. The data provided in the Foresters' court balance sheets allow for a more formal test of the insolvency of a court. Two concepts from the economic of insurance

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[48] Logan, interview
[49] See: Ancient Order of Foresters District Record Books, Foresters Archives, Southampton

must first be presented: the implicit degree of risk loading and the probability of ruin.[50]

*The Implicit Degree of Risk Loading*

As suggested in its title, the degree of risk loading measures the amount to which the price of an insurance contract, or in this case a friendly society contribution, covers the cost of expected claims associated with the contract. It can be derived simply from an equation of the price of contract:

$$P = E + R$$

Where P is the price, E is the expected claim, and R is the amount of risk loading, or the amount that the insurance company—or friendly society—takes as "profit" on top of the immediate expenses.[51] Assuming that risk loading is proportional to the risk embedded in a contract, or the expected sick claim, the above equation can be expressed as follows:

$$P = E[z] + \pi E[z]$$

Where E[z] is the expected claim per member and π is the implicit degree of risk loading. Solving for π, we get:

$$\pi = P / E[z] - 1$$

This can be calculated numerically with the price of a friendly society contract estimated as the total amount of contributions received per member. Intuitively, if π is equal to zero, or the degree of risk loading is zero, the court is behaving risk-neutrally; it is not compensating for any future risks but is merely covering the cost of its claims. If π is less than zero, the court's membership price is insufficient to cover the risk profile

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[50] The first use of these statistics in economic history was likely Emery, *Risky Business*, 1996

[51] It is common to see this equation written as, *P=C+E+R*, where C represents the operating costs of the insurance company. Operating costs are removed from these estimates because the friendly societies divided their funds between a sick fund and a management fund, both of which had their own sources of income; this paper is concerned solely with the operation and valuation of the sick fund.

of its membership.  If π is greater than zero, the court's membership fee accounts for excess or adverse risks above and beyond operation costs. The sign and size of the risk loading estimates have clear implications for the financial viability of a court: A financially unsound court would tend to have a negative risk loading value as its price would be too low to cover the complete costs of expected claims, though the value would not necessarily be negative in all years of the court's operation.  Similarly, a financially sound court would have mostly positive risk loading values, though in some abnormal years—for example, in the early years of a court's existence—the value might be negative.  There is a possibility that the risk loading value could be too large—reflecting an inefficient pricing mechanism—though the threshold between sound and excessive risk loading would be court specific and difficult to quantify.[52]  For purposes of interpretation, this paper therefore assumes that a positive risk loading value is evidence of solvency and a negative value is evidence of financial peril.  The risk loading estimate, however, only captures the soundness of one year's pricing schedule and must be examined upon a long-run risk horizon.  In order to understand the immediate financial risk facing a court in any given year, a different measure is required.

*The Probability of Ruin*

The intuition behind the probability of ruin is straightforward: it approximates the likelihood that a court's claims will be greater than its income and assets in a given year, forcing the court to close.  The probability of ruin requires three pieces of information for calculation: the average or expected sick claim in a given year; the court's income in each year; and the structure of the distribution of sick claims around the mean. Once a distributional assumption about the aggregate claims distribution has been made and estimates of the expected sick claim in a given year

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[52] John Murray brought this to my attention

have been produced, calculation of the probability of ruin follows from a simple numerical process. First, discussion of the aggregate sick claim and the basic operation of a court is required.

The probability of ruin estimates presented here make several assumptions about the internal operation of a court. First, they assume that the court had no access to reinsurance or external sources of funding not documented on the court balance sheets. This is likely to be true. Though some of the courts occasionally received supplementary income from the Foresters' district account, this income was recorded in the balance sheets along with other sources of income and thus appears in the calculation of ruin probabilities. It is unlikely that any reinsurance beyond this took place. The estimates of probability of ruin also require an understanding of the composition of lodge assets. Most courts had floating balances that were reasonably large, though the degree of liquidity of these balances likely fluctuated from court to court. For example, one court might have its balance invested in a public house— with very little access to it in a time of emergency—and another in a savings account—readily at hand in times of need. The data provided does not allow for a comprehensive examination of the composition of these assets. This paper will therefore present the probability of ruin in three ways: first, with the court's asset balance included in its annual income; second, with the balance excluded from the court's income, and third, with only the income from member contributions included. Comparisons between these statistics allow for an understanding of the financial significance of various elements of a court's portfolio.

*The Aggregate Claims Distribution*

Both the probability of ruin and implicit degree of risk loading measures are *counterfactual*: they deal not with what actually happened to a court in a given year but with what would have happened in a

average year if the court behaved normally.  It is therefore necessary to estimate the risk profile of the court, which is reflected in its aggregate claims distribution.  The estimate of the aggregate claims distribution has important implications for the probability of ruin estimates, which rely on an assumption of how claims are distributed around the expected value. The modelling process for the aggregate claims distribution therefore requires some discussion.

First, limitations of the Foresters' data demand that the claims distribution is modelled collectively—as the claims distribution of the entire court—rather than individually—as the sum of the individual risk profiles of the members of the court.[53]  This is justified for two reasons. First, the Foresters did not engage in actuarial pricing such that the price of membership corresponded to the risk profile of the individual.  The relationship between an individual price and an individual's claims distribution is therefore of little worth for understanding the court's solvency condition.  Second, the courts' funds were pooled aggregately and distributed uniformly upon sickness.  The size of sick payments was not a function of the type of claim but its duration; this, again, makes individual claims distributions less informative than the collective distribution of claims.
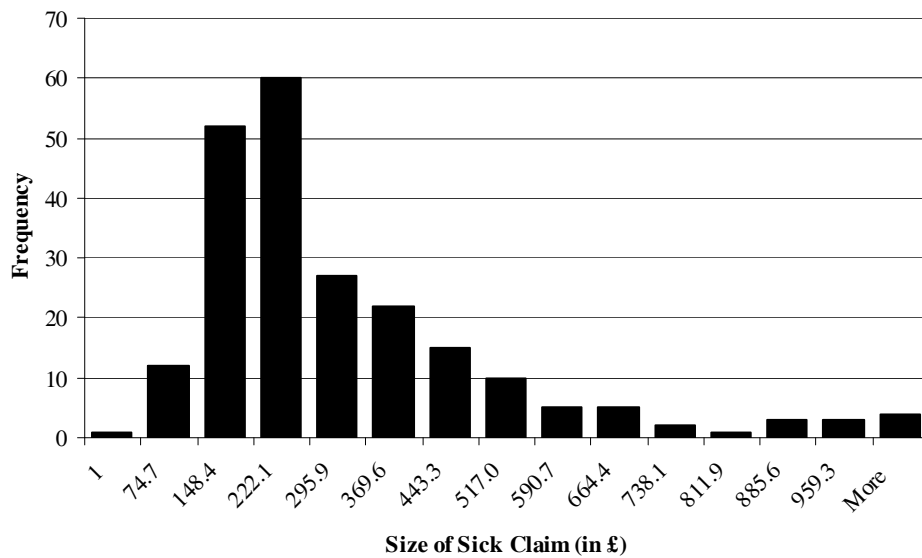
A second consideration is the distributional shape of the claims distribution.  Emery and Emery modelled the claims distribution as a Compound-Poisson process composed of a claims number process and a claims size process, in which the number of claims in a given year was assumed to have a Poisson distribution and the size of claims a Gamma distribution.[54]  This is not possible using the Foresters' data as the number of claims in a given year is not always given.  It is therefore necessary to model the total size of claims as a single process.  Figure 2

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[53] See: Beard et al., *Stochastic Risk*, 1977; Emery, *Risky Business,* 1996
[54] Emery and Emery, *Young Man's Benefit*

shows a histogram of the frequency distribution of claims of various sizes. The clustering of the distribution to the left of the mean and the long right-hand tail suggest that the claims distribution can be modelled effectively with a Poisson regression model.[55]

**Figure 2: Histogram of the Frequency of Different Volumes of Sick Claims**



A final consideration for an estimation of the aggregate claims distribution is the nature of risk driving the size and distribution of claims. The distribution of claims of a court has many determining factors, including the occupational risks associated with the dominant local industry, the age profile of the court, and the collective risk of viruses and other contagious diseases. Data scarcity makes a complete estimation of the claims distribution using these direct variables impossible. Accordingly, following Emery and Emery, this paper models the claims distribution using indirect proxy variables, including: the number of members in a court; the age of the court—the number of years since its inception; the square of the age of the court; and dummy variables

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[55] Satterthwaite, *Generalized Poisson Distribution,* 1942

reflecting whether or not the court was in its first two years, and whether or not it was located in a rural area or a town. The interpretation of these variables is relatively straightforward: it is expected that older courts made more sick payments, but that this effect marginally decreased with age. Also, courts in their first two years often paid out less sick pay per member than courts with longer life spans. Finally, Foresters' district rules suggest that the size of sick payments made by courts should correspond to the level of development in that area, and the Foresters' themselves classified their courts into the three categories of rural, town, and city.[56] Following the Poisson framework, the regression takes the following form:

$$Sick = \exp(\beta_0 + \beta_1 Mem + \beta_2 Age + \beta_3 Age^2 + \beta_4 Young + \beta_5 Rural + \beta_6 Town)$$

Where *Sick* is the total value of sick payment in pounds for each court in each year and the other variables are as explained above. For purposes of simplicity, sick payments were rounded to the nearest pound in accordance with the values of old British money.[57]

### Table 5: Poisson Regression Results

Dependent variable: annual sickness payment

|  | Coefficient | Z-statistic | P-value |
|---|---|---|---|
| MEM | 0.002 | 105.53 | 0.000 |
| AGE | 0.0425 | 22.16 | 0.000 |
| AGE2 | -0.0005 | -15.39 | 0.000 |
| YOUNG | -0.5997 | -7.88 | 0.000 |
| RURAL | 0.2244 | 10.22 | 0.000 |
| TOWN | 0.3022 | 16.21 | 0.000 |

Pseudo $R^2$ = 0.87; N = 224

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[56] The regression model excludes a dummy on CITY in order to avoid over-specification

[57] For example, 11 shillings were assumed to be equal to one pound while 9 shillings were equal to none

Table 5 shows the Poisson regression results for the above equation. The very low P-values and high Z-statistics suggest that all of the coefficients are highly significant at the 95% level. The coefficients of the regression can be interpreted as follows: for a one unit change in the dependent variable, the difference in logs of the independent variable, or the sick pay, is expected to change by the amount of coefficient. Most of the coefficients are of the desired sign: a court's claims increase with age with decreasing marginal returns, courts in their first two years show smaller sick claims, and courts with more members show larger sick claims. The geographic dummy variables are slightly puzzling: the coefficients on both RURAL and TOWN are positive, suggesting that claims were higher, on average, in rural areas and towns than in the city.

**Figure 3: Predicted vs. Real Sick Pay**
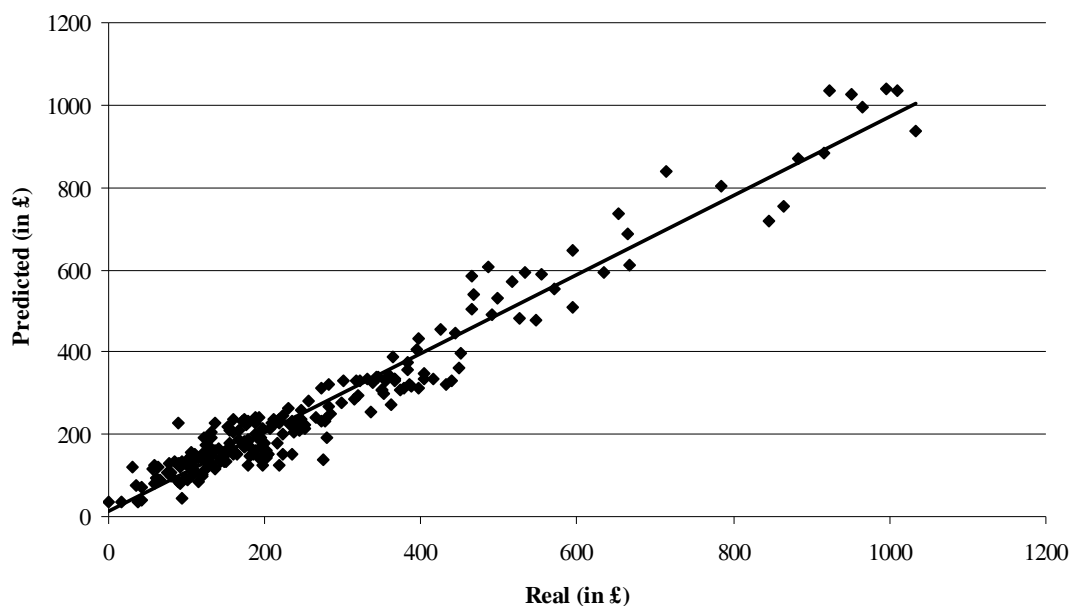


It is possible that friendly societies were more established in rural and town areas than in London and thus paid out more sick benefits. The small number of courts included in the sample, however, makes interpretation of and extrapolation from these dummy coefficients a perilous task. The scatter plot of predicted and real sick claims in Figure

3 shows visually the accuracy of the model in predicting the aggregate sick pay of the eight courts. As shown, the model captures most of the variance in sick pay amongst the courts. In particular, for claims sizes below four-hundred, dispersion around the 45-degree line is very small. The model also shows little evidence of auto-correlated errors: dispersion around the 45-degree line appears to be randomly distributed. As the regression model described above assumes that the predicted values of the model adhere to a Poisson distribution, the probability of ruin can be numerically calculated by plugging values for the income of the court into the Poisson distribution function:

$$\Pr{}^{RUIN} = 1 - \Pr(I) = 1 - \frac{\lambda^I e^{-\lambda}}{I!}$$

Where $I$ is the income of a court in a given year (either calculated with contributions only, annual income from all sources, or income plus assets) and $\lambda$ is the expected number of claims in a given year, estimated using the regression model.[58]

*Results: Risk Loading and the Probability of Ruin*

Table 6 shows the risk loading estimates for five years for each court. Years were chosen to reflect the period before the 1908 Old Age Pensions Act and were based on availability of data. Complete results can be found in the appendix.

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[58] See: Beard, *Stochastic Risk*; the intuition behind this equation is that the probability of ruin is equal to the area under the Poisson frequency distribution to the right of $I$, or the court's annual income

## Table 6: Sample Risk Loading Estimates

| Anchor of Hope | | Pettiward | |
|---|---|---|---|
| Year | Risk Loading | Year | Risk Loading |
| 1903 | -0.056 | 1904 | -0.302 |
| 1904 | -0.072 | 1905 | - |
| 1905 | -0.057 | 1907 | 0.168 |
| 1906 | -0.086 | 1908 | 0.138 |
| 1907 | -0.135 | 1909 | 0.158 |

| Equity | | Brounlow | |
|---|---|---|---|
| Year | Risk Loading | Year | Risk Loading |
| 1907 | 0.304 | 1890 | 1.05 |
| 1908 | 0.304 | 1891 | 1.01 |
| 1909 | 0.307 | 1892 | 1.02 |
| 1910 | 0.239 | 1893 | 1.29 |
| 1911 | 0.267 | 1894 | 1.03 |

| Pride of Reading | | Eleanor Rummyn | |
|---|---|---|---|
| Year | Risk Loading | Year | Risk Loading |
| 1902 | 0.333 | 1900 | 0.258 |
| 1903 | 0.321 | 1901 | 0.231 |
| 1904 | 0.288 | 1902 | 0.252 |
| 1905 | 0.295 | 1903 | 0.222 |
| 1906 | 0.241 | 1904 | 0.203 |

| Prince of Wales | | Perseverence | |
|---|---|---|---|
| Year | Risk Loading | Year | Risk Loading |
| 1888 | 0.141 | 1895 | 0.551 |
| 1889 | 0.183 | 1896 | 0.523 |
| 1890 | 0.165 | 1897 | 0.488 |
| 1891 | 0.161 | 1898 | 0.470 |
| 1892 | 0.202 | 1899 | 0.471 |

With the exception of one court, Anchor of Hope, almost all risk loading measures were positive and relatively large, sometimes greater than one. Court Pettiward showed a negative risk loading measure in its first year of existence but positive values thereafter. Table 7 shows estimates of the probability of ruin for five years for each court. The probability of ruin estimates are given in three formats: including court assets—or the court's available funds—as income; excluding assets as income; and treating only member contributions as income.

## Table 7: Sample Probability of Ruin Estimates

### Anchor of Hope

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1903 | 0.00 | 0.0001204 | 0.794 |
| 1904 | 0.00 | 0.00 | 0.862 |
| 1905 | 0.00 | 0.0000193 | 0.802 |
| 1906 | 0.00 | 0.0000449 | 0.901 |
| 1907 | 0.00 | 0.0001220 | 0.980 |

### Pettiward

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1904 | 0.00 | 0.00000183455 | 0.978 |
| 1905 | - | - | - |
| 1907 | 0.00 | 0.00000000002 | 0.050 |
| 1908 | 0.00 | 0.00 | 0.081 |
| 1909 | 0.00 | 0.00000000124 | 0.054 |

### Equity

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1907 | 0.00 | 0.00 | 0.00000006 |
| 1908 | 0.00 | 0.00 | 0.00000008 |
| 1909 | 0.00 | 0.00 | 0.00000009 |
| 1910 | 0.00 | 0.00 | 0.00001824 |
| 1911 | 0.00 | 0.00 | 0.00000301 |

### Brounlow

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1882 | 0.00 | 0.00 | 0.000002708 |
| 1883 | 0.00 | 0.0000000000078 | 0.000000204 |
| 1884 | 0.00 | 0.0000000008 | 0.000000032 |
| 1885 | 0.00 | 0.00 | 0.0000000002305 |
| 1886 | 0.00 | 0.00 | 0.0000000000002 |

## Pride of Reading

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1907 | 0.00 | 0.00 | 0.00 |
| 1908 | 0.00 | 0.00 | 0.000000003 |
| 1909 | 0.00 | 0.00 | 0.00 |
| 1910 | 0.00 | 0.00 | 0.00 |
| 1911 | 0.00 | 0.00 | 0.00 |

## Eleanor Rummyn

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1901 | 0.00 | 0.00 | 0.00087814 |
| 1902 | 0.00 | 0.00 | 0.00246081 |
| 1903 | 0.00 | 0.00 | 0.00112529 |
| 1904 | 0.00 | 0.00 | 0.00337470 |
| 1905 | 0.00 | 0.00 | 0.00671019 |

## Prince of Wales

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1904 | 0.00 | 0.00 | 0.000000285 |
| 1905 | 0.00 | 0.00 | 0.000000286 |
| 1906 | 0.00 | 0.00 | 0.000003020 |
| 1907 | 0.00 | 0.00 | 0.000000123 |
| 1908 | 0.00 | 0.00 | 0.000000768 |

## Perseverance

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1889 | 0.00 | 0.0000004069 | 0.000647936190 |
| 1890 | 0.00 | 0.0000000004 | 0.000049515204 |
| 1891 | 0.00 | 0.0000000025 | 0.000000261688 |
| 1892 | 0.00 | 0.00 | 0.000000032234 |
| 1893 | 0.00 | 0.00 | 0.000000004679 |

Pr(A) represents the ruin probability calculated with income plus assets; Pr(NA) shows the probability of ruin with total income but no assets; Pr(C) shows ruin probabilities calculated with just income from contributions

The three columns should be interpreted as follows: The column in which assets are included is the probability that a court's claims in a given year are greater than the court's total assets and annual income, assuming that the court can translate all of its assets into useable funds in time to pay out its claims. The column excluding assets but including all other sources of income shows the probability that a court's claims will exceed the income it receives from member contributions, interest, initiation fees, and other sources. The final column shows the probability that a court's claims in a given year will be greater than the court's income from contributions in that year. If a court were unable to translate its assets or income from investments into liquid assets, this column would reflect the actual probability of ruin, though it is likely that most courts had at least some immediate access to their assets.

In all three columns, with the exception of Anchor of Hope, probabilities of ruin are generally very small. With assets included, ruin probabilities are all zero; without assets, the largest ruin probability is 0.000122 for Anchor of Hope in 1907; Pettiward in its first year shows a ruin probability of 0.978 if only member contributions are included in the estimate. It should be noted that a ruin probability estimate of zero does not indicate the impossibility of a year of exceedingly large claims; it merely shows that under the assumptions of the Poisson distribution adopted in this paper, the probability of receiving claims greater than income is unrecognizable. This opens the question of the optimal ruin probability, or the point at which a court becomes financially ruinous. This question can best be answered in relative terms: ruin probabilities with total income but without assets for Anchor of Hope are as many as one-thousand times larger than for Pettiward, the second most financially ruinous court. The relative discrepancy between Pettiward and the other six courts, however, is much smaller. This would seem to suggest that Anchor of Hope was operating fundamentally differently than the other

courts studied, reflected both in its relatively high ruin probabilities and consistently negative risk loading values. Taken in concert, the risk loading and probability of ruin estimates cast considerable doubt on the hypothesis that the friendly societies were near financial ruin at the turn of the 20th century: only one court, Anchor of Hope, shows signs of financial stress for the period.

## V.　Between Theory and Evidence: A Game of Insurance

This paper has so far proceeded with two objectives: first, to provide a quantitative assessment of the financial viability of the English friendly societies at the turn of the 20th century; and second, to use these quantitative results to re-examine the accepted narrative of the origins of the welfare state in Britain, in particular the 1908 Old Age Pensions Act. The first objective was accomplished in the graphs and tables shown in the previous section. The second has so far been accomplished only implicitly. In order to make full use of the quantitative results contained herein a stronger exposition of the theory of institutional change is required.

Both the theory of institutional change suggested by North and others and Gilbert's politically-oriented explanation of the 1908 Old Age Pensions Act suggest underlying conditions of disorder in the operation of the friendly societies. For new institutional theorists, this disorder necessarily takes the form of fluctuating factor prices, or changes in the relative social costs of pension provision between the friendly societies and the state. For Gilbert, the perceived financial decline of the friendly societies was a *political* phenomenon, forcing the societies into tacit support of state pension policies they had formerly opposed. Gilbert's argument aligns closely with Charles Lindblom's suggestion that policy is made by consensus and not vision: the insolvency of the friendly societies

acted to generate conditions of consensus where discord had previously prevailed. Despite their relative differences, the fundamental dynamics of both Gilbert's and the new institutional explanation of the origins of state insurance institutions can be demonstrated with a simple logical argument, proceeding in three steps. First, striking demographic and social transformations of the late 19th century—manifest in a larger industrial labour force and longer life expectancies—dramatically increased the demand for both sickness and old-age insurance in Britain. Second, this spike in demand financially strained the friendly societies as older memberships demanded more sick pay than there existed in contributions. Finally, the deteriorating financial position of the friendly societies created a political environment in which state insurance provision was highly popular and politically feasible by the early 20th century. The merits of this argument rest upon two nodes: first that the friendly societies were rendered financially insolvent by the demographic changes of the 20th century; and second that their compromised financial position changed the political decision-making conditions of prominent society leaders.

The results presented above, though inherently limited in scope, suggest that the Foresters—and perhaps the friendly societies in general—were more resilient, more adaptable, and more financially sound than the historical literature has so far suggested. This stems from the findings that the membership of the friendly societies was skewed towards older members of the population, and that despite the vulnerability of older memberships, seven of eight of the Foresters courts studied were strongly financially sound. Recall North's quotation that underlying conditions of "order and disorder" drive the process of institutional change.[59] The possibility that the friendly societies were financially viable institutions at the same time that they were being

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[59] North, *Economic Change,* 2005, pp. 7

functionally replaced by state provisions suggests a reinterpretation of North's dichotomy.

A sometimes crude but often useful starting point for understanding institutional change is the theory of games.[60]  A game simultaneously simplifies and concretizes social behaviour, allowing an in-depth examination of the incentive structures facing each of its participants. Games are also abstract, un-muddled by the nuance of history.  They provide insight into what *would have been* had the actors involved in the real-life game ably assessed their competing incentives.  Within this context, the decision of insurance providers to enter the insurance market can be modelled as a simple game with two players: the friendly societies and the state.[61]  The rules of the game are straightforward: benefits accrue to each player from playing the game (selling insurance), and benefits are higher in conditions of monopoly (if only one player plays the game) than conditions of competition between private and public providers.  Benefits to playing are also scaled to the size of a player, so larger players will benefit more from playing than smaller ones.  A related implication is that smaller players will incur more significant costs than larger players when new members join the game.  These rules are generally reflective of the real-life insurance market, as described by Barr and Borch.[62]

The first players of the game are the friendly societies, and their stake in the outcome of the game is deep: by the end of the 19th century the friendly societies were large, financially complex, and international established institutions. [63]  Many of their members were hereditary, having inherited membership from their fathers and grandfathers

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[60] The inspiration for this use of game theory comes from Bates, "The ICO as an International Institution," 1995

[61] Commercial insurers are for the moment ignored; their political and economic significance was reasonably limited at the time of the campaign for old age pensions

[62] Barr, *Welfare State;* Borch*, The Economics of Insurance*

[63] We are for the moment disregarding commercial insurers

(membership was mostly male).[64]  Most of the affiliated orders of the friendly societies had established rituals, ornate regalia, and strong leadership positions in both local and national politics, for example reflected in their inclusion of honorary members—comprised of successful business leaders, members of parliament, and royalty—amongst their ranks.[65]  They were, in a word, *embedded* in the political and economic structures of the late Victorian period.  The friendly societies' strong reaction in opposition to the possibility of state interference in the insurance market can be understood from this entrenchment and the inevitable financial costs of a much larger and tax-subsidized competitor.  The proclamations from society representatives cited earlier in this paper underlie this sense of fear of takeover.  In the testimony before the 1898 Royal Commission on Old Age Pensions, for example, just nine out of thirty-four friendly society representatives even weakly supported the possibility of a state pensions act.  At the time, even this small number was seen as evidence in favour of the possibility that the friendly societies would support a state pension scheme.[66]

The objective of the theory of games is not just to understand the preconditions of a political fight but to suggest a possible winner.  The friendly societies were actively engaged—at least vocally—in opposition to state pension schemes through the end of the 19th century.  By the time of the 1908 Old Age Pensions Act, several friendly society representatives registered support of state schemes.  Why did the friendly societies forfeit their opposition to state schemes when they did?  At the core of the theory of games is the uncertainty of social events; in the context of game theory, group decisions in conditions of uncertainty are naturally *probabilistic,* composed of likelihoods rather than deterministic

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[64] Logan, interview
[65] Gosden, *Friendly Societies*
[66] Thane, *Old Age History*

processes. The transition from fraternal insurance schemes to state provision was equally uncertain, driven both by slow demographic transformations and rapid political changes. The outcome of the game can best be understood as a competition between three hypotheses.

A fourth should be discarded from the start: that the friendly societies were in fact insolvent, as suggested by the 19th century actuaries. The limitations of the empirical results presented in the previous section have already been thoroughly examined. Most notable of these shortcomings is the lack of institutional depth; the eight courts considered inevitably do not meaningfully capture the national condition of the friendly societies. Gilbert's hypothesis can therefore find some support in the possibility that the results presented here are biased. There are nonetheless two strong reasons to believe that the friendly societies were more financially resilient than has been previously assumed. First, the analytical techniques used to address insolvency in the 19th century were biased towards financial ruin. Fundamentally, 19th century actuaries were treating the friendly societies as funded insurance schemes when in fact they operated pay as you go programs and were less vulnerable to long-term changes in the composition of risk. Second, and more importantly, the demographic forces attributed to the friendly societies' decline were national, and therefore would have affected any insurance scheme, whether mutual, commercial, or governmental. The results of this paper suggest that the friendly societies were more successful at managing these demographic changes than has henceforth been assumed. The following three hypotheses therefore assume that the friendly societies were financially sound.

*Hypothesis 1: The Friendly Societies did not Present a Credible Threat to State Insurance Provision*

The ability of a small player of the insurance game to prevent interference from a larger player depends on the credibility of the threat it wields. The political influence of the friendly societies is a case of controversy in the literature: Gosden and Gilbert tend to agree that the societies were strongly influential amongst parliamentarians while Thane suggests that their influence was of limited importance in shaping the labour reforms of the 20th century.[67] The commentary of the 1898 Royal Commission on Old Age Pensions is a useful measure of the political clout of the friendly societies; in it, a commissioner suggests that any politically viable state pension scheme would require the support of the friendly societies.[68]

For the friendly societies to credibly threaten the provision of state insurance, two conditions would have to have been met: first, the friendly societies would need significant political clout, manifest in access to parliamentarians, influence amongst key voting blocs, and a national scope and reach; second, they would require long-term institutional viability. The friendly societies at the turn of the 20th century met the first condition strongly: they were nationally established, politically savvy, and prominent amongst both the labouring classes and political elites. The results of this paper suggest that they met the second condition as well: the Foresters—Britain's second-largest friendly society—show little evidence of financial strain in the calculations made here, and also exhibit no tendency towards a declining financial position; the risk loading and ruin probability measures calculated in section six show no aggregate downward trend over time. The friendly societies did not lose the fight with the state because of weaknesses in their political reach or structure.

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[67] Thane, *Old Age History*; Williams, *Development*
[68] Royal Commission

Their threat *was* credible, and indeed was successful in fending off state intervention for at least two decades.

*Hypothesis 2: The Friendly Societies and the State were Playing a Different Game*

A second consideration in the demise of the friendly societies is access; as membership in a society required regular contributions, access to society services was unavailable to the unemployed, poor, and temporarily employed. The shape of the 1908 pensions legislation—a small, non-contributory scheme to provide pensions benefits to the most needy—aligns well with the hypothesis that early state pensions provision was designed as supplemental to the work of the friendly societies and not an alternative to membership in a friendly society. Indeed, many of the influential participants in the campaign for old age pensions, most notably Charles Booth, were first and foremost campaigners for relief of the aged poor.[69] This argument, however, is limited in two ways. First, the outcome of the 1908 Act must be understood not as the result of a concerted political vision but as the most politically viable option for public pensions at the time. The 1908 Act was soon followed by more ambitious proposals for national insurance in 1911 and again in 1925. The political debate between the friendly societies and the state that preceded the 1908 Act was sufficiently vigorous to suggest that the friendly societies were aware of the political consequences of the state's entry into the insurance game. Second, the friendly societies' initial opposition to state pension schemes contrasts sharply with the contention that the friendly societies and the state were playing different games. If the societies were unthreatened by state insurance in they early 20th century they would have been unthreatened by state insurance in the mid-19th century as well. The transformation of the friendly societies' attitude towards state

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[69] Booth, *The Aged Poor in England and Wales,* 1894

provision in the years leading into 1908 cannot be explained by the need for pension provision beyond the reach of the friendly societies.

*Hypothesis 3: The Friendly Societies were Hedging: Their Mild Support of the 1908 was an Attempt to Avoid Passage of a More Robust State Scheme*

As Charles Lindblom's exposition of "muddling through" suggests, political changes are shaped and inspired by the possibility of compromise.  Again, the limited nature of the 1908 Act suggests a role for political consensus: as the debate surrounding old age pensions grew more vibrant, the friendly societies thrust their support behind a washed-down bill that would scarcely interfere with their operations.  This is indeed the argument that Gilbert makes, suggesting that the friendly societies even helped to contribute to the structure of the minimalistic, non-contributory 1908 Act as an alternative to a contributory pensions program that would directly interfere with the business of the friendly societies.

The logic of the insurance game described above, however, offers little evidence that compromise between the friendly societies and the state would have produced an optimal equilibrium for both parties.  For a compromise to be tenable in an insurance game, it must be sustainable, or resilient against the natural forces of disorder.  This was not the case in the insurance game of the early 20th century.  The friendly societies and the state were unequal competitors in the market for insurance, and the state's initial entry into the insurance game precipitated its eventual prominence and the demise of mutual insurance in Britain.  Though many representatives of the friendly societies exhibited tacit support for the 1908 Act, their support was never without reservation.[70]  Similarly, the friendly societies' rejection of any partnership with the state in pension

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[70] Thane, *Old Age History*

provision suggests their unwillingness for compromise in the insurance game. Though the structure of the 1908 Act was undoubtedly designed to win the support of the friendly societies, within the game of insurance the passage of the Act cannot be understood solely as a political compromise between the friendly societies and the state to avoid more ambitious proposals.


## VI: Conclusions: History Without Evidence, Policy Without Process

The failures of each of these hypotheses to singlehandedly explain the death of the friendly societies and the emergence of state provision of old age insurance in Britain exhibits the poverty of mono-causal explanations of institutional change. The contours of history are sufficiently complex to sully any clean system of structured interactions with the grime of nuance, luck, and randomness. The objective of the economic historian must be thus to separate the systematic from the stochastic; in other words, to borrow a term from the evolutionary sciences, to understand economic and social change as a process of "punctuated equilibrium," in which deterministic processes are shaped, interrupted, and constrained by random ones.[71] The Old Age Pensions Act of 1908 can neither be understood as the result of simple fluctuations in relative costs of pension provision nor as a piece of luck. It can perhaps best be described as the consequence of a constellation of interactions, some ongoing and others sudden, that helped to produce a political environment amenable to state pensions reform at the turn of the 20th century.

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[71] This phrase, originally borrowed from the writings of Stephen Jay Gould, features in Douglas North's writings on institutional change

To better understand the origins of the British welfare state, a broader framework than the simple friendly societies-state dichotomy adopted here is required. The 1908 Act borrowed from many political roots: from campaigners for reform of the poor law; from cabinet members' impressions of the German model of state insurance; from poverty activists' writings on the aged poor; and from the proclamations and decisions made members of the friendly societies. Around these political forces were demographic ones: Britons were living longer; cities were growing larger; and the ethos of community, self-help, and mutualism that defined the Victorian period was dissipating in a younger generation.[72] State pension provision was a consequence of these changing political circumstances, and the clamouring for pension provision amongst many of the political elite in the last quarter of the 19th century suggests that passage of the Act was an eventuality to be implemented under the right government. Why, then, did the Act emerge in 1908?

The results of this paper suggest, unlike Gilbert and many others, that the fundamental precondition to the passage of state pensions in Britain was not the financial insolvency of the friendly societies but rather the creation of a transformative political environment in the early 20th century. Though the financial position of the friendly societies may have influenced the pension debate through exhortation—many amongst the friendly societies believed their institutions were financially doomed—it is unlikely that the belief in insolvency common at the time was driven by underlying weaknesses in the operation of the friendly societies. Recognizing that the friendly societies were more adaptable than has previously been understood, a simple explanation for the 1908 act emerges.

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[72] Some of these transformations are described in Hunt, *British Labour History: 1815-1914*, 1981

The demand for state provision of pensions was strong from the mid-to-late 19th century, a consequence of both rising income levels and rising life expectancy.  Rising income levels produced the possibility of retirement as well as a stronger awareness of the plight of the poor; rising life expectancy produced a class of potential pensioners: aged, working class men and women too old to work in the industrial economy but unwilling to accept the social stigma of the poor law.  The size of this pensioner class grew from the 1860s to the turn of the 20th century, increasing accordingly the demand for state provision of pensions.  The passage of state insurance schemes in Germany in 1883 provided a comparative alternative as well as a political threat to British pension reformers: as prime economic and military competitors with Britain, the German scheme challenged the British ethic of self-responsibility as an efficient way of ordering society.  By the turn of the century, belief in self-help was weak and evaporating; friendly society admissions were declining, the industrial north—the birthplace of the self-help movement—was shrinking, and the influence of friendly society leaders was eroding. The election of a Labour government in 1906 under the leadership of David Lloyd George both confirmed these social changes and provided an added political threat to opponents of state pensions schemes.  The 1908 Act grew from this context, and marks the conclusion of the slow ebb of friendly society influence in Britain.

An early section of this paper described the friendly societies as social as well as economic institutions.  This dichotomy was initially maintained as a reminder of the societies' uncharacteristic structure and seemingly non-economic disposition; the financial operations of the friendly societies were always tied to social functions and their financial success was at least in part due to their social relevance.  Recognizing the dangers of flippant conjecture, the results of this paper seem to suggest that it was not the financial operations of the friendly societies

that rendered them incapable of preventing the passage of state insurance schemes in the early 20th century, but the decline of their social status in late Victorian England. The shrinking relevance of the friendly societies may have been partially hastened by fundamentals—rising life expectancy and augmented sickness—but seems to have been driven by the changing economic and social demands of a complex and increasingly urban industrial economy. In this way, the institutional death of the friendly societies predated 1908, and was written in the gears of change that defined the late Victorian period.

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## Appendix I: Complete Risk Loading Results

**Risk Loading**

| Anchor of Hope | | Pettiward | |
| --- | --- | --- | --- |
| Year | Risk Loading | Year | Risk Loading |
| 1895 | -0.055 | 1904 | -0.302 |
| 1896 | -0.052 | 1905 | - |
| 1897 | -0.049 | 1906 | - |
| 1898 | -0.088 | 1907 | 0.168 |
| 1899 | -0.040 | 1908 | 0.138 |
| 1900 | -0.079 | 1909 | 0.158 |
| 1901 | -0.071 | **Brounlow** | |
| 1902 | -0.054 | Year | Risk Loading |
| 1903 | -0.056 | 1879 | 3.141 |
| 1904 | -0.072 | 1880 | 1.436 |
| 1905 | -0.057 | 1881 | 0.570 |
| 1906 | -0.086 | 1882 | 0.564 |
| 1907 | -0.135 | 1883 | 0.611 |
| 1908 | - | 1884 | 0.633 |
| 1909 | -0.098 | 1885 | 0.720 |
| 1910 | -0.095 | 1886 | 0.815 |
| 1911 | -0.103 | 1887 | 0.958 |
| **Equity** | | 1888 | 1.066 |
| Year | Risk Loading | 1889 | 1.075 |
| 1903 | 0.270 | 1890 | 1.053 |
| 1904 | 0.281 | 1891 | 1.013 |
| 1905 | 0.283 | 1892 | 1.022 |
| 1906 | 0.286 | 1893 | 1.288 |
| 1907 | 0.304 | 1894 | 1.031 |
| 1908 | 0.304 | 1895 | - |
| 1909 | 0.307 | 1896 | 0.994 |
| 1910 | 0.239 | 1897 | 1.002 |
| 1911 | 0.267 | **Eleanor Rummyn** | |
| **Pride of Reading** | | Year | Risk Loading |
| Year | Risk Loading | 1879 | 0.504 |
| 1883 | 0.961 | 1880 | 0.481 |
| 1884 | 0.967 | 1881 | 0.451 |
| 1885 | 0.918 | 1882 | 0.416 |
| 1886 | 0.940 | 1883 | 0.501 |
| 1887 | 0.788 | 1884 | 0.487 |
| 1888 | - | 1885 | 0.511 |
| 1889 | 0.595 | 1886 | 0.499 |
| 1890 | 1.038 | 1887 | 0.485 |
| 1891 | 0.729 | 1888 | 0.456 |
| 1892 | 0.691 | 1889 | 0.428 |
| 1893 | 0.669 | 1890 | 0.434 |
| 1894 | 0.640 | 1891 | 0.422 |

| Year | Risk Loading | | Year | Risk Loading |
|------|------|---|------|------|
| 1895 | 0.582 | | 1892 | 0.419 |
| 1896 | 0.499 | | 1893 | 0.391 |
| 1897 | 0.435 | | 1894 | 0.385 |
| 1898 | 0.423 | | 1895 | 0.389 |
| 1899 | 0.380 | | 1896 | 0.371 |
| 1900 | 0.409 | | 1897 | 0.293 |
| 1901 | - | | 1898 | 0.302 |
| 1902 | 0.333 | | 1899 | 0.279 |
| 1903 | 0.321 | | 1900 | 0.258 |
| 1904 | 0.288 | | 1901 | 0.231 |
| 1905 | 0.295 | | 1902 | 0.252 |
| 1906 | 0.241 | | 1903 | 0.222 |
| 1907 | 0.213 | | 1904 | 0.203 |
| 1908 | 0.184 | | | |

**Perseverence**

| Year | Risk Loading |
|------|------|
| 1909 | 0.204 |
| 1910 | 0.223 |
| 1911 | 0.196 |

**Prince of Wales**

| Year | Risk Loading |
|------|------|
| 1888 | 0.141 |
| 1889 | 0.183 |
| 1890 | 0.165 |
| 1891 | 0.161 |
| 1892 | 0.202 |
| 1893 | 0.325 |
| 1894 | 0.279 |
| 1895 | - |
| 1896 | - |
| 1897 | 0.284 |
| 1898 | 0.435 |
| 1899 | 0.273 |
| 1900 | 0.240 |
| 1901 | 0.265 |
| 1902 | 0.246 |
| 1903 | 0.224 |
| 1904 | 0.219 |
| 1905 | 0.215 |
| 1906 | 0.190 |
| 1907 | 0.219 |
| 1908 | 0.203 |
| 1909 | 0.176 |
| 1910 | 0.196 |

Perseverence table (right column):

| Year | Risk Loading |
|------|------|
| 1889 | 0.302 |
| 1890 | 0.357 |
| 1891 | 0.458 |
| 1892 | 0.484 |
| 1893 | 0.500 |
| 1894 | 0.587 |
| 1895 | 0.551 |
| 1896 | 0.523 |
| 1897 | 0.488 |
| 1898 | 0.470 |
| 1899 | 0.471 |
| 1900 | 0.470 |
| 1901 | 0.479 |
| 1902 | 0.467 |
| 1903 | 0.558 |
| 1904 | 0.410 |
| 1905 | 0.416 |
| 1906 | 0.428 |
| 1907 | 0.396 |
| 1908 | 0.357 |
| 1909 | 0.362 |
| 1910 | - |
| 1911 | - |
| 1912 | - |
| 1913 | - |
| 1914 | - |
| 1915 | - |

## Appendix II: Complete Probability of Ruin Results

**Probability of Ruin**

**Anchor of Hope**

| Year | Pr (A) | Pr (NA) | Pr (C) |
|---|---|---|---|
| 1895 | 0.00000000000 | 0.06715000000 | 0.77737500000 |
| 1896 | 0.00000000000 | 0.01681100000 | 0.76472600000 |
| 1897 | 0.00000000000 | 0.01134300000 | 0.74956800000 |
| 1898 | 0.00000000000 | 0.00383200000 | 0.89761000000 |
| 1899 | 0.00000000000 | 0.00000000000 | 0.70853400000 |
| 1900 | 0.00000000000 | 0.01022300000 | 0.87791100000 |
| 1901 | 0.00000000000 | 0.00464800000 | 0.85013800000 |
| 1902 | 0.00000000000 | 0.00010200000 | 0.78555800000 |
| 1903 | 0.00000000000 | 0.00012000000 | 0.79449400000 |
| 1904 | 0.00000000000 | 0.00000000000 | 0.86183100000 |
| 1905 | 0.00000000000 | 0.00001900000 | 0.80200300000 |
| 1906 | 0.00000000000 | 0.00004500000 | 0.90088500000 |
| 1907 | 0.00000000000 | 0.00012200000 | 0.98031300000 |
| 1908 | - | - | - |
| 1909 | 0.00000000000 | 0.00000000000 | 0.93077500000 |
| 1910 | 0.00000000000 | 0.00000100000 | 0.92351500000 |
| 1911 | 0.00000000000 | 0.00000000000 | 0.94128700000 |

**Equity**

| Year | Pr (A) | Pr (NA) | Pr (C) |
|---|---|---|---|
| 1903 | 0.00000000000 | 0.00000000000 | 0.00000073000 |
| 1904 | 0.00000000000 | 0.00000000000 | 0.00000041000 |
| 1905 | 0.00000000000 | 0.00000000000 | 0.00000038000 |
| 1906 | 0.00000000000 | 0.00000000000 | 0.00000035000 |
| 1907 | 0.00000000000 | 0.00000000000 | 0.00000006000 |
| 1908 | 0.00000000000 | 0.00000000000 | 0.00000008000 |
| 1909 | 0.00000000000 | 0.00000000000 | 0.00000009000 |
| 1910 | 0.00000000000 | 0.00000000000 | 0.00001824000 |
| 1911 | 0.00000000000 | 0.00000000000 | 0.00000301000 |

**Pride of Reading**

| Year | Pr (A) | Pr (NA) | Pr (C) |
|---|---|---|---|
| 1883 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1884 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1885 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1886 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1887 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1888 | - | - | - |
| 1889 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1890 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1891 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1892 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1893 | 0.00000000000 | 0.00000000000 | 0.00000000000 |

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1894 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1895 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1896 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1897 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1898 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1899 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1900 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1901 | - | - | - |
| 1902 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1903 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1904 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1905 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1906 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1907 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1908 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1909 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1910 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1911 | 0.00000000000 | 0.00000000000 | 0.00000000000 |

## Prince of Wales

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1888 | 0.00000000000 | 0.00000000000 | 0.01160696040 |
| 1889 | 0.00000000000 | 0.00000000000 | 0.00124787810 |
| 1890 | 0.00000000000 | 0.00000000000 | 0.00221755830 |
| 1891 | 0.00000000000 | 0.00000000000 | 0.00187788740 |
| 1892 | 0.00000000000 | 0.00000000000 | 0.00011547210 |
| 1893 | 0.00000000000 | 0.00000000000 | 0.00000000500 |
| 1894 | 0.00000000000 | 0.00000000000 | 0.00000017070 |
| 1895 | - | - | - |
| 1896 | - | - | - |
| 1897 | 0.00000000000 | 0.00000000000 | 0.00000001790 |
| 1895 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1899 | 0.00000000000 | 0.00000000000 | 0.00000000890 |
| 1900 | 0.00000000000 | 0.00000000000 | 0.00000015640 |
| 1901 | 0.00000000000 | 0.00000000000 | 0.00000000740 |
| 1902 | 0.00000000000 | 0.00000000000 | 0.00000003970 |
| 1903 | 0.00000000000 | 0.00000000000 | 0.00000021910 |
| 1904 | 0.00000000000 | 0.00000000000 | 0.00000028490 |
| 1905 | 0.00000000000 | 0.00000000000 | 0.00000028640 |
| 1906 | 0.00000000000 | 0.00000000000 | 0.00000301990 |
| 1907 | 0.00000000000 | 0.00000000000 | 0.00000012260 |
| 1908 | 0.00000000000 | 0.00000000000 | 0.00000076840 |
| 1909 | 0.00000000000 | 0.00000000000 | 0.00001130010 |
| 1910 | 0.00000000000 | 0.00000000000 | 0.00000110670 |

## Pettiward

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1904 | 0.00000000000 | 0.00000183460 | 0.97836458280 |
| 1905 | - | - | - |
| 1906 | - | - | - |

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1907 | 0.00000000000 | 0.00000000000 | 0.04981343360 |
| 1908 | 0.00000000000 | 0.00000000000 | 0.08114817630 |
| 1909 | 0.00000000000 | 0.00000000120 | 0.05375661360 |

**Brounlow**

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1879 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1880 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1881 | 0.00000000000 | 0.00000000182 | 0.00000325018 |
| 1882 | 0.00000000000 | 0.00000000000 | 0.00000270810 |
| 1883 | 0.00000000000 | 0.00000000001 | 0.00000020356 |
| 1884 | 0.00000000000 | 0.00000000076 | 0.00000003224 |
| 1885 | 0.00000000000 | 0.00000000000 | 0.00000000023 |
| 1886 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1887 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1888 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1889 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1890 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1891 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1892 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1893 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1894 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1895 | - | - | - |
| 1896 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1897 | 0.00000000000 | 0.00000000000 | 0.00000000000 |

**Eleanor Rummyn**

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1879 | 0.00000000000 | 0.00000000000 | 0.00000039332 |
| 1880 | 0.00000000000 | 0.00000000000 | 0.00000076156 |
| 1881 | 0.00000000000 | 0.00000000002 | 0.00000188741 |
| 1882 | 0.00000000000 | 0.00000000003 | 0.00000626488 |
| 1883 | 0.00000000000 | 0.00000000000 | 0.00000006923 |
| 1884 | 0.00000000000 | 0.00000000000 | 0.00000011070 |
| 1885 | 0.00000000000 | 0.00000000000 | 0.00000002055 |
| 1886 | 0.00000000000 | 0.00000000000 | 0.00000003110 |
| 1887 | 0.00000000000 | 0.00000000000 | 0.00000005118 |
| 1888 | 0.00000000000 | 0.00000000000 | 0.00000020140 |
| 1889 | 0.00000000000 | 0.00000000000 | 0.00000070749 |
| 1890 | 0.00000000000 | 0.00000000000 | 0.00000040406 |
| 1891 | 0.00000000000 | 0.00000000000 | 0.00000067301 |
| 1892 | 0.00000000000 | 0.00000000000 | 0.00000071729 |
| 1893 | 0.00000000000 | 0.00000000000 | 0.00000301447 |
| 1894 | 0.00000000000 | 0.00000000000 | 0.00000336792 |
| 1895 | 0.00000000000 | 0.00000000000 | 0.00000226895 |
| 1896 | 0.00000000000 | 0.00000000000 | 0.00000593242 |
| 1898 | 0.00000000000 | 0.00000000000 | 0.00021074468 |
| 1899 | 0.00000000000 | 0.00000000000 | 0.00013653681 |
| 1900 | 0.00000000000 | 0.00000000000 | 0.00036331108 |
| 1901 | 0.00000000000 | 0.00000000000 | 0.00087813983 |

| 1902 | 0.00000000000 | 0.00000000000 | 0.00246081223 |
| 1903 | 0.00000000000 | 0.00000000000 | 0.00112529074 |
| 1904 | 0.00000000000 | 0.00000000000 | 0.00337469959 |
| 1905 | 0.00000000000 | 0.00000000000 | 0.00671018722 |

## Perseverence

| Year | Pr (A) | Pr (NA) | Pr (C) |
|------|--------|---------|--------|
| 1889 | 0.00000000000 | 0.00000040689 | 0.00064793619 |
| 1890 | 0.00000000000 | 0.00000000043 | 0.00004951520 |
| 1891 | 0.00000000000 | 0.00000000255 | 0.00000026169 |
| 1892 | 0.00000000000 | 0.00000000000 | 0.00000003223 |
| 1893 | 0.00000000000 | 0.00000000000 | 0.00000000468 |
| 1895 | 0.00000000000 | 0.00000000000 | 0.00000000000 |
| 1896 | 0.00000000000 | 0.00000000000 | 0.00000000001 |
| 1897 | 0.00000000000 | 0.00000000000 | 0.00000000007 |
| 1898 | 0.00000000000 | 0.00000000000 | 0.00000000050 |
| 1899 | 0.00000000000 | 0.00000000000 | 0.00000000087 |
| 1900 | 0.00000000000 | 0.00000000000 | 0.00000000041 |
| 1901 | 0.00000000000 | 0.00000000000 | 0.00000000019 |
| 1902 | - | 0.00000000000 | 0.00000000004 |
| 1903 | 0.00000000000 | 0.00000000000 | 0.00000000007 |
| 1904 | - | - | - |
| 1905 | 0.00000000000 | 0.00000000000 | 0.00000000319 |
| 1906 | 0.00000000000 | 0.00000000000 | 0.00000000142 |
| 1907 | 0.00000000000 | 0.00000000000 | 0.00000000045 |
| 1908 | 0.00000000000 | 0.00000000000 | 0.00000000573 |
| 1909 | 0.00000000000 | 0.00000000000 | 0.00000009636 |
| 1910 | 0.00000000000 | 0.00000000000 | 0.00000006029 |

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