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Life, death, and Irish statistics: Recovering Ireland's civil registration statistics, 1864-1920

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LIFE, DEATH, AND IRISH STATISTICS:
RECOVERING IRELAND'S CIVIL REGISTRATION
STATISTICS, 1864-1920

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Working Paper 25-11

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December 2025

Life, death, and Irish statistics: Recovering Ireland's civil registration statistics, 1864-1920[♦]

Eoin McLaughlin[✱] & Niall Whelehan[♣]

December 2025

Abstract

Civil registration of vital statistics was introduced in Ireland in 1864, yet historians have often viewed the resulting data as unreliable due to weak incentives for compliance and uneven administrative capacity. This paper reassesses the performance of Ireland's vital registration system by tracing its legal origins, documenting its institutional development, and re-evaluating its demographic accuracy. We show that the primary motivation for establishing civil registration was the protection of property rights, which shaped both the design of the system and the incentives facing registrars. New evidence on legal utilisation demonstrates that recourse to records of vital registration increased steadily and converged with usage rates in Britain, suggesting growing engagement with an expanding bureaucratic state in Ireland. Revisiting longstanding comparisons between registered vital events and decadal census enumerations, we find that death registration was generally robust and that irregularities in birth registration are considerably smaller than earlier studies imply. These results indicate that Irish civil registration is more reliable, and more suitable for empirical research, than the prevailing consensus suggests. Revised age-standardised mortality estimates further show that, once demographic structure is accounted for, Ireland's mortality trajectory was distinctive but not exceptional in comparative perspective.

Keywords: civil registration, vital statistics, demographic measurement, state capacity.

JEL Classification: N33, J11, K11.

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1 Introduction

The United Kingdom was a relative latecomer to civil registration within the wider western European experience.¹ It was first introduced in England and Wales in 1838, followed by Scotland in 1855, and lastly by Ireland in 1864. As Connell (1950) lamented, the late arrival of civil registration in Ireland meant it was unavailable during the Great Famine of the 1840s, but it became a source of information on fertility and mortality in the later nineteenth century. Comparison of vital statistics in the UK shows that Ireland had a much lower birth rate both in terms of population but also in terms of female reproductive age and it also had lower mortality rates and infant mortality rates in the later nineteenth century (see Figure 1). These trends are widely acknowledged in the wider British literature on historical demography (Mitchison 1977), but the reliability of civil registration has been questioned, both by nineteenth century officials as well as within Irish social and economic historiography. For example, Kennedy & Clarkson's (1997) assessment of changes in mortality was that there were no *real* changes in mortality rates, rather changes were driven by improvements in registration rather than declines, or rather slight increases in mortality. Whilst in a harsher critique of Irish demographic statistics Verrière (1979) argued that crude rates of births, marriages and deaths were misleading because of the extent of migration and argued for a greater use of standardization with a preference for the decadal censuses over annual vital registration.² This article critically engages with assessments of the unreliability of the Irish vital registration system and re-evaluates its demographic accuracy. In doing so it brings new understandings of the expansion and limitations of official data collecting and scientific governance in Ireland.

There were different reasons for the introduction of vital statistics in Ireland. In the United Kingdom officials viewed vital registration as an essential element of modern societies and it expanded the interventions of the British state in everyday Irish life. The fact that it was introduced later in Ireland fed a sense of the Irish system needing to 'catch up' to align with the other three nations. In the 1860s the Registrar General's downbeat assessments of the completeness of registration perhaps reflected a general distrust of the state on the part of the populace, but also

¹ One of the earliest systems of civil registration is associated with Sweden (UN 1995). In Europe more generally, civil registration is associated with Napoleonic codes. It was introduced in France in 1792 and spread to other European countries. The UK had a system of parish registration which have been used extensively by the Cambridge Population Group (e.g., Wrigley and Schofield 1981, see critical review by Flinn (1982)), but this differed from the civil registration of vital statistics.

² The main impact of Irish emigration patterns was to prematurely age the Irish population through the selective migration of the young and as Ireland had an equal share of young female migrants it also reduced the population of women of childbearing age. The latter observation was known to nineteenth century statisticians, for example see discussion of Martin (1877) by William Farr.

official views of Irish exceptionalism and slowness to ‘modernise’.³ This article reevaluates engagement with the Irish registration system and demonstrates its demographic accuracy. The primary reason for this, we argue, was that vital registration brought greater clarity over property rights and ‘the inheritance of their property’ through both a record of births, deaths, and marriages (BPP 1861, Q403-404). Dublin’s *Freeman’s Journal* warmly reported that the new system could ‘with confidence be appealed to determine all questions affecting property and the legitimacy of individuals’.⁴ Civil registration provided a tool for Irish Catholics to assert property rights in an era of new and far-reaching changes to land occupation and ownership from the 1870s. We demonstrate how registration was adopted by the legal system and that usage of the system in Ireland matched trends documented in England and Wales. The centrality of property rights as a motive for introducing civil registration had the second order effect of making the demographic component more reliable, because of the demarcation of lineage, than heretofore has been assumed. There was also a public health aspect to vital registration, which could help more effective monitoring by ‘bring[ing] thoroughly before the public the causes affecting the health of the majority of the people’ (BPP 1861, Q 889-892). Previously, a report from the Statistical and Social Inquiry Society of Ireland concluded that vital registration was an ‘essential condition for many sanitary reforms affecting the welfare of the population, and as an additional protection to the moral and material interests of society’ (Moore 1860, Appendix J). Irish civil registration may have been a relative latecomer, but its value was readily appreciated and newspapers acknowledged that ‘the want of a complete system of registration was painfully felt by all classes of the community’, and encouraged all to comply.⁵

A key aim of this article, then, is to revise and challenge existing understandings of the unreliability of Irish vital registration records by demonstrating their accuracy and their importance as sources that can provide crucial insights and context to modern Irish history, in particular mortality and birth rates. A major criticism of Irish vital registration suggested that Irish infant mortality rates were incredible in comparison with France and Germany, which held almost double the Irish rates (Verrière 1979). However, broader comparison indicates Ireland had similar trends with other high emigration societies such as Scandinavian countries (see Appendix 1). Studies of Irish life expectancy have found that it was quite high in the post-famine period, similar to the USA and England, and higher than Germany and countries with a similar level of income per capita (Ó Gráda 1994, Guinnane 1997, Walsh 2017). However, the study of mortality in post-

³ For a discussion of the ‘modernising’ state in Ireland see Delaney (2025, pp. 37-56).

⁴ *Freeman’s Journal*, 10 December 1863.

⁵ See, for example, *Freeman’s Journal*, 10 December 1863; 24 December 1864; *Tuam Herald*, 19 December 1863; *Carlow Morning Post*, 12 December 1863

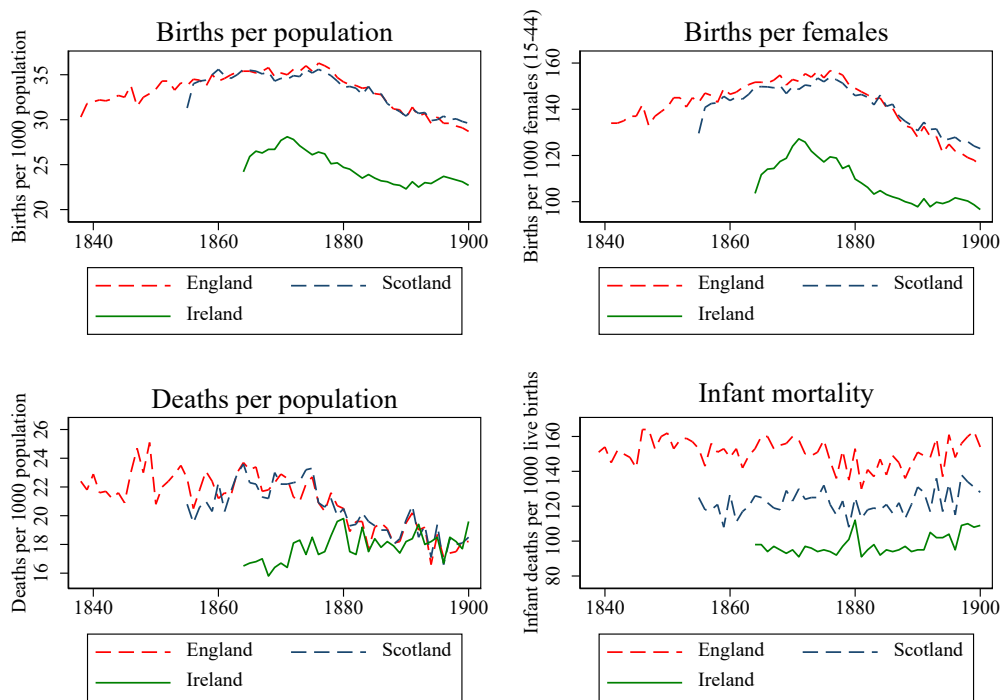
Famine Ireland has generally been neglected because of the perceived flaws in civil registration records. Vaughan and Fitzpatrick notably expressed concerns about the ‘incompleteness and inaccuracy’ and ‘statistical weakness’ of the source material in the annual statistical reports of the Registrar General (1978, p. xv). While Walsh (1970, 2017) highlights under-registration of births and deaths as reported from the initial reports of the Registrar General.⁶ Detailed examination of civil registration enables a new analysis of whether demographic trends were accurate, or statistical artefacts. If the trends are accurate they show very low mortality rates by European standards, and also much lower birth rates. If the figures are distorted by inaccuracies, then it is necessary to adjust the recorded figures to give a more accurate depiction of demographic trends.

We re-assess the reliability of Irish civil registration by revisiting attempts by contemporaries to evaluate mortality statistics. Contemporary enumerators sought to test the new registers by triangulation of source material between the census and registers in 1871. This enables us to assess the scale of under/over reporting at registration district level (Poor Law Unions) and to make informed adjustments where necessary. However, bar a few outlier registration districts,⁷ on the whole the measures are close approximations of each other. While we are conscious there was a likelihood of under-reporting of deaths, it was not significant enough to change the picture that emerges here based on the data from the annual registers. However, as Mitchinson (1977) reminds us, crude demographic information can mislead when falling crude birth rates and crude deaths imply the aging of the population, something that became evident from the decadal censuses in Ireland (Colvin et al. 2024). Without accounting for the aging of the population, crude mortality figures mislead in the direction of improvement. So, if the registration data is reliable, then Ireland prematurely aged and a more accurate measure of mortality assessment requires age standardisation to make comparisons over time; something that the English General Registrar observed in the late nineteenth century. We document age and sex standardized mortality trends and show how standardised trends in Ireland were masked by heavy emigration. Finally, the registrar’s annual reports tended to come with the caveat that under-reporting of births and deaths was likely more common in the west of Ireland compared to other regions (a perception which continued into the twentieth century), however this is difficult to support given the available evidence and it seems unlikely that such under/over reporting was purely a western phenomenon (Dean and Mulvihill 1972; Breathnach and Gurrin 2018; de Bromhead et al. 2022).

⁶ Although it must be acknowledged that studies by actuaries have tended to disregard concerns about the validity of registration (e.g., Barry 1940, Hall 2013). Indeed, early estimates of Irish life tables showed that the elderly population in Ireland had higher life expectancy than those in Ireland and Australia (Bigger and O’Meara 1932).

⁷ There are outliers in both directions which effectively cancel each other out in a national picture.

Figure 1 Birth and Death rates in the UK, 1838-1900



Sources: Mitchell (1988).

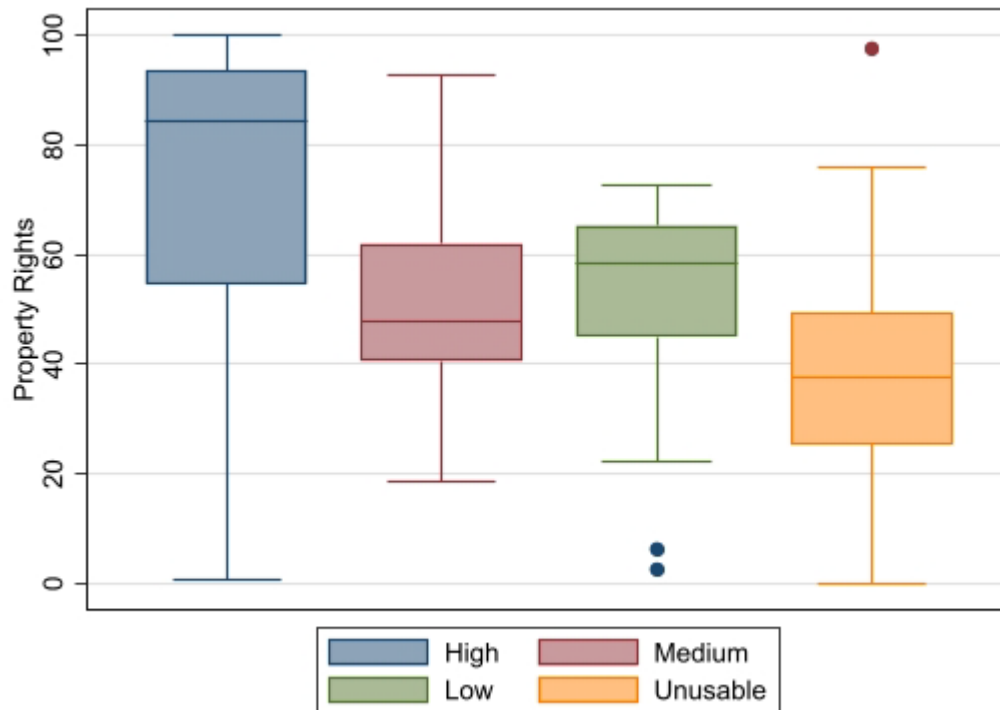
The reliability and completeness of civil registration are also relevant for countries today. Vital registration provides crucial documentary evidence about births, deaths, and marriages that can be used to enforce claims to property and facilitate property transfer, while also enabling public authorities to better manage public health.⁸ Today, there remains a severe global undercount of births and deaths: estimates suggest that only around 60 countries produce child mortality statistics that rely primarily on high-quality vital registration data (UNICEF 2017; Sankoh et al. 2020). There is considerable variation in the quality and completeness of civil registration. In Africa, for example, only 56.5 percent of births and 34.6 percent of deaths were registered in the early 2010s (UNECA 2017), and there continues to be substantial policy and research interest in strengthening civil registration systems across the continent.⁹ The link between property rights and civil registration is illustrated in Figure 2: countries with higher-quality and more complete vital

⁸ This widely seen as core features of vital registration, e.g. see UN (1995), Rao et al. (2000) and Schwid et al. (2018).

⁹ In 2024 the UNECA held a 5 day workshop on vital registration in Nairobi, Kenya on strategies to improve vital registration: Workshop on developing implementation guidelines to improve civil registration and vital statistics systems: <https://apai-crvs.uneca.org/events/workshop-developing-implementation-guidelines-improve-civil-registration-and-vital>

registration tend, on average, to be associated with stronger property rights, consistent with both reflecting broader institutional capacity (Philips et al. 2015).

Figure 2 Property Rights and the quality of vital registration



Source: Property rights data are from the 2025 Heritage Fund Index of Economic Freedom, and the quality of vital registration is derived from (WHO 2024a, b).

The paper proceeds as follows. Section 2 discusses the introduction of civil registration in Great Britain. Section 3 discusses the introduction of civil registration in Ireland. Section 4 assesses the reliability of civil registration of deaths. Section 5 assesses the accuracy of birth registration and section 6 presents estimates of age and sex standardised mortality.

2 The Introduction of Civil Registration of Vital Statistics in Great Britain

The 1830s are described by Porter as a period of a ‘great burst in official, as well as private, statistical activity’ in Victorian Britain and the emergence of ‘statistical thinking’ (Porter 1986). The General Register Office was created in 1837 to collect data on births, deaths, and marriages, but the Britain lagged behind other European countries, such as Holland, Belgium, Italy, Austria, and France, due to the introduction of civil registration of vital statistics as part of the Napoleonic code. Before the arrival of the British system in 1837, there were several debates and a parliamentary inquiry regarding its merits. The ‘star witness’ at the 1833 parochial registration

inquiry was the famous Belgian statistician Adolphe Quetelet who had been attending a meeting of the statistical society in Cambridge. In evidence, Quetelet appealed to English national sentiment as he lamented that; ‘It is indeed a subject of wonder to every intelligent stranger, that in a country so intelligent as England, with so many illustrious persons occupied in statistical inquiries, and where the state of the population is the constant subject of public interest, the very basis on which all good legislation must be grounded has been never prepared; foreigners can hardly believe that such a state of things could exist in a country so wealthy, wise and great.’ (BPP 1833, Q998).

Within the United Kingdom, England first introduced a system of civil registration, utilising the facilities of the new poor law for its successful local administration (Cullen 1974). The new system was not without criticism, with Lord Ellenborough famously objecting to the expense of registration because ‘it was required to be done just to gratify the statistical fancies of some few philosophers, in order that they might know how many persons died, and how many were born in a year. If they wished to obtain that information they ought to pay for it, and not make the poor man pay for it, with a penalty.’¹⁰ Yet, despite this criticism, it was Lord Ellenburgh who in an act of ‘statistical coxcombery’ introduced a clause requiring the cause of death to be included in the death certificate.

Within the literature exploring the rise of statistical thinking, there is very limited mention of the importance of civil registration in terms of defining property rights, for example in Porter (1986) and Cullen (1975). Before the introduction of civil registration, England had a system of parish registration of births, deaths, and marriages that was acknowledged to be deficient (Glass 1973). In 1832, when John Wilks introduced a select committee to investigate civil registration he added the proviso that it ‘was very important to all persons possessing property, however humble or exalted, and to whatsoever religious denomination they belonged’.¹¹ To evidence this he made reference to injustices caused by the parish registration system for dissenters whereby baptismal entry was not considered valid evidence or proof of legitimacy in court (Glass 1973). A secondary concern was the demand for statistics from the medical profession and the newfound interest in statistics. Higgs (2004) documents how property rights were a central consideration in the introduction of vital registration. This was highlighted by the Registrar General in the 1875 report which documented the increasing number of searches of the register over time, from an annual average of 952 in 1845-9 to 18,292 in 1870-4. The increase in searches the Registrar General attributed to the ‘provisions of the Registration Act are becoming more generally known by the

¹⁰ Registration Of Births, Marriages, And Deaths, *Hansard*, 35, 11 July 1836.

¹¹ Parochial Registration, *Hansard*, 16, 28 March 1833.

legal profession' with certificates required for proof of death and 'for pedigree purposes'. Birth certificates were also required for proof of age for various roles such as civil service clerkships (BPP 1877, p. liii). The availability of data for friendly societies was also a concern as vital statistics were needed for the construction of life tables.

Despite widespread support, vital registration did not arrive in Scotland until 1854 (Cameron 2007). In consultation over its introduction, the English Registrar General, George Graham, expressed interest that civil registration be introduced in Scotland and Ireland but with a remedy to known defects in the English system, namely that not every birth and death was registered, that medical practitioners did not have to provide a cause of death, and that there was insufficient detail on forms for 'statistical or inheritance purposes' (Cameron 2007). The main barriers to the introduction of registration in Scotland were the cost and complexity of administration and the fees and penalties for registration. Another was a need to change the laws of marriage. When civil registration was finally introduced it was based on system of compulsory registration, twenty years before compulsion was introduced into the English system (Cameron 2007, Higg 2004).

3 The Introduction of Civil Registration in Ireland

The experience of vital registration indicates significant involvement of Irish interests in shaping this important piece of legislation, reflecting the mid-nineteenth century enthusiasm for scientific approaches to government and evidence-based policymaking (O'Neill 2024). An Irish Births and Deaths Registration Association was established to press politicians on the need for a system in Ireland, emphasising its desirability for sanitary reform.¹² Yet when Sir Robert Peel, son of the former prime minister, and then Irish Chief Secretary, first introduced a bill for a system of civil registration in 1862, it was clear that his primary intention was to establish a more systematic recording of property. He stated that Ireland was suffering an injustice compared to the other parts of the United Kingdom and as a result:

'Property has become alienated for want of a proper and careful registration. All parties and religious sects in Ireland are thoroughly agreed as to the necessity of it. The Protestants of the North are not less anxious for it than the Roman Catholics, who have been the greatest sufferers from the want of an efficient registration.'¹³

That property was the central concern was also evident when Lord Naas, the Chief Secretary for Ireland, stated that 'the register of marriages was a complete barometer of the welfare of the people, and in all cases of property which depended on questions of legitimacy and descent it was of the greatest importance to have a complete system.'¹⁴ During parliamentary debates, various

¹² *Freemans' Journal*, 3, 5 February 1863.

¹³ Births And Deaths Registration (Ireland), *Hansard*, volume 165, 20 February 1862.

¹⁴ Births And Deaths Registration Ireland) Bill—Bill 9. *Hansard*, Volume 169, 19 February 1863.

criticisms of the proposed system were made that it was not ‘intended to take effect as a sanatory measure’ and that ‘it would be of little use for sanatory purposes’.¹⁵

Concern for property explains why marriages were given high importance. The question of marriage registration was controversial and there were strong calls for a new system to rectify the one introduced in 1844, which recorded only Church of Ireland marriages. According to the Catholic *Derry Journal*, it was a ‘was a memento of a persecuting age’, and a new system to register marriages was urgently needed as a matter of ‘equal rights’.¹⁶ The sense that marriage registration was defective added to the enthusiasm for an entirely new civil registration system. The recording of births and deaths without consideration of marriages was deemed by Francis Plunkett Dunne, landowner and MP for Queen’s County, to have been ‘valueless’ and ‘statistical pedantry’ should be centrally funded because ‘it would be of no benefit to the ratepayers’.¹⁷

The intention of early draft legislation had been for the police to administer civil registration. During parliamentary debates, however, it was argued that this would be unpopular with large swathes of the populace. John Francis Maguire, the member of Parliament for Dungarvan, stated that ‘he should gladly support a Bill for a system of registration, but he could not adopt the worst possible machinery that the ingenuity of man could devise’.¹⁸ The Irish police had ‘taken a military character’ compared with the police in Britain, and it was not tolerable to ‘have the constabulary poking their noses into our houses when they hear of a death or a birth’.¹⁹ Moreover, this would add responsibilities beyond core policing duties. Instead, it was argued that a vital registration system would be more effective if it made use of the extensive poor law infrastructure and its medical officers (Moore 1859). This division stalled the draft legislation in 1862.²⁰

When civil registration was finally introduced in 1864 a central ‘General Register Office’ was formed in Dublin that was responsible for the collation of the various district registers. It was quite clear that registration was not conducted at national level nor at county level, but explicitly using the pre-existing local government apparatus. The administration of registration of births, deaths, and marriages was superimposed on the existing poor law system and conducted within these administrative units (see Figure 3) along with the new registrar offices. Many existing Irish mortality studies have focused on either national or county level pictures, but given the

¹⁵ The Marquess of Clanricarde. Births And Deaths Registration (Ireland) Bill—(No 30). *Hansard*, 169, 24 March 1863

¹⁶ *Derry Journal*, 19 February 1862; 25 February 1863.

¹⁷ M’Mahon. Births And Deaths Registration (Ireland) Bill—Bill 9. *Hansard*, Volume 169, 20 February 1863

¹⁸ Births And Deaths Registration (Ireland) Bill, *Hansard*, vol 166, 1 May 1862.

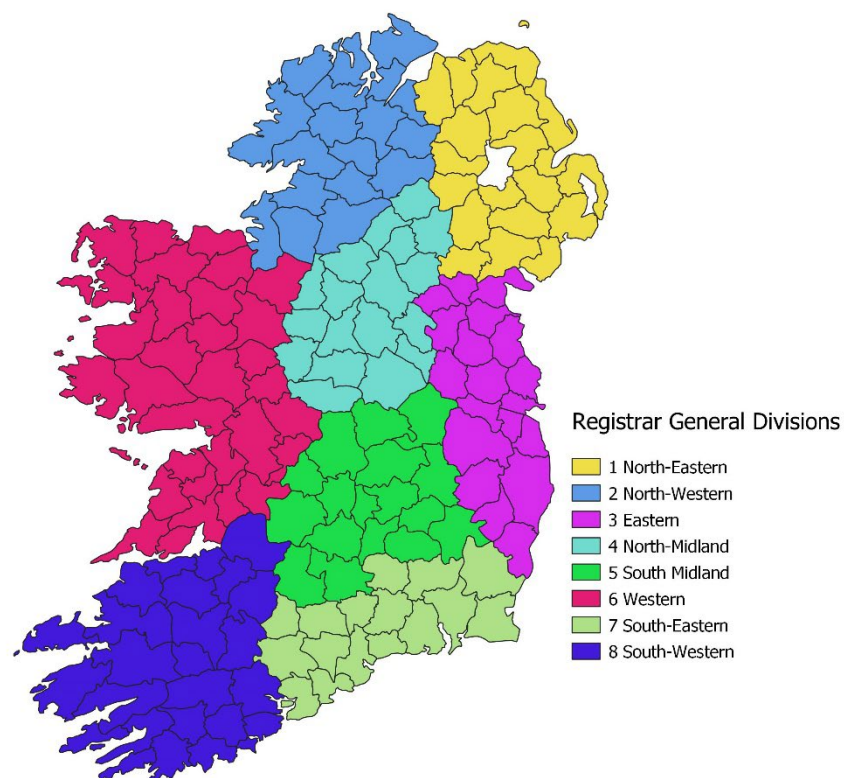
¹⁹ *Derry Journal*, 25 February 1863; Or as the medical doctor John Brady (member of parliament for Leitrim), put it, ‘The people of that country would revolt against permitting a common policeman to enter their houses for the purpose of registering the birth of a new-born child.’ Births And Deaths Registration (Ireland) Bill. *Hansard*, Volume 166: debated on Thursday 1 May 1862.

²⁰ Sir Robert Peel. Births And Deaths Registration (Ireland) Bill—Bill No 20. *Hansard*, Volume 167: 2 July 1862

administrative structure of registration, we would argue that the Poor Law Union makes a more appropriate unit of analysis.

When the system of vital registration was introduced the registrar implemented a publicity campaign to raise awareness of the legal requirement to register births, deaths, and marriages. The Registrar-General, William Donnelly, sent notices to all Poor Law Board of Guardians to inform them of the requirements of the new legislation as well as publication notices within the Poor Law Unions. The Registrar-General also utilised the Irish Constabulary to display notices at police stations throughout the country. The notice was also printed and sent to ‘every magistrate, to the clergy of all denominations, to medical practitioners, to editors of papers, and to many other persons of influence’. The Registrar-General noted that the requests were ‘very favourably received and generally acted upon’ (BPP 1868).

Figure 3 Registrar General Divisions



Earlier generations of historians dismissed the reliability of registration records to analyse demographic trends, including mortality, because they considered Ireland was ‘merely less efficiently registered’ than England and Wales in the initial period of registration (Kennedy and Clarkson 1993, p. 170). In this view, subsequent improvements in registration explain why there

was only minor decline in crude mortality rates in Ireland compared to England, where mortality rates fell by 15 per cent between 1870 and 1900, while Irish mortality rates remained relatively constant (Kennedy and Clarkson 1993, p. 171). Kennedy and Clarkson cite the First and Second Reports from the Select Committee on Death Certification (BPP 1893-94) as evidence of under registration. However, the Select Committee was more concerned with the causes of death on the certification rather than the registration of deaths per se. Determining the exact cause of death is undoubtedly fraught with complications requiring coroner certificates, whereas the latter is a simple process of informing of a death. The issue of classification of cause of death continued to plague mortality statistics in the UK until the mid-twentieth century. For example, a study of death certification accuracy in 75 NHS hospitals in 1959 found that the cause of death was assigned with a high degree of certainty in only 63 percent of cases (Heasman and Lipworth 1966). One aspect of this was Ireland's 'premature aging', which left Ireland with an unusually elderly population structure (Gilleard 2016, Colvin et al. 2025). However, to date there are no age standardised estimates of mortality across Ireland and Britain to assess whether this explains the discrepancy.

As the introduction of registration was explicitly linked to property rights in both England and Ireland, the General Registrar reports contained information on the number of paid searches in the records (and later they also included gratuitous searches in the English returns). The *Thirty-Eighth English Registrar General Report* for 1875 stated that:

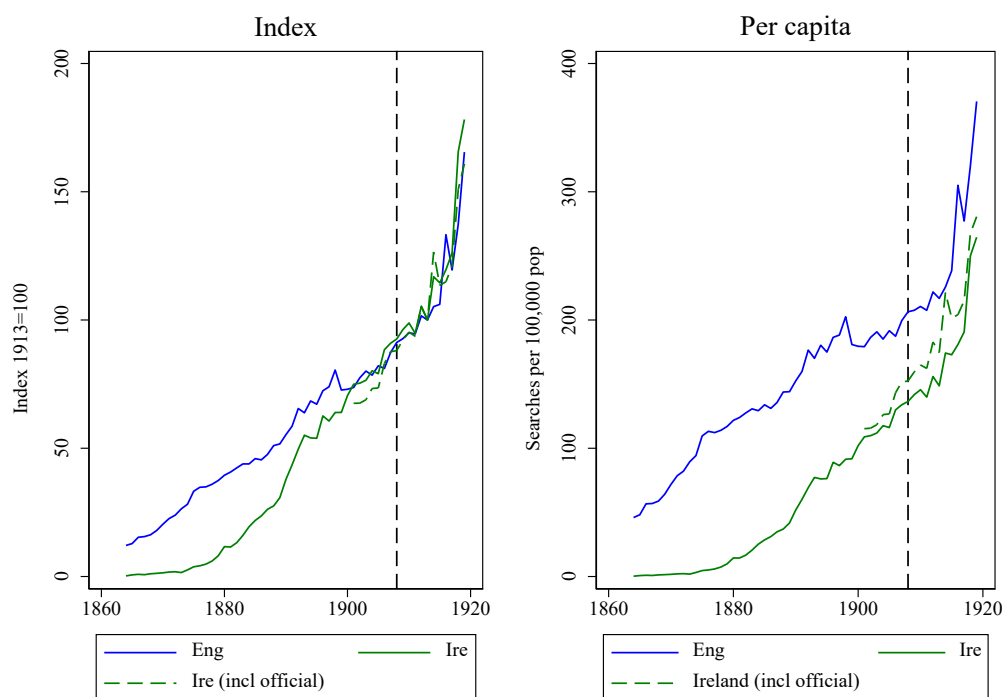
‘the provisions of the Registration Act are becoming more generally known by the legal profession, and increasing numbers of certificates are required for proof of death, as well as for pedigree purposes. A considerable number of applications for birth certificates are made by candidates for civil service clerkships, for boys about to be apprenticed, and for boys about to be employed as messengers, etc, for post office purposes.’ (BPP 1877).

And later General Registrar reports continued to report searches ‘by the public for legal evidence of births, deaths, and marriages’ (BPP 1907).

The Irish Registrar General reports also began reporting the number of searches in the opening pages of the annual reports from 1887 onwards. It was stated that the number of searches and copies issued had ‘increased with great rapidity during the past few years’ (BPP 1888). Subsequent reports emphasized how the number of searches had been ‘maintained’ (BPP 1889). The number of searches in both England and Ireland are shown both in index form and per person in Figure 4. There was a large increase in searches over time and Irish searches increased at a faster rate than English ones. The Irish search figures were reported ‘exclusive of searches made for official purposes’. These have been added into the Irish figures and illustrate convergence towards levels seen in England. Figure 4 includes a line to indicate the 1908 census when a birth certificate would have been required to claim the pension in both jurisdictions, but this is not such an immediately

significant event although it could possibly explain the rapid growth in searches thereafter.

Figure 4 Searches of the general registrar in England & Wales and Ireland, 1864-1919



Sources: *Annual Reports of the Registrar-General of Births, Deaths, and Marriages in England* (various years) and *Annual Reports of the Registrar-General of Ireland* (various years).

The Registrar General reports for both England and Ireland also included discussion on offences against registration. The *Twenty-sixth General Registrar Report for Ireland* noted how there was an increase in powers of the Registrars as part of the 1880 Births and Deaths Registration Acts and that the Registrars gradually ‘became acquainted with their facility’ to pursue cases (BPP 1890). These were relatively small but do provide a check on the reliability of registration. For example, the 1896 report highlighted prosecutions for offences against the registration acts. There were 617 in 1896, the offences covered:

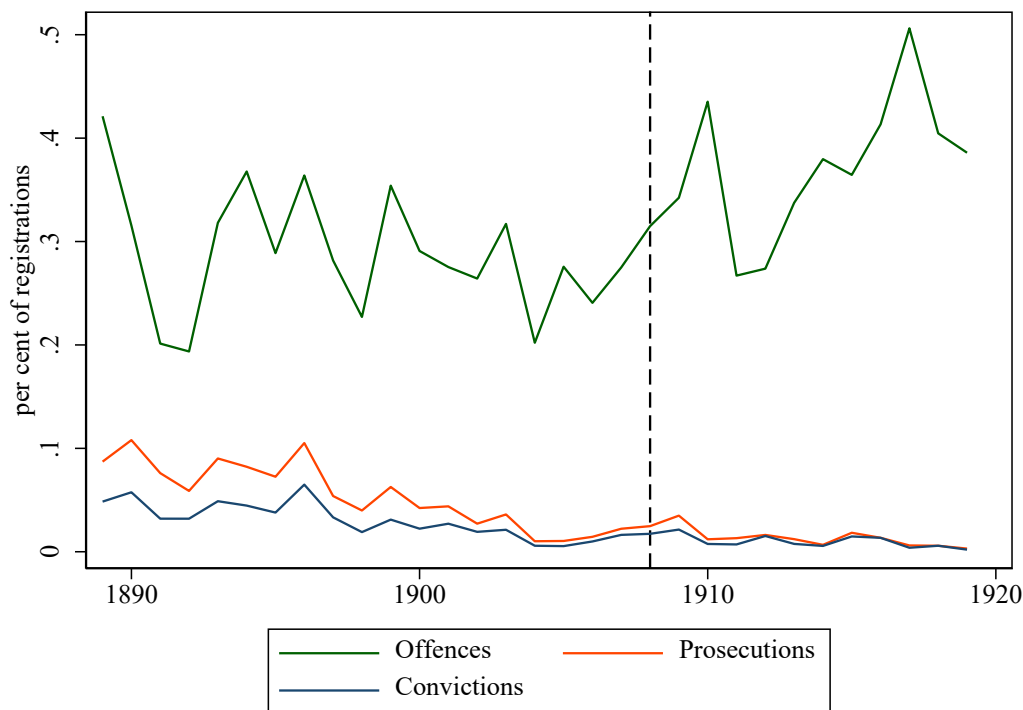
neglect to register births, neglect to register deaths, neglect to furnish certificates of marriage; failure of Coroner to furnish certificate of inquest; giving false information as to age at death, as to cause of death, and as to duration of illness previous to death; giving false information as to births viz, registering illegitimate children as legitimate, and misrepresenting date of birth; neglect of medical practitioners to furnish certificate of cause of death; falsifying extracts from registers’ (BPP 1896).

Some extracts of cases related to failure to register births, or for registering an illegitimate birth

as legitimate. It appears that the biggest issue related to false information for age of death. In the Twenty-Sixth General Registrar report of 1890 several cases were highlighted where dependents of deceased men had misstated their husbands' age and cause of death in order to claim payments from an assurance policy from the Industrial Assurance Company (BPP 1890). A similar issue was highlighted in the Thirty-Second General Registrar report in 1895 with an example where a family member joined a friendly society and gave a lower date of birth to get a lower premium but when they died the family misstated the age of death in order to collect the insurance policy but the 'proceedings had to be abandoned for want of documentary proof of age' (BPP 1896). Of the 617 offences in 1896, 155 prosecutions were brought. In 1913 there were 655 offences but only 24 prosecutions. Figure 5 shows the offences, prosecutions and successful convictions as a percentage of all registrations (births, deaths, and marriages) and indicates a low rate of offences. The low rate of prosecutions ('on careful inquiry') compared to offences, and the low rate of convictions (owing to insufficient evidence) indicates a relatively successful registration apparatus.²¹ The rise in offences from 1910-20 and the fall in prosecutions would also imply a less carefully policed system, something that appears to have continued into the independence period.

²¹ All cases were to be heard before local Petty Sessions courts. Under the 1880 act punishments were usually in the form of fines 'not exceeding ten pounds'. There were more severe punishments for false statements (such as relating to still-births), these ranged from 'a summary conviction to a penalty not exceeding ten pounds, and on conviction on indictment to find, or to imprisonment, with or without hard labour, for a term not exceeding two years, or to penal servitude for a term not exceeding seven years': An Act to amend the Law in Ireland relating to the Registration of Births and Deaths, 1880, 43 & 44 Vict, c. 13, s. 30 and 35.

Figure 5 Offences, Prosecutions and convictions as a percentage of annual registrations, 1889-1919



Sources: *Annual Reports of the Registrar-General of Ireland* (various years).

4 Assessing the reliability of vital registration in Ireland

The issue of under and over reporting has been a key concern for scholars regarding the reliability of the registration of deaths (and births) globally. For example, in a 1957 UN report it was stated that:

‘[a] major factor producing unreliability in mortality statistics – both crude and specific – is, of course under-registration of deaths. Registration is a civil affair. It is a well-known fact that in countries where civil administration is not yet well developed, the requirements of death registration, although theoretically obligatory, are not well complied with.’ (UN 1957, p. 2).

A crude rule of thumb is that a system with registration of over 60 percent is considered ‘a useful source of information’, and below may be unrepresentative (Siegel and Swanson 2004, p. 267). Our analysis of cross-tabulated results, shown below, is that registration in Ireland was close to 90 percent island-wide, although with variation across registration districts.

One mid-twentieth century UN report stated that ‘until quite recent times, governments paid little attention to the appraisal of the accuracy of the demographic statistics’ (UN 1955), yet this was not true of the Irish administration in the 1860s and 1870s, which was in fact quite concerned

with the accuracy of vital registration. Compulsory registration for deaths was required within seven days of death, notice of births was required within twenty one days, and full information within three months.²² Late registration of births was possible but expensive, the fee being two shillings and sixpence. Each union registrar was paid a rate of ‘one shilling for every entry of birth or death included’, and this came at the expense of ratepayers. There were penalties for failure to register births and deaths (between twenty to forty shillings) and for improper registration of births and deaths, or for losing or damaging registers (£10), which incentivised accuracy.

It was known that there were inaccuracies in vital registration in England and Wales. However, the inaccuracies were not so much to do with deaths. In the *Second Report of the Registrar General of England & Wales*, the decrease in deaths reported in 1839 were deemed to be due to a fall in mortality and ‘not to imperfect registration’ as it was estimated that the under-registration rate of deaths was around 2 per cent (BPP 1840). The main issue was instead with the registration of births. The eminent statistician William Farr, who was also the superintendent of the statistical department of the English General Registrar Office, estimated that there was an underreporting of births around 5 per cent (Glass 1951). This led to various discussions of the reliability of the registration of births in England (e.g., debates between Sargant (1864, 1865) and Farr (1865)). The issues with English registration were due to it not being compulsory until 1874, after which it improved significantly. This was compared with the situation in Scotland where registration was compulsory when first introduced, and had a higher degree of accuracy (Glass 1951).

Estimates of the extent of under-registration in England and Wales used information from both the registrar general reports and the population census. Glass (1951) estimated that there was an under-registration rate of 8 percent in the 1840s that declined to 1 percent by the early 1870s. Teitelbaum (1974) found similar results and found variation across English counties that also declined by the early 1870s. Although aggregate figures indicate a decline in under-registration, Teitelbaum’s (1974) county level estimate suggests there was still under-registration present in rural counties. For example, both Middlesex and Essex had under-registration rates over 5 per cent from 1841-1901, while Herefordshire had an increase in under-registration in 1861, Rutland experienced an increase in 1901.

The 1871 census of Ireland explicitly attempted ‘to test the accuracy of the returns of death’ by including a survey of deaths in the census enumeration forms and comparing this against the registration figures from when they began (BPP 1874, pxxxvi). The survey was included with the regular census form that heads of families were required to fill out, and was explicitly mentioned

²² 26 & 26 Vict. c. 11.

in the instructions.²³ The motivation for the survey was stated as being ‘caused by the want of a Registration of Deaths in Ireland, for the *entire* period over which the inquiry extends, and the consequent defect of information for various objects useful to the community’ (emphasis in the original) (BPP 1876, p. 464). The survey asked for details on names, age, sex, relationship, rank and occupation, disease, and time of death (both season and year) in the time since ‘the 7th of April 1861’ (BPP 1876, p. 466). It was not a simple block count but asked for a specific name to be supplied, therefore soliciting reasonably accurate information of the number of deaths. Although the further back the death occurred the estimates might be rougher. A facsimile of this survey form is included in Appendix A2. The census commissioners concluded that ‘comparison will be found to give very favourable results as to the accuracy of the Census returns always of course allowing a margin for such omissions as may be caused by emigration and the breaking up of families, also the defects of memory on the part of those who made the returns and had no record to refer to’ (BPP 1874). The census commissioners were thankful for the good fortune that the period of comparison was not an abnormal period of mortality and enjoyed the ‘comparative freedom from epidemic disease’, aside from a Cholera epidemic in Dublin in 1866-67 (BPP 1874, p. cxvi). The one issue highlighted was the underreporting of deaths in Dublin when burials were compared with registered deaths in the city. The ratio of deaths registered in Dublin to burials averaged 0.90 from 1864 to 1870, although from 1868 to 1870 it was 0.92. So even though there was a slight improvement in the late 1860s, there was still a discrepancy between registered deaths and burials. Dublin accounted for 10 percent of registered deaths in Ireland, therefore the Dublin discrepancy (assuming all other counties had accurate reporting) would imply 1 percent underreporting of deaths nationally.

Figure 6 shows the distribution of the ratio of deaths in the census survey to registered deaths. The accuracy increases the closer the time periods match. In the worst cases, outlying unions were approximately 30 percent out from census survey data, but as can be seen there were few such outliers. By 1870 there was considerable alignment between the census survey and death registration. This is clearly shown in Table 1, where 76 percent of Poor Law Unions in 1870 had registrations within 10 percent of the census survey and 44 percent of Poor Law Unions had

²³ The instructions for filling out forms asked for accuracy from the heads of households and reported that the information would be kept confidential: ‘Heads of Families are requested to see that the Answers to the Queries in the annexed Tables are distinctly and correctly given; since upon their accuracy the value of the Census must depend. The information will be published in General Abstracts only and strict care taken that the Returns are not used for the gratification of curiosity, or any other object than that of rendering the Census as complete as possible. The Enumerator, on receiving the Returns, is on not account to permit them to be inspected by any person, except the Officer of the District to whom he is instructed to deliver them without delay, for transmission to the Census Office. The Returns will be considered by the Officer as strictly confidential. It is particularly requested that this Return may not be soiled or in any way injured. When the Members of the Family are too numerous for one Form, two or more will be supplied.’ (BPP 1876, p. 464).

registrations within 5 percent of the census survey. The regional variation is illustrated in Figure 7 with no clear regional pattern evident.

Figure 6 Ratio of Registration of Deaths to Census death survey, 1864-1870

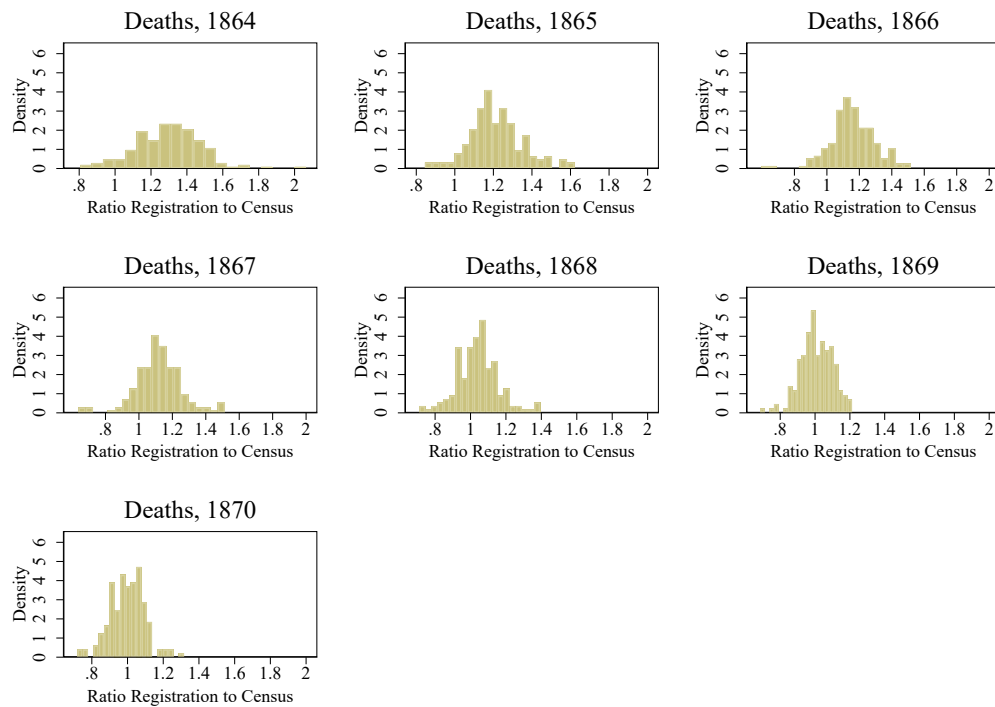
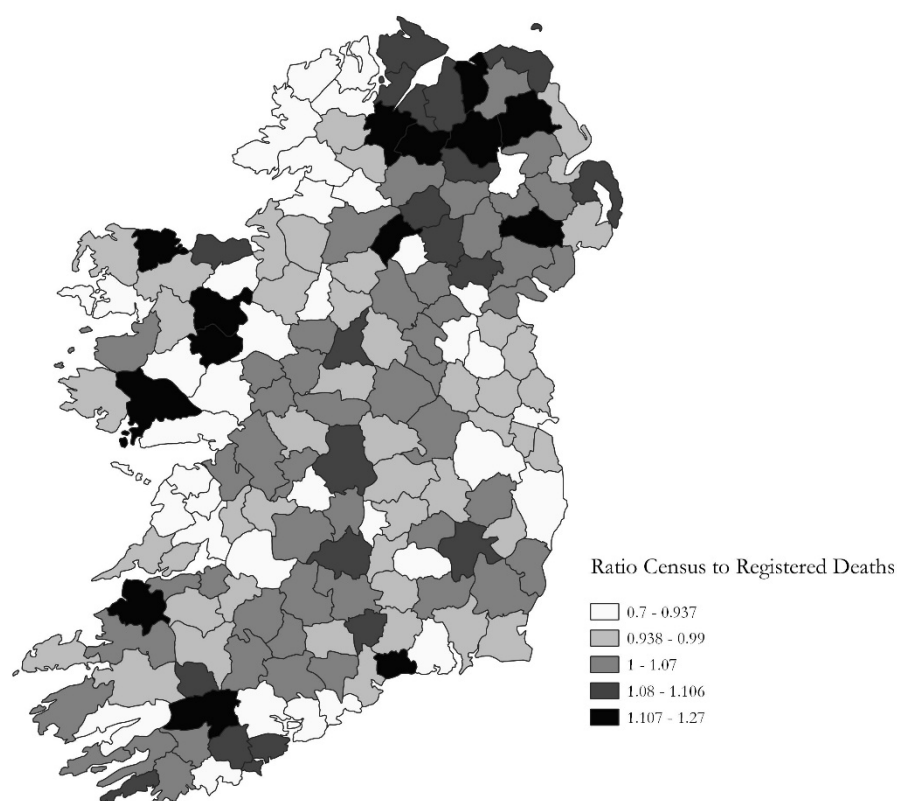


Table 1 Ratio of Registration of Deaths to Census survey 1864-1870

Year	Number of Unions	Mean	Std. Dev.	Min	Max
1864	163	1.294	0.190	0.806	2.064
1865	163	1.215	0.139	0.844	1.621
1866	163	1.157	0.140	0.597	1.517
1867	163	1.118	0.140	0.638	1.515
1868	163	1.042	0.118	0.711	1.393
1869	163	1.006	0.093	0.684	1.213
1870	163	0.999	0.097	0.719	1.317
1868-70	163	1.015	0.087	0.705	1.266
1869-70	163	1.002	0.084	0.702	1.261
Unions where ratio was between +/- 10%					
1864	21	1.018	0.063	0.913	1.100
1865	21	1.018	0.063	0.913	1.100
1866	48	1.026	0.058	0.904	1.095
1867	65	1.031	0.050	0.912	1.099
1868	103	1.017	0.052	0.924	1.099
1869	117	0.998	0.054	0.900	1.097
1870	124	1.002	0.057	0.903	1.093
1868-70	128	1.006	0.054	0.906	1.095
1869-70	130	1.003	0.054	0.902	1.099
Unions where ratio was between +/- 5%					
1864	7	1.001	0.023	0.956	1.030
1865	11	1.004	0.034	0.956	1.049
1866	18	1.003	0.029	0.961	1.047
1867	34	1.014	0.026	0.953	1.049
1868	50	1.009	0.027	0.957	1.049
1869	68	0.997	0.029	0.950	1.050
1870	63	0.998	0.028	0.950	1.046
1868-70	67	1.004	0.027	0.953	1.049
1869-70	72	1.003	0.028	0.950	1.050

Figure 7 Ratio of Registration of Deaths to 1871 Census death survey



A similar exercise was not repeated in the 1881 Census, thus it is not possible to compare the statements about improving accuracy in registration. From this analysis, the 1871 census survey data do show that reasonably accurate registration was in place. In fact, the census commissioners believed that the existence of the general registration of deaths meant that ‘in future census compilations it will not be necessary to publish so many Tables of Deaths and to report thereon’ (BPP 1873, Part II. Vital Statistics, vol II, p. cxvi). This view then is at odds with the early view of the Registrar General that registration was incomplete. Instead, it indicates a level of satisfaction with the system of civil registration.

The early Registrar General reports expressed continued concern over the accuracy of registration. In the first report for the year 1864, the General-Registrar William Donnelly stated that ‘I consider that many Births, Deaths, and Marriages have not been registered’ (BPP 1868-69, p. 16). The following year the Registrar also lamented the completeness of registration and reported that ‘these events registered in 1865 do not show any satisfactory increase compared with the previous year’ (BPP 1870), with the same sentence repeated again in the report from 1866 until 1874 (BPP 1870b, 1871, 1871b, 1872 1873c, 1874, 1874b, 1876, 1876b). In the reports, Irish figures were compared unfavourably against birth, death, and marriage rates for England, Scotland,

Sweden, Prussia, Hanover, Wurtemberg, Bremen, Holland, France, Spain, and Austria (exclusive of Hungary). The Irish rates were lower and thus the conclusion was that there was a deficiency in Irish registration. Yet the 1860s was the decade of 'Fenian panic', with high tensions about nationalist uprisings that led to the introduction of emergency legal powers. The prevailing official view of government requiring exceptional measures in Ireland arguably contributed, at least in part, to Donnelly's views of a population resistant to compliance with civil registration in ways unlike Britain.

By the Twelfth Registrar-General report in 1876 a new Registrar-General (William M. Bourke) was in post and the reports no longer contained the same monotone criticism of the registration system. The new Registrar reported that while birth rates seemed low especially in comparison with England, 'the conclusion at first naturally suggested by these figures is that the registration of births in Ireland must be very defective; but, on examination this proves to be, in great part, erroneous' (BPP 1876c, p. 12). The issue with death registration was due to a lack of notification of deaths to Registrars and that marriage registration was 'not perfect' because of the lack of adherence to guidelines by all clergymen (BPP 1876c, p. 31). This point was reiterated in the subsequent report when the Registrar noted that the deficiency in terms of low rates was 'most marked in Roman Catholic marriages, many of which I fear, remain unregistered' (BPP 1878, p. 29). Births were considered accurate although there was an issue with late registration of births and these late registrations occurred too late for them to be included in annual returns. Deaths were considered to be more accurate once notice of deaths was introduced by the Public Health acts in 1878 (BPP 1880, p. 29).

The major change to the Irish system of registration came with the 1878 Public Health Act, which involved the incorporation of burial returns with death registration to adjust possible undercounting of deaths. The discrepancy between burial returns and registration was first highlighted and discussed in the 1871 census, with Dublin the primary region affected. However, the general contemporary view that registration was accurate casts doubt on any assertions about improving registration under the 1878 Public Health Act, assertions that may have been made to distance the government from blame for rising mortality rates. Therefore, we believe that this aligns with Cousens' (1964, p. 305) conclusion that the 'discrepancy in [death] registration was not of great magnitude'. Even the underreporting in Dublin was remedied by the 1878 Public Health Act and was not of a magnitude to affect the aggregate trend in registration. The Dublin discrepancy meant that total deaths were underreported by between 0.50 to 0.93 per cent.²⁴

²⁴ Dublin North and Dublin South constituted an average of 9.29 per cent of total registered deaths between 1871 and 1877. Increasing the Dublin Deaths by 10 percent, implies an average increase in deaths of 93 percent. Or using

While the 1881 Census did not attempt to assess the accuracy of vital registration, the registered births and deaths were used to estimate the population in 1881. Using the intercensal natural increase in population, and after adjusting for emigration, the Census Commissioners arrived at a figure that was 0.81 per cent higher than the enumerated census population. The full calculation is shown in Table 2. The census commissioners thus concluded that:

The discrepancy is, after all, very slight, being as it is, considerably less than one per cent of the population in ten years, and we have no doubt, especially when we bear in mind the improvements which have recently been effected, that the Registration and Emigration Statistics, will henceforth form very reliable data for estimating the fluctuations in the population of Ireland in the intervals between each systematic enumeration of the people (BPP 1882, p. 76).

Based on the above discussion we argue that Verrière (1979) was perhaps too harsh in his judgement that Irish vital registration statistics were ‘elles restent lourdement grevées d’incertitude [they remain heavily burdened with uncertainty]’ and that only the censuses could be used to track demographic trends. Verrière (1979) highlighted criticism of registration from early returns of the General Registrar and placed greater weight on the census as a source of demographic data; it appears that Verrière (1979) overlooked the census commissioners’ faith in the system of vital registration.

Verrière (1979) argued that both births and deaths (particularly of the under 1’s) were under-registered. The under-registration of deaths of infants under 1, particularly still-births, was a major issue, but this misses a key element of vital registration in the UK. It was primarily for property rights. Still-born children did not continue family lineage and were not going to acquire any property. English vital registration only began recording stillbirths from the 1920s, and in Scotland from 1939 (Higgs 2004, Davis 2009).

the data from figure 5 (8 percent for Dublin North and 3 per cent for Dublin South), this implies an average increase 0.5 percent of total registered deaths.

Table 2: Estimated population compared to enumerated population

	People
1871 Population	5,412,377
$\sum Births\ 1871 - 1881$	1,391,983
$\sum Deaths\ 1871 - 1881$	969,076
<i>Natural Increase</i> (Births – Deaths)	422,907
1871 Population + Natural Increase	5,835,284
Emigration	618,650
Estimated 1881 population	5,216,634
Enumerated 1881 census population	5,174,836
Difference between enumerated 1881 census population and estimated population	41,798
<i>Immigration (not included)</i>	
Foreign Population 1871	17,010
Foreign Population 1881	19,535
Change in Foreign born population	2,525

Source: Adapted from text in BPP (1882, p. 76).

5 Accuracy of birth registration

There has been greater scrutiny of birth registration than of death registration. This is evident in two seminal articles published in the *Economic History Review*,²⁵ although the implicit assumption in both appears to have been that only Ireland was defective, as there was no reference to the defects in civil registration in England (e.g., Glass 1951). In contrast to death registration, Cousens (1964, p.305) concluded that births were over registered as ‘it was possible for him [the local registrar] to add to his stipend by making fictitious entries’ highlighting the particular case of Castlebar. Walsh (1970), in his study of births and fertility, compared the registered county births with the 1871 census and found ‘considerable inaccuracies in the registration data for 1871 and 1911’, in particular. Walsh (1970) highlighted the over-registration of births at the county level, and referred back to Cousens’ cynical observations vis-à-vis supplementing stipends with fictitious entries.

Walsh argued that ‘if both sources [annual registration and decadal censuses] of data were reliable, these two figures should be very close in all counties; the number of births should exceed

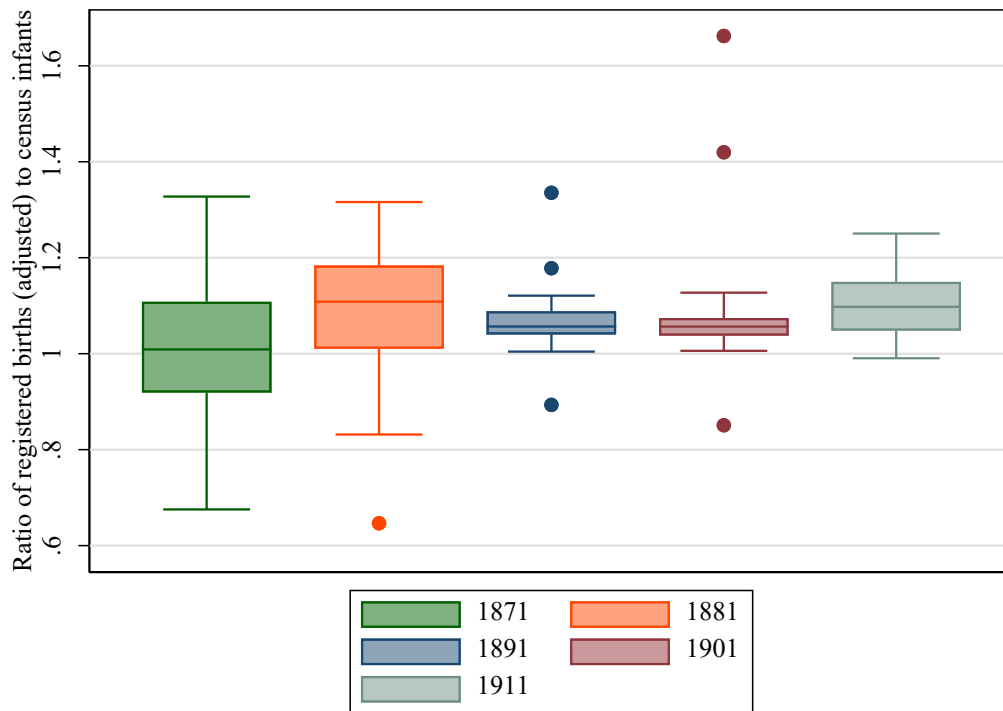
²⁵ For later critical scrutiny, see Coward (1982) and de Bromhead et al. (2022).

the number of children under one by the sum of the infant deaths during the year and the net emigration of infants' (Walsh 1970, p. 152). Walsh showed a ratio of registered births to the children under 1 and concluded that 'there were considerable inaccuracies in the registration of data for both 1871 and 1911.'

Here we return to the original estimates of Walsh for 1871 and 1911, as well as repeating the analysis for the years 1881, 1891, and 1901. In Table A3.1 we replicate the Walsh ratio and then adjust the 1870 births to include infant deaths in the same year. It is clear that Walsh did not control for infant deaths, the timing of the census, or net migration. These adjustments lower the ratio, from 1.120 to 1.013 using this simple adjustment (see Figure 8). In fact, Verrière (1979) argued that the adjustment of registered births by infant deaths was '*certainement plus proche de la réalité*'. The original analysis by Walsh was also done at county level, with 32 counties on the island, but actual registration took place in registrar districts (sub-county level) and we continue our analysis at registrar district.

One of the largest outliers in our adjustment is Westmeath where the ratio fell even below Walsh's estimates, but neighbouring Longford has a much higher ratio. The registration boundaries do not map neatly onto county boundaries and this suggests that perhaps the county match for registration were somewhat askew. In later years a similar discrepancy related to the placement of Belfast. County registration placed part of Belfast in Down while the census count distinguished Belfast from Down. Removing Belfast registered births from Down matches the census infant population but implies a larger deficiency in Belfast than what is currently recorded.

Figure 8: Ratio of adjusted registered births and census infants



Note: The ratio of registered births is adjusted by subtracting the recorded number of deaths under 1.

Walsh (1970) also did not discuss the timing of the census, which contains information on the population under 1 years of age at the time it was conducted, on 2 April 1871. Therefore, the number of registered births in the previous year (that is April 1870 to April 1871) minus those under 1 that died, should, in principle, be an approximate match for the census figures. The comparison in Table A3.1 compared 1870 (quarters 1 to 4) with the total infant population in 1871 quarter 1. This is clearly a discrepancy. Moreover, infant deaths should ideally be recorded at the same frequency (e.g., 1870 quarters 2-4 and 1871 quarter 1). The challenge is that the registrations only report age by death annually, making it difficult to account for infant mortality that occurs in the first quarter of the year to April. However, total births and deaths were recorded quarterly so we can adjust the birth figures by summing quarters 2, 3, 4 in 1870 with quarter 1 in 1871. We use the quarterly information about deaths to weight the likely infant deaths in each quarter. Unsurprisingly, the first quarter (i.e., the winter) had the highest share of deaths.

Figure 9 below compares registered births and deaths of those under 1, in 1870 and 1871, against the 1871 census number of the population under one years of age. It also compiles an estimate of the registration of births and infant deaths for the last three quarters of 1870 and the first quarter of 1871 and compares this with the 1871 census. This is the most realistic scenario in terms of overlap, but the estimation assumes infant deaths occur at the same quarterly frequency

as all mortality. As can be seen in Figure 9, the figures are skewed by a few outliers. This is highlighted again in Table 3, which compares the mean ratio across different sub-samples. For all Poor Law Unions, the mean ratio is 1.035 implying there is only a 4 percent discrepancy between registration and the census. Restricting the sample to those Unions with a ratio between 10 percent above or below shows that 145 were within this range and the mean is 1.025, and 76 unions had a ratio between 5% above or below. On the upper end, only 5 unions had ratio over 15 percent, the highest was Ballymahon at 17 percent over, and on the lower end, only one union, Dublin South, had a ratio below 10 percent. Overall this appears to show a remarkable degree of consistency between the census and registration figures.

This is a drastically different conclusion to that presented by Walsh (1970, Table 3), who compared county births in 1870 with the 1871 Census enumerated infants. Walsh found an average ratio of 1.120, with a higher standard deviation, across thirty two counties with the ratio ranging from 0.738 in Westmeath to 1.450 in Longford. While Walsh discussed biases from not accounting for infant mortality, his figures did not adjust for infant deaths during 1870 making the difference between registration and census reporting appear more severe than they would with a more careful analysis. As we highlight above, including infant deaths from 1870 reduces the mean ratio of registration to census births from Walsh's reported 1.12 to 1.01. Establishing these figures at the poor law level reveals both lower variation and a lower mean from those estimated by Walsh (see Figures 9 & 10). While the figures still indicate some over-reporting of births, overall the problem does not appear to be anything as drastic as has been implied.

Figure 9: Comparison of Registration of Births (1870, 1871, & 1870-71) to 1871 Census enumeration

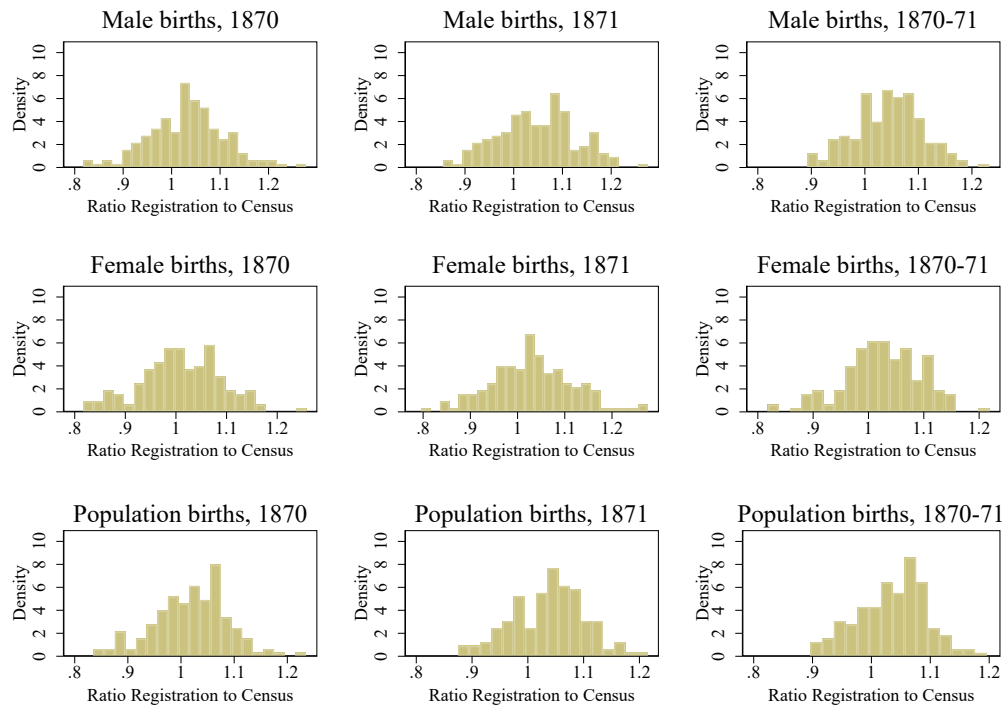


Figure 10: Registration of Births to 1871 Census enumeration

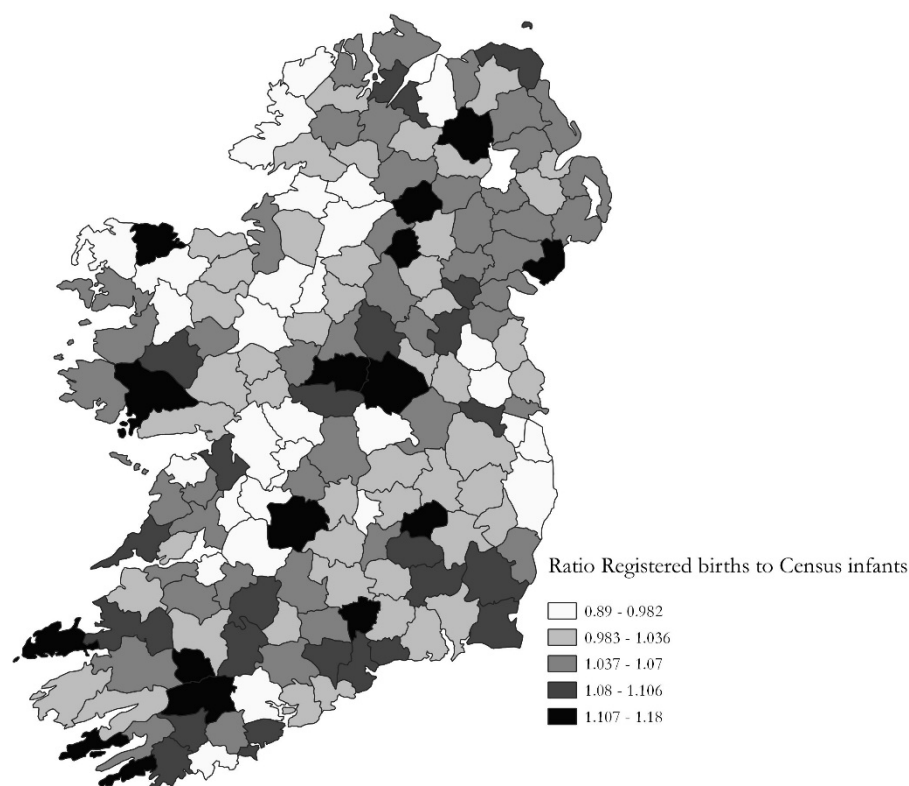


Table 3 Comparison of the Ratio of Birth Registration (1870-71) to 1871 Census enumeration

	Number of unions	Mean	Standard Deviation	Minimum	Maximum
All Unions	163	1.035	0.058	0.896	1.177
Unions with ratio +/- 10%	145	1.025	0.049	0.903	1.097
Unions over 10%	17	1.131	0.023	1.103	1.177
Unions over 15%	4	1.167	0.100	1.154	1.177
Unions under 10%	1	0.896	-	0.896	0.896
Counties (Walsh 1972)	32	1.120	0.168	0.738	1.450
Counties (1870 births minus 1870 infant deaths)	32	1.013	0.149	0.675	1.327

Given the discussion of registration, a pertinent question is whether the identified reporting issues are systematic across Poor Law Unions. Figure 11 examines this by comparing the ratio of death registration/census to birth registration/census, this indicates some weak correlation between both. Table 4 explores this more systematically by regressing these ratios on each other and including the registration district controls with controls for poor law area, population, and valuation controls, as well as controls for the outliers in death and birth registrations. We see that the biases in recording of births are correlated with the misreporting of deaths and vice versa. We also see some district over-reporting of deaths in the North-Eastern by 5 percentage points but there is no systematic misreporting across all districts. While for births, these are overestimated in North-Eastern by 4 percentage points, in South-Eastern and South-Western by 5 percentage points. Controlling for outlying districts for births and deaths has no effect on the death registration/census ratio, but outlier birth registration districts have a much more sizeable impact on the birth registration/census ratio.

Figure 11 Scatterplot of Ratio of registered deaths to census and registered births to census enumerated infants, 1871

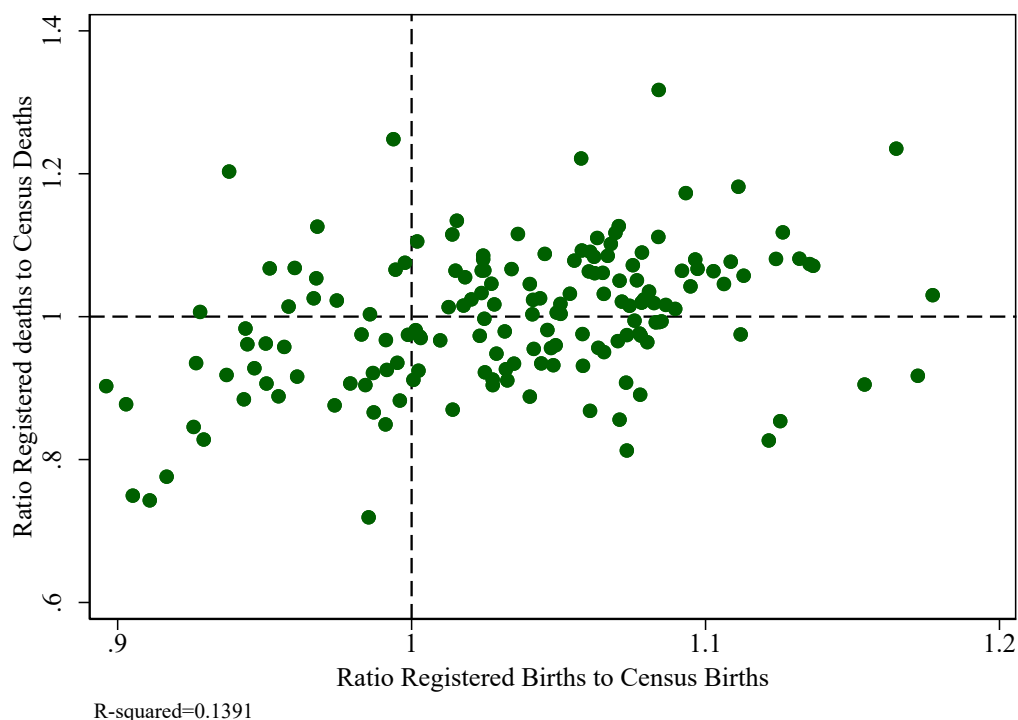


Table 4 Regression of Registered Deaths/Census and Registered Births/Census

	(1)	(2)	(3)	(4)
	Deaths		Births	
Population density	-0.02 (0.029)	-0.03 (0.031)	0.01 (0.025)	0.02 (0.025)
Area	-0.00 (0.000)	-0.00 (0.000)	0.00 (0.000)	0.00 (0.000)
Poor Law Valuation	-0.0003 (0.002)	0.001 (0.002)	-0.003* (0.002)	-0.003* (0.001)
Birth Registration/Census		0.01*** (0.002)		
Death Registration/Census				0.002*** (0.000)
	Registration Districts Reference			
Eastern				
North-Eastern	0.09*** (0.020)	0.05** (0.023)	0.06*** (0.014)	0.05*** (0.014)
North Midland	0.04* (0.026)	0.03 (0.027)	0.02 (0.017)	0.01 (0.017)
North Western	-0.01 (0.035)	-0.01 (0.033)	-0.01 (0.019)	-0.01 (0.017)
South Midland	0.02 (0.028)	0.01 (0.024)	0.02 (0.017)	0.02 (0.015)
South-Eastern	0.02 (0.027)	-0.01 (0.025)	0.05*** (0.013)	0.05*** (0.012)
South-Western	0.05** (0.024)	0.02 (0.023)	0.06*** (0.014)	0.05*** (0.014)
Western	0.01 (0.031)	0.01 (0.030)	-0.01 (0.018)	-0.01 (0.018)
Death registration/census outliers	-0.01 (0.026)	0.00 (0.026)	-0.02 (0.012)	-0.02 (0.011)
Birth registration/census outliers	0.00 (0.061)	-0.04 (0.065)	0.08*** (0.024)	0.08*** (0.027)
Constant	0.99*** (0.026)	0.40** (0.189)	1.02*** (0.016)	0.86*** (0.049)
Observations	163	163	163	163
R-squared	0.11	0.19	0.32	0.38

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Note: See Table A4 for summary statistics.

Verrière (1979) was notably critical of the registration of births and deaths of infants. He compared the total number of births registered from 1871 to 1880 with the census enumeration of the population aged under 10. The difference between the census and vital registration, he inferred, was a measure of the mortality of those aged 0-5. The resulting estimate equated to 147 per 1,000 and was lower than the infant mortality rate in France (170 per 1,000) and Germany (200 per 1,000). Verrière implied that this figure was ‘improbable [invraisemblables]’ because of the likely effect of emigration, thus it implied under-registration of births. Verrière was also critical of mortality figures. He believed these too were under-registered, particularly for infants, while the deaths of those aged 1 to 4 were recorded with greater accuracy. The plausibility of the census and

vital registration figures are assessed in Table 5. Verrière compared the sum of birth registrations from 1871 to 1880 with the 1881 census population under 10. The census figures reflect a population that has survived, so the first adjustment should include the registered deaths of those under 1. This reduces the discrepancy by approximately two-thirds. Another important factor is emigration. The annual emigration returns indicate the number of children who emigrated with their families and including these figures reduces the discrepancy to 2 percent.²⁶ These adjustments then suggest that the discrepancy is not as large as implied by Verrière. To lend further robustness, we compare the cohort aged 0 to 9 in 1871 with the cohort aged 10 to 19 in the 1881 censuses, and the implied cohort depletion is 85.70 per 1,000. This cohort depletion includes both death and emigration and suggests a smaller discrepancy. The other salient factor is that there was an absolute decrease in those aged under 10 between the 1871 and 1881 census (a 6.8 per cent decline).

Table 5 Estimated bias from vital registration and census

<i>Estimate</i>	<i>Rate per 1,000</i>
I. Verrière estimates	146.22
II. Estimates without adjusting births for deaths	140.08
III. Estimates adjusting for deaths under 1	47.25
IV. Estimates adjusting for deaths under 1 and emigration	20.42
V. Cohort depletion (1871-1881 census)	85.70
VI. Decline in population aged under 10	68.35

Note: Verrière uses registered births from 1871-80 and the 1881 census population under 10.

Another possible cause of low birth registration is infanticide. In Appendix A6 we discuss infanticide and in Appendix A7 with discuss sex ratios. For infanticide we document a large discrepancy in existing estimates from Farrell (2013) and find that the infanticide rates are less than 1 percent of reported infant deaths, although we do document a slightly positive correlation between infanticides and infant mortality (see Figure A.5.5). In terms of sex ratios, we do not observe large abnormalities and conclude that this is not a major determinant of inaccuracies. Within the wider historical criminology literature, Taylor (1998) highlighted the stagnation of Victorian crime figures and argued that these reflected supply-side constraints within the criminal

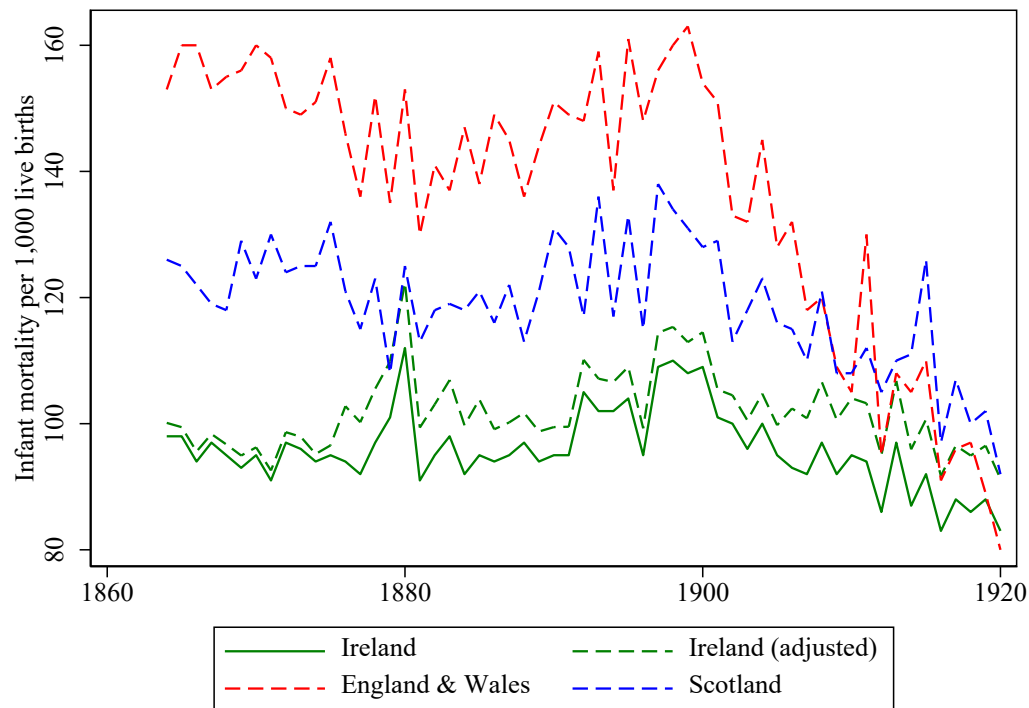
²⁶ In the 1881 census there was a noticeable increase in this discrepancy between registered births and the census population of infants (see Figure 8). In appendix A5 we repeat the analysis from Table 4 for the 1881 census and highlight the role of emigration in disrupting civil registration.

justice system rather than a real decrease in the level of crime. In infanticide (which was the largest component of homicides), Archer (2008) supports Taylor's assessment that there was underreporting in England. Ireland had a much different experience with criminal justice in the nineteenth century and had a higher number of police per capita than Britain, as a result the Irish constabulary was more involved in the monitoring and prosecution of various crimes. In any case, the adjusted infanticide figures reported in Appendices A5 & A6 show similar rates as reported in Liverpool in the 1860s.²⁷

Given the issues relating to the under-registration of deaths of infants, we can adjust the recorded infant deaths by the ratio of the registered births to census infants as presented in Figure 8. The results of this adjustment are presented in Figure 12 for infant mortality figures. This is because the mean ratio was at its highest in 1911. In the years prior the ratio was closer to 5 percent. These adjusted infant mortality rates would still be lower than those reported in France and Germany, but challenge the argument of Verrière that there was significant under-registration of deaths in Ireland. The adjustment are not very sizeable. In Appendix A9, we explore additional sources of under-registration, including 'missing' births and deaths, and draw on evidence from a case study comparing baptisms with birth registration (Kennedy 2023) to derive weights for adjusting for missing births. These adjustments have a sizeable effect; however, a key caveat is that similar under-registration likely existed elsewhere, without comparable adjustments being applied.

²⁷ Archer (2008) reports that children under 1 were 63 percent of all 182 murder verdicts at Liverpool Coroner's Court between 1852-1862. This equates to a rate of 1.91 per 100,000 population. Infanticide is believed to have been more common than reported in official criminal statistics but that cases were more likely to be brought against mothers of older infants than against mothers of newborns (Higginbotham 1989).

Figure 12 Infant mortality rates in the UK.



Note: The adjustment to infant mortality rates for Ireland use the weights from figure XY to adjust the number of reported infant deaths. This leads to an increase in infant deaths but no adjustments are made to registered births.

6 Standardised mortality

The idea of a standard population was introduced for first time in the 1871-81 supplement to the English Registrar General Report when it was observed that differences in age and sex across counties in England could drive differences in crude mortality, and that ‘it is unsafe therefore, to base any comparison between two areas upon their general death-rates, until it has been first ascertained that the populations of the two are practically identical as regard their age and sex distribution.’ However, it was argued that because ‘differences due to variations in sex distribution are usually so small that it is practically sufficient to correct merely for age distribution, and thus save half the labour’ (BPP 1885, pp xvii-xviii). This approach to standardisation was then introduced into annual reports of the English Registrar General to show changes in mortality over time adjusted for age and sex composition (Higgs 2004, BPP 1903). The standard population used for standardisation purposes was the 1901 population of England.

The same standardisation procedure was not implemented by the Registrar General of Ireland, but given the dramatic demographic changes experienced by Ireland in the nineteenth century, standardisation was needed there more than in England.²⁸ The differences between the 1901 census in England and Ireland are shown in Figure 13 (see Appendix A8 for comparison with other census years). It is clear that Ireland, as Gilleard (2016) argues, had ‘prematurely aged’. The other aspect of Irish emigration was the high ratio of female migrants (Fitzpatrick 1986). It has been acknowledged within the Irish literature that emigration likely affected the comparability of mortality. For example, Clarkson (1985) noted that the crude death rate in Ulster masked the disparity between urban and rural populations as the rural areas had high levels of emigration and the urban areas had higher levels of immigration. However, despite this observation there was no attempt to estimate standardised mortality rates.

Therefore to make comparisons within Ireland over time requires standardisation for both age and sex. Such standardisation is also required to make comparisons with Britain (and elsewhere in Europe), this was shown in the case of the 1918 influenza pandemic whereby most estimates are not age standardised and make comparison difficult (see Colvin and McLaughlin (2021)). At present only standardised estimates are available for England and Wales, these use the 1901 English population distribution as a standard population. The notable distinction of course is the absence of age heaping in England whereas in Ireland there was still a level of heaping present (Colvin et al. 2024). The aggregated mortality statistics were reported in quinquennial and decadal intervals, this minimises the bias introduced from digit preferences for ages ending in 5’s and 0’s.

The construction of age and sex standardised mortality requires information on age and sex specific mortality. This is available from the annual reports of the registrar general in Ireland. The census provides the denominator for the population in the associated age categories.

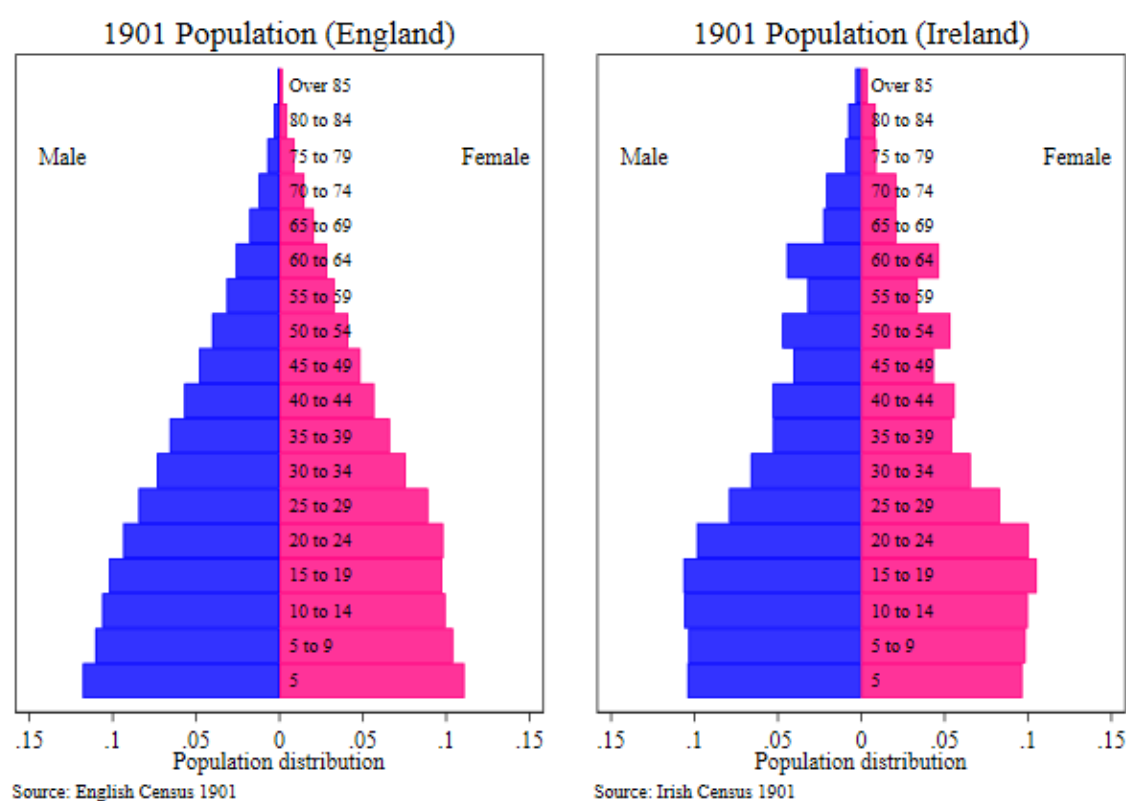
$$M_{sat} = \frac{\sum m_{sat} P_n}{P_t} \times 1,000$$

Given that a both age specific mortality and the population is known, we have used a direct standardisation approach using the 1901 English population as the standard population (P_a).

$$m_t = \frac{\sum m_{sat} P_a}{P_t} \times 1,000$$

²⁸ There was a slight change in the female share of the Irish population from 51 per cent in 1861 to 50 percent by 1911, therefore an adjustment purely on age gives a similar result. However, the Female share of the 1901 English population was 52 percent and thus the comparison highlights the divergence between male and female mortality experiences in Ireland.

Figure 13 Comparison of 1901 population in England and 1901 population in Ireland



The difference between crude and age standardised mortality are shown in Figures 14, 15, and 16. Purely analysing mortality using crude mortality, indicates a dramatic decline in mortality in England and Wales while in Ireland there does not appear to be any change in mortality. However, standardised estimates indicate that Ireland had already achieved a lower level of mortality than England and that declines in mortality were followed by Ireland, albeit with a slight lag. Distinguishing between male and female mortality highlights how standardised mortality was higher for Irish women than males, this was a notable distinction compared to patterns observed in England. Comparable figures for the twentieth century show that Irish registration and standardised mortality continued to lag behind developments in England and Wales (Hall 2013).²⁹

²⁹ Applying the adjustment of 5 percent or 10 percent to infant deaths (as discussed in the previous section) does not alter the picture (see Figure A9.4).

Figure 14 Crude and standardised mortality rates, England and Ireland

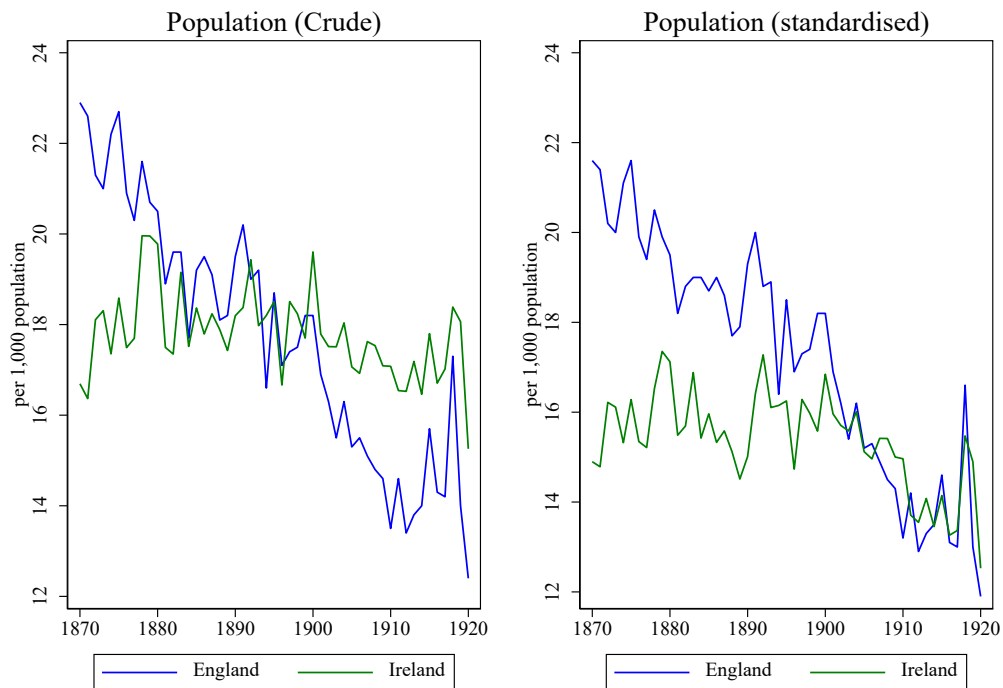


Figure 15 Crude and standardised male mortality rates, England and Ireland

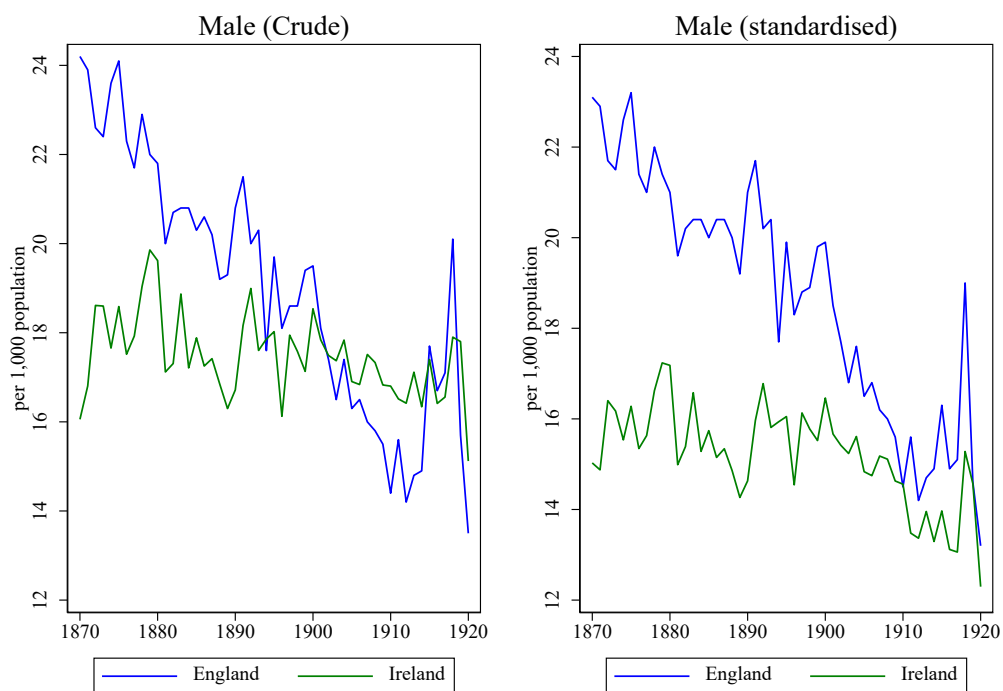
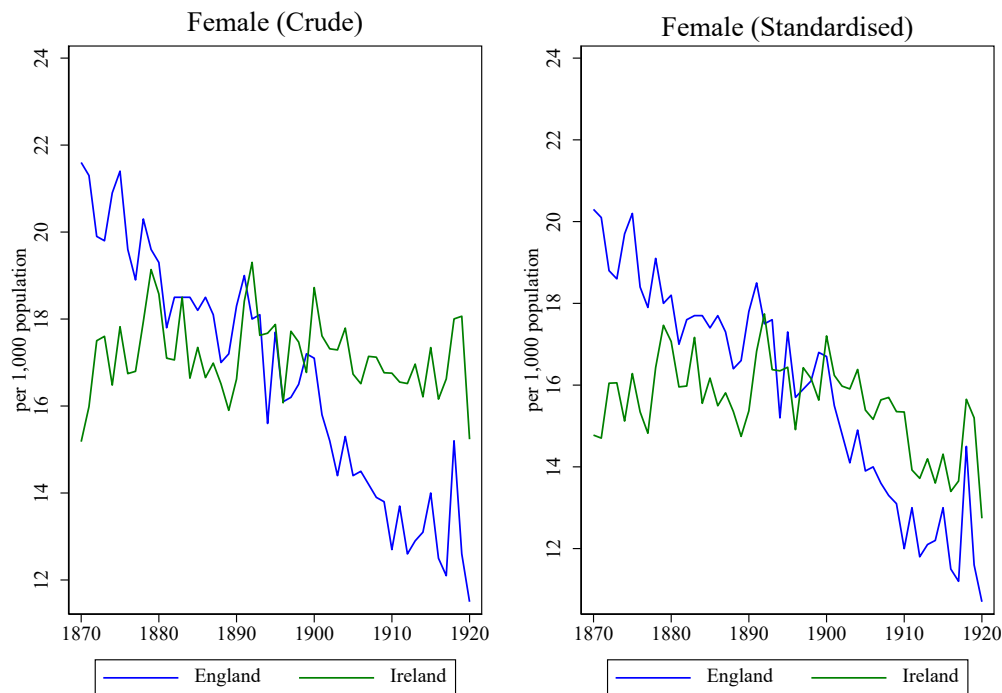


Figure 16 Crude and standardised female mortality rates, England and Ireland



7 Conclusion

The history of the introduction of civil registration in Ireland in 1864 reflects broader tendencies that historians have identified in the expansion of the British state and data-led governance in Ireland. It formed an important part of the aim to fully integrate Ireland into the United Kingdom, while at the same time indicating official views of Irish ‘difference’ and a need ‘to speed up development in Ireland in order to bring it more closely into line with Britain’ (Crossman 2018, Delaney 2025). The first Registrar’s reports suggested much work was needed to haul a recalcitrant population to comply with the new system in order to achieve a level of completeness relative to the other UK nations. This framework arguably lingered in earlier scholar’s assessments in the 1960s and 1970s of the deficiencies of civil registration.

Questions about the completeness of vital registration have never been particular to Ireland. In the 1950s, it was reported that only 30 percent of global deaths were reported; registration ranged from 7 percent in some parts of East Asia to 100 percent in Europe and North America (Shryock et al. 1976). In 2000 the estimated reporting increased to 36 percent and then to 38 percent by 2015 (AbouyZahr 2015a, 2015b). The WHO (2024b, c) reported data on age standardised mortality and provided an indication of the quality of the data available, ranging from ‘high completeness’, low completeness but moderate quality, low completeness and severe quality issues. Lastly, there were countries where, ‘death registration data are unavailable or unusable due

to quality issues. Estimates of mortality by causes should be interpreted with caution: estimates may be used for priority setting, however, they are not likely to be informative for policy evaluation or comparisons among countries' (WHO 2024b, c). Based on our evaluation of Irish civil registration we believe that Irish data is most likely in the second category, 'low completeness but moderate quality category' (the same category as France today), but by nineteenth century standards it would have been 'high completeness', completeness', which challenges the assessments of Walsh, Cousens and Verrière, and reveals vital registration statistics to be a more reliable historical source than heretofore acknowledged.

Ireland experienced impressive economic growth relative to the rest of the UK in the post-Famine period (Geary and Stark 2002, 2015; Kenny et al. 2023). As economic growth is typically associated with higher life expectancy (Preston 1975), the declines in age-standardised mortality documented here make Ireland more consistent with standard Preston curves (Prados de la Escosura 2023). The reliability of death registration also permits more detailed analysis of the drivers of declining mortality, including the role of improvements in housing quality (de Bromhead et al. 2025). Further research on Irish demographic change could explore the influence of migration on fertility patterns over time and the extent to which these dynamics contributed to Ireland's divergence from broader European trends. Moreover, the increasing reliability of vital registration, and its adoption by a public seeking stronger property rights in an era of largescale land redistribution, may shed additional light on trends in total factor productivity (TFP) growth, as well as on wealth accumulation and inequality. Recent work on Irish economic performance has placed greater emphasis on TFP growth as a key driver of post-Famine economic expansion, raising the possibility that enhanced property rights provided an important institutional foundation for this growth. Consistent with this interpretation, Turner (2010) documents a decline in the share of wealth held by the top 1 per cent from the 1890s onward, a period that coincides with rising registration coverage and increased search activity.

The low rate of infant mortality reported for Ireland and the low rate using adjustments presented here are compatible with findings of an urban-rural differential in England (Williams and Galley 1995). Within Ireland, infant mortality was significantly higher in cities and recorded levels were higher than those of comparable cities in the UK. However, Ireland was considerably less urbanized and less densely populated compared to England and Wales. Given the well documented urban penalty in the nineteenth century, this could explain the lower rates of infant mortality in Ireland. While the high rates of emigration can explain some of the issues relating to the anomalies that appear in unstandardized series, standardized mortality trends align with those in the rest of the UK and most likely explain discrepancies with the rest of Europe.

The last issue remains to align the findings in this study with Coward's (1982) finding of under registration in Ireland in the twentieth century. Perhaps some information can be gleaned from the slight uptick in offences against registration shown in Figure 5. This also aligns with the increased divergence between registration and census records in 1911. In the new regime, one of the first reforms was the disbandment of the old Poor Law system and with it went various registration districts. Perhaps these disruptions to civil government can help explain the increase in under registration documented from the 1910s onwards.

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Appendices

A1 Comparison with Europe

Below are indicative comparisons of crude mortality between Ireland and other European countries based on available data from secondary data sources. The existing comparisons have been either with the rest of the UK (Kennedy & Clarkson 1993) or with France and Germany (Verrière 1979). A broader comparison highlights both the divergent experiences but also some similarities that could be explored in future work.

Figure A1.1: Mortality per 1,000 living population

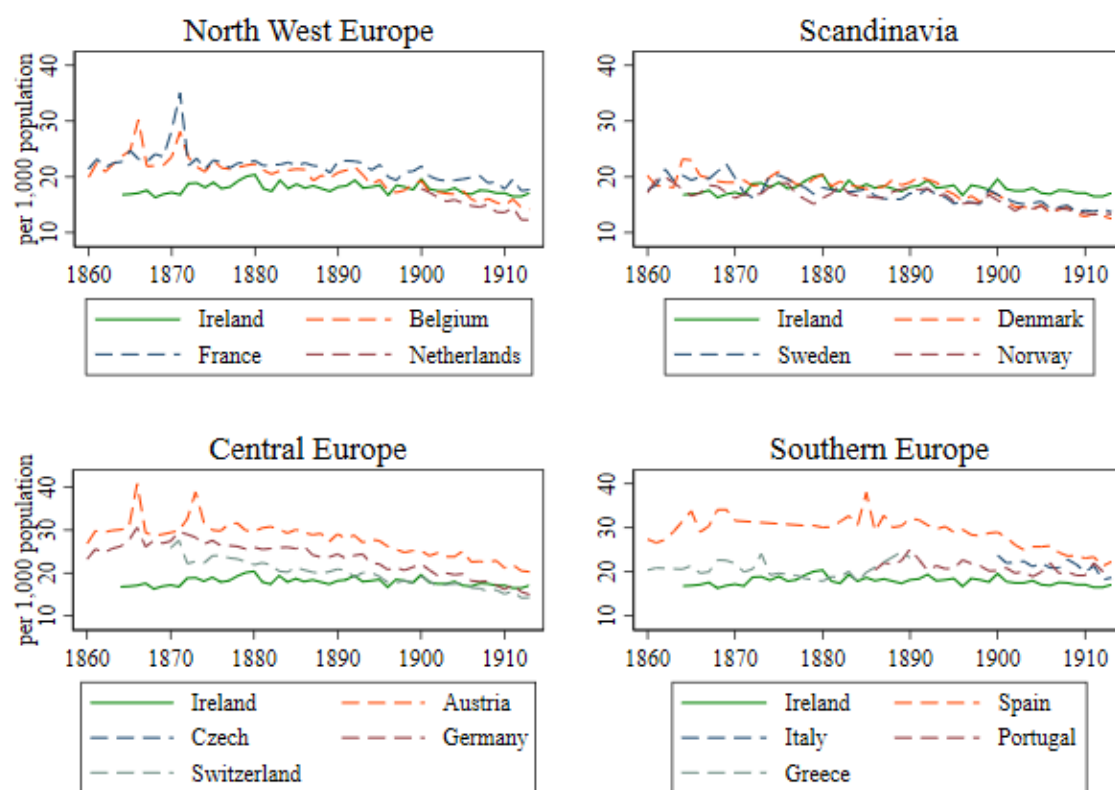


Figure A1.2: Births per 1,000 living population

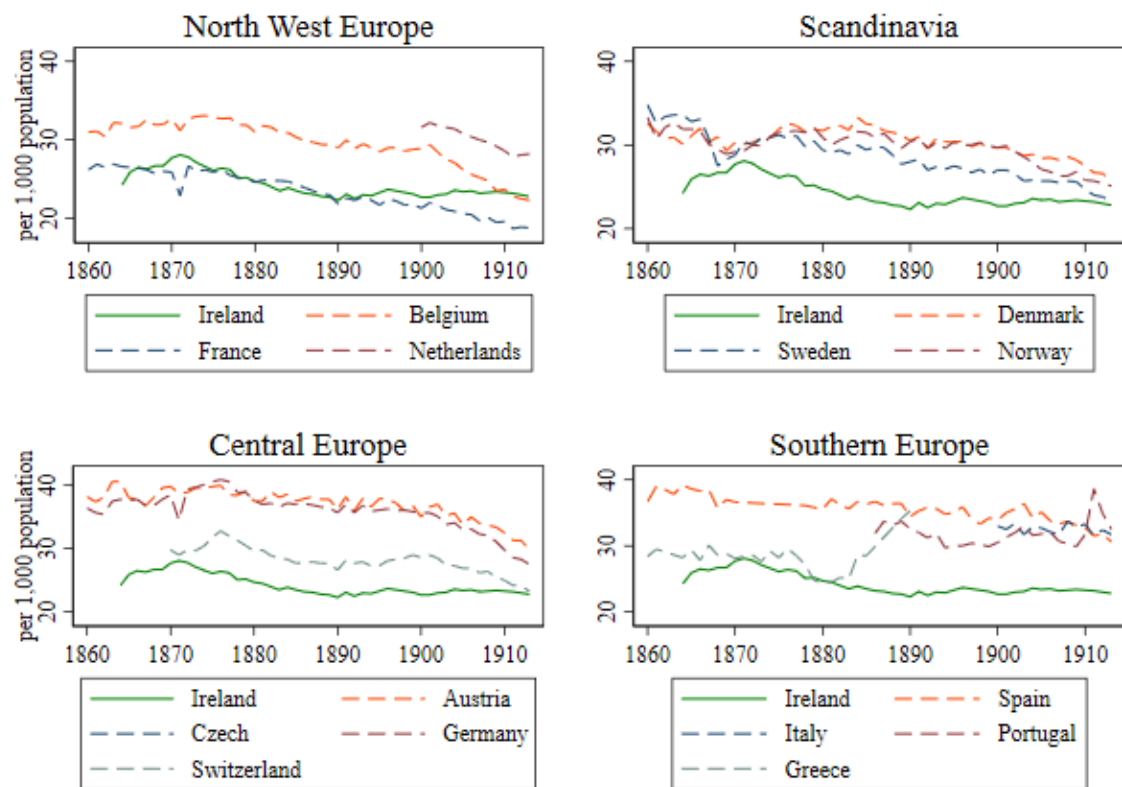


Figure A1.3: Infant deaths per 1,000 live births

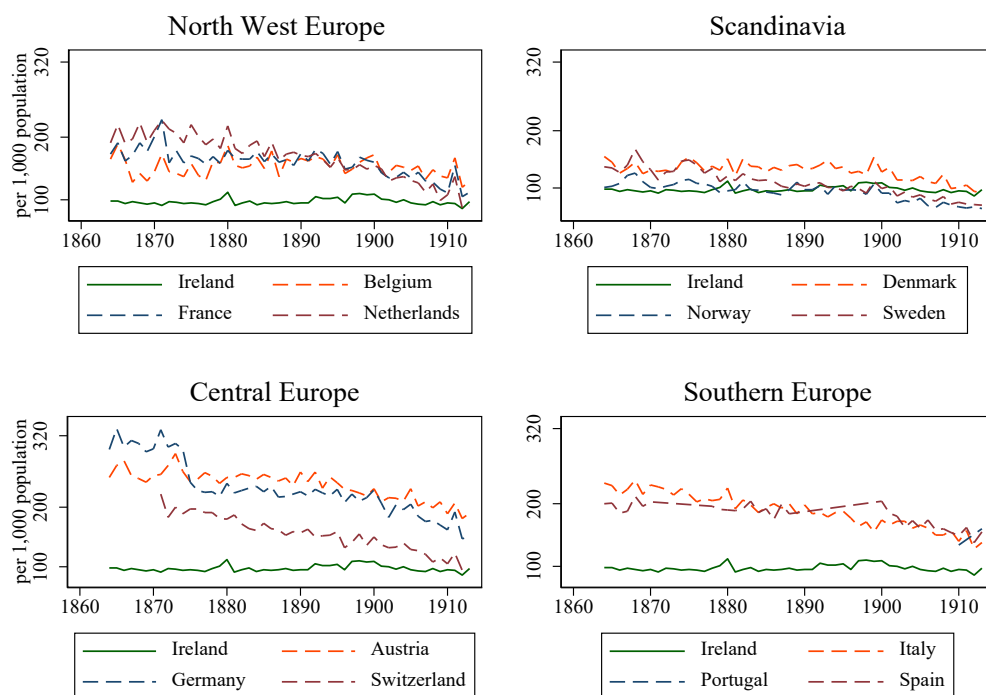
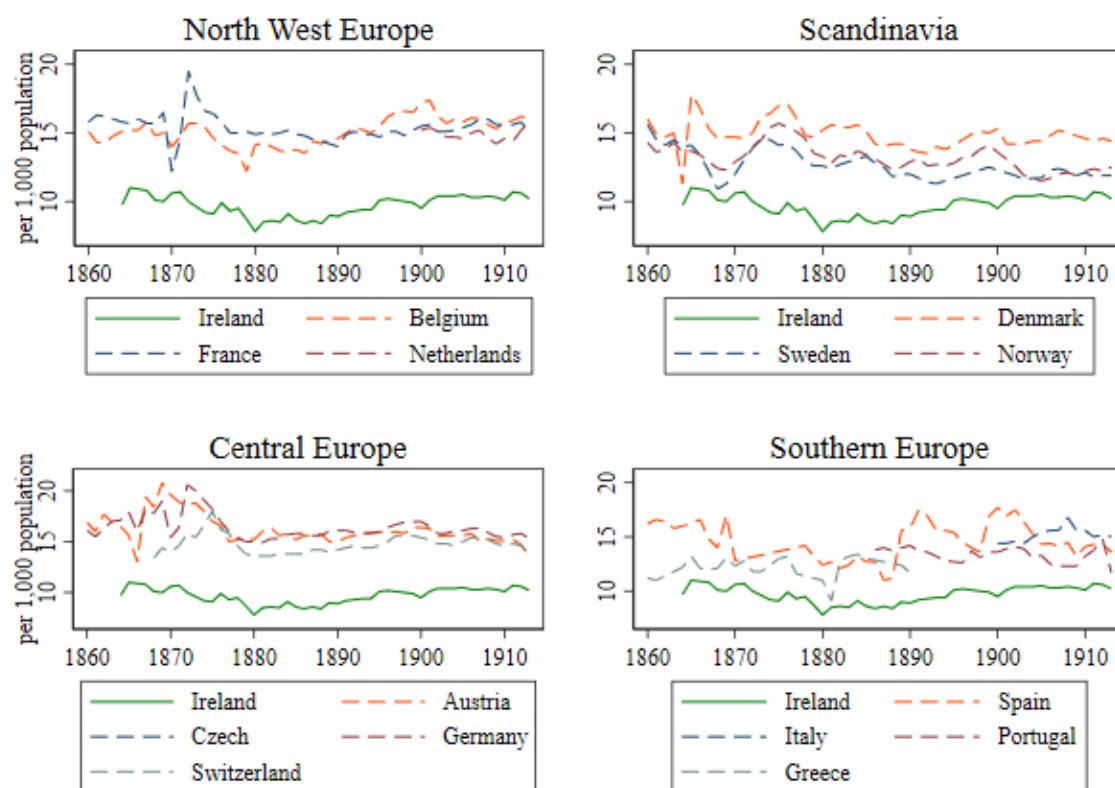


Figure A1.4: Marriages per 1,000 living population



A2: Census survey on general mortality

Table A2.1 presents a facsimile of the mortality survey from the general survey of the 1871 census and Table A2.2 presents a stylised return (BPP 1876, pp 466-467).

Table A2:1 Mortality Survey from 1871 census

Form A (Table 3). Return of the members, visitors, boarders, and servants, who have died while residing with this family, since the 7th of April 1861, the Date of the last Census.

Note: the necessity of this Table is caused by the want of a Registration of Deaths in Ireland for the entire period over which the inquiry extends.

Number	Names		Relation	Age		Sex	Rank, Profession, or occupation	Cause of Death	Time of death	
	Christian Name	Surname		Years	Months for infants under one year				Season – as Spring, Summer, Autumn or Winter	In what Year?
1			Of each to the Head of the Family, whether Wife, Son, Daughter, or other relative, visitor, boarder, Servant, & c.			Whether male or female	State the particular rank, Profession, trade, or other employment of each person	Disease or Accident which caused death		
2										
3										
4										
5										
6										

Table A2:2 Example Table

Form A (Table 3). Return of the members, visitors, boarders, and servants, who have died while residing with this family, since the 7th of April 1861, the Date of the last Census.

Number	Names		Relation	Age		Sex	Rank, Profession, or occupation	Cause of Death	Time of death	
	Christian Name	Surname		Years	Months for infants under one year				Season – as Spring, Summer, Autumn or Winter	In what Year?
1	Mary	Moran	Wife	48		Female	None	Fever	Summer	1861
2	Patrick	Moran	Son	12		Male	None	Small Pox	Summer	1866
3	Bryan	Byrne	Visitor	40		Male	Pedlar	Apoplexy	Autumn	1867

A3: Replication of Walsh (1970)

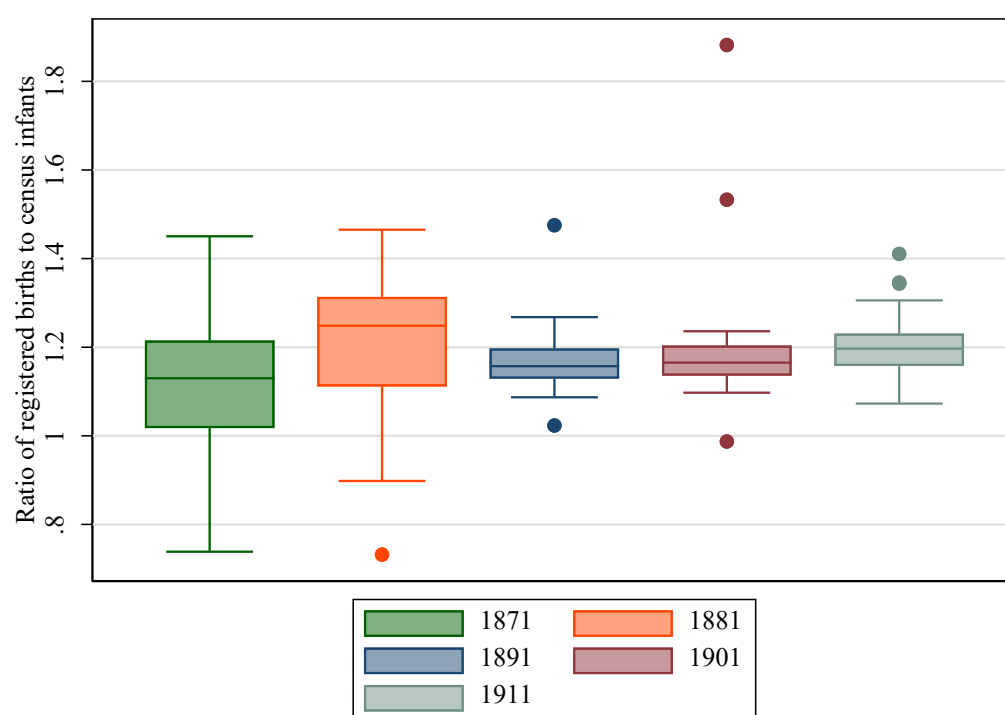
Table A2.1 presents Walsh's ratio of census under 1 population to registered births alongside efforts to replicate his estimates according to what is presented in the original Walsh study and what is presented in the text of the paper. Column 1 is a replication of Walsh's numbers that use the registered Births in 1870 divided by the 1871 census population under 1. Despite acknowledging the need for adjustments between the two sources, surprisingly Walsh did not actually make any adjustment for the timing of the census, infant deaths, or net migration in his estimates. Moreover, we found two errors in the original estimates. The estimate for Antrim was too low and implied a higher number of births than were recorded, and Galway excludes Galway town.³⁰ We show the Walsh calculation extended across different censuses in Figure A3.1

³⁰ We include Antrim (6088), Belfast (5307), and Carrickfergus (248) which gives us a census population of 11643.

Table A3.1: Comparison of county estimates of the ratio of birth registration to census infant population, 1871

		(1)	(2)	(3)
		Walsh estimate	Registered Births 1870 / 1871 Census infants	Adjust registered births (Registered Births – infant deaths 1870) / 1871 Census infants
Leinster	Carlow	1.022	1.022	0.896
Leinster	Dublin	1.112	1.112	0.958
Leinster	Kildare	1.231	1.231	1.117
Leinster	Kilkenny	1.029	1.029	0.923
Leinster	King's	1.154	1.154	1.052
Leinster	Longford	1.45	1.450	1.327
Leinster	Louth	1.408	1.408	1.278
Leinster	Meath	0.842	0.842	0.774
Leinster	Queen's	0.886	0.886	0.811
Leinster	Westmeath	0.738	0.739	0.675
Leinster	Wexford	1.299	1.299	1.145
Leinster	Wicklow	1.012	1.012	0.920
Munster	Clare	1.039	1.039	0.955
Munster	Cork	1.168	1.168	1.059
Munster	Kerry	1.146	1.146	1.052
Munster	Limerick	1.128	1.128	1.016
Munster	Tipperary	1.155	1.155	1.047
Munster	Waterford	1.333	1.333	1.170
Ulster	Antrim	1.193	1.132	1.002
Ulster	Armagh	1.406	1.406	1.282
Ulster	Cavan	1.194	1.194	1.103
Ulster	Donegal	0.974	0.974	0.918
Ulster	Down	1.06	1.060	0.965
Ulster	Fermanagh	0.979	0.980	0.913
Ulster	Londonderry	1.236	1.236	1.114
Ulster	Monaghan	1.199	1.199	1.094
Ulster	Tyrone	1.162	1.162	1.075
Connaught	Galway	1.135	1.054	0.964
Connaught	Leitrim	0.956	0.956	0.889
Connaught	Mayo	1.058	1.058	0.957
Connaught	Roscommon	1.261	1.261	1.170
Connaught	Sligo	0.867	0.867	0.802
All-Ireland	Mean	1.119	1.117	1.013
All-Ireland	Weighted mean	1.059	1.050	0.951

Figure A3.1 Ratio of registered births and census infants



Note: This methodology follows the approach of Walsh (1971).

A4 Summary Statistics

The summary statistics of the variables used in Table 4 are presented below. The data sources are the 1871 census of Ireland.

Table A4.1 Summary statistics for variables used in Table 4

Variable	Obs	Mean	Std. Dev.	Min	Max
Registered Deaths/Census	163	1.00	0.10	0.72	1.32
Registered Births/Census	163	1.04	0.06	0.90	1.18
Population Density	163	0.31	0.51	0.08	4.19
Area	163	124687.70	44449.30	41207	257479
Poor Law valuation (£10,000)	163	8.18	7.48	1.0946	58.5238
North Eastern	163	0.12	0.33	0	1
North Midland	163	0.11	0.31	0	1
North Western	163	0.10	0.31	0	1
South Midland	163	0.10	0.31	0	1
South Eastern	163	0.10	0.30	0	1
South Western	163	0.15	0.36	0	1
Western	163	0.19	0.39	0	1
Death outlier	163	0.25	0.43	0	1
Birth outlier	163	0.03	0.17	0	1

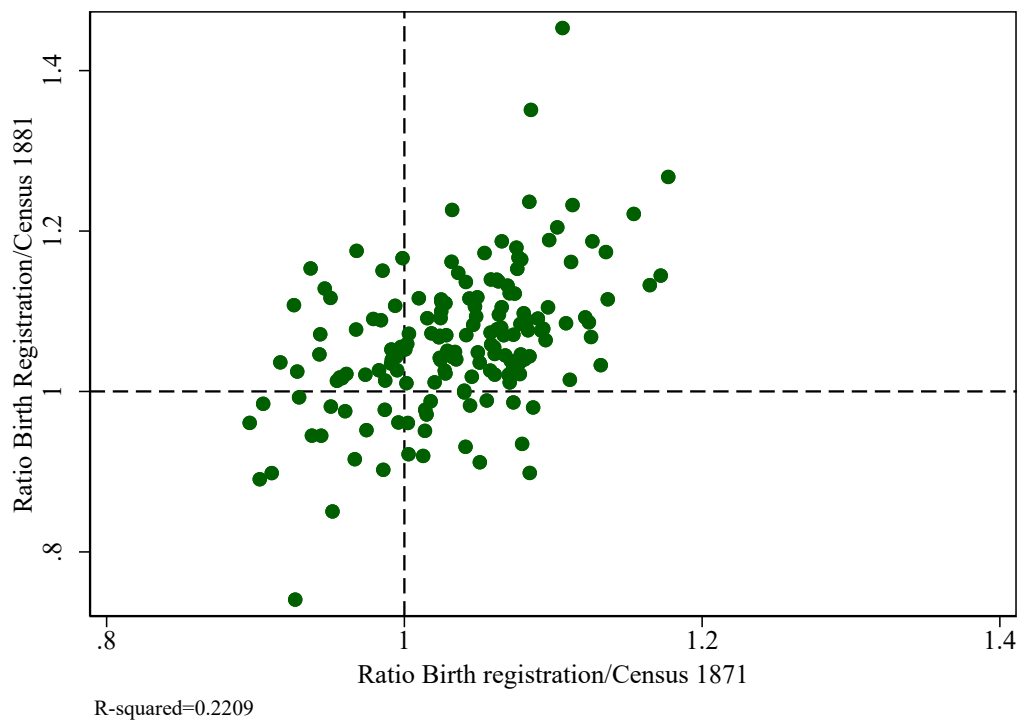
A5 1881 Census, Civil registration, and Emigration

While the census commissioners did not include death tables in the 1881 census, it is possible to repeat the analysis comparing birth registrations and infant population. Table A8.1 shows there was a clear deterioration in birth registration and the variance between the registered births and census increased. While the ratio is still much less than reported by Walsh (1970) it does still beg the question what drove the increase? There was a correlation between the ratios from the 1871 and 1881 censuses (see Figure A8.1)

Table A5.1 Comparison of birth registration and 1881 and 1871 censuses

	Observations	Mean	Standard Deviation	Minimum	Maximum
1881					
Total 1881	163	1.062	0.089	0.741	1.453
Males	163	1.069	0.083	0.773	1.428
Females	163	1.060	0.084	0.709	1.469
1871					
Total	163	1.035	0.058	0.896	1.177
Male	163	1.045	0.063	0.892	1.217
Female	163	1.026	0.069	0.818	1.202
Difference 1881-1871					
Total	163	0.027	0.080	-0.186	0.347
Male	163	0.025	0.081	-0.221	0.314
Female	163	0.034	0.087	-0.225	0.365

Figure A5.1 Scatter of Ratio of Birth registration/census



A possible explanation could be the divergent trends in migration that occurred in the late 1870s. Emigration increased from 1880 onwards (Vaughan and Fitzpatrick 1978, pp 261-263). While emigration figures were recorded, there are doubts over their completeness and historians have used cohort depletion as an alternative way to assess migration flows.

Cohort depletion is a proxy for the high emigration rates from Ireland which are underestimated by annual emigration returns which overlook permanent and step-wise emigration to Britain (Fitzpatrick 1998, p. 564). Following Fitzpatrick (1998, p. 608), we track the percentage decrease of cohorts between the two census periods. Fitzpatrick choose to group two cohorts (5-24) from one census period to the next. Instead of taking this approach we use 10 year benchmarks to track cohort depletion and we also adjust cohort depletion for mortality in each cohort.

Table A5.2 Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Ratio 1881	163	1.06	0.09	0.7405	1.4531
Change in ratio 1871-1881	163	0.03	0.08	-0.1862	0.3468
Cohort depletion 10-19 1871	163	0.28	0.07	0.1718	0.5727
Cohort depletion 20-29 1871	163	0.39	0.09	-0.0260	0.6089
Cohort depletion 30-39 1871	163	0.42	0.04	0.3272	0.5269
Cohort depletion 40-59 1871	163	0.25	0.05	0.11	0.46
Area	163	124687.7	44449.3	41207.00	257479.00
Poor Law Valuation	163	8.18	7.48	1.09	58.52
Population density	163	0.31	0.51	0.08	4.19
North Eastern	163	0.12	0.33	0	1
North Midland	163	0.11	0.31	0	1
North Western	163	0.10	0.31	0	1
South Midland	163	0.10	0.31	0	1
South Eastern	163	0.10	0.30	0	1
South Western	163	0.15	0.36	0	1
Western	163	0.19	0.39	0	1
Death outlier	163	0.25	0.43	0	1
Birth outlier	163	0.03	0.17	0	1
Deaths Census ratio	163	99.87	9.65	71.91	131.72

Table A8.2 presents regression results of the change in the ratio of registered deaths to infant population from 1871-1881. Column 1 includes cohort depletion estimates showing five different cohorts. The 0-9 in 1871 (i.e., 10-19 in 1881), 10-19, 20-29, 30-39, and 40-49. Of the cohorts, the ones most likely to be disruptive for registration purposes would be the cohorts most likely to bear children, the 10-19 cohort from 1871 and the 20-29 cohort. Column 1 presents unconditional regressions and the 20-29 cohort has a negative and significant effect. Once controls are included in column 2, the 10-19 cohort is also significant. These findings are also present when we control for outliers in the birth and death registration from 1871

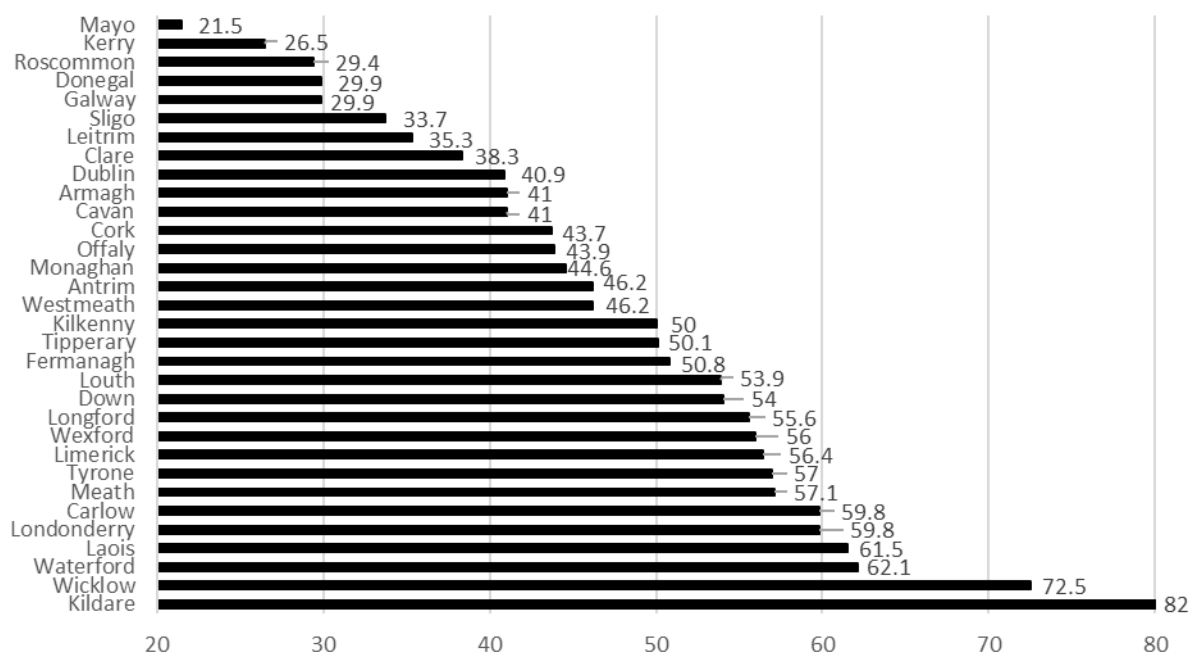
Table A5.2 Regressions of change in ratio of registered deaths to census infant population (1871-1881)

	Ratio 1881			Change in ratio 1871-1881		
	(1)	(2)	(3)	(4)	(5)	(6)
Cohort depletion 0-9 1871	0.31*** (0.117)	-0.01 (0.140)	0.03 (0.136)	0.31*** (0.117)	-0.09 (0.138)	-0.10 (0.135)
Cohort depletion 10-19 1871	0.14* (0.082)	0.21** (0.100)	0.20* (0.101)	0.14* (0.082)	0.20* (0.114)	0.20* (0.113)
Cohort depletion 20-29 1871	0.68*** (0.244)	0.52** (0.233)	0.56** (0.237)	0.68*** (0.244)	0.54* (0.276)	0.52* (0.278)
Cohort depletion 30-39 1871	-0.16 (0.189)	-0.03 (0.211)	-0.06 (0.220)	-0.16 (0.189)	-0.09 (0.213)	-0.08 (0.213)
Cohort depletion 40-59 1871	-0.16 (0.189)	-0.03 (0.211)	-0.06 (0.220)	-0.05 (0.188)	-0.09 (0.213)	-0.08 (0.213)
area		-0.00 (0.000)	-0.00 (0.000)		-0.00 (0.000)	-0.00 (0.000)
PoorLawVal10000		-0.00 (0.002)	-0.00 (0.002)		0.00 (0.002)	0.00 (0.002)
Population density		0.01 (0.029)	0.01 (0.029)		-0.00 (0.023)	-0.00 (0.023)
Eastern				Reference		
North Eastern		0.06** (0.024)	0.05** (0.024)		-0.00 (0.027)	0.00 (0.028)
North Midland		-0.05** (0.025)	-0.05** (0.026)		-0.08*** (0.029)	-0.07** (0.029)
North Western		-0.02 (0.028)	-0.01 (0.027)		-0.02 (0.027)	-0.02 (0.027)
South Midland		0.04* (0.021)	0.03 (0.021)		0.01 (0.025)	0.01 (0.025)
South Eastern		0.02 (0.022)	0.01 (0.022)		-0.03 (0.023)	-0.03 (0.023)
South western		0.04 (0.026)	0.03 (0.027)		-0.01 (0.028)	-0.01 (0.028)
Western		-0.05* (0.027)	-0.05* (0.026)		-0.05* (0.030)	-0.05* (0.030)
Death outlier		-0.02 (0.015)	-0.02 (0.015)		-0.00 (0.016)	-0.00 (0.016)
Birth outlier		0.08*** (0.031)	0.08** (0.034)		0.00 (0.030)	0.00 (0.030)
DeathsCen_100			0.00** (0.001)			-0.00 (0.001)
Constant	0.68*** (0.084)	0.79*** (0.082)	0.66*** (0.106)	-0.22** (0.091)	-0.19* (0.099)	-0.14 (0.119)
Observations	163	163	163	163	163	163
R-squared	0.13	0.33	0.34	0.07	0.17	0.17

A6 Infanticide Rates

A recent study of infanticide has calculated rates of infanticide over the period 1850-1900. Farrell (2013) uses judicial statistics to calculate a combined rate of infanticide and concealment of birth for every county in the country from 1865 to 1900.³¹ Farrell (2013, p. 20) calculates rates ranging from 21.5 per 100,000 in Mayo to rates of 82 per 100,000 in Kildare, with a county average of 47.83 per 100,000 for the island – these are replicated in Figure A6.1. These are very high rates even using the low estimate of cases reported in the judicial statistics. If accurate, they would lend strong support to the suspicion that infant murders and the concealing of births were very frequent occurrences compared to other places and periods and that under recorded infanticide could explain Ireland's low infant mortality. The difficulty, however, is that these figures are inconsistent with the raw data provided by Farrell on the number of actual cases reported in the judicial statistics.

Figure A6.1 Reproduction of Figure 1 (p. 20) from Farrell, 'Infant murders and concealment of birth offences per 100,000 population'



Source: Farrell (2013)

Although not explicitly stated, Farrell's figure for infanticide is based on the following equation:

³¹ Farrell, notes that she uses three sources, judicial statistics, Irish Crime Records Return of Outrages, and Dublin Metropolitan Police returns (p.15), but relies on Judicial statistics for figure 1.1.

$$\text{Infanticide rate per 100,000} = \frac{\sum I (1865 \dots 1900)}{\bar{P}} \times 100,000 \text{ (A6.1)}$$

Where Infanticides are aggregated over the period 1865-1900 and the denominator is based ‘on population averages from the 1861, 1871, 1881, 1891, 1901 censuses’ from Vaughan and Fitzpatrick (1977).

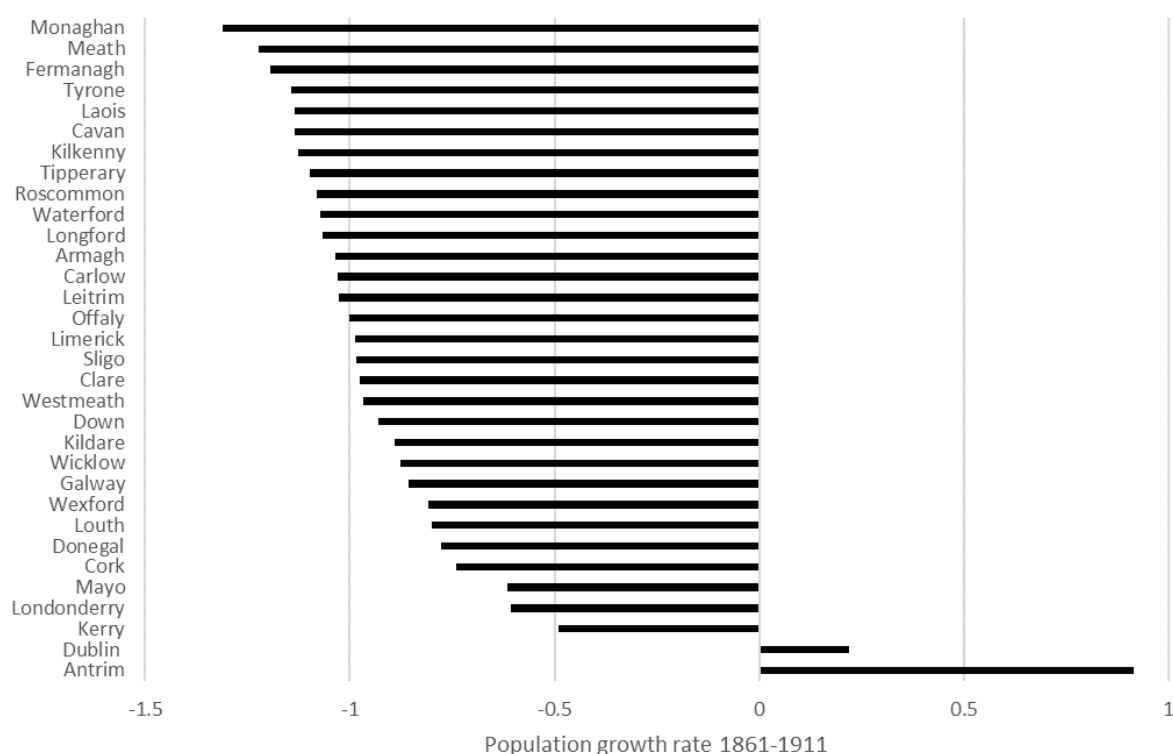
Conventional infant mortality – as distinct from infanticide – rates are typically calculated as follows (McGehee 2004):

$$\text{Infant mortality rate per 1,000} = \frac{D_i}{B_i} \times 1,000 \text{ (A6.2)}$$

Where D_i are infant deaths in a given year and B are births during the same year.

Here we see an immediate distinction between equation A6.1 and equation A6.2. Firstly, the denominator in equation A6.1 is the average population over a 40 year time period, whereas in equation A6.2 the denominator comes from the same time period as the numerator. Why this matters is that the denominator averaged is influenced by population trends, quite simply population growth rate varies across the island. Figure A6.2 illustrates this point, as can be seen the rank order of population growth (population decline for the majority of the island) does not correspond to the rank ordering of Farrell’s infanticide rate.

Figure A6.2: Population growth rate 1861-1911



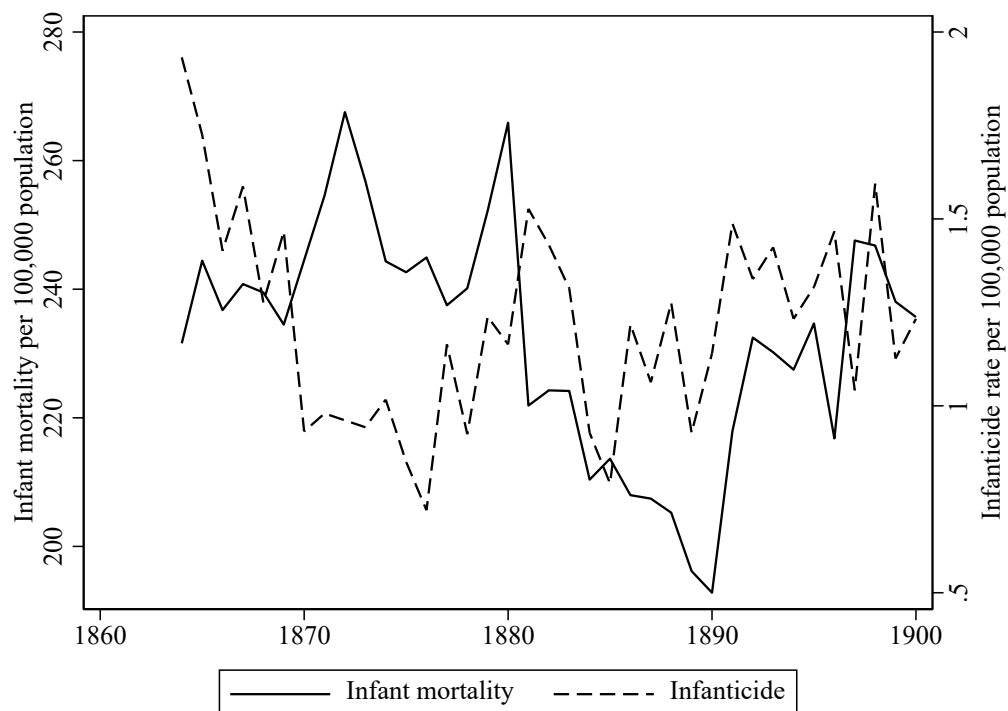
The fact that the counties that are highest on the infanticide chart in Farrell also have the highest rates of population decline – i.e. with lower denominators in equation A6.1 – suggests a second look at the underlying statistics are needed.

Farrell reports that there were 712 murders of infants (1865-1893) and 1,195 cases of concealing a birth (1863-93) reported in the judicial statistics giving a combined total of 1,907 cases (Farrell 2013, pp. 16-17). From the judicial statistics, this number of cases of infanticide and concealment average 64 cases a year over thirty years and this equates to an average infanticide rate of 1.22 per 100,000 per annum – shown in Figure A6.3. This rate is only one fifteenth of the lowest rate and just over one fiftieth of the highest rate calculated by Farrell. Thus, the rates offered by Farrell are inconsistent with the raw data and thus give an inflated impression of the rate of infanticide. Further, comparing infanticide with infant mortality using the same denominator as used by Farrel (see Figure A6.4) illustrates how there was a drastic difference in scale between infanticide and infant mortality. While Farrell's figures implied that infanticide was 20.55 percent of infant mortality, the correct figure is 0.52 percent. Again highlighting how Farell's rates overstate the level of infanticide.

Figure A6.3 Infanticide and concealment cases and infanticide rate per 100,000 population, 1864-1900

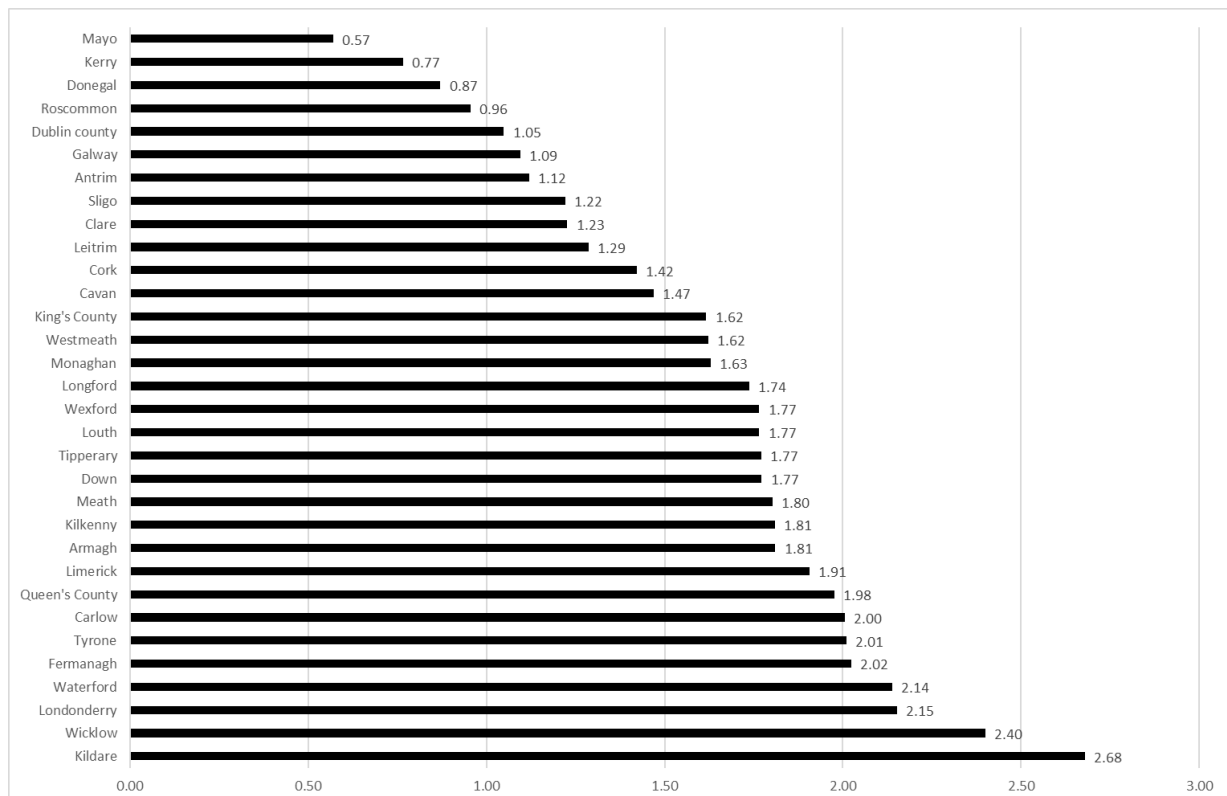


Figure A6.4 Infant mortality and infanticide per 100,000 population



If we were to calculate an accurate rate of infanticide and concealment of birth cases, to take but one example, for Co. Kildare, over this time period, the average rate from 1864-1900 is 2.68 per 100,000 of the population which is significantly lower than the reported figure of 82 per 100,000 by Farrell (2013, figure 1.1). Take another extreme, Mayo instead of having 21 infanticide cases per 100,000, has a significantly lower figure of 0.57 per 100,000. A correction to Farrell's figure is illustrated in Figure A6.5.

Figure A6.5: Corrected Infanticide rates per 100,000 population, 1864-1900



Another issue relates to the most appropriate denominator for infanticide and concealment. Are infanticides best expressed in terms of the population or in terms of births? If the figures are reported in terms of births instead of the population, as shown in Figure A6.6, then for Kildare the infanticide rate per 100,000 live births would be 94.18. For Mayo, the infanticide rate per 100,000 live births would be 19.18. In this case, the figures are more striking as the denominator is the population at risk. Lastly, we document a correlation between infant mortality and infanticide rates in Figure A6.7.

Figure A6.6 Infanticides per 100,000 live births

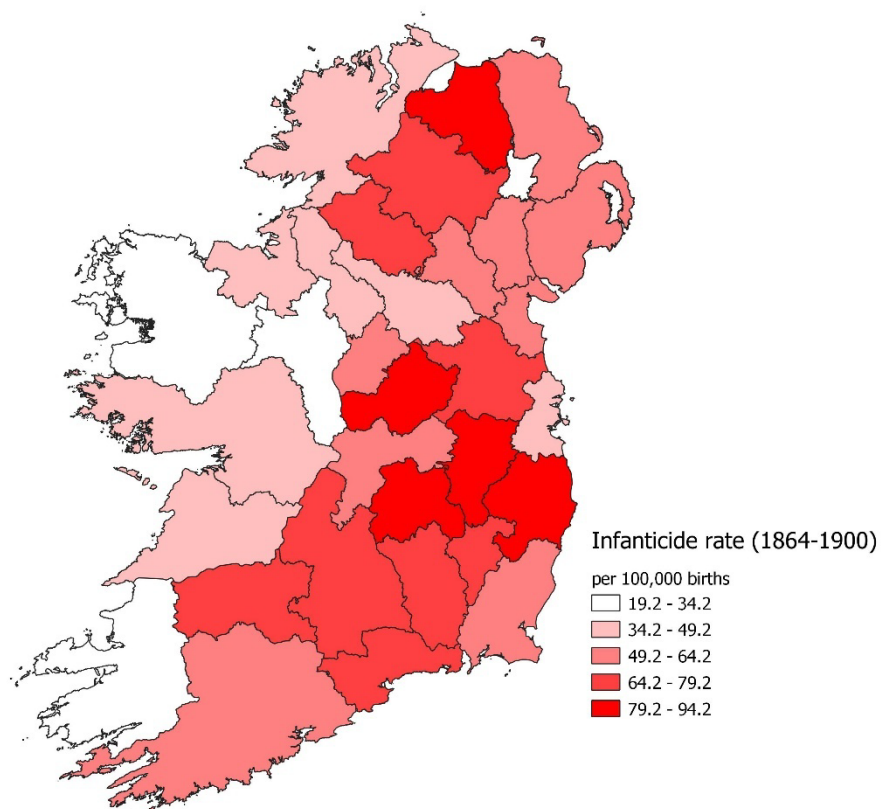
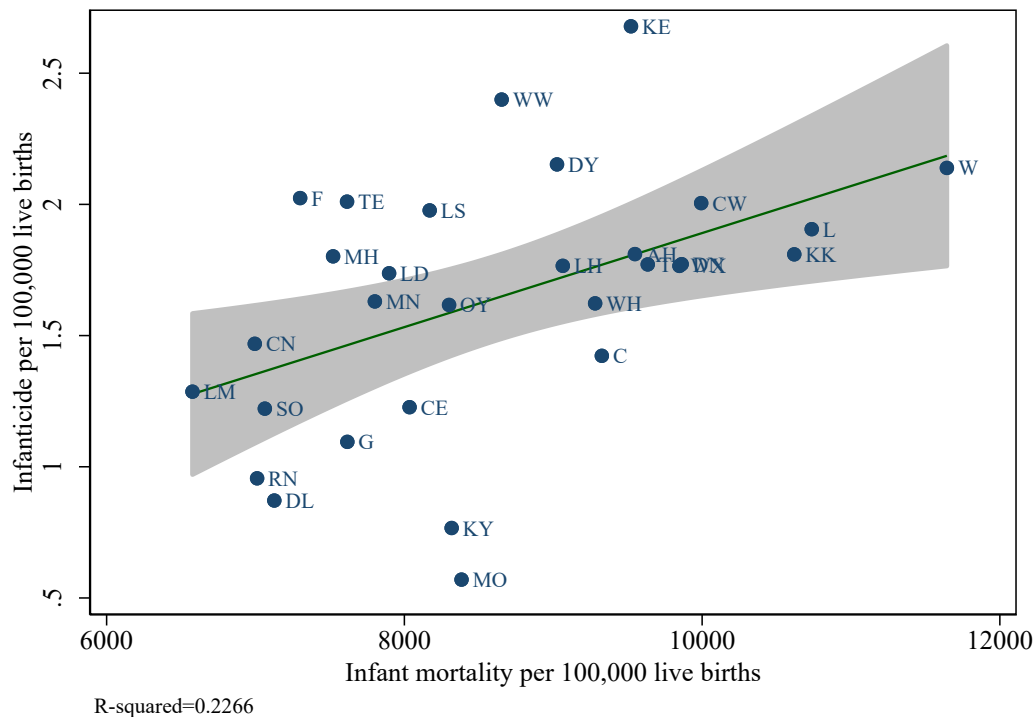


Figure A6.6 Relationship between infanticide and infant mortality per 100,000 live births



A7 Child Sex Ratios

Another aspect of the question of infanticide is gender preference. Beltrán Tapia and Gallego-Martínez (2020) focus on child sex ratios as a way to determine preference for males over females in nineteenth century Spain. In societies with high infant mortality ratios (over 250 per 1,000 live births), there should be an equalisation of child sex ratios but in the case of Spain Beltrán Tapia and Gallego-Martínez (2020) found exceptionally high (ratios over 115). In the Irish case we do not find such sex specific gender discrimination. This is shown for time series data from 1870 to 2019, when the ratio of male to female registered births was 105.67, this is shown in Figure A7.1. This is further illustrated in a series of child sex ratios using the 1841, 1861, and 1891 censuses in Figure A7.2, A7.3, and A7.4.

Figure A7.1: Sex ratios of registered births, 1870-2019

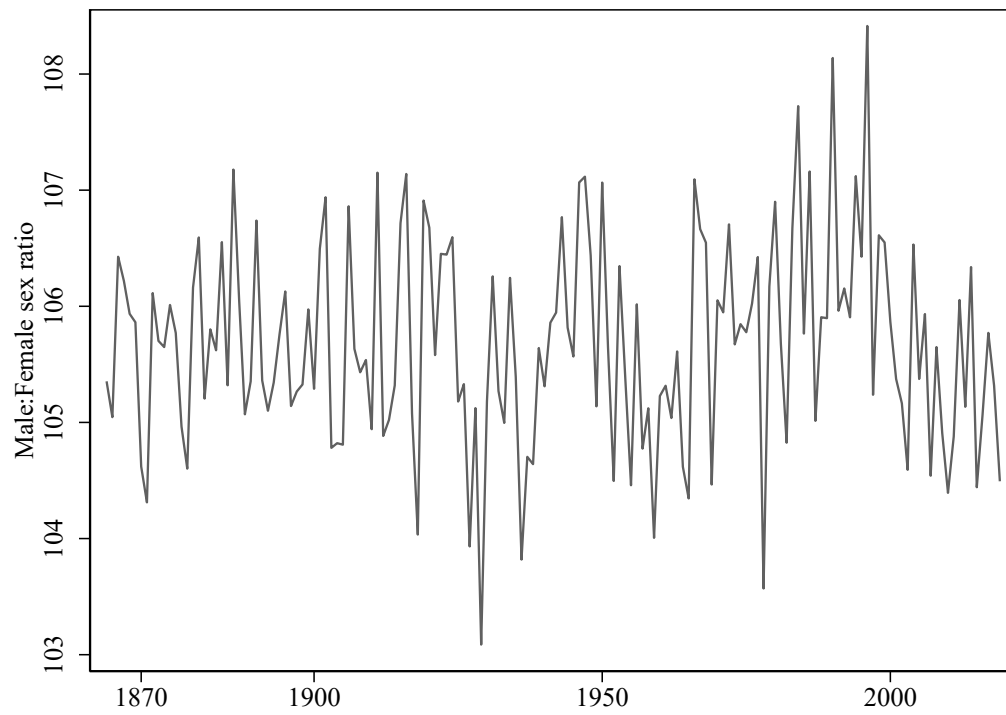
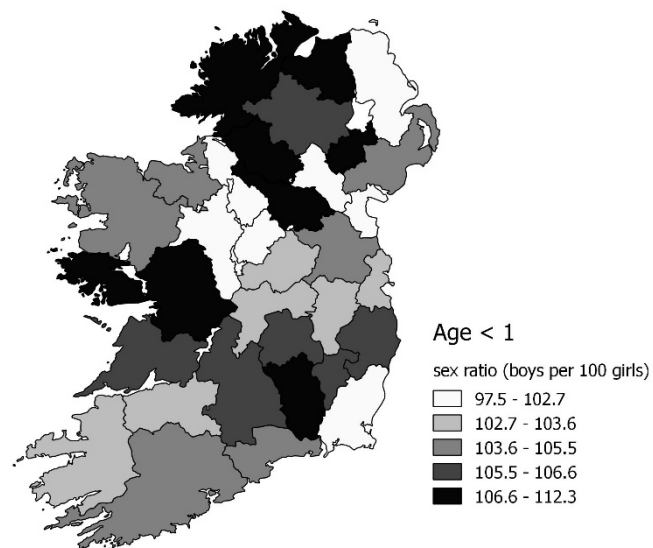


Figure A7.2: 1841 child sex ratios



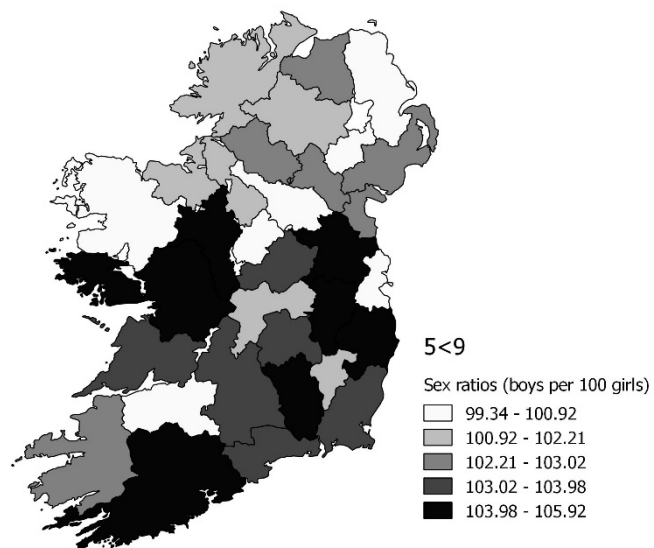
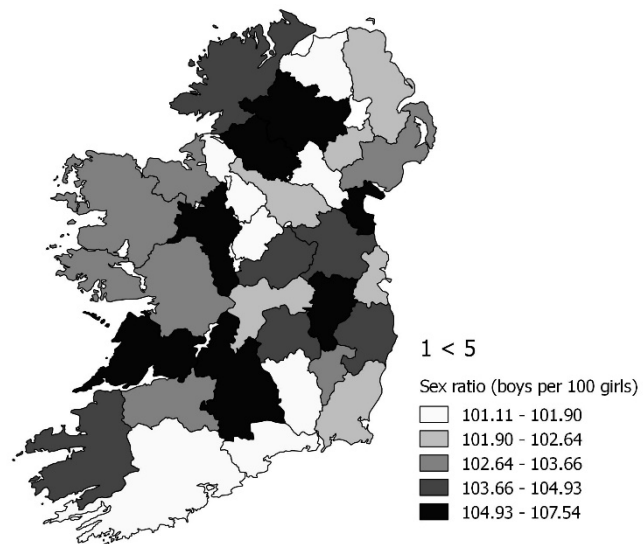
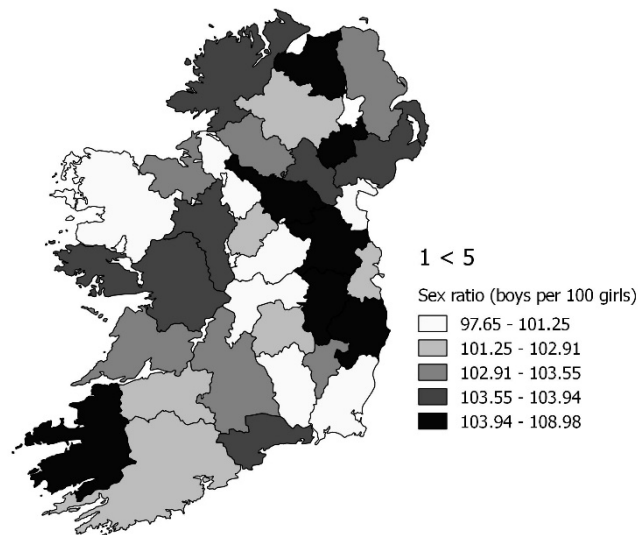
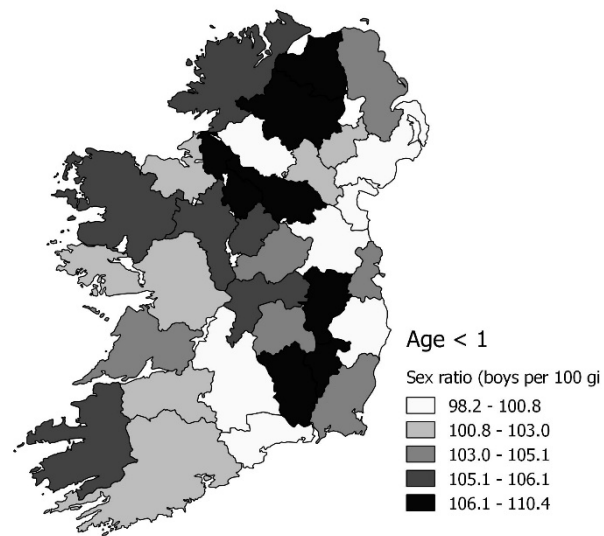


Figure A7.3: 1861 child sex ratios



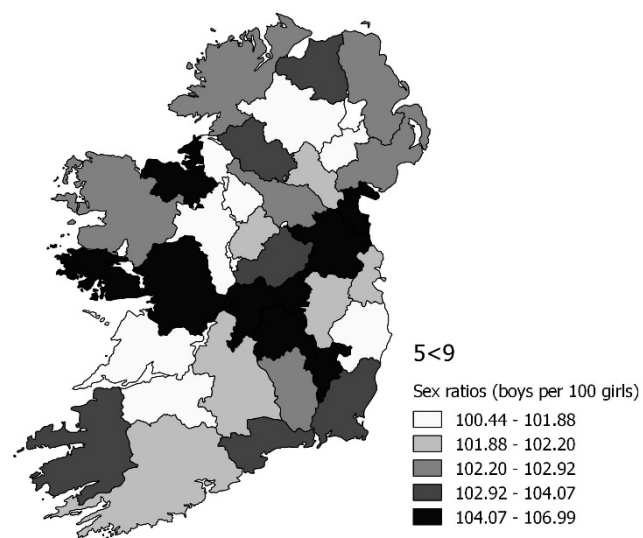
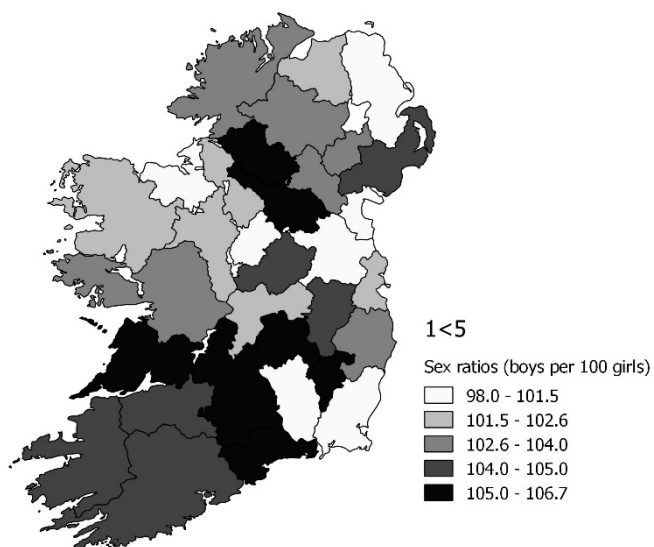
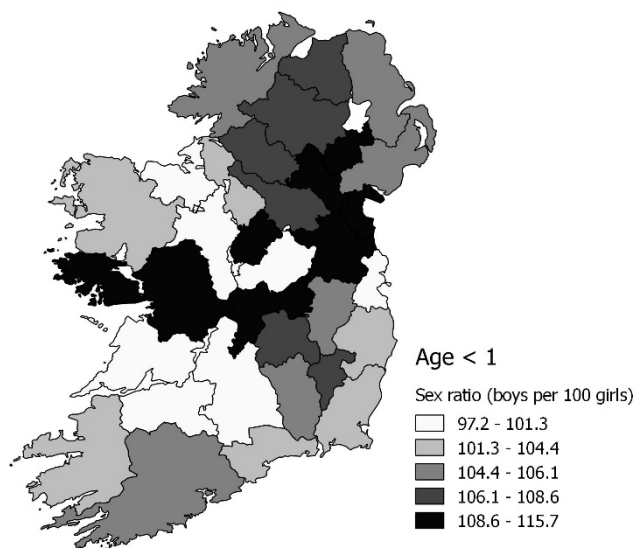
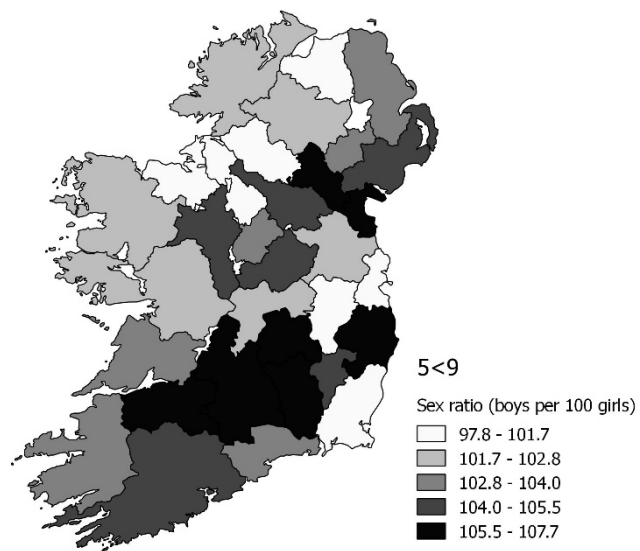


Figure A7.4: 1891 child sex ratios





A8 Population pyramids

Here we highlight the difference between the population distribution in Ireland compared with the 1901 English population. Despite trends in digit preference, the 1841 Irish population comes closest to resembling the 1901 English population distribution with a large base under 25. Whereas the 1861 and 1881 Irish populations show the signs of increased migration and a gradually aging population.

Figure A8.1 Comparison of 1901 population in England and 1841 population in Ireland

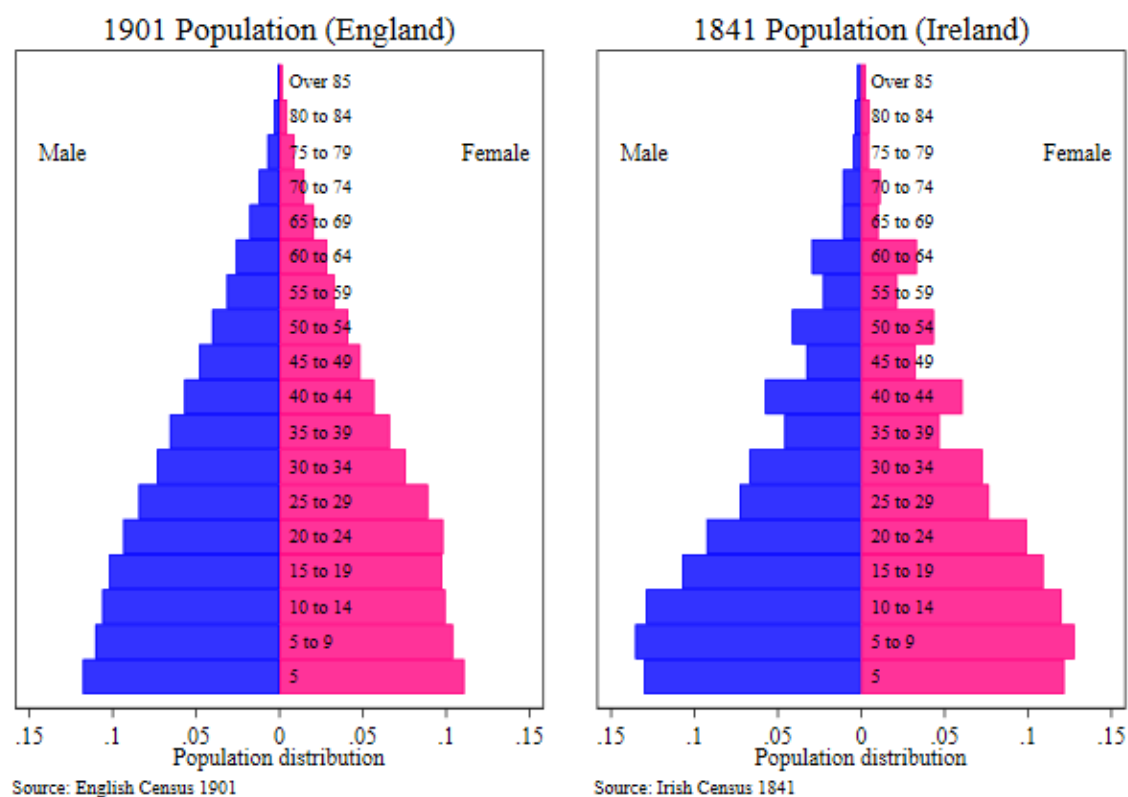


Figure A8.2 Comparison of 1901 population in England and 1861 population in Ireland

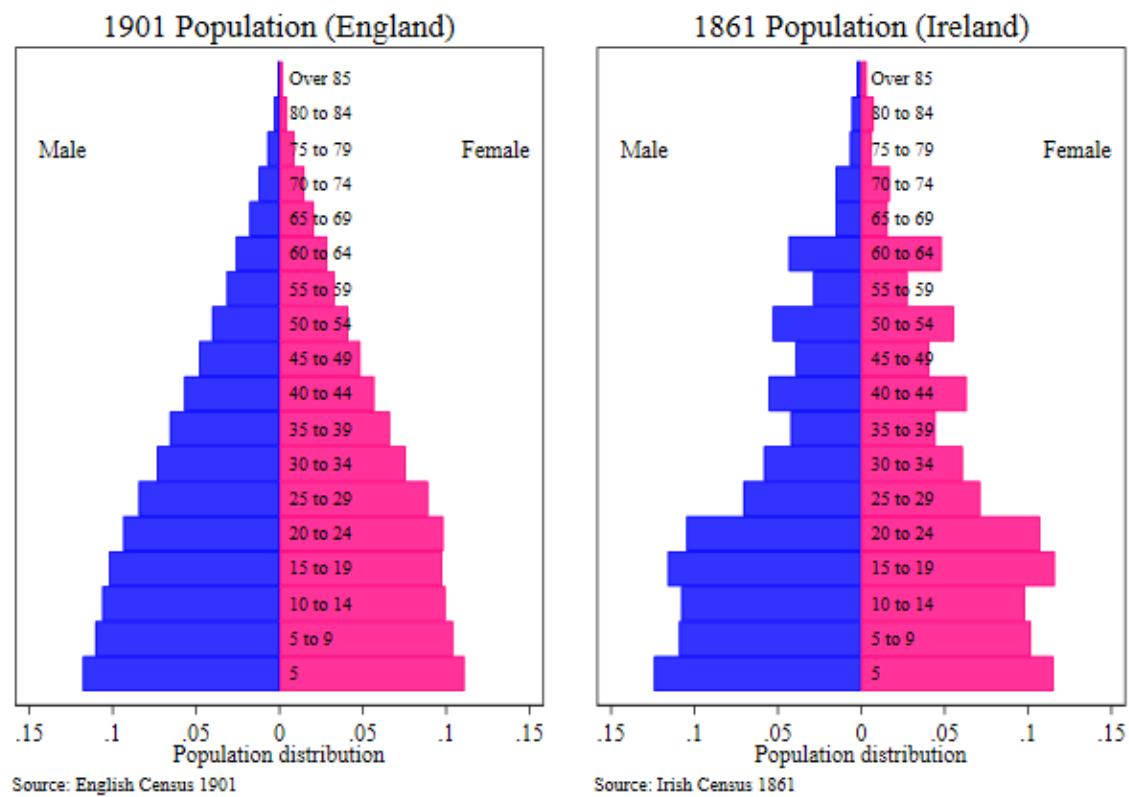
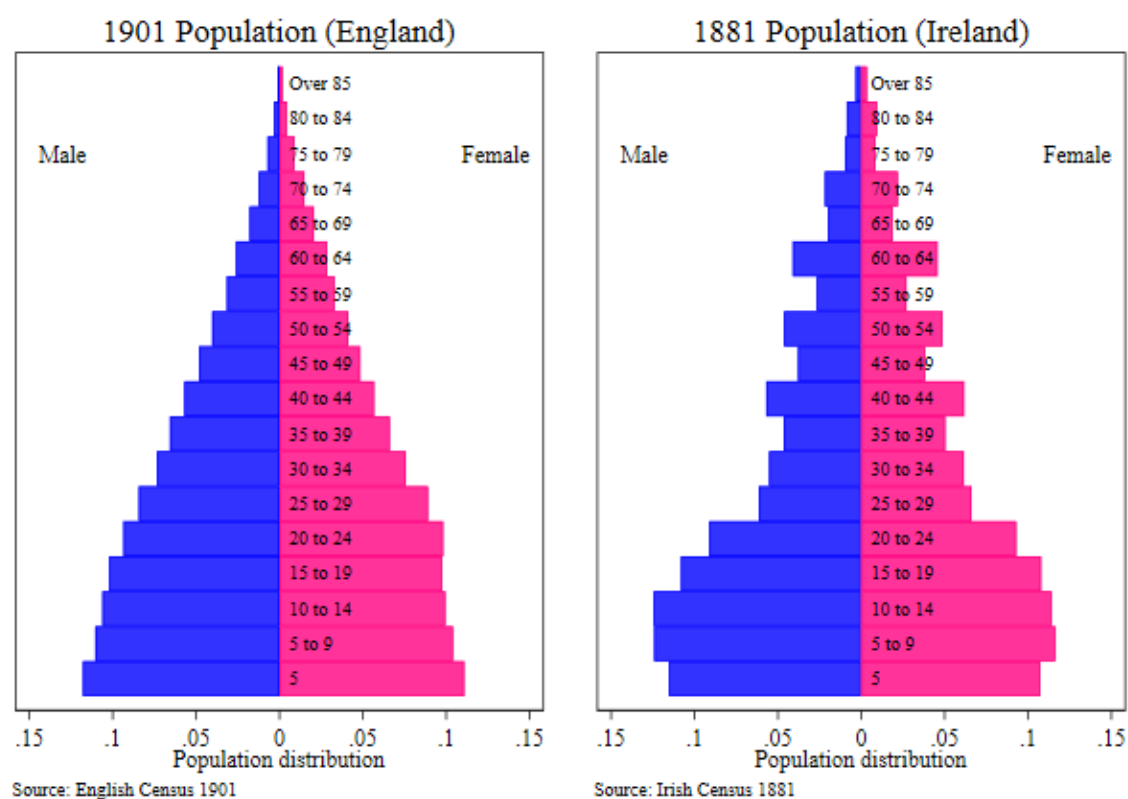


Figure A8.3 Comparison of 1901 population in England and 1881 population in Ireland

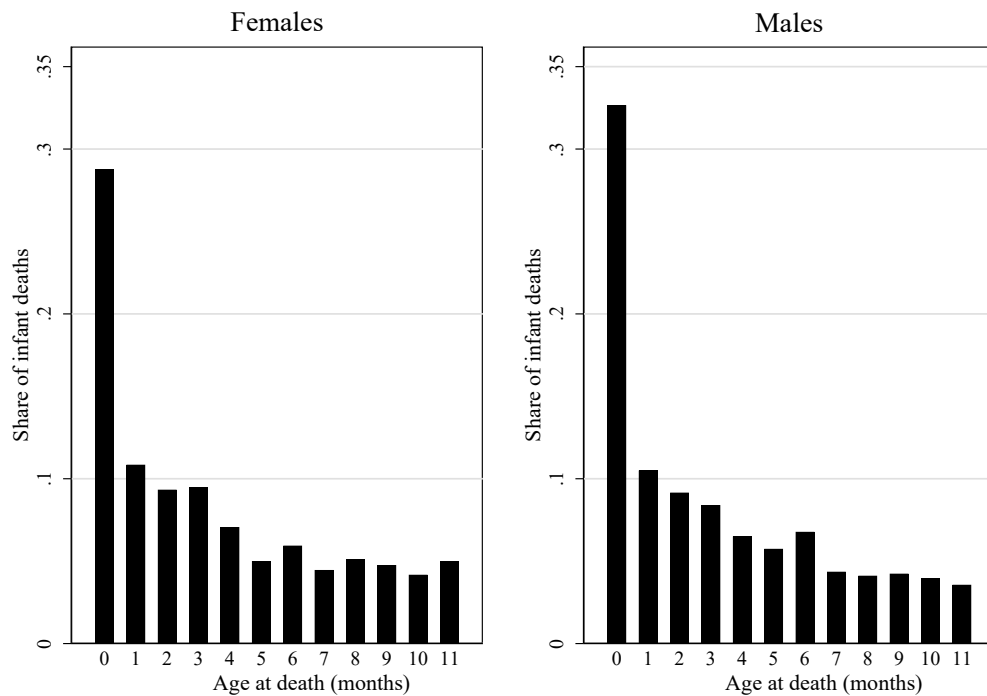


A9 Infant Mortality and “Missing” Births

While the Registrar General reports had always reported information on deaths of infants, it was not until the early twentieth century that more detailed information was provided on infant mortality because of the ‘great interest which is been taken by sanitarians in the subject’ (BPP 1907b, p. xxxiv). The 1906 Registrar General Report contained detailed information on cause of death by infant age (shown in Figure A9.1), where roughly half of infant deaths were under 3 months. A third of infant deaths were within 1 month, of these two-thirds were classified as ‘wasting diseases’; premature births, congenital defects, injury at birth, and ‘atrophy, debility, and marasmus’. The two largest classifications within wasting diseases were premature births and debility. Subsequent Registrar General reports documented age of death of infants in urban and rural areas and a similar pattern of infant deaths was documented. Overall, infant mortality was much higher in urban areas and Irish cities had infant mortality rates comparable with other British cities, such as London, Liverpool, Glasgow, and Edinburgh (see Figure A9.3). However, there was

a distinction between urban and rural areas in terms of the distribution of infant deaths. In urban areas, 54 percent of infant deaths were under 3 months while in rural areas this was slightly higher at 63 percent of infant deaths.

Figure A9.1 Distribution of infant deaths in 1906



Later Registrar General reports gave information on infant mortality by age. Figure A9.2 shows mortality rates by classification, the largest classification was “wasting diseases” (which included premature births) and this was most pressing in the first month of birth. Surprisingly infectious diseases were classified as a lower share of infant deaths. Figure A9.3 presents figures on infant mortality in UK cities. Dublin and Belfast showed comparable infant mortality rates to those seen in other UK cities, although higher than the rates seen in London.

Figure A9.2 Infant Deaths per 1,000 live births, 1906

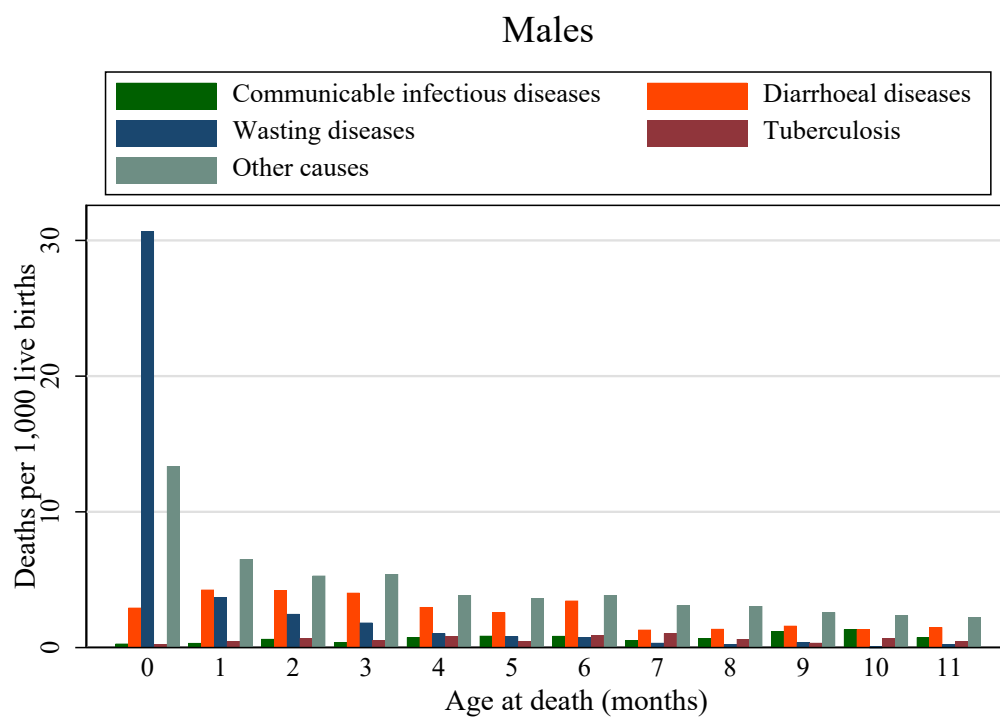
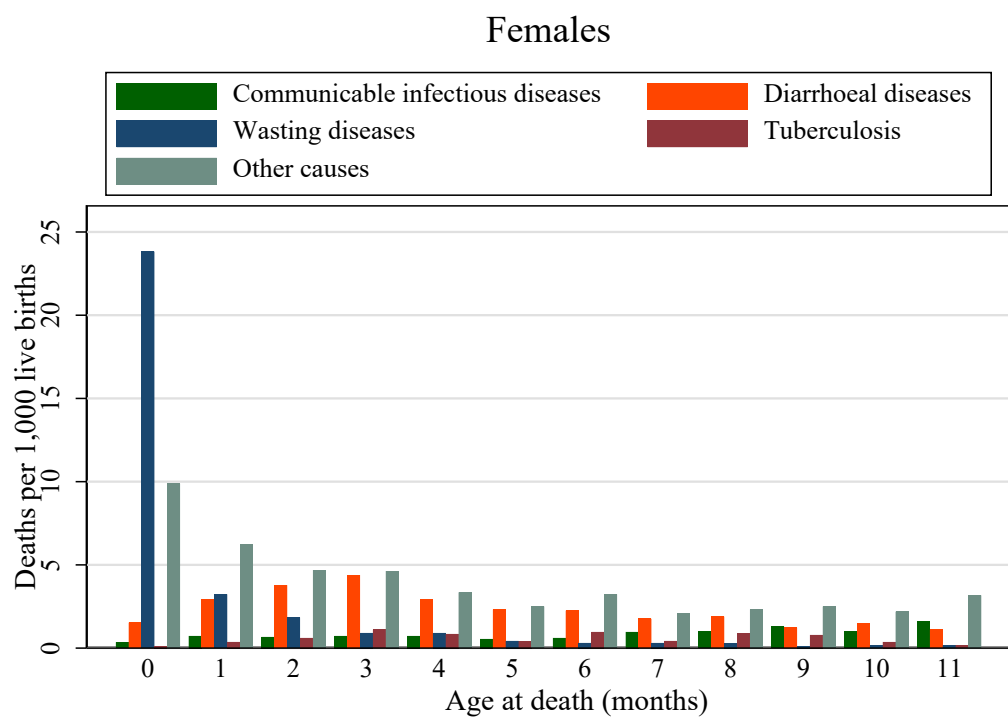
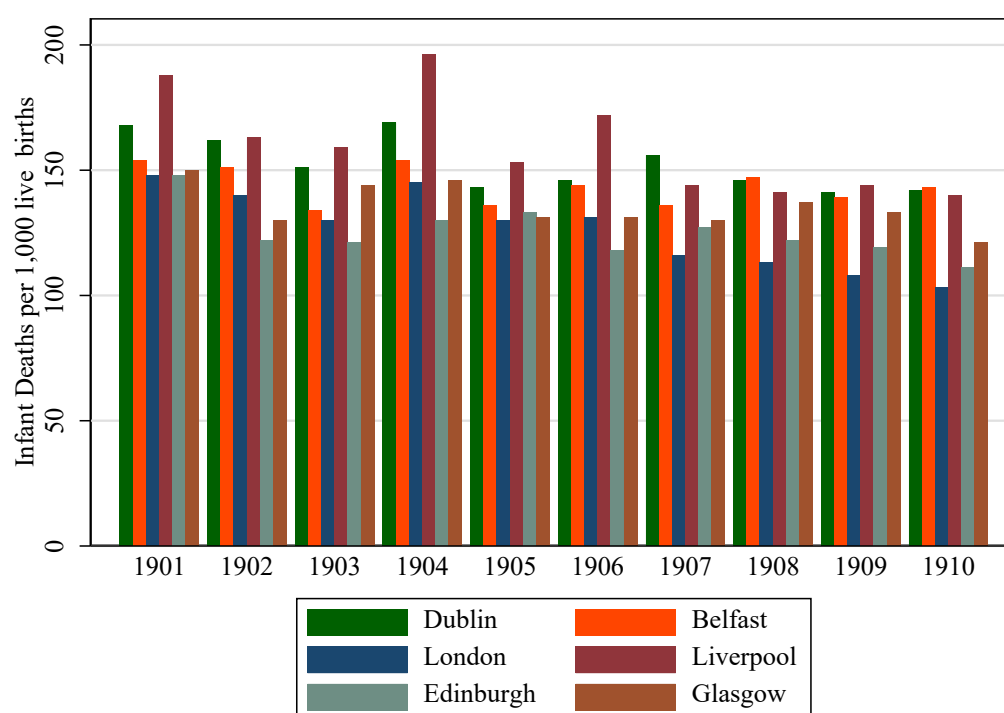


Figure A9.3: Infant Mortality in Irish and British cities, 1901-1910



Given that the large share of infants are reported to have died within a month it is possible that parents or guardians did not register the births or death, therefore showing up in neither the numerator nor the denominator in a calculation of infant mortality. How prevalent such a situation was, and how much it changed over time, is difficult to assess given that it is a ‘unknown unknown’. One way to address this issue is to compare civil registration with baptismal records. Baptism was a vital sacrament in the Catholic church and Catholic clergy were obliged to make it available to all believers; however unbaptized infants were denied burial in consecrated ground (Kennedy 2020; Kennedy & Solar 2025).

Only one such study has currently been undertaken for a single parish and there has been no systematic study across the literature. Kennedy (2023) studied the parish of Borrisoleigh, County Tipperary, a parish within the Thurles registration district. In Kennedy’s study, roughly 10 percent of baptisms were not matched in civil registration in the period 1865-1921. The ratio declined over time but peaked during known pandemics (1890-92) at 14 percent and was as low as 5 percent between 30 January 1910 and 16 June 1912. This compares with a 7 percent under-registration according to the Walsh (1970) method and a 2.5 percent under-registration according to the method documented in Figure 8. Kennedy (2023) is only one case study, but it would suggest that there was an under-registration of births (and by approximation infant deaths) in the region of between 5 to 10 percent. As some of this under-registration is included in the adjustment reported figure 12, this implies that there is a further under-registration to account for.

What Kennedy's study suggests is that there was greater compliance with the Catholic church than with civil registration. This is not surprising given that the Catholic registration system was a more established but as civil registration became better known there was greater compliance. Part of the greater compliance comes from reforms to the registration system, under which suspected still-births were not to be 'wilfully' buried as such without either a written certificate from a medical practitioner, a declaration that the child was not born alive, or an order of a coroner. Non-compliance to the regulations meant the person could be liable for a penalty of up to ten pounds.³² This may account for the decrease in the discrepancy between baptisms and registration noted by Kennedy.

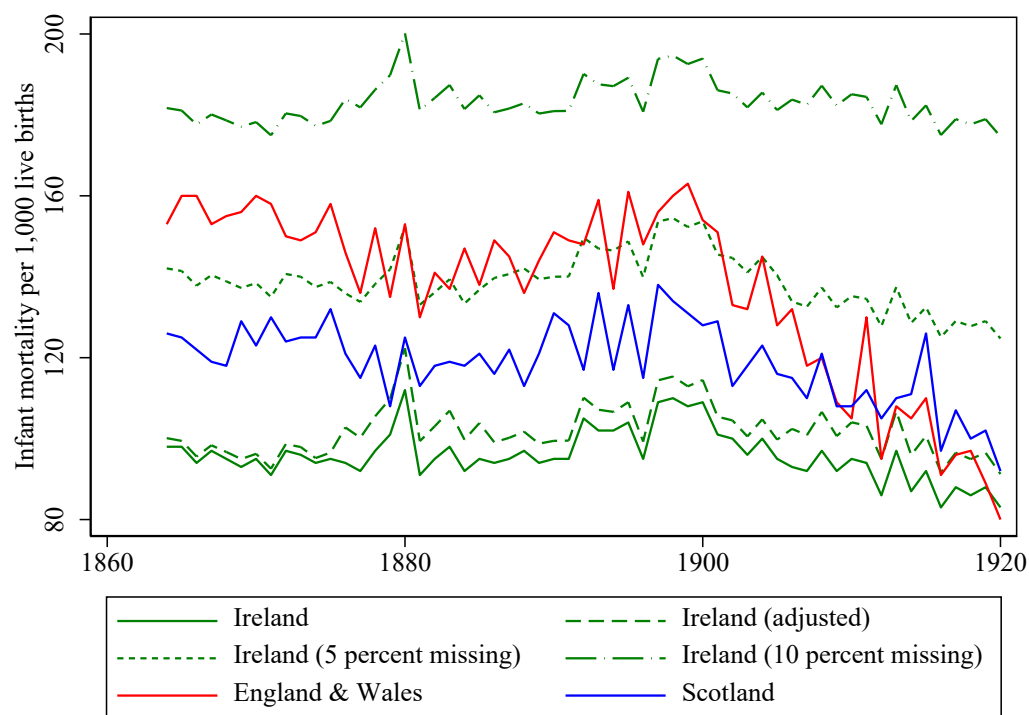
The implications of this adjustment to infant mortality are shown in Figure A9.4. The adjustments clearly matter, the 10 percent figure places Irish infant mortality on the same level as Northwest Europe (Figure A1.3) and much higher than elsewhere in Europe, whereas the 5 percent adjustment places Ireland slightly higher than levels seen elsewhere in the UK. However, the 5 or 10 per cent adjustment to births would still not change Ireland's relative position with other European countries (see Figure A9.3).³³ A caveat with this adjustment of course is that these similar adjustments were not made to reported figures from elsewhere in the UK, and as shown above these figures were also subject to under-registration (Glass 1951, Teitelbaum 1974). It is also unknown if similar biases exist in other estimates of infant mortality. For example, it is not until the 1920s that still births are reported in England and when stillbirths were recorded they averaged 40 per 1,000 live births from 1929 to 1938 (BPP 1947), which if included in infant mortality rates would make a substantial increase in infant mortality. The adjustments recorded for 5 percent under-recording averaged 43.02 per 1,000 live births from 1864 to 1920 and for 10 percent under-recording it averaged 87.21 per 1,000 live births.

Figure A9.5 shows the effect of the 5 and 10 percent adjustments to births as presented in Kennedy (2023) to births. While Figure A9.6 illustrates the changes to age standardised mortality from adjustments to infant deaths.

³² An Act to amend the Law in Ireland relating to the Registration of Births and Deaths, 1880, 43 & 44 Vict, c. 13, s.18.

³³ A further way to illustrate the magnitude of the adjustment required for Irish rates to align with those observed elsewhere is to apply English birth rates to the Irish population. This exercise provides an estimate of the number of births that would be expected in Ireland and allows comparison with the numbers actually registered. On this basis, registered births in Ireland would need to be higher by approximately 43 per cent in the 1860s, 36 per cent in the 1870s, 46 per cent in the 1880s, 35 per cent in the 1890s, and around 20 per cent by the 1900s. Discrepancies of this magnitude are not observed in any of the census–registration cross-checks documented to date and make it highly implausible that Irish birth registration suffered from under-enumeration on this scale.

Figure A9.4 Adjustment for “missing” births and deaths



Note: Ireland (adjusted) using the adjustment factor from figure 12, Ireland (5 percent missing) assumes 5 percent of births are missing and are deaths, this is added to Ireland with the adjustment from figure 12 subtracted from both the numerator and denominator to avoid double counting. Ireland (10 percent missing) assumes 10 percent of births are missing and these are dead, this is added to Ireland with the adjustment from figure 12 subtracted from both the numerator and denominator to avoid double counting.

Figure A9.5 Adjustments to birth rates to include “missing” births

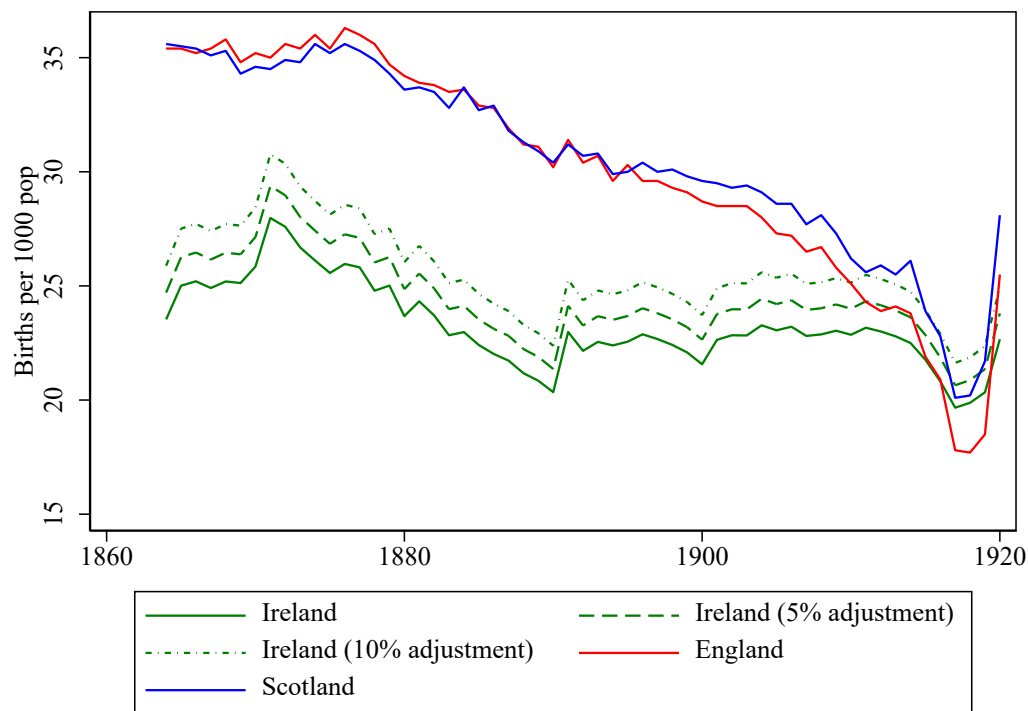
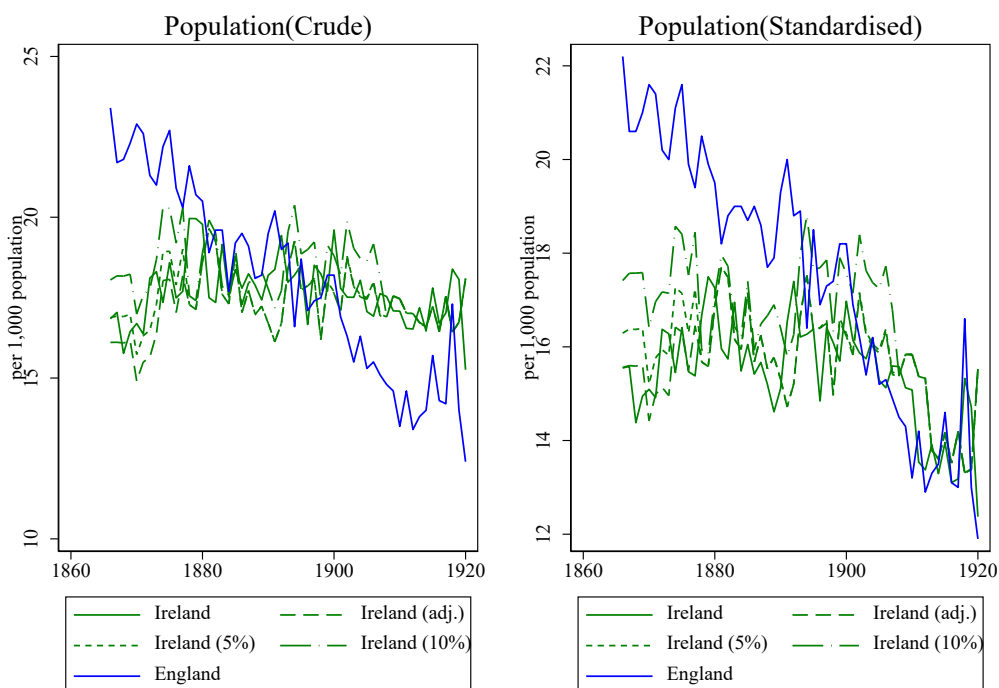


Figure A9.6 Applying adjustments to crude and standardised mortality rates



Appendix references

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