

# Religious Revival and Social Order

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## Abstract

Cultural beliefs usually evolve slowly, but during times of religious revival, beliefs change rapidly. During the two-year Welsh Revival of 1904-5, roughly 6% of the adult population converted to Christianity, after decades of stable religiosity. This religious shock was temporary, with church membership returning to pre-Revival levels by 1909. I use this unusually sharp variation in societal religiosity to estimate effects of religion on social order. I use a difference-in-difference design, comparing Wales with neighboring England. The Revival led to a reduction in aggregate crime by 5 to 12%, with this effect driven by much larger and persistent reductions in violent crime, and drunkenness, which was considered a major social ill at the time. In contrast, I estimate no effect of an earlier legislative effort to reduce drunkenness: in this setting, religion succeeded where institutional efforts had failed. The Revival did little to regulate sexual behaviors and did not promote prosociality, as measured by local welfare spending. Instead, the Revival increased social order only among the domains most emphasised by the revivalist preachers of the time. Reinforcing my findings, I estimate similar effects on crime of the earlier 1859 Welsh Revival.

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“Do not get drunk on wine, which leads to debauchery. Instead, be filled with the Spirit”  
– Ephesians 5:18, NIV.

## 1 Introduction

Economists typically think of culture as slow-moving, but in the case of religious revivals cultural beliefs change rapidly. During the two-year Welsh Revival of 1904 to 1905, roughly 90,000 people converted to Christianity, accounting for around 6% of the population above the age of 11. I use this rapid change to societal religiosity to contribute to an old debate in the social sciences: does religion provide social order?

Religious revivals are periods of time in which religious enthusiasm rapidly increases, and are often accompanied by mass conversion. While infrequent, revivals feature prominently in the religious history of many countries, and not least America, where a series of “Great Awakenings” brought broad-ranging social reforms (McLoughlin 1978; Fogel 2000). The speed of religious change in the case of revivals aids causal inference: whereas most work in economic history on the causal effects of religion uses long-run cross-sectional variation, in this paper I use a difference-in-difference design. With this design I can take advantage of the sharp timing of the revival, and of its effects, to rule out most confounds.

The Welsh Revival of 1904-5 emerged in a country facing dramatic social change, not least being the industrialisation that saw a large shift of male employment from agriculture into coal mining. These social changes led to a sense of moral decline and cultural crisis, as the Welsh came to terms with new ways of life that no longer fit with the traditions that they had grown up with (Jones 2004). It was in this context of cultural anxiety that church leaders began hoping for a revival of religion, and beginning in early-1904, that revival arrived: many converted at informal meetings held in the west of Wales, and revival fervor quickly spread to the entirety of Wales. From 1903 to 1905, at least 87,548 people converted to Christianity, or roughly 6% of the population over the age of 11. This large shock to religiosity was temporary, with church membership in Wales returning to pre-Revival levels in 1909.

While Wales was “revived”, England was not. Church membership as a percentage of the population remained stable in England both before and after the Revival. Given this fact, I use a difference-in-difference design, comparing Wales with England, to estimate the effects of the Revival on social order, captured by measures of both antisocial and prosocial behaviors. Three features strengthen the validity of this design. First, Wales and England share common national institutions during this period, limiting institutional confounds. Second, though the Revival was not an exogenous event affecting Wales, the historical record suggests that, if anything, social order would be deteriorating in Wales relative to England prior to the Revival, given the claims that moral decline prompted the onset of the Revival. This

historical claim suggests that endogeneity of the Revival would push against finding positive effects on social order. Third, in my county-year-level analysis I use two approaches to inference: county-clustered standard errors and randomization inference. For the latter approach I estimate a placebo distribution of treatment effects for contiguous clusters of counties in England, addressing the critique that Wales is effectively just one treated unit.

The total crime rate, digitized from the *Judicial Statistics of England and Wales*, was 33% higher in Wales than in England prior to the Revival. Pre-trends are parallel, with only suggestive evidence that the crime rate in Wales was deteriorating relative to that in England. Total crime fell in Wales relative to England from 1904 to 1907, with estimated difference-in-difference effects of -5 to -12%. The timing of these effects is consistent with the Revival causing crime to fall, and similar negative effects beyond 1909 suggest that the temporary religious shock may have had persistent effects. These effects on crime are likely due to changes in actual criminal behavior rather than a fall in reporting in Wales – in particular, there is no similar drop in Welsh police capacity from 1904 onwards, as measured by police presence and police spending per capita. The negative effects are also not likely driven by the deterrence effects of an increasing probability of punishment in Wales – conviction rates evolve similarly in Wales and England following the Revival.

In the absence of changes to reporting and institutional deterrents to crime, the reduction in crime is plausibly due to the Revival increasing intrinsic and social costs of committing crime. To explore what costs the Revival shifted, I estimate difference-in-difference effects separately for different pre-defined categories of crime from the *Judicial Statistics*. The Revival does not shift criminal behavior across the board. While the Revival was followed by a large fall in drunkenness and violent crimes, there is no detectable impact on economic crimes or moral crimes. The null effect on economic crimes suggests that the Revival did not reduce crime through the channel of churches providing social insurance (Chen 2010; Ferrara and Testa 2020). The null effect on moral crimes shows that the Revival did not shift moral values in general towards the normative standards of Christians.

Drunkenness offences in Wales fell precipitously and durably after the Revival hit. By 1907 I estimate a Revival-induced reduction of 37%, and by 1911 a reduction of 46%. These effects are consistent with a historical record that emphasises the transformative effect of the Revival on drinking norms, as “drunkards forgot the way to the saloons, which in fact were empty in a few nights. All the former inebriates were busy worshipping” (Matthews 2018, p. 21). The effect is also notable for two reasons. First, drunkenness was considered a major problem at the time, with drunkenness offences making up 35% of all crimes reported to the police in Wales in 1903. Second, the large effects contrast with null effects of a landmark piece of legislation passed earlier: the Sunday Closing Act 1881, an Act that required the closure of public houses in Wales on Sundays. In this case, the Revival-induced shift in drinking norms

was more effective in ensuring social order than legislative efforts – efforts that were surmounted by a populace that did not share the values that motivated the legislation.

The Revival also led to a decrease in violent crime – I estimate a reduction in assaults of 12% by 1906, and an even larger reduction in a more serious violent crime, felonious wounding, at 51% by 1907. A natural question is whether impacts on violence are merely a corollary of impacts on drunkenness – drunks are violent, so less drunkenness means less violence. I find mixed evidence on this point. In particular, while the reduction in assaults can be accounted for by the reduction in drunkenness, the reduction in felonious wounding cannot – since in the pre-period I estimate zero co-movement between felonious wounding and drunkenness. If the two don't move together, it is not obvious that a fall in drunkenness should be accompanied by a fall in felonious wounding. In this sense, there is some evidence that the Revival reduced violent crime independently of its impact on drunkenness offences.

Together the results support the idea that the Revival reduced antisocial behavior, and perhaps even persistently. That said, other dimensions of social order have been emphasised in academic work on the role of religion in society. In particular, some psychologists have argued that religion is inextricably linked with restrictive reproductive morals (Weeden and Kurzban 2013; Hone et al. 2020), while others have shown evidence that religion promotes cooperative and prosocial behavior (Shariff and Norenzayan 2007; Shariff et al. 2016; White et al. 2019), perhaps facilitating the emergence of large-scale societies throughout history (Norenzayan 2013). I find little support for these claims in the context of the Welsh Revival. While the Revival led to fewer brothel-keeping offences, it did not affect prostitution offences or the (non-criminal) illegitimate birth rate. Furthermore, the Revival did not impact the extent or nature of local relief provided to the poor under the Poor Laws, a measure that captures local prosocial preferences. Why didn't the Revival affect these other behaviors, despite clear normative stances held by the church? A likely answer comes from the sermons of the era. Based on a qualitative analysis, Jones (2004) writes that sermons would rarely discuss specific sins, with one exception: the sin of drunkenness. Religious revivals may then only change the behaviors that are emphasized from the pulpit, and not those secret sins that are ignored.

Revivals are unusual, but not infrequent in Wales, a place that became known as the “Land of Revivals”. I take advantage of this fact to explore the generalizability of my findings. Using more limited data for the last previous national revival in 1859, I find that the main effects replicate – in particular, the Welsh Revival of 1859 also led to a reduction in aggregate crime and in drunkenness offences. These findings bolster external validity, and also reduce the likelihood that my earlier findings are driven by a chance non-Revival confound that affected Wales in 1904 onwards and not England.

In documenting qualitatively and quantitatively the nature of two Welsh Revivals, this paper contributes to work on cultural change, whether gradual (Giuliano and Nunn 2017), or more rapid (Bursztyn

et al. 2017, 2018), and more descriptive historical work on the origins and consequences of revivals (McLoughlin 1978; Fogel 2000). More centrally, in using the Revival to estimate effects on social order, I build on a large correlational literature on the religion-crime link in sociology (Hirschi and Stark 1969; Stark 1996; Baier and Wright 2001; Adamczyk et al. 2017), and on work by psychologists, often using lab experiments, that focuses on the religion-prosociality link (Shariff and Norenzayan 2007; Norenzayan and Shariff 2008; Shariff and Rhemtulla 2012; Norenzayan 2013; Shariff et al. 2016; White et al. 2019). Two notable papers by economists study the link between religion and antisocial behavior. Gruber and Hungerman (2008) find that the repeal of Sunday trading restrictions in the US led to an increase in drinking and drug use, while Medina (2020) finds that US church attendance reduces drug-related, alcohol-related, and white-collar crimes after instrumenting attendance with Sunday-specific weather shocks. My work builds on these two papers by using religious revivals to estimate effects of extensive margin societal-level changes to religion, in which the masses not only attend church more at the margin, but also convert to Christianity. Finally, this paper relates to a much larger body of work on the effects of religion on other outcomes (see Becker et al. (2020) for a review), including effects on human capital and income (Barro and McCleary 2003; Becker and Woessmann 2009; Valencia Caicedo 2019; Squicciarini 2019; Bryan et al. 2020), moral values (Bergeron 2019), innovation (Bénabou et al. 2015), and mental health (Campante and Yanagizawa-Drott 2015; Fruehwirth et al. 2019).

## 2 Background on the Welsh Revival

**Religious Revivals.** While economists tend to think of culture as slow-moving (Nunn 2020), Christian revivals are relatively short periods of time in which religious beliefs and practices change rapidly. These changes are usually seen in mass conversions to Christianity, and often follow a period of spiritual decline. Such revivals punctuate the history of North America. In the 1730s, large numbers returned to Christianity during America’s “First Great Awakening”, catalysed by the revivalist preaching of Jonathan Edwards and others. Revivalist sermons, exemplified by Edwards’ enduringly influential “Sinners in the Hands of an Angry God”, emphasised the reality of hell, and the presence of only one escape route: conversion. America’s “Second Great Awakening” began some sixty years later, with the Christian message spread in camp meetings and by itinerant Methodist “circuit riders” (Fogel 2000), and its “Third Great Awakening” arrived another sixty years or so later (McLoughlin 1978). Waves of revivals have not only reached American shores. The 1859 revival in present-day Northern Ireland reportedly produced 100,000 converts, while the Welsh revivals of 1859 and 1904 produced similar numbers.

It is difficult to pinpoint exactly why each revival occurs where and when it does. McLoughlin (1978)

argues that the origins of great awakenings<sup>1</sup> can be understood using the arguments of Wallace (1956) for how cultures reform. In particular, a great awakening occurs when a society finds that its behaviors have diverged so far from prevailing norms that people are unable to sustain the existing foundation of religious beliefs. The divergence creates a feeling of identity crisis, which proceeds in several stages. In the first stage, individuals succumb to the stress of social change one-by-one, becoming psychologically or physically ill. This first stage may be characterised by increased use of drugs and alcohol, and more frequent suicide. In the second stage, the “period of cultural distortion”, people gradually conclude that their problems are not individual, but societal or institutional, with, for example, churches not offering a solution to the newly prevailing social order. Wallace’s third stage involves the appearance of a prophet who undergoes a traumatic religious experience. America’s awakenings had no such single prophet, but certainly had charismatic religious leaders that began new denominations and cults. In the final stages, these leaders attract new followers, particularly among the young.

The structure of Wallace (1956) is instructive, but perhaps more useful is McLoughlin’s overall description of great awakenings as “the results, not of depressions, wars, or epidemics, but of critical disjunctions in our self-understanding. They are not brief outbursts of mass emotionalism by one group or another but profound cultural transformations affecting all Americans and extending over a generation or more. Awakenings begin in periods of cultural distortion and grave personal stress, when we lose faith in the legitimacy of our norms, the viability of our institutions, and the authority of our leaders in church and state.” Fogel (2000) echoes this view, arguing that technological change leads to moral crises, which in turn are resolved by awakenings. This theory of revivals has the potential to explain why revivals occur in certain places and during broad time periods, but it does not easily explain why a revival would start in a particular year.

These arguments that revivals follow periods of social change and identity crisis relate to the idea that religion might serve as a coping mechanism in the face of difficult life events (Sinding Bentzen 2019). The argument relates less to the idea that religiosity increases in times of economic distress (Costa et al. 2019) – social change may precipitate revivals even in a context of rising income levels, as was the case during the Industrial Revolution. Otherwise, the argument is distinct from the idea of social norms unravelling after the correction of misperceptions (Bursztyn et al. 2017, 2018). Revivals occur without an obvious information shock (correcting misperceptions), and narratives of conversions appear to reflect changes to privately held beliefs and preferences, not only their public manifestations.

Regardless of how revivals and awakenings start, historians have argued that they bring substantial

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<sup>1</sup>I use the terms “revival” and “awakening” interchangeably, though strictly speaking McLoughlin (1978) does not. McLoughlin’s argument here applies to “awakenings” where to McLoughlin, “Revivals alter the lives of individuals; awakenings alter the world view of a whole people or culture.”

moral and social change. For America, [McLoughlin \(1978\)](#) argues that “our Second Awakening led to the solidification of the Union and the rise of Jacksonian participatory democracy; our Third Awakening led to the rejection of unregulated capitalistic exploitation and the beginning of the welfare state”, while [Fogel \(2000\)](#) makes similarly grand claims, arguing for example that the Second Awakening spurred the abolition of slavery. These arguments for America relate to century-long religious-political cycles that cannot easily be tested empirically. The Welsh Revival of 1904-5 provides more traction – religious enthusiasm built up, and dissipated, rapidly, and I use this sharp variation to estimate shorter term effects on social order.

**Social Change and Religion in Wales.** Late-nineteenth century Wales was a country beset with social change and cultural crisis. The industrialising Welsh economy saw the share of men employed in agriculture fall from 35 to 10% during 1851 to 1914, and the share in coal mining rise from 10 to 35% over the same period ([Davies 2007](#), p. 445). The cultural crisis was typified by the decline of the Welsh-speaking population, from two-thirds in 1850 to two-fifths in 1914, and the battle of nonconformist Christians to reduce the influence of the Church of England, particularly in the domain of elementary education.

While Christianity pervaded Welsh national culture in the late-nineteenth century, not everyone was involved in organized religion – using data from the 1851 Religious Census [Davies \(2007, p. 475\)](#) estimates that about 40% of the Welsh population attended a place of worship, while at the height of the revival in 1905, 40% were members of a church, as reported by the *1910 Royal Commission on the Church of England and Other Religious Bodies in Wales and Monmouthshire*. There is little in the historical record on the irreligious in the remaining 60%, though as [Davies \(2007, p. 475\)](#) writes, “[the irreligious element] was much smaller in Wales than it was in England, a fact proudly proclaimed in countless speeches.”

Of the church members in 1905, 26% belonged to the Church of England, 71% to the four major nonconformist denominations (24% Congregationalists, 23% Calvinistic Methodists, 19% Baptists, 5% Wesleyan Methodists), and 3% to other smaller denominations. The dominance of the nonconformists is notable given their history of revival activity. As [Jones \(2004, p. 38\)](#) writes, “Certainly, one of the chief characteristics of Welsh Nonconformity in the nineteenth century was the series of revivals that it experienced. Some of them were fleeting and localized, others, like the Beddgelert Revival (1817-21) and the ‘Temperance’ Revival (1839), extended over large portions of the country and had a profound influence... One revival had hardly ceased when pentecostal expectations were being fired up for another. It was quite generally believed that one could expect a revival every ten years and people began to speak of Wales as the ‘Land of Revivals’.”

**The Origins of the Welsh Revival of 1904-5.** Structural transformation led to a sense of social disloca-

tion and moral decline as “a substantial proportion of the people of Wales had been cast into a completely new pattern of society in the industrial valleys where the old rural institutions were no longer available, or where they had to adapt rapidly to meet new requirements” (Jones 2004, p. 63). Church leaders saw moral decline in changes to leisure patterns that today have little moral association – the growing popularity of sports, theatre visits, and holidays.<sup>2</sup> Such activities reflected “the truth... that social progress was enabling more of the common folk to imitate the idle pursuits of the aristocracy”, but clashed with the churches’ moralistic emphasis on thrift and their condemnation of idleness (Jones 2004, p. 73). The spiritual decline was perhaps more directly observed within the churches themselves, which we can see described in a piece in the periodical *Geninen* in 1898 by an anonymous author, “Religious gatherings and prayer meetings in Wales are smaller than previously; people absent themselves from communion, without embarrassment. . . people go from the chapel to the public house, and back, without any shame” (Jones 2004, p. 67).

This set of cultural anxieties fits closely with the view of McLoughlin (1978) that revivals occur when a society experiences distress in finding its behaviors diverging from prevailing norms. Accordingly, church leaders began increasingly to hope and pray for revival. The editorial of *Y Dysgedydd* in 1901 reads “The situation of our country, politically, socially, commercially, and religiously, cries out for submission and fasting before God... We do not recall a time of more insolent and unbridled ungodliness” (Jones 2004, p. 284). In January 1903, a statement titled “The Great Need of Wales” by Dean Howell, a key leader in the Church of England in Wales, made a particular impression, leading to new prayer meetings across Wales (Jones 2004, p. 284).

**Stories of the Revival.** No salient external shock marked the onset of the revival. The revival came first to the inhabitants of New Quay, on the west coast of Wales, in February 1904. Joseph Jenkins, a Calvinistic Methodist minister, had begun several months earlier to run more informal meetings, “where those present would be expected to pray, sing, read or speak according to the inspiration of the moment” (Jones 2004, p. 285). These meetings led to new emotional and spiritual experiences, with young people stirred to evangelise, and “the church was revitalized, people’s morals improved, and Bible reading and family prayer became not the exception but the norm” (Jones 2004, p. 286).

The revival proceeded to spread throughout Wales, with the Calvinistic Methodist weekly newspaper *Y Goleuad* reporting in July 1904 that revival could be seen “in many places”, and the *Caernarvon and Denbigh Herald* writing in December 1904 that the “religious revival appears to be rapidly spreading

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<sup>2</sup>Football provoked particular consternation, much to the current author’s distress: ...“fierce hatred of football was quite common. . . The Baptists of Caernarfonshire mourned ‘the harmful tendency of present-day sports, especially football’” (Jones 2004, p.70). More surprising, the bicycle was also a target of attacks: Reverend W. Oscar Owen “...complained bitterly about the increasing popularity of the bicycle. ‘Our young people cannot go to hell too swiftly on their feet’” (Jones 2004, p.71).

throughout North Wales. Meetings are held practically at every town” (Pope 2006).

Though no single leader spearheaded the revival, a Calvinistic Methodist named Evan Roberts became particularly well-known. After years of piety, Roberts began to experience unusual times of prayer in the spring of 1904. Several times “he claimed to have seen a person stretching out his hand from the midst of a shining mist and in it there was a paper with the number 100,000 written down”. His interpretation of the vision was that one hundred thousand would be converted in a coming revival (Jones 2004, p. 292). Twenty six year-old Roberts felt called to preach after a meeting near New Quay in September 1904. In his words, “After being humbled, a wave of peace filled my bosom... After this the salvation of souls weighed heavily on me. I felt on fire to go through the length and breadth of Wales to tell people about the Saviour” (Jones 2004, p. 292).

Roberts began his public work in October 1904, holding meetings in which he would state the “conditions for revival” as the confession of sin openly before God, the removal of doubt, obedience to the Holy Spirit’s promptings, and public confession of faith in Christ (Jones 2004, p. 295). The meetings would often go on well into the night, with “people... in a wild commotion, some... on their feet, some seated, some on their knees, others at the foot of their seats weeping helplessly and unable to draw breath” (Jones 2004, p. 298). What prompted such emotion? According to Jones (2004, p.299), Roberts “succeeded in causing thousands to agonize over their relationship with God and... warned people of the dire consequences of refusing Christ.” The media began to take interest in the revival in November, with both the *Western Mail* and the *South Wales Daily News* beginning to report regularly on the meetings held by Evan Roberts (Jones 2004, p. 296).

By the end of 1904, the revival had spread to the whole country, with meetings characterised by emotional excitement and a departure from the formal structure of the past. Whenever the revival arrived in a location, it would usually arrive suddenly, “and people could name the day and the hour that this happened” (Jones 2004, p. 311). The revival continued to spread in 1905, with Roberts continuing to travel for several evangelistic campaigns, until his seventh, and last, in December. The revival came to a close in early 1906. By this time a general election proved to be a distracting influence, while in some locations “there were very few converts... for the simple reason that there were so few left to be converted” (Jones 2004, p. 330).

**The Revival in Numbers.** The revival led to a large increase in membership of the four major non-conformist denominations (top-left panel, Figure 1). Total membership of these denominations grew by only 3.2% from 1901 to 1903, roughly in line with population growth. Departing from the steady growth since 1860, membership grew by 18.3% from 1903 to 1905. The latter growth amounted to 81,958 new members, a number close to the number of 100,000 in the visions of Evan Roberts, and a number re-

flecting 5.6% of the 1901 population above the age of 11 in Wales.<sup>3</sup> The *Western Mail* published three lists of converts and reached a similar number: 87,548 converted across Wales by February 1905. This number is likely a lower bound given that the revival continued after February. The abnormality of these numbers was recognised at the time, with the *1910 Royal Commission on the Church of England and Other Religious Bodies in Wales and Monmouthshire* reporting that the “influence of the Revival of 1904 and 1905, was without a parallel in Wales since the great Revival of 1859, and gave the Nonconformist statistics of full members... for the year 1905 quite an exceptional character.”

The impact of the revival on the Church of England cannot be understood from the membership figures – the reporting definition for Church of England membership unfortunately changed in 1905. Instead, the *1910 Royal Commission* uses the annual number of confirmations to argue that the Church of England was also impacted (top-right panel, Figure 1). While the number of confirmations in Wales during 1902 and 1903 was only 2.5% higher than the previous two years, the number during 1904 and 1905 was 19.4% higher.

The impact of the revival was temporary, especially for the nonconformist denominations, with membership numbers declining in absolute terms from 1906 onwards. The revival then provided a short, sharp, shock to religiosity in Wales. In contrast, despite the spread of some revival meetings to England,<sup>4</sup> stable church membership and confirmation figures around 1904-5 suggest that England as a whole did not experience a revival of religiosity (bottom panels, Figure 1). This fact motivates a difference-in-difference approach to estimating the effects of the revival, comparing the evolution of outcomes in Wales relative to England before and after 1904.

**Consequences.** Historians have primarily emphasised effects of the revival on crime (particularly drunkenness), adultery, and leisure activities. On crime, Jones (2004, p. 366) writes “There were no cases of drunkenness at the petty courts at Wrexham and the courts of Rhayader, Aber-carn and Llandysul had very little work to do. There was a great reduction in the cases before the courts in Tredegar, Abertillery and the Rhymney valley... Sir Marchant Williams joined Judge Gwilym Williams and the chief constable of Flintshire in attributing the reduction in crime to the revival.” On adultery, some held the view that the revival led to an increase – perhaps influenced by the unusual presence of young women as fellow workers at the side of revivalists like Evan Roberts. Jones (2004, p. 366) argues that this effect was unlikely, given that the proportion of illegitimate births was falling in Wales at the time. On leisure,

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<sup>3</sup>Witnesses to the *1910 Royal Commission* reported varying ages at which a child could become a member, ranging roughly from 12 to 15. To be conservative, I take the lower bound, and using microdata for the 1901 census I calculate the percentage of the population of eligible age that became nonconformist church members during the Revival.

<sup>4</sup>For example, Jones (2004, p. 337) writes “It is well known that the revival touched Welsh people living in England. Some of the events which occurred in Liverpool have already been discussed and similar scenes were witnessed in other Welsh-speaking communities in England.”

the revival appears to have caused a puritanical reaction against new forms of entertainment, as “football clubs were disbanded either because people did not go to watch the games or because the players refused to have anything more to do with the sport”, “drama companies were forced to disband”, and “eisteddfodau [a Welsh cultural festival] had to be cancelled” (Jones 2004, p. 367). I focus in this paper on the effects on crime, drunkenness-related or otherwise, adultery, and other moral and prosocial behaviors. These outcomes capture different dimensions of social order in Wales.

### 3 Data and Approach

**Crime Data.** To measure crime, I digitized a subset of tables from the 1899 to 1913 editions of the *Judicial Statistics of England and Wales*, with the exception of 1908 due to the poor quality of available scans. 1913 is a natural end date for the analysis given that the police returns on crime are no longer disaggregated by police district from 1914 onwards, and given the onset of the First World War in 1914. While the necessary data exists prior to 1899, an unusually large Wales-specific shock, the Welsh coal strike of 1898, motivates 1899 as the first pre-period year.

My primary outcome measures from the *Judicial Statistics* are the number of crimes known to the police, for each of 151 types of crime, for each of 191 police districts, with 16 of these districts in Wales (from Tables XXIII, XXIV). Given that the variation in the Revival lies at the country-level, and that district boundaries change somewhat over time, I aggregate the data to the county-level, with 13 of 54 counties in Wales (see the map in Figure A1). I also normalize the crime numbers by population as of the last decennial census (from Table XXII), to create my main set of outcomes: the number of crimes per one thousand people, for each crime type. I introduce and explain the types of crimes as and when they appear for analysis below.

To proxy for the perceived probability of punishment, I digitized the overall conviction rate (from Tables XXI, XXII), though only for 1899 to 1907, which I again aggregate to the county-level. To measure police capacity, I digitized tables from the 1901 to 1907 *Reports of the Inspectors of Constabulary*, to get county-level measures of the number of police constables per one thousand people (from Table II) and the total expenditure on the police force in pounds per one thousand people (from Table III), again normalizing by population as of the last census.

**Sexual Morality and Prosociality.** To measure sexual mores, I digitized the number of illegitimate births per one thousand births at the county-level from the 1901 to 1907 *Annual Report of the Registrar-General of Births, Deaths, and Marriages*. To measure prosociality, I use the number of people receiving relief under the Poor Laws per one thousand and the ratio of indoor to outdoor relief from the *Great Britain*

*Historical Database: Labour Markets Database, Poor Law Statistics* (UK Data Archive No. 4105). I describe relevant institutional details regarding the Poor Laws below, where I also report the results.

**Empirical Approach.** Church membership as a percentage of the population over the age of 14 was stable in Wales and England prior to 1904, though substantially higher in Wales (Figure 2). The Revival increased Welsh church membership by 5 percentage points by 1905, with a return to 1903 levels by 1909. In contrast, the English church membership percentage was stable throughout. Given these facts, I use a difference-in-difference approach, comparing Wales with England, to estimate the effects of the Revival on social order.<sup>5</sup> Specifically, I use the following specification:

$$y_{ct} = \alpha_c + \alpha_t + \sum_{s=1899}^{1902} \beta_s^{\text{pre}} (\text{Wales}_c \times 1 [t = s]) + \sum_{s=1904}^{1913} \beta_s^{\text{post}} (\text{Wales}_c \times 1 [t = s]) + \varepsilon_{ct} \quad (1)$$

where  $y_{ct}$  is some outcome  $y$ , for example the total number of crimes per one thousand people, in county  $c$  during year  $t$ .  $\alpha_c$  and  $\alpha_t$  are county and year fixed effects. Given the usually slow-moving nature of religiosity, geographic fixed effects are less common in related work, and useful here in fully absorbing time-invariant differences between Welsh and English counties. To estimate pre-trend coefficients ( $\beta_s^{\text{pre}}$ ), I fully interact a dummy variable equal to one for the Welsh counties with pre-period dummy variables, with 1903 as the omitted year. For the post-period coefficients ( $\beta_s^{\text{post}}$ ), I interact  $\text{Wales}_c$  with each post-period dummy variable, from 1904 to a maximum of 1913. Post-period coefficients from 1909 onwards are suggestive of persistent effects of a temporary shock to religion, given that by 1909 the Welsh church membership percentage had returned to 1903 levels.  $\varepsilon_{ct}$  is the error term, and I weight each observation by county population, as measured in the last census.

**Inference.** I use two approaches to inference. First, I report p-values from clustering the standard errors at the county-level. This approach is standard in difference-in-difference settings, but harder to justify in a setting in which the treated counties are contiguous, and are then likely to face spatially correlated unobserved shocks. To address this, my preferred approach modifies the randomization inference approach used in [Cunningham and Shah \(2018\)](#). For this, I randomly select sets of contiguous English counties, subject to the constraint that each set has a population that is within 90 to 110% of the population of Wales, according to the 1901 census. Given that three English counties (London, Lancaster, and York

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<sup>5</sup>Alternative approaches are not viable. In particular, crime data for this period does not exist below police district-level, and while there are 13 police districts in Wales, the rapid spread of the Revival throughout Wales precludes a within-Wales analysis due to a lack of district-level variation in the Revival. Related, the decentralised and nationwide spread of the Revival precludes the distance-to-source instruments common in this literature (e.g. [Becker and Woessmann 2009](#); [Valencia Caicedo 2019](#); [Bergeron 2019](#)) and supply-side instruments based on the travels of a key movement leader (e.g. [Blakeslee 2018](#)).

West Riding) each exceed the 110% bound, I drop these three counties from the analysis throughout. I then re-estimate Equation 1 400 times, replacing  $\text{Wales}_c$  with  $\text{Placebo Wales}_c^d$  where this new variable is set equal to one for the contiguous set of English counties chosen in random draw  $d$ , with  $d \in [0, 400]$ . I then calculate randomization inference p-values by comparing the magnitude of  $\beta_s^{\text{pre}}$ ,  $\beta_s^{\text{post}}$  with that of the 400 placebo coefficients. A p-value below 0.05 tells us that the true difference-in-difference effect for Wales is larger in magnitude than the difference-in-difference effect for at least 95% of the placebo Waleses formed from clusters of contiguous English counties. More informally, this result tells us that it is difficult to find a cluster of English counties, roughly the same size as Wales, that experienced as large a change in outcomes relative to the rest of England and Wales as Wales itself actually did.

**Causality and Interpretation.** Though the Revival was not an exogenous event, three facts increase the likelihood that the effects I estimate are due to the Revival rather than omitted factors. First, the history of the Welsh Revival, as well as that of revivals in general, suggests that prior to the Revival, social order was more likely to breaking down than improving. Improvements to social order after 1904 are then more likely to reflect a break with previous trends than a continuation. This point suggests that in this setting we might not expect parallel pre-trends – instead we might expect that social order was deteriorating in Wales relative to England prior to the Revival. I test for this by looking at whether  $\hat{\beta}_s^{\text{pre}} < 0$ . Second, the sharp onset of the Revival means that I can use the year-by-year timing of estimated effects to rule out the role of more slow-moving factors and of rapid factors that hit Wales in years other than 1904 and 1905. Third, Wales and England were subject to common national institutions during this period, with Wales waiting until 1997 for devolution. In practice this means that very few Acts of Parliament applied only to Wales during this era, limiting the possibility of institutional causes of estimated difference-in-difference effects.

## 4 The Welsh Revival of 1904 and its Consequences

**The Revival and Crime.** The aggregate crime rate was 33% higher in Wales than in England during 1899 to 1903, the five years prior to the Revival (left panel, Figure 3). This difference was relatively stable during those five years, with the exception of a larger drop in the Welsh crime rate in 1900 than in England. Given this, there is only suggestive evidence that social order was deteriorating in Wales relative to England, with the pre-period coefficient for 1900 negative and statistically significant with either approach to inference (right panel, Figure 3). Otherwise, pre-trends are parallel, and most importantly, there is no evidence that crime was already falling in Wales prior to the Revival.

The aggregate crime rate fell by 5.4% of the Welsh pre-period mean in Wales relative to England

during 1904, the first year of the Revival, with this fall increasing to 11.5% by 1906 (right panel, Figure 3). Each estimated difference-in-difference coefficient for 1904 to 1907 is statistically significant at at least the 5% level with both county-clustered and randomization inference. The fall in crime for Wales from 1904 onwards is then not likely to reflect chance spatially correlated shocks – very few contiguous clusters of counties in England saw as large a relative change in crime during these years, and strikingly, there does not exist a single placebo cluster of English counties for which I estimate as negative an effect during 1904 to 1907 (as evidenced by the fact that every single grey circle lies above each blue circle). Taking these estimated effects together with their timing and our priors given what historians have written about the Revival, it is likely that the Revival caused the drop in crime of 5 to 12%.

To better interpret the magnitudes, I can roughly calculate the number of converts per each crime avoided. For this calculation, I take the *Western Mail's* estimate of 87,548 converts, the estimated difference-in-difference effect of -3.41 crimes per one thousand by 1906, and the Welsh population as 2,012,876, as of the 1901 census. The number of converts per crime avoided is roughly 13. This crime-reduction-per-convert exchange rate seems plausible, and it brings with it an additional implication. Under the assumption that the Revival only impacted crime through the behavioral change of converts, to achieve the observed reduction in crime, those converted must have been sufficiently criminal to begin with. In particular, I calculate that converts must have a baseline crime rate of at least 7.8%,<sup>6</sup> as compared with the rate for the Welsh population as a whole of 3% from 1899 to 1903. To the extent that the Revival impacted crime primarily through conversion, this accounting exercise suggests that converts were at least 2.6 times more criminal than a random selection from the population.<sup>7</sup>

Considering the period beyond 1907, there is suggestive evidence that the Revival-induced crime reduction was persistent, even once Welsh religiosity returned to previous levels. In particular, the difference-in-difference coefficients from 1909 to 1913 all remain negative, with three of five statistically significant, with the largest coefficient in 1911 reflecting a 18.1% crime reduction in Wales relative to England (right panel, Figure 3). That said, the pattern of effects is also consistent with the effects of the Revival dissipating by 1909, and subsequent non-Revival Welsh-specific shocks causing crime in Wales to fall.

**Reporting.** As ever with crime data, the differential evolution of crime rates in Wales relative to England might reflect actual changes to criminal behavior, or changes to reporting, with actual behavior

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<sup>6</sup>From the estimated fall in crime by 1906 ( $= 3.41 * (2,012,876/1000)$ ) divided by the number of converts (87,548). The lower bound comes from considering the case where the Revival reduces crime among these converts to zero.

<sup>7</sup>Ideally I would make more concrete statements on the characteristics of converts relative to the general population. However, no microdata on the characteristics of converts exists, to my knowledge, beyond the scattered anecdotes of books and newspaper reports.

unchanged. I explore the reporting channel by using the same event study specification to check for changes in police force capacity in Wales relative to England around 1904. Neither measure of police force capacity evolves significantly differently in Wales relative to England after the Revival (Figure A2). The number of constables per one thousand fell insignificantly by 2% in Wales relative to England in 1904, though even this small fall rebounded by 1905.<sup>8</sup> Total police expenditure per one thousand, 74% of which goes to salaries, fell somewhat in Wales relative to England, but never significantly. Furthermore, the pattern of the insignificant fall in expenditure cannot easily explain the pattern of the crime reduction in Figure 3 – crime continued to fall in Wales relative to England throughout 1904 to 1906, whereas expenditure per one thousand did not. Together these results suggest that the Welsh crime reduction after the Revival reflects a fall in actual criminal behavior, and not just a fall in the likelihood that crimes are reported to the police.

**Why Did Criminal Behavior Fall?** Two cost-related channels might rationalize the relative fall in criminal behavior in Wales around the time of the Revival. Most related to the religious revival, the intrinsic or social cost of committing crime may have increased for the converts, or even for those that were already religious but became even more so as a result of the Revival. Less related to religion, the extrinsic cost of committing crime may have increased in Wales, deterring criminal behavior through a greater perceived probability (or severity) of punishment. To explore the latter channel, I use the aggregate conviction rate as a proxy for the perceived punishment probability.

The conviction rate in both England and Wales hovered around 80% before the Revival (left panel, Figure A3), and did not increase in Wales relative to England following the Revival (right panel, Figure A3). If anything, the conviction rate in Wales relative to England fell slightly, by 2 percentage points, in 1906 (RI  $p < 0.05$ , insignificant with county-clustered inference). To the extent that the conviction rate is a reasonable proxy for the perceived probability of punishment, it seems unlikely that the Welsh crime reduction was due to the deterrent of an increase in the extrinsic cost of crime.

In the absence of an evolving extrinsic cost of crime, it is likely that the Revival increased the intrinsic and social costs (or reduced the intrinsic and social benefits) of committing crime. To shed light on what types of costs the Revival shifted, I use the following specification to estimate a pooled difference-in-difference effect separately for different categories of crime:

$$\text{Crime}_{ct}^x = \alpha_c + \alpha_t + \sum_{s=1899}^{1902} \gamma_s^{\text{pre}} (\text{Wales}_c \times 1 [s = t]) + \gamma^{\text{post}} (\text{Wales}_c \times \text{Post}_t) + \varepsilon_{ct} \quad (2)$$

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<sup>8</sup>Given this fact, crime per *constable* also fell in Wales relative to England, which is arguably a better measure of actual criminal behavior. As Davies (2012) writes, “the chief constable of Carmarthenshire frequently argued that the correct measure of the criminality of a county was not linked to population but with the rate of crimes committed per police constable.”

where  $\text{Crime}_{ct}^x$  is a measure of crimes per one thousand of type  $x$  in county  $c$  during year  $t$ , standardized by subtracting the mean of the outcome and dividing by the standard deviation.  $\text{Post}_t$  is a dummy variable equal to one for the entire post-period from 1904 to 1913. To avoid ad-hoc categorization of crimes to each type  $x$ , I use the categorization found on page 38 of the 1905 edition of the *Judicial Statistics*. These categories, along with their associated percentage of all crime in Wales in 1903, are: (i) Personal Crimes and Offences (10%), (ii) Crimes and Offences Against Morals (2%), (iii) Crimes and Offences of Dishonesty (12%), (iv) Crimes of Mischief and Cruelty (3%), (v) Drunkenness (35%), (vi) Breaches of Police and Municipal Regulations (36%), and (vii) Vagrancy (3%). These categories are mutually exclusive and mutually exhaustive of the 151 specific crimes contained in the judicial statistics.<sup>9</sup> They also have the advantage of mapping to concepts that we might expect religion to impact, e.g. moral values (category (ii)), and dishonesty (category (iii)).

There is no evidence that the Revival shifted morals across the board. While there is evidence that the Revival reduced personal and drunkenness crimes ( $p < 0.01$  for each, with either approach to inference), the estimates for the remaining five categories of crime are always statistically insignificant (Figure 4). These null effects rule out two plausible channels by which the Revival might operate. First, churches may provide social insurance (Chen 2010; Ferrara and Testa 2020), reducing the benefits of economic crimes like theft. But economic crimes, contained in the category “Crimes and Offences of Dishonesty”, do not fall in Wales relative to England (see also Figure A4). Second, revivals might shift moral values generally towards the normative standards held by churches. But there is no effect on “Crimes and Offences Against Morals”, a category dominated by sexual crimes (I explore effects on sexual behaviors in more depth below).

Two categories were impacted. Personal crimes fell in Wales relative to England by  $0.27\sigma$  from 1904 to 1913. This category primarily comprises violent crimes, with the most common by far being “Assaults (Non-Indictable)”, making up 83% of this category in 1903 in Wales. This hints that the Revival reduced violence – an idea I explore more thoroughly below. Drunkenness crimes fell in Wales relative to England by  $0.94\sigma$ , with the estimated coefficient substantially more negative than the nearest placebo estimate. This category comprises three similar offences: drunkenness (in public), habitual drunkenness, and habitual drunkards obtaining drink. 99.8% of crimes in this category in 1903 in Wales belong to the first offence, an offence which I now consider in detail.

**Drunkenness.** Drunkenness was considered a major social ill in late-nineteenth and early-twentieth century Britain. In his social history of the Welsh county of Carmarthenshire from 1870 to 1920, Davies (2012) writes that “If the historian considers the degree of opposition to an activity by the volume of

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<sup>9</sup>For the full list of crimes belonging to each category, see Appendix B.

complaints made against it then probably the most odious and reprehensible offence in the late nineteenth century was drunkenness. Drink was widely seen to be the root of all evil.” Tellingly, drunkenness offences comprise fully 35% of known crimes in Wales in 1903, and unlike other offences, progress on drunkenness is frequently highlighted by county and borough police forces in the *Annual Reports of the Inspectors of Constabulary*. Drunkenness was a particular concern among nonconformist Christians. These nonconformists successfully lobbied for the Sunday Closing Act of 1881 – an Act requiring the closure of public houses in Wales on Sundays, and the first ever Act of Parliament to apply only to Wales.

During the five years prior to the Revival, the drunkenness crime rate was on average 81% higher in Wales than in England (left panel, Figure 5). Looking at pre-trends, drunkenness crimes were also increasing somewhat faster in Wales than in England (right panel, Figure 5), consistent with the idea that perceived moral decline precipitated the Welsh Revival. As soon as the Revival hit in 1904, drunkenness offences fell precipitously in Wales, while remaining stable in England. By 1907, I estimate a relative drunkenness reduction of 37%, and by 1911 a reduction of 46%. These effects are highly statistically significant with either approach to inference. While drunkenness offences remain higher in Wales than in England throughout the period, by 1911 the pre-period difference of 81% had fallen to 24%.

The timing of these trends suggests that the Revival reduced drunkenness offences substantially and durably, with the far higher levels of drunkenness in Wales almost fully converging with those of England. Unlike the trends of the overall crime rate, there is no sign of the impact of the Revival dissipating following the return of religious participation to original levels – instead, the evidence supports the idea that the Revival permanently shifted moral values regarding drunkenness.

Why did the Revival reduce drunkenness so dramatically? The content of sermons from the era is illuminating. From a qualitative study of 800 sermons, Jones (2004, p. 159) writes that “it was not common practice to devote an entire sermon to the discussion of a specific sin. It was not considered acceptable to attack specific sins even occasionally, apart from drinking or drunkenness.” While the moral standards of the church may have been well known, only the moral deviance of drunkenness was frequently addressed from the pulpit. This emphasis changed behavior accordingly, as “Drunkards forgot the way to the saloons, which in fact were empty in a few nights. All the former inebriates were busy worshipping” (Matthews 2018, p. 21).

**Religion vs. Institutions.** To put the Revival-induced drunkenness decline in context, I estimate the same difference-in-difference specification for an earlier institutional attempt to address drunkenness: the Sunday Closing Act of 1881.<sup>10</sup> Davies (2012) writes that “The passage of the Welsh Sunday Closing Act on 27 August 1881 marked both the commencement of separate parliamentary legislation for Wales and

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<sup>10</sup>I am grateful for Patrick Francois, and his youthful sojourns in Wales, for bringing my attention to this Act.

the zenith of the temperance movement in Wales. The years following the passing of the Act witnessed an immense controversy over the efficacy of the Act, and detailed statistical warfare was waged as to whether the Act resulted in an increase or a decrease in Sunday drunkenness.”

Similar to the years prior to the Revival, drunkenness offences were more common in Wales than in England prior to the passage of the Sunday Closing Act (left panel, Figure A5). The Act did not meaningfully affect drunkenness offences in the nine subsequent years (right panel, Figure A5) – all the post-period event study coefficients are statistically insignificant when using county-clustered standard errors, and only significant with randomization inference, in 1889 and 1890, with the sign indicating an *increase* in drunkenness. Even allowing for the possibility of some bias, the comparison of Figure A5 with Figure 5 is stark – the evidence that the Revival effectively reduced drunkenness offences is far stronger than the evidence for the effects of legislation.

This analysis of the impact of the Sunday Closing Act fits with historical accounts. [Davies \(2012\)](#) writes that “What is indisputable is that there was a marked increase in the number of clubs in Wales following the introduction of the Act and in the production of flagons and off-licence sales. In addition, the bona fide traveller clause of the Act [an exception for out-of-town visitors to be allowed alcohol] was frequently abused.” In exploiting loopholes, the Welsh undermined the Act’s potency. This case study speaks to a broader point on the impact of institutional reforms on social and moral causes. These impacts may be weak if prevailing values conflict with the spirit of the reform, especially when enforcement is limited. In contrast, by shifting the underlying values themselves, religious change may be more effective.

**Violence.** The impact on drunkenness offences might matter more generally if, as [Davies \(2012\)](#) writes on the views of late nineteenth-century commentators, “drink was the evil which underlay crime and other social evils such as theft, assault and battery.” Supporting this view, violent crime also fell in Wales relative to England after the Revival. The top-left panel of Figure 6 shows the year-by-year estimates on the “Personal Crimes and Offences” category, for which I already discussed the pooled post-period estimate (Figure 4). The top-right panel shows the same estimates, this time for the modal offence in that category: non-indictable assaults. In each case, crime drops significantly in Wales relative to England during the key Revival years, 1904 to 1906, with an estimated reduction by 1905 of 9% and 12% respectively. The effect dissipates initially, and then returns from 1909 to 1913. As with the effects on aggregate crime (Figure 3), whether this latter trend is due to the Revival, rather than some other later Welsh-specific shock, is not clear. That said, the timing of the earlier effects from 1904 to 1906 are plausibly due to the Revival.

The evidence for a Revival-induced violence reduction is even stronger for more serious violent crime, as measured by the rate of felonious wounding. This offence covers, for example, those that shoot some-

one with the intent and effect of causing grievous bodily harm,<sup>11</sup> and is punishable with life imprisonment with hard labor. Felonious wounding fell in Wales relative to England from 1904 onwards (bottom panel, Figure 6), with a peak reduction of 51% occurring by 1907 ( $p < 0.01$  with both approaches to inference).

The most serious violent crimes, murders, were sufficiently uncommon in Wales that I lack statistical power to detect even large effects. For example, there were only ten murders in Wales in 1903, and only three murders during 1905, the peak of the Revival. Given this, I estimate a 67% reduction in murders by 1905 (right panel, Figure A6), but despite being large, this point estimate is not statistically significant. The other year-by-year point estimates are insignificant with only one exception in 1913, and even positive in 1904 and 1906. Given the rarity of the offence, we cannot infer much about the Revival’s impact on murder.

**Drunken Violence?** The timing of the drop in violent crime in Wales is consistent with the idea that the Revival reduced not just drunkenness, but also violence. Could the violent reduction be a direct consequence of the fall in drunkenness? Without a separate instrument for drunkenness, decomposing this causal chain is difficult. To make some progress, I estimate the co-movement of drunkenness and violent crime prior to the Revival, and use the magnitude of the co-movement to understand whether the drop in drunkenness can account for the drop in violent crime. In particular, I estimate the following specification, using data for England and Wales covering the pre-period of 1899 to 1903 only:

$$\text{Violent Crime}_{ct} = \alpha_c + \alpha_t + \theta \text{Drunkenness Crime}_{ct} + \varepsilon_{ct} \quad (3)$$

where the dependent variable is either the rate of non-indictable assaults (from top-right panel, Figure 6) or the rate of felonious wounding (from bottom panel, Figure 6), and the key right-hand-side variable is the rate of drunkenness crimes (from Figure 5). I cluster the standard errors at the county-level, and again weight by county population.

$\theta$  captures the within-county co-movement of drunkenness and violent crime after partialling out nationwide annual variation. If drunks are more likely to commit violent crime, we would expect to see that  $\theta > 0$ . This is true for non-indictable assaults:  $\hat{\theta} = 0.13$  ( $p < 0.01$ ), meaning that when drunkenness crimes increase by one, non-indictable assaults tend to increase by 0.13. The estimated effect of the Revival on drunkenness crimes per one thousand is -1.93 by 1905 (Figure 5). Given the co-movement of these crimes with non-indictable assaults, this effect could account for an effect of  $-1.93 \times 0.13 = 0.25$  non-indictable assaults per one thousand. The actual effect is -0.3 (Figure 6), suggesting that the impact

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<sup>11</sup>More specifically, the offence covers, among others, those “who, with intent to maim, disfigure, or disable any person, or to do some other grievous bodily harm to any person, or to resist or prevent the lawful apprehension or detainer of any person, by any means whatsoever wounds or causes any grievous bodily harm to any person, or shoots at any person, or by drawing a trigger, or in any other manner attempt to discharge at any person any kind of loaded arms” (Stephen 1904, Article 257).

on assaults can be reasonably well accounted for by the impact on drunkenness. The same can not be said for felonious wounding, where I find  $\hat{\theta} = -0.00014$  ( $p = 0.8$ ). I.e. there is no evidence that, prior to 1904, the rates of felonious wounding co-moved with the rates of drunkenness offences. Despite this, relative rates of felonious wounding fell in Wales following the Revival.

This brief accounting exercise suggests that while the fall in drunkenness offences can account for the fall in non-indictable assaults, it cannot easily account for the fall in more serious violent crimes, given that these more serious crimes did not co-move with drunkenness to begin with. The exercise then supports the idea that the Revival *independently* reduced violent proclivities, and not only through the mechanism of a lower likelihood of drunkenness.

**Sexual Mores.** Religious belief is tightly linked with restrictive reproductive morals (Weeden and Kurzban 2013; Hone et al. 2020), with no exception for Victorian and Edwardian Britain. Despite this, there are several reasons to expect a limited impact of the Revival on sexual mores. First, as noted above, sermons rarely mentioned specific sins. Second, also noted earlier, there was a suspicion at the time that the Revival led to an *increase* in adultery. Third, regarding sexual mores Davies (2012) writes that “the emphasis on outward respectability resulted in the absence of any serious deterrent against successfully conducted clandestine activity”. Put another way, it is possible that religious revivals might have better success regulating public immorality, like public drunkenness, than private immorality, like clandestine adultery.

I use two criminal outcomes and one non-criminal outcome to estimate effects on sexual mores: brothel-keeping and prostitution offences, and the rate of illegitimate births. The brothel-keeping and prostitution offence rates were 195% and 100% higher, respectively, in Wales than in England in the five years prior to the Revival (left panels, Figure A7). The Revival had only a limited impact on these sexual offences (right panels, Figure A7). Brothel-keeping offences fell in Wales relative to England following the Revival, though these reductions are statistically significant only with randomization inference. The considerably more common prostitution offences, if anything, increased more in Wales than in England by 1907.

While brothel-keeping and prostitution offences were higher in Wales than England prior to the Revival, the illegitimate birth rate was lower (left panel, Figure 7), perhaps reflecting the fact that a more chaste Wales was less tolerant of sexual offences. We can learn more about specific cases of illegitimacy from affiliation orders – court accusations of paternity made by mothers of illegitimate children. In Carmarthenshire, most of these mothers claim that the fathers seduced them with the promise of marriage (Davies 2012). Religious leaders were not immune to temptation, for example, “The Revd Gwilym Nicholas, a Congregationalist Minister of Gowerton, was summoned by Emily Maria Richards of Ca-

marthen for the paternity of her child in October 1918. Their courtship occurred when he lodged with Emily's mother while he was a student... Despite his claim that 'I cannot think how it happened', he was ordered to pay 5s. a week plus costs" (Davies 2012). Nevertheless, chapels did not tolerate philandering. Davies (2012) writes about another case where "in June 1905, Elizabeth Ann Rees, aged nineteen... summoned Joseph Morse, a tinsmith worker... to answer charges of fathering her illegitimate son. The authorities at Bethlehem Chapel, the place where the relationship germinated and grew, responded in a manner sadly too common amongst Nonconformists by expelling him." More generally, illegitimacy was severely stigmatized, with "concealment of birth, infanticide or suicide... often the only choices that offered themselves to a girl abandoned by her seducer and condemned by her family and by society" (Davies 2012).

The Revival did not impact the illegitimate birth rate in Wales (right panel, Figure 7) – the illegitimate birth rate actually grew more in Wales than in England after 1903, though only by 3 to 4%, and never significantly. Taking the three measures of sexual behavior together, the evidence suggests that the Revival had little impact on sexual mores despite the clear Christian stance on this particular moral behavior.

**Prosocial Behavior.** While the Revival reduced the antisocial behaviors of drunkenness and violence, a separate question is whether the Revival impacted *prosocial* behavior. Psychologists have argued for such impacts using priming studies in which individuals primed to think of religious concepts donate more to anonymous strangers in dictator games (Shariff and Norenzayan 2007; Shariff et al. 2016; White et al. 2019, though for null effects see Gomes and McCullough 2015; Benjamin et al. 2016). A common proposed mechanism is perceived supernatural monitoring – a moralizing God is watching you, even if no-one else is. Together with other work, these studies support a grander claim: that religious prosociality facilitated the emergence of large-scale societies (Norenzayan and Shariff 2008; Norenzayan 2013; Norenzayan et al. 2016; Lang et al. 2019).

Since historical, societal, shocks to religiosity have not been used to test for the religion-prosociality link, an analysis of the effects of the Revival complements well existing work. Importantly, the Welsh Revival constitutes a religious shock with the necessary features emphasized in the religion-prosociality literature. First, the Christian God is a *moralizing* God that punishes bad behavior, as required by the theory (Norenzayan 2013). Second, regular and wide reporting in the media, as well as an increased frequency of prayer in everyday life,<sup>12</sup> ensured that the Welsh Revival was salient throughout the pop-

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<sup>12</sup>After the revival began in New Quay in February 1904, "Bible reading and family prayer became not the exception but the norm" (Jones 2004, p. 286), while by December "the young workers at the quarry at Penmaenmawr insisted on holding prayer meetings during their lunch break" (Jones 2004, p. 301). In Blaenau Ffestiniog, "daily prayer meetings continued to be held until June 1905 with a procession every day through the town for much of this period" (Jones 2004, p. 320). Most strikingly, prayer became intertwined with work in industrial areas: "at the Grovesend steelworks... the workers sounded the hooter to announce a prayer meeting, and despite the protests of the overseers, they prayed for three-quarters of an hour.

ulation. This salience put religion “on the mind” even for those that were already Christians.<sup>13</sup> These reminders of God are a crucial ingredient, given some evidence that in the absence of such reminders, religious people are no more prosocial than the irreligious (Norenzayan and Shariff 2008).

I use local welfare spending to proxy for prosociality. The Poor Laws ensured the provision of tax-funded assistance to the destitute, either through “outdoor relief”, e.g. subsidized food and cash transfers, or “indoor relief”, which required recipients to enter workhouses (Persky 1997). Relief was administered by poor law unions with considerable decision-making power, despite some oversight from the Local Government Board, a central authority responsible to Parliament (MacKinnon 1987). Relief was funded by local property taxes, or poor rates, with ratepayers themselves electing the administrators, known as the poor law guardians. An instructive example of the autonomy of the guardians can be seen in the “Crusade Against Outrelief” in the 1870s. While poor law unions were legally required to relieve the poor, they could reduce expenditure by restricting access to outdoor relief, in the hope that most people would turn down the alternative – indoor relief in unpleasant workhouses. In the 1870s, according to MacKinnon (1987), poor law unions took exactly this strategy. As a result of their efforts, the proportion of paupers relieved in workhouses rose from roughly 15 to 30% from the mid-1860s to the early-1900s.

The welfare expenditure-reducing efforts of the Crusade motivate two proxies for prosociality during the Revival-era: the number of people per one thousand provided relief, and the proportion of people provided relief indoors (where an increase implies lower prosociality). To be clear, these measures capture the behavior of local poor law guardians, which reflect a combination of both their own social preferences and the preferences of the ratepayers they represent.

Prior to the Revival, Wales provided relief to a higher fraction of the population than England, and this relief was much more often given outdoors (left panels, Figure 8). Consistent with the “Crusade Against Outrelief”, the level of relief was falling, and the percentage given indoors rising, in both England and Wales. Though pre-trends are not completely parallel (right panels, Figure 8), there is no sign that the Revival promoted more relief, especially outdoors, in Wales relative to England. During 1904 to 1907, all event study coefficients are statistically insignificant with randomization inference, and when statistically significant with county-clustered inference, the sign goes in the direction of *less* generous welfare in Wales. Some differences in the direction of more generosity in Wales emerge in later years, but these differences are highly unlikely to be a consequence of the Revival – first, these differences appear quite suddenly in 1910 and 1911. It is unlikely that the Revival would have no effect for six years followed by an effect that suddenly appears. Second, psychologists have emphasized the importance of reminders

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Prayer meetings became a daily occurrence at Nantyllyllon colliery and in many other coal mines” (Jones 2004, p. 367).

<sup>13</sup>Meta-analytic evidence suggests that such religious salience affects the behavior of the already-religious, though not the irreligious (Shariff et al. 2016).

of religiosity for promoting prosocial behavior – the existing theory then suggests that the Revival would have the largest effects during 1904-5 and smaller effects, if any, in later years.

One challenge to my claims of null effects on prosociality is that measures of welfare spending reflect both social preferences toward the poor (the supply-side) and the state of the economy (the demand-side). In principle, the patterns in the top-right panel of Figure 8 could be explained by two offsetting effects: the Revival promoted generosity, increasing poor relief, but also stimulated the economy, reducing the demand for relief. On the latter, a possible channel would be an increase in labor supply, as attitudes toward leisure time returned to more puritanical standards. To test for this, I return to the crime data. If the Revival improved the economy, especially for the poor, we might expect that economic crimes, like theft, would fall. As I wrote above, there is no evidence for this (Figure A4). Similarly, if the economy improved for the poor, we might expect to see fewer vagrancy-related offences. Again shown earlier, vagrancy offences are not affected (Figure 4). Collectively, these results are best explained by the story that the Revival affected neither prosociality nor the economy.

**Summary.** The Revival did not provide a wholesale moral transformation, but the evidence does suggest that the Revival provided social order by dramatically reducing the extent of both public drunkenness and violence. These targeted impacts can be partly rationalized by the emphasis of the preaching at the time: as Jones (2004) wrote, specific sins were rarely mentioned from the pulpit, except for that of drunkenness. Despite the overall impact on social order, I find no evidence for prominent psychological and cultural evolutionary claims for the role of religion throughout history – the Revival had only a limited impact on sexual behaviors, and no detectable impact on prosocial behavior. This pattern of effects supports the idea of context-specific effects of religious shocks, and speaks against the idea of religious salience driving a general shift towards known moral behaviors.

## 5 A Replication: The Welsh Revival of 1859

The unusual nature of the Welsh Revival of 1904 prompts a natural question: do these effects of the Revival on social order generalize? To shed light on this, I make use of the fact that prior to 1904, Wales last had a nationwide revival in 1859. The 1859 Revival was similarly large, and while data is more limited for this earlier time period, sufficient crime data exists to replicate the core results.

**The 1859 Revival.** The Welsh Revival in 1859 was preceded, and arguably triggered, by a revival in America from 1857-8 – one that began America’s “Third Great Awakening.” This revival grew from prayer meetings held by businessmen, with attendance swelling in response to the banking crisis and

associated recession of 1858 (Randall 2009). Reports from the American revival crossed the atlantic, likely catalysing the spread of the revival to Wales (Brown 2008, p. 221; Holmes 2001, p. 35). Most notably, one minister active in the American revival, Welshman Humphrey Jones, returned home to preach. Jones, along with a convert of his, David Morgan, went on to become leading figures in the Welsh Revival.

Like the 1904 Revival, spiritual change began in Cardiganshire, where thousands converted during the winter of 1858-9. Revival fervor spread to the rest of Wales (Phillips 1860, p. 15), and commentators again remarked on the impact on drunkenness. Phillips (1860) reports on many specific instances, including that “near Bethesda... about twelve public-houses have been closed, partly on account of the change in the views of the parties who held them, and partly because the hope of gain from this quarter had quite disappeared” (p. 96), and from another locality, “drunkenness is scarcely known in the neighbourhood; so much has it decreased that the Mayor of Denbigh has not had a case before him since the 9th of November, except one—and he was a ‘tramp,’ an entire stranger to the town” (p. 97).

The scale of the 1859 Revival was similar to, though perhaps even larger than, that of the 1904 Revival. The Revival reportedly increased church membership by 80,000 (Brown 2008, p. 221), roughly 7% of the population of Wales. The more limited church membership data for the period shows trends similar to those in Figure 1 for the 1904 Revival – Baptist membership in Glamorganshire and Monmouthshire increased by 35.3% from 1858-60 (compared with 29.1% from 1903-5), while Wesleyan Methodist membership for Wales as a whole increased by 32% (16.8% from 1903-5) (Figure 9). While revival activity also spread to England, it had much less of an impact there than in Wales. Brown (2008) argues that the lack of traction was due to division in English evangelical circles regarding the approach of professional revivalists. Regardless of the reason, the greater impact in Wales than in England motivates a repeat of the previous difference-in-difference analysis to understand the effects of the 1859 Revival.

**The 1859 Revival and Crime.** Given that the relevant data is available only from 1858 onwards, I can estimate the difference-in-difference specification, but I cannot estimate pre-trends – it follows that causal claims for the 1859 Revival rest on weaker foundations than those for the 1904 Revival.

As with the 1904 Revival, the total crime rate was higher in Wales than in England on the eve of the 1859 Revival (top-left panel, Figure 10). The total crime rate fell more sharply in Wales than in England in 1859, and especially in 1860. If we can attribute the difference-in-difference estimate to the Revival, the Revival reduced crime by 14.8% by 1861 (top-right panel, Figure 10, significant with randomization inference, but not with county-clustered inference) – similar to the 11.5% effect of the 1904 Revival by 1906. The reduction in crime in Wales relative to England is relatively persistent, with most post-period coefficients statistically significant at the 5% level with randomization inference, although only

significant (at the 10% level) with county-clustered inference in 1860. Despite the larger p-values than for the 1904 Revival, the similar magnitudes suggest that the earlier effects replicate.

As with the total crime rate, drunkenness offences started higher in Wales, but converged to levels in England by 1861 (bottom-left panel, Figure 10). The difference-in-difference effect by 1861 is a crime reduction of 26.5% (bottom-right panel) – similar to the earlier reduction by 1906 of 35.5%. Unlike the 1904 Revival, these effects on drunkenness do not persist, and it should be noted that with county-clustered inference the results are never statistically significant.

With the caveats of this more limited analysis – no pre-period estimates and less statistical power – the analysis of the 1859 Revival largely replicates that of the 1904 Revival. The total crime rate, including drunkenness, fell in Wales relative to England after 1859, particularly from 1859 to 1860 where we see the largest increase in church membership (Figure 9). The one inconsistency is that the earlier revival’s impact on drunkenness did not persist. It is difficult to say why this lack of persistence might be, though collectively these results at least hint that while revivals might generally increase social order, their ability to do so durably may be more context-dependent.

## 6 Conclusion

Societies can ensure social order through laws and through values. Laws deter bad behavior through the state-led threat of punishment. Values deter bad behavior through the intrinsic and social costs of deviance. This paper presents evidence for the values channel. The Welsh Revival of 1904-5 shifted moral values, with 6% of the population over the age of 11 converting to Christianity in only two years. This religious shock reduced violent and drunkenness crimes in Wales, and while the shock was temporary, these crime reductions endure until at least 1913. In contrast, a landmark piece of anti-drunkenness legislation, the Sunday Closing Act of 1881, had no impact on drunkenness crimes. In this case, values trump laws at ensuring social order.

Despite the mass conversion and negative effects on crime in general, I find little evidence for prominent psychological theories for the role of religion in regulating sexual behaviors and promoting prosociality, as measured by local welfare spending. The pattern of results in this paper are best rationalized by the emphasis of Revival-era preaching: specific sins were rarely mentioned in sermons, with the one exception of drunkenness.

The effects on only some values-related behaviors motivate the study of other religious revivals. If the effects of revivals depend heavily on the emphasis of preaching, rather than on the more general channel of putting “God on the mind”, these results may not generalize. While I do find similar effects of crime and drunkenness of the Welsh Revival of 1859, we might ask: would the American Third Great

Awakening of the late-1800s, the Azusa Street Revival of the early-1900s, and the Toronto Blessing of the 1990s have the same effects?

Finally, the most glaring question I leave unanswered regards the origins of the Welsh Revival. Why did it happen in Wales, at that time, and why did it spread so quickly? Answering this question can help close the circle of [Fogel \(2000\)](#) – showing not only that revivals bring social change, but also that social change brings revivals. This broader theory suggests that societies may “self-correct”, with societal breakdown eventually stymied by an endogenous cultural response. If this is the case, we might also reasonably ask: could such self-correction still happen today? And if it did, would it be Protestant Christianity that restores order, or would it be an entirely different cultural movement?

## References

- Adamczyk, Amy, Joshua D Freilich, and Chunrye Kim**, “Religion and crime: A systematic review and assessment of next steps,” *Sociology of Religion*, 2017, 78 (2), 192–232.
- Baier, Colin J and Bradley RE Wright**, ““If you love me, keep my commandments”: A meta-analysis of the effect of religion on crime,” *Journal of Research in Crime and Delinquency*, 2001, 38 (1), 3–21.
- Barro, Robert J and Rachel McCleary**, “Religion and economic growth,” Technical Report, National Bureau of Economic Research 2003.
- Becker, Sascha O. and Ludger Woessmann**, “Was Weber wrong? A human capital theory of Protestant economic history,” *The Quarterly Journal of Economics*, 2009, 124 (2), 531–596.
- Becker, Sascha O, Jared Rubin, and Ludger Woessmann**, “Religion in economic history: a survey,” 2020.
- Bénabou, Roland, Davide Ticchi, and Andrea Vindigni**, “Religion and innovation,” *American Economic Review*, 2015, 105 (5), 346–51.
- Benjamin, Daniel J, James J Choi, and Geoffrey Fisher**, “Religious identity and economic behavior,” *Review of Economics and Statistics*, 2016, 98 (4), 617–637.
- Bentzen, Jeanet Sinding**, “Acts of God? Religiosity and natural disasters across subnational world districts,” *The Economic Journal*, 2019, 129 (622), 2295–2321.
- Bergeron, Augustin**, “Religion and the Scope of Morality: Evidence from Exposure to Missions in the DRC,” *Working Paper*, 2019.
- Blakeslee, David S**, “The Rath Yatra Effect: Hindu Nationalist Propaganda and the Rise of the BJP,” *Working Paper*, 2018.
- Brown, Stewart Jay**, *Providence and empire: religion, politics and society in the United Kingdom, 1815-1914*, Pearson Education, 2008.
- Bryan, Gharad, James J. Choi, and Dean Karlan**, “Randomizing Religion: The Impact of Protestant Evangelism on Economic Outcomes,” *The Quarterly Journal of Economics (forthcoming)*, 2020, 1, 88.

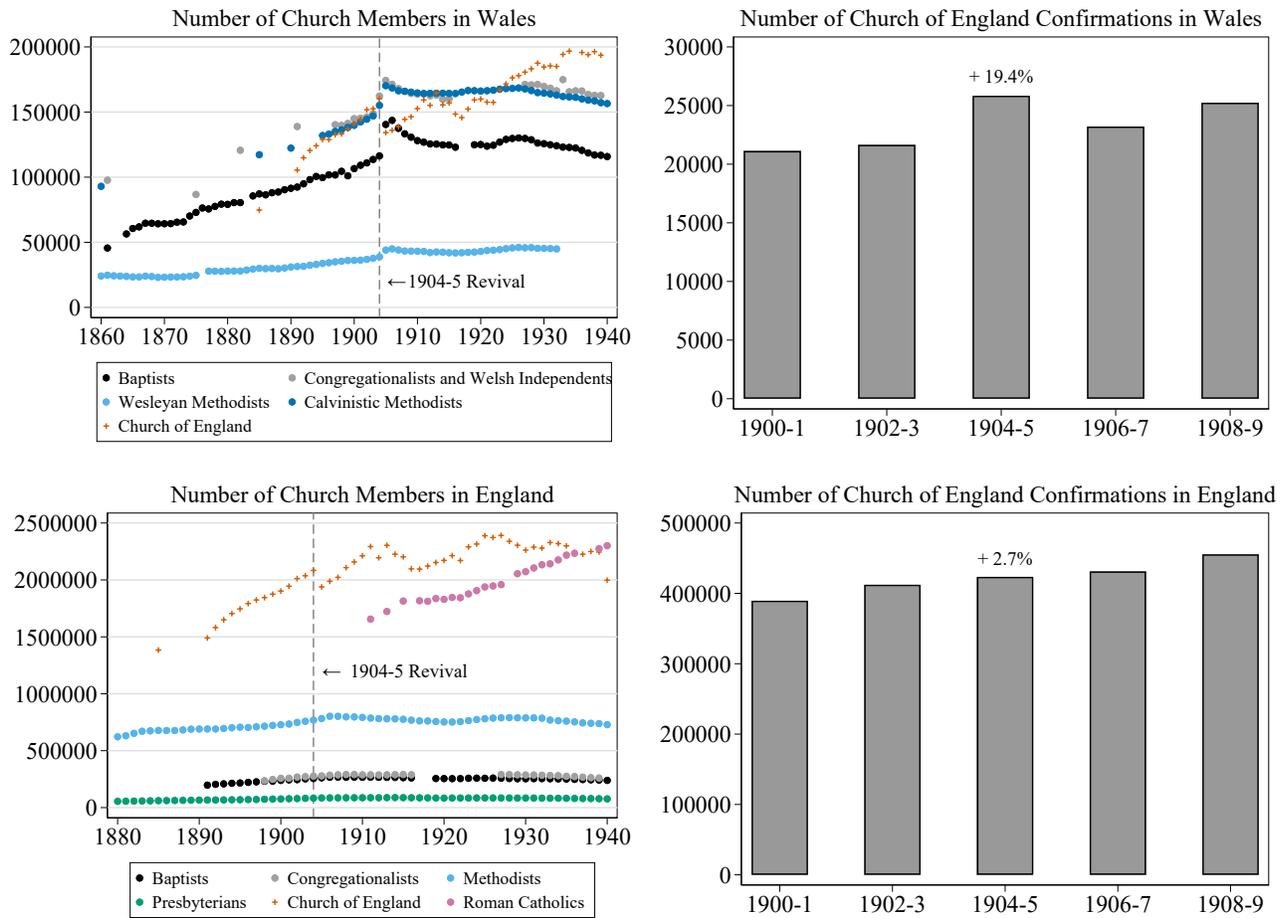
- Bursztyn, Leonardo, Alessandra L. González, and David Yanagizawa-Drott**, “Misperceived social norms: Female labor force participation in Saudi Arabia,” Technical Report, National Bureau of Economic Research 2018.
- , **Georgy Egorov, and Stefano Fiorin**, “From extreme to mainstream: How social norms unravel,” Technical Report, National Bureau of Economic Research 2017.
- Caicedo, Felipe Valencia**, “The mission: Human capital transmission, economic persistence, and culture in South America,” *The Quarterly Journal of Economics*, 2019, 134 (1), 507–556.
- Campante, Filipe and David Yanagizawa-Drott**, “Does religion affect economic growth and happiness? Evidence from Ramadan,” *The Quarterly Journal of Economics*, 2015, 130 (2), 615–658.
- Chen, Daniel L**, “Club goods and group identity: Evidence from Islamic resurgence during the Indonesian financial crisis,” *Journal of Political Economy*, 2010, 118 (2), 300–354.
- Cunningham, Scott and Manisha Shah**, “Decriminalizing indoor prostitution: Implications for sexual violence and public health,” *The Review of Economic Studies*, 2018, 85 (3), 1683–1715.
- da Costa, Francisco Junqueira Moreira, Angelo Marcantonio Junior, and Rudi Rocha de Castro**, “Stop suffering! Economic downturns and pentecostal upsurge,” Technical Report, FGV EPGE Escola Brasileira de Economia e Finanças 2019.
- Davies, John**, *A History of Wales*, Penguin UK, 2007.
- Davies, Russell**, *Secret Sins: Sex, Violence & Society in Carmarthenshire 1870-1920*, University of Wales Press, 2012.
- Ferrara, Andreas and Patrick A Testa**, “Resource blessing? Oil, risk, and religious communities as social insurance in the US South,” *Working Paper*, 2020.
- Fogel, Robert William**, *The fourth great awakening and the future of egalitarianism*, University of Chicago Press, 2000.
- Fruehwirth, Jane Cooley, Sriya Iyer, and Anwen Zhang**, “Religion and depression in adolescence,” *Journal of Political Economy*, 2019, 127 (3), 1178–1209.
- Giuliano, Paola and Nathan Nunn**, “Understanding cultural persistence and change,” Technical Report, National Bureau of Economic Research 2017.

- Gomes, Cristina M and Michael E McCullough**, “The effects of implicit religious primes on dictator game allocations: A preregistered replication experiment.,” *Journal of experimental psychology: General*, 2015, 144 (6), e94.
- Gruber, Jonathan and Daniel M Hungerman**, “The church versus the mall: What happens when religion faces increased secular competition?,” *The Quarterly journal of economics*, 2008, 123 (2), 831–862.
- Hirschi, Travis and Rodney Stark**, “Hellfire and delinquency,” *Social Problems*, 1969, 17 (2), 202–213.
- Holmes, Janice**, *Religious revivals in Britain and Ireland, 1859-1905*, Irish Academic Press, 2001.
- Hone, Liana SE, Thomas G McCauley, Eric J Pedersen, Evan C Carter, and Michael E McCullough**, “The sex premium in religiously motivated moral judgment.,” *Journal of Personality and Social Psychology*, 2020.
- Jones, R Tudur**, *Faith and crisis of a nation: Wales 1890-1914*, University of Wales Press, 2004.
- Lang, Martin, Benjamin G Purzycki, Coren L Apicella, Quentin D Atkinson, Alexander Bolyanatz, Emma Cohen, Carla Handley, Eva Kundtová Klocová, Carolyn Lesorogol, Sarah Mathew et al.**, “Moralizing gods, impartiality and religious parochialism across 15 societies,” *Proceedings of the Royal Society B*, 2019, 286 (1898), 20190202.
- MacKinnon, Mary**, “English poor law policy and the crusade against outrelief,” *The Journal of Economic History*, 1987, 47 (3), 603–625.
- Matthews, David**, *I Saw the Welsh Revival*, Ambassador International, 2018.
- McLoughlin, William G**, “Revivals, Awakening and Reform: An Essay on Religion and Social Change in America, 1607-1977,” *Chicago History of American Religion (Chicago: University of Chicago Press, 1978)*, 1978.
- Medina, Jonathan Moreno**, “Sinning in the Rain: Weather Shocks, Church Attendance and Crime,” *Review of Economics and Statistics (forthcoming)*, 2020.
- Norenzayan, Ara**, *Big gods: How religion transformed cooperation and conflict*, Princeton University Press, 2013.
- **and Azim F Shariff**, “The origin and evolution of religious prosociality,” *science*, 2008, 322 (5898), 58–62.

- , – , **Will M Gervais, Aiyana K Willard, Rita A McNamara, Edward Slingerland, and Joseph Henrich**, “The cultural evolution of prosocial religions,” *Behavioral and brain sciences*, 2016, 39.
- Nunn, Nathan**, “History as Evolution,” Technical Report, National Bureau of Economic Research 2020.
- Persky, Joseph**, “Retrospectives: Classical family values: Ending the poor laws as they knew them,” *Journal of Economic Perspectives*, 1997, 11 (1), 179–189.
- Phillips, Thomas**, *The Welsh Revival: Its Origin and Development*, James Nisbet and Company, 1860.
- Pope, Robert**, “Demythologising the Evan Roberts Revival, 1904-1905,” *The Journal of Ecclesiastical History*, 2006, 57 (3), 515.
- Randall, Ian**, “Lay People in Revival: A Case Study of the ‘1859’ Revival,” *transformation*, 2009, 26 (4), 217–231.
- Shariff, Azim F, Aiyana K Willard, Teresa Andersen, and Ara Norenzayan**, “Religious priming: A meta-analysis with a focus on prosociality,” *Personality and Social Psychology Review*, 2016, 20 (1), 27–48.
- **and Ara Norenzayan**, “God is watching you: Priming God concepts increases prosocial behavior in an anonymous economic game,” *Psychological science*, 2007, 18 (9), 803–809.
- **and Mijke Rhemtulla**, “Divergent effects of beliefs in heaven and hell on national crime rates,” *PloS one*, 2012, 7 (6), e39048.
- Squicciarini, Mara**, “Devotion and development: Religiosity, education, and economic progress in 19th-century france,” *Education, and Economic Progress in 19th-Century France (July 2019)*. CEPR Discussion Paper No. DP13877, 2019.
- Stark, Rodney**, “Religion as context: Hellfire and delinquency one more time,” *Sociology of religion*, 1996, 57 (2), 163–173.
- Stephen, James Fitzjames**, *A Digest of the Criminal Law (Crimes and Punishments)*, Macmillan, 1904.
- Wallace, Anthony FC**, “Revitalization movements,” *American anthropologist*, 1956, pp. 264–281.
- Weeden, Jason and Robert Kurzban**, “What predicts religiosity? A multinational analysis of reproductive and cooperative morals,” *Evolution and Human Behavior*, 2013, 34 (6), 440–445.

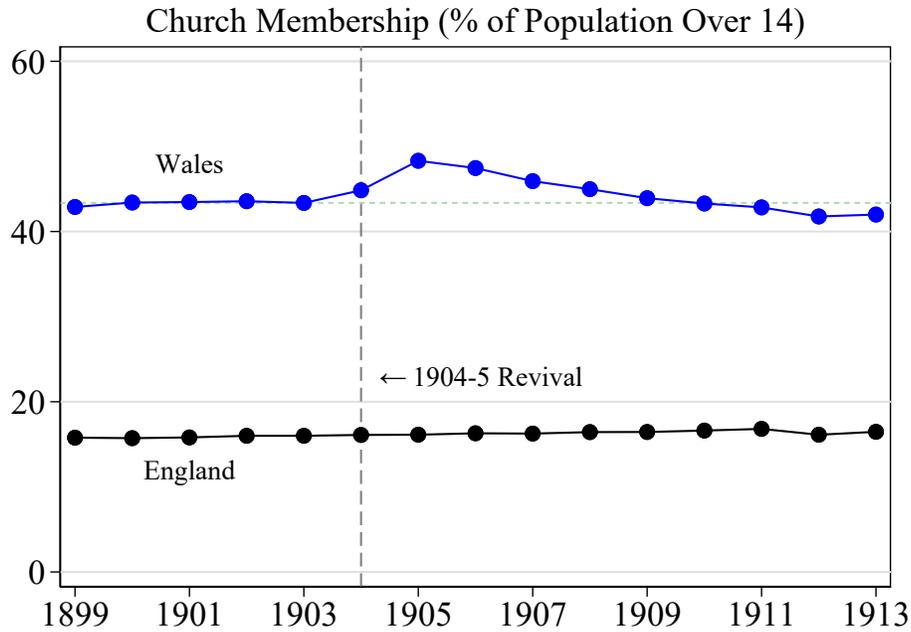
**White, Cindel JM, John Michael Kelly, Azim F Shariff, and Ara Norenzayan,** “Supernatural norm enforcement: Thinking about karma and God reduces selfishness among believers,” *Journal of Experimental Social Psychology*, 2019, 84, 103797.

Figure 1: Wales was “revived”, England was not



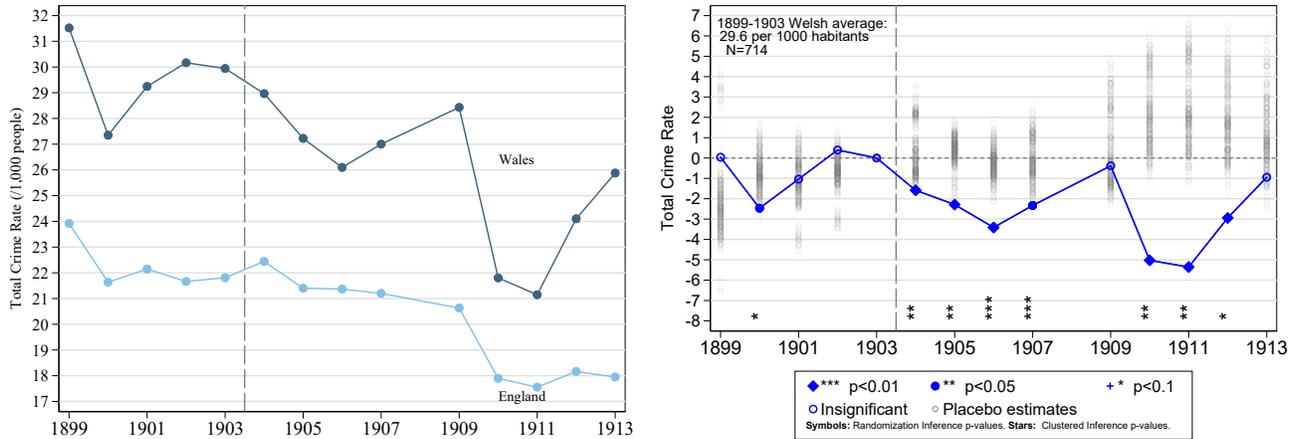
*Notes:* The membership time series for the Church of England drops in 1905 due to a change in measurement – up to 1904 the number is the estimated number of communicants, whereas from 1905 it is the number of communicants on Easter Day. Given this, the effect of the revival on the Church of England in Wales vs. England is better understood using the right-hand-side panels. *Source:* Top-left panel: UK Data Archive No. 4105 – Digest of Welsh Historical Statistics: Religion, 1669-1974, which uses these underlying sources: Baptist Handbooks, Congregational Yearbooks, Minutes of Wesleyan Methodist Conference, Royal Commission on the Church of England and Other Religious Bodies in Wales and Monmouthshire, 1910, vol. VIII, Eglwys Methodistiaid Califfinaidd Cymru, and Handbook of the Church of England. These sources compile annual statistical reports from individual churches. Top-right panel: Royal Commission on the Church of England and Other Religious Bodies in Wales and Monmouthshire, 1910, vol. I. Bottom-left and bottom-right panels: R. Currie et al. (1977), Churches and Churchgoers: Patterns of Church Growth in the British Isles since 1700.

Figure 2: Church membership pre-trends were parallel



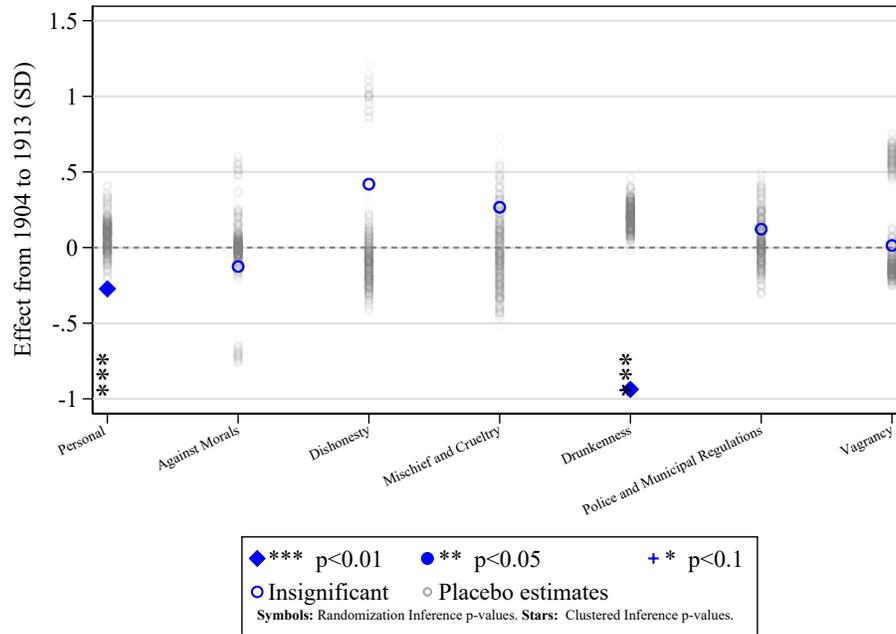
*Notes:* This figure shows total church membership as a percentage of the population over 14, which is geometrically interpolated using decennial census data. For Wales, total church membership is calculated as the sum of members belonging to five denominations: Baptists, Congregationalists and Welsh Independents, Wesleyan Methodists, Calvinistic Methodists, and the Church of England. For England, the sum is of members belonging to six denominations: Baptists, Congregationalists, Methodists, Presbyterians, Calvinistic Methodists, and the Church of England. Given the change in reporting of members for the Church of England from 1905 onwards, the calculation uses an adjusted series of Church of England membership numbers. Specifically, for each of Wales and England I calculate the growth of Church of England from 1904 to 1905 as the annual membership growth predicted by the actual growth in confirmations that year, using the fitted values from a year-level regression of membership growth on confirmation growth in England from 1892 to 1940, excluding 1905, the year of the reporting change. From 1905 onwards, I keep the membership growth as that recorded in the unadjusted membership data.

Figure 3: Total crime fell in Wales relative to England by 5 to 12% following the Revival



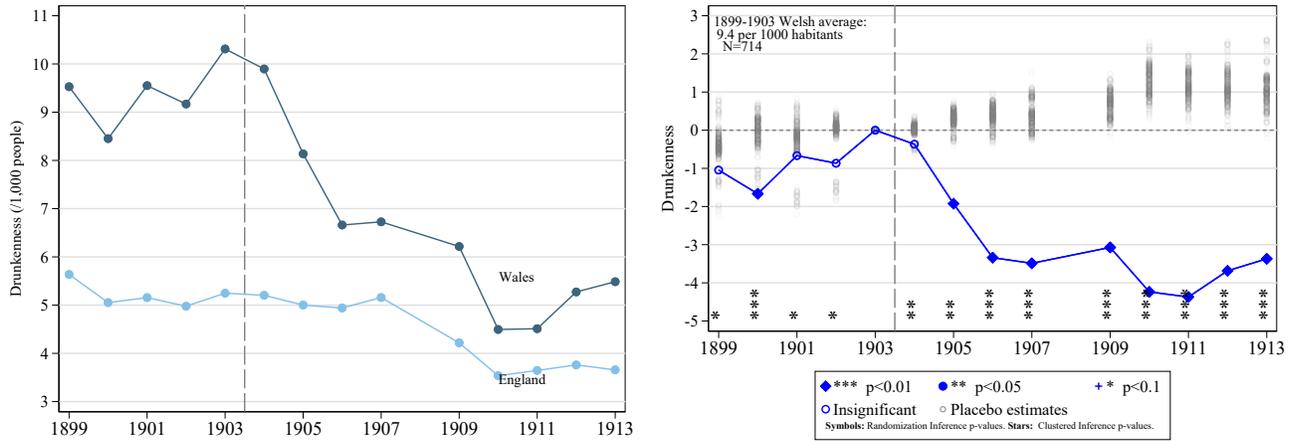
Notes: The left panel plots the raw aggregate crime rate separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. The aggregate crime rate is digitized from Tables XXIII and XXIV of the *Judicial Statistics of England and Wales*. Data for 1908 is missing due to the poor quality of available scans.

Figure 4: The Revival only impacted drunkenness and personal, mostly violent, crimes



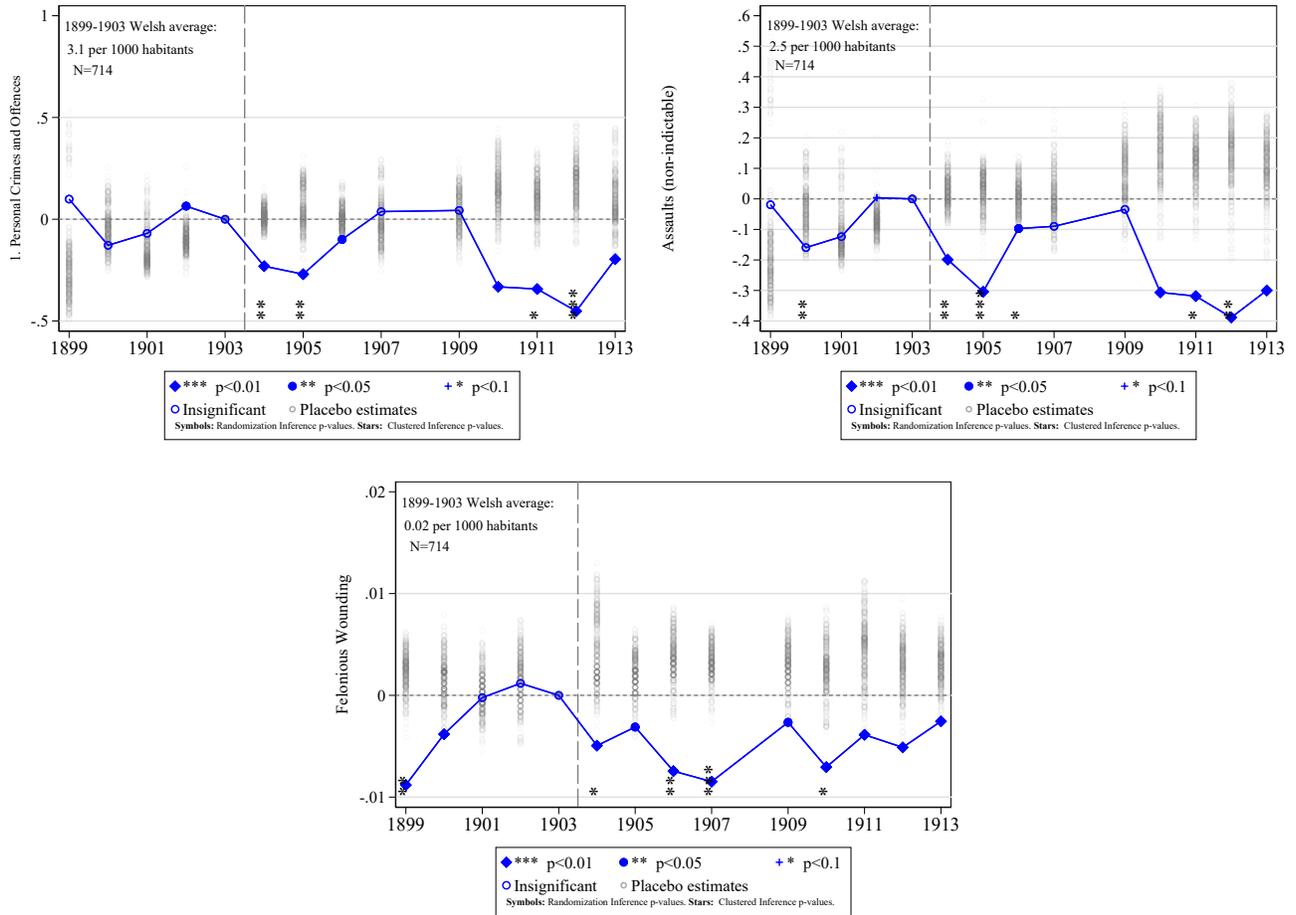
Notes: Each blue dot denotes the estimated coefficient on the  $Wales_c \times Post_t$  interaction term of a pooled difference-in-difference specification, with  $Post_t$  including the entire post-period from 1904 to 1913. The seven outcomes are measures of crime belonging to pre-existing categories taken from the *Judicial Statistics*. These categories are mutually exclusive and mutually exhaustive of 152 underlying specific crimes. Each outcome is standardized, making each estimate interpretable as an “effect” of the Revival in terms of standard deviations of the outcome. P-values are reported from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. The outcomes are aggregated from underlying specific crimes, digitized from Tables XXIII and XXIV of the *Judicial Statistics of England and Wales*.

Figure 5: Drunkenness offences in Wales relative to England fell by up to 46% following the Revival



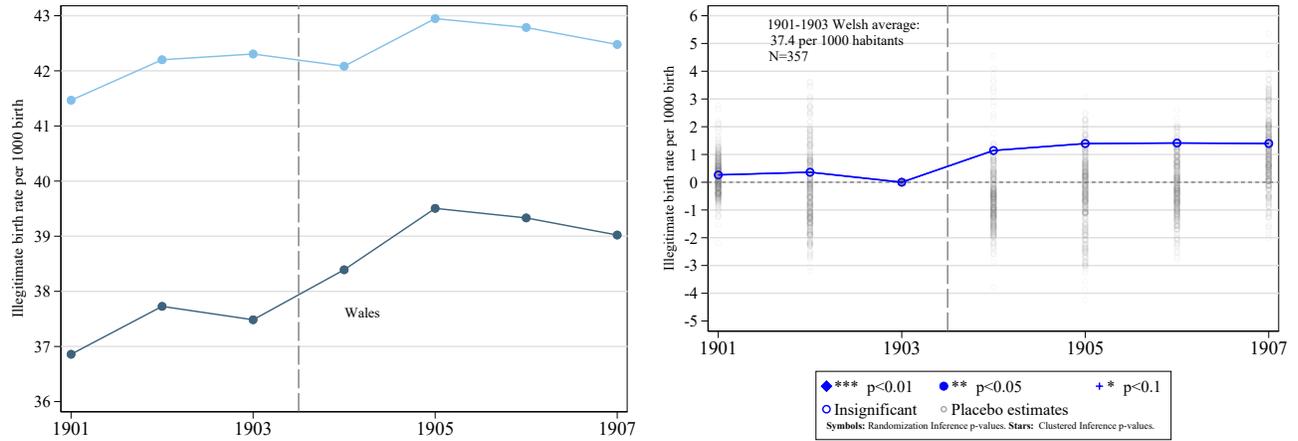
Notes: The left panel plots the drunkenness crime rate separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. The drunkenness crime rate is digitized from Table XXIV of the *Judicial Statistics of England and Wales*. Data for 1908 is missing due to the poor quality of available scans.

Figure 6: The Revival reduced violent crime



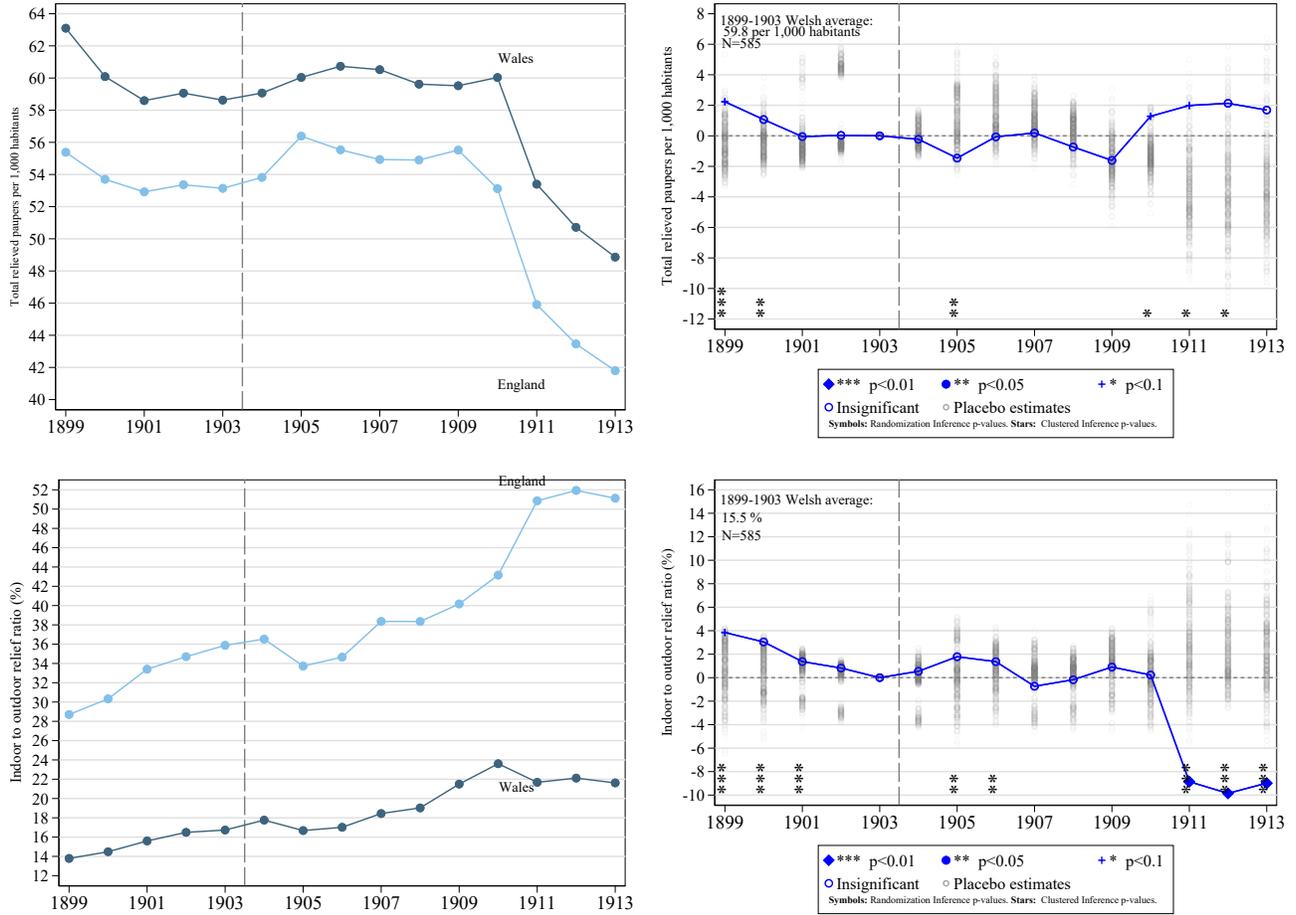
Notes: Each panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The top-left panel outcome is “Personal Crimes and Offences”, one of seven broad categories of crimes. The modal offence within this category is “Assaults (Non-Indictable)”, which is the outcome for the top-right panel. The bottom panel outcome is “Felonious Wounding”, a more serious violent offence within “Personal Crimes and Offences”. The estimates from each of the 400 placebo regressions are plotted as grey circles. The three outcomes are digitized from Tables XXIII and XXIV of the *Judicial Statistics of England and Wales*. Data for 1908 is missing due to the poor quality of available scans.

Figure 7: The Revival did not reduce the illegitimate birth rate



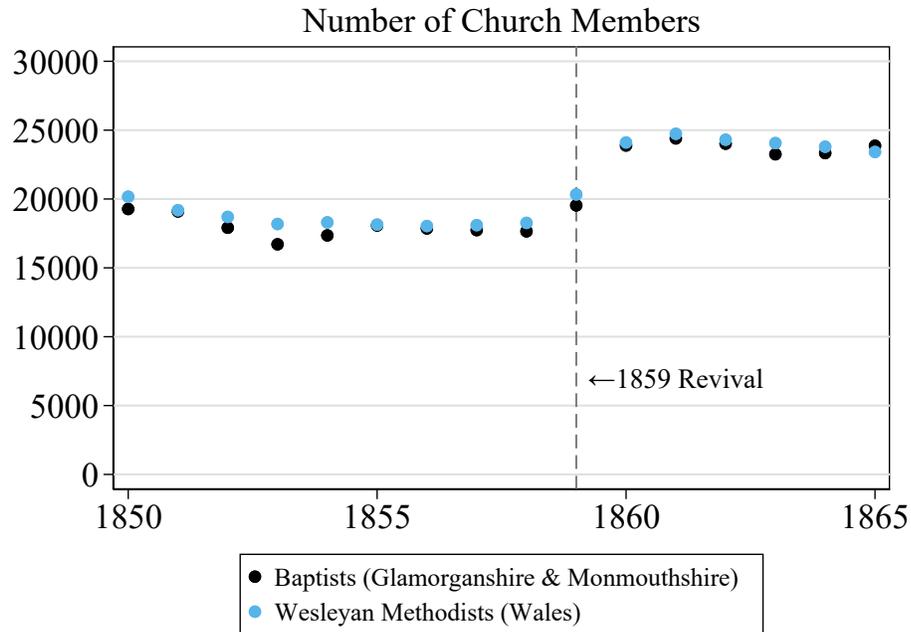
Notes: The left panel plots the illegitimate birth rate separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. The illegitimate birth rate is digitized from the *Annual Report of the Registrar-General of Births, Deaths, and Marriages*.

Figure 8: The Revival did not promote prosocial behavior toward the poor



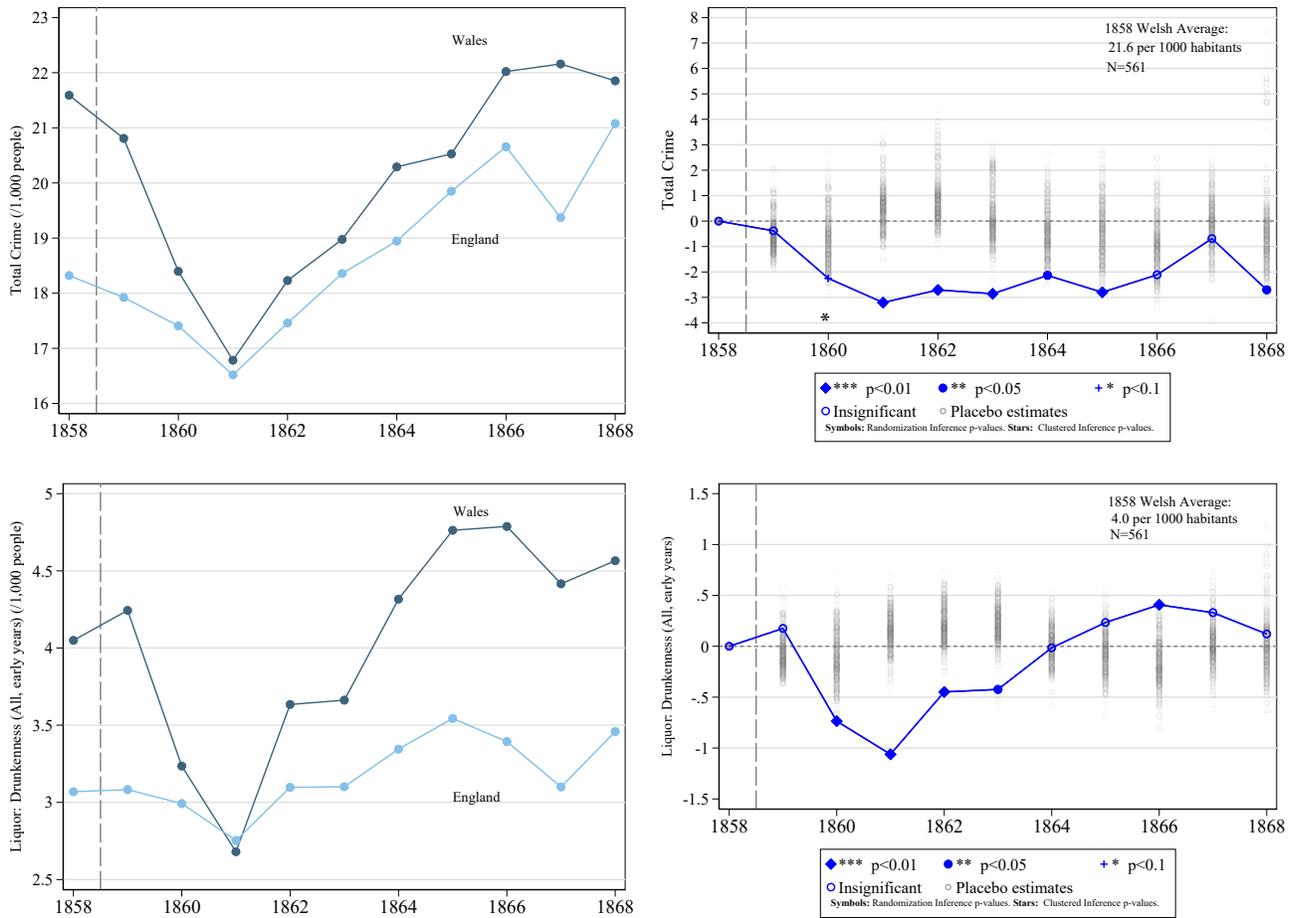
Notes: The top panels consider the number of people receiving poor relief per one thousand, the bottom panels consider the percentage of people receiving relief that received it indoors (in workhouses). Each outcome proxies for local prosociality, given that poor law unions would limit access to outdoor relief to reduce overall expenditure. Such attempts would reduce the total number receiving relief (top panels) and increase the percentage receiving relief indoors (bottom panels). The left panels plot the outcomes separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panels visualise the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. Both outcomes are from the *Great Britain Historical Database: Labour Markets Database, Poor Law Statistics* (UK Data Archive No. 4105).

Figure 9: The 1859 Revival also increased Welsh church membership



*Notes:* The figure shows the time series for a more limited set of church membership data before and after the 1859 Welsh Revival. *Source:* UK Data Archive No. 4105 – Digest of Welsh Historical Statistics: Religion, 1669-1974, from these underlying sources: Baptist Handbooks, Minutes of the Methodist Conferences, Minutes of Wesleyan Methodist Conference. The reported number of Baptist members for Glamorganshire in each year from 1853 to 1855 is 9045, 1010, 10203. I presume the 1010 number for 1854 to be a typo, and replace it with 10100 for the purpose of the above figure.

Figure 10: The 1859 Revival also reduced crime, including drunkenness

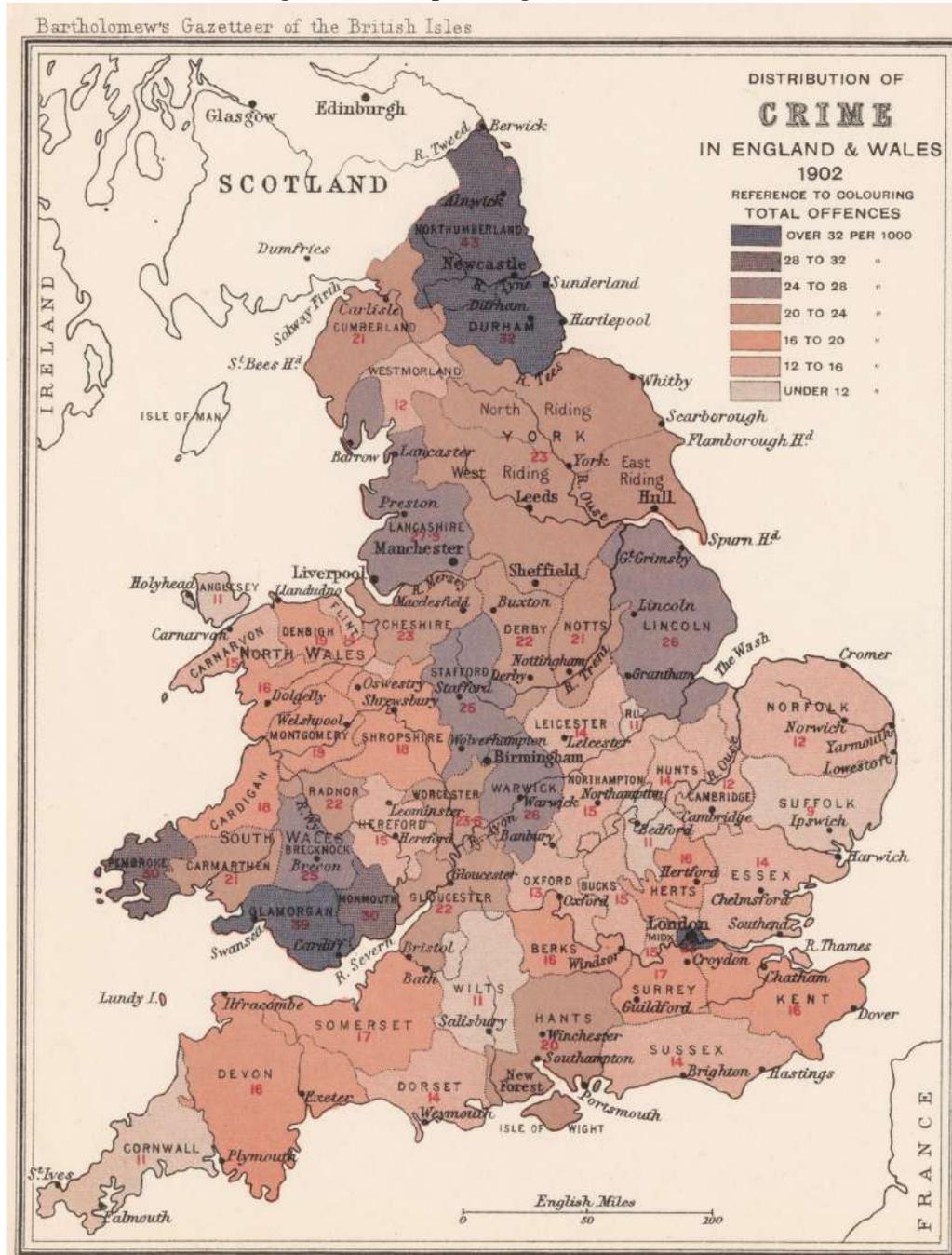


Notes: The left panels plot the outcomes separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panels visualise the difference-in-difference estimates from Equation 1, this time for the period 1858-68, with p-values from both county-clustered standard errors and randomization inference. The relevant data begins in 1858, so in this case I cannot estimate pre-trends. The estimates from each of the 400 placebo regressions are plotted as grey circles. The aggregate and drunkenness crime rates are digitized from Tables 4 and 7 of the *Judicial Statistics of England and Wales*.



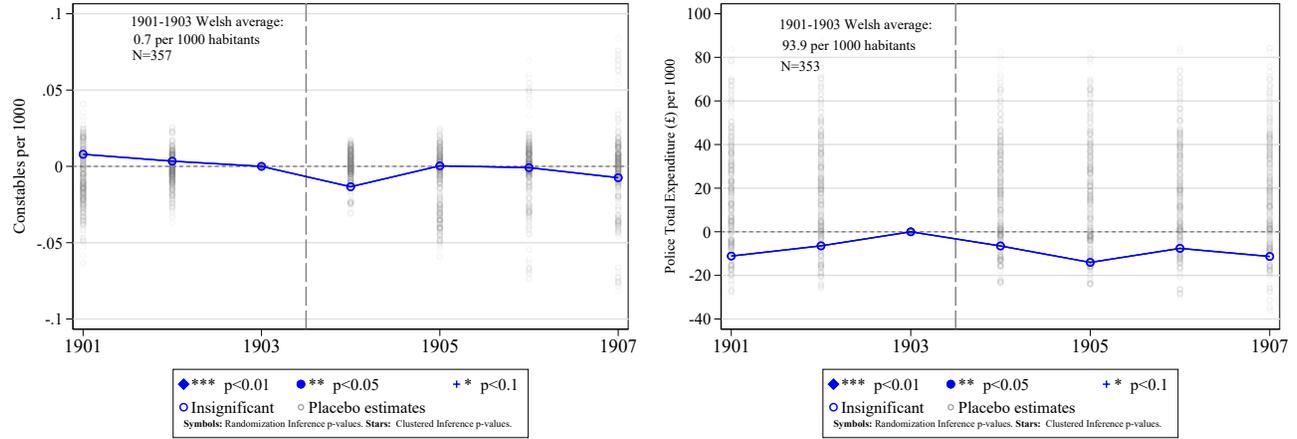
# A Appendix [For Online Publication]

Figure A1: Map of England and Wales



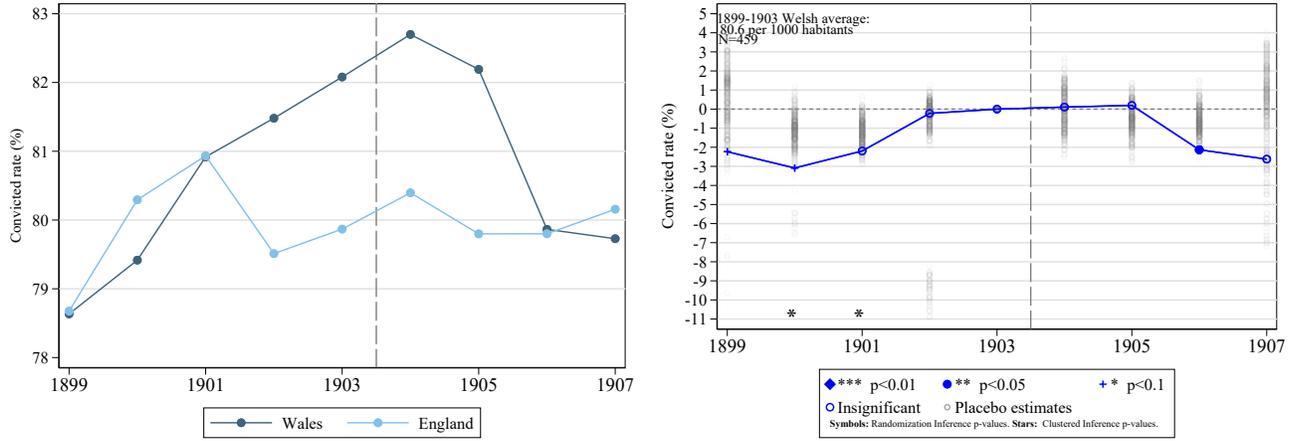
Notes: The map shows the county borders of England and Wales, with color-coding as per the total crime rate in 1902. There are 13 contiguous Welsh counties: Anglesey, Carnarvonshire, Denbighshire, Flintshire, Merionethshire (not labelled – contains Dolgelly town), Montgomeryshire, Radnorshire, Cardiganshire, Brecknockshire, Pembrokeshire, Carmarthenshire, Glamorganshire, and Monmouthshire.

Figure A2: Welsh police reporting capacity did not drop following the Revival



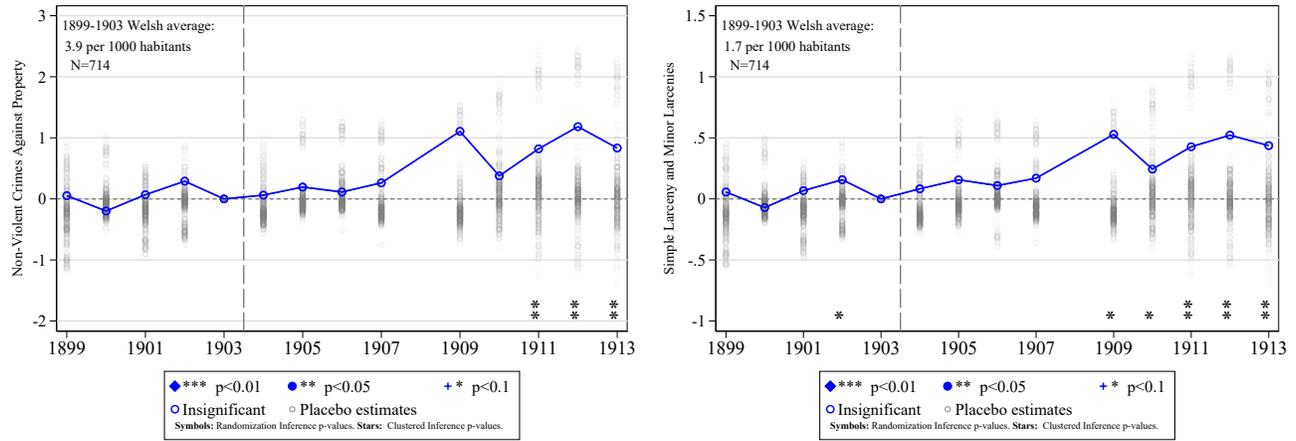
Notes: Both panels visualise the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. Both outcomes are digitized from the *Annual Reports of the Inspectors of Constabulary*. Constables per 1000 is the number of police constables in the county (from Table II) normalized by 1000s of population as of the last decennial census. Police Total Expenditure per 1000 is the gross total cost of the police in pounds in the county (from Table III) normalized by 1000s of population as of the last decennial census.

Figure A3: The punishment probability did not increase in Wales at the time of the Revival



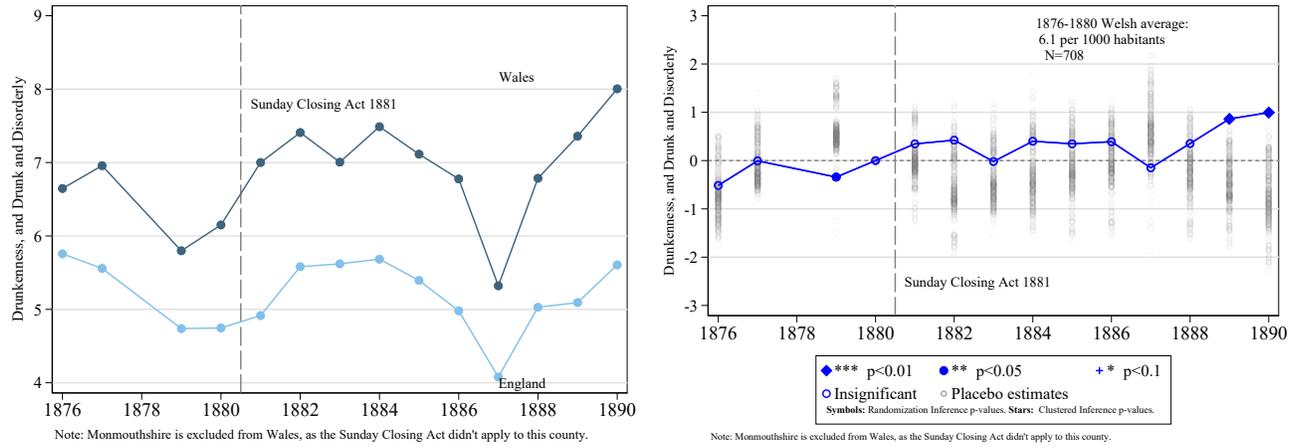
Notes: The left panel plots the raw aggregate conviction rate separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. The conviction rate is digitized from Tables XXI and XXII of the *Judicial Statistics of England and Wales*.

Figure A4: The Revival did not reduce economic crimes



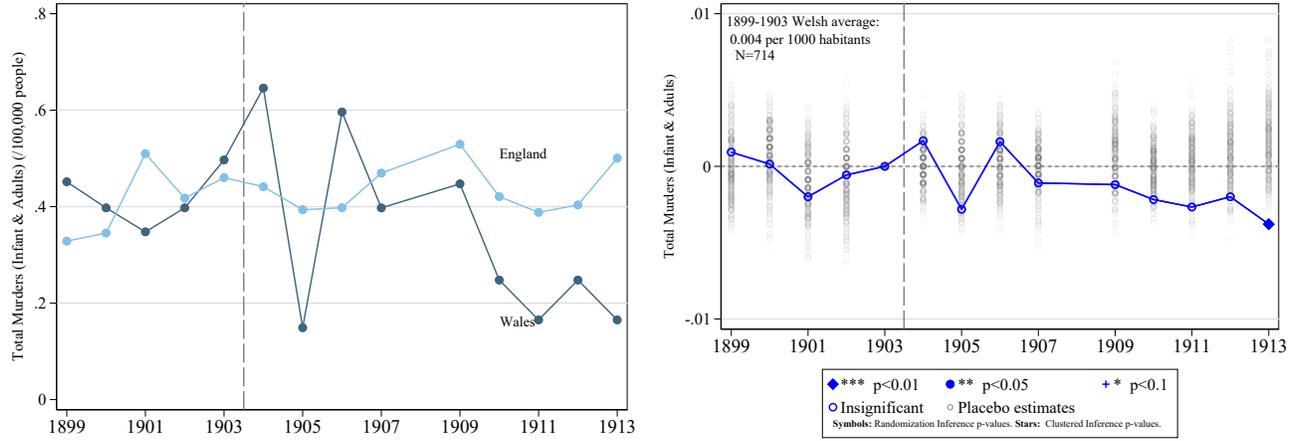
Notes: Each panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. Both outcomes are digitized from Table XXIII of the *Judicial Statistics of England and Wales*. Non-Violent Crimes Against Property (left panel) is a pre-existing category of crime (e.g. see pg136 of the 1905 *Judicial Statistics*) which includes the following offences: Larceny of Horses and Cattle, Larceny from the Person, Larceny in House, Larceny by a Servant, Embezzlement, Larceny of Post Letters, Other Aggravated Larcenies, Simple Larceny and Minor Larcenies, Obtaining by False Pretences, Frauds by Agents Etc., Falsifying Accounts, Other Frauds, Receiving Stolen Goods, and Offences in Bankruptcy. These offences are a strict subset of those included in the category “Crimes and Offences of Dishonesty” (used in Figure 4). Simple Larceny and Minor Larcenies (right panel) is the most common offence within the category of Non-Violent Crimes Against Property.

Figure A5: The Sunday Closing Act of 1881 did not reduce drunkenness offences



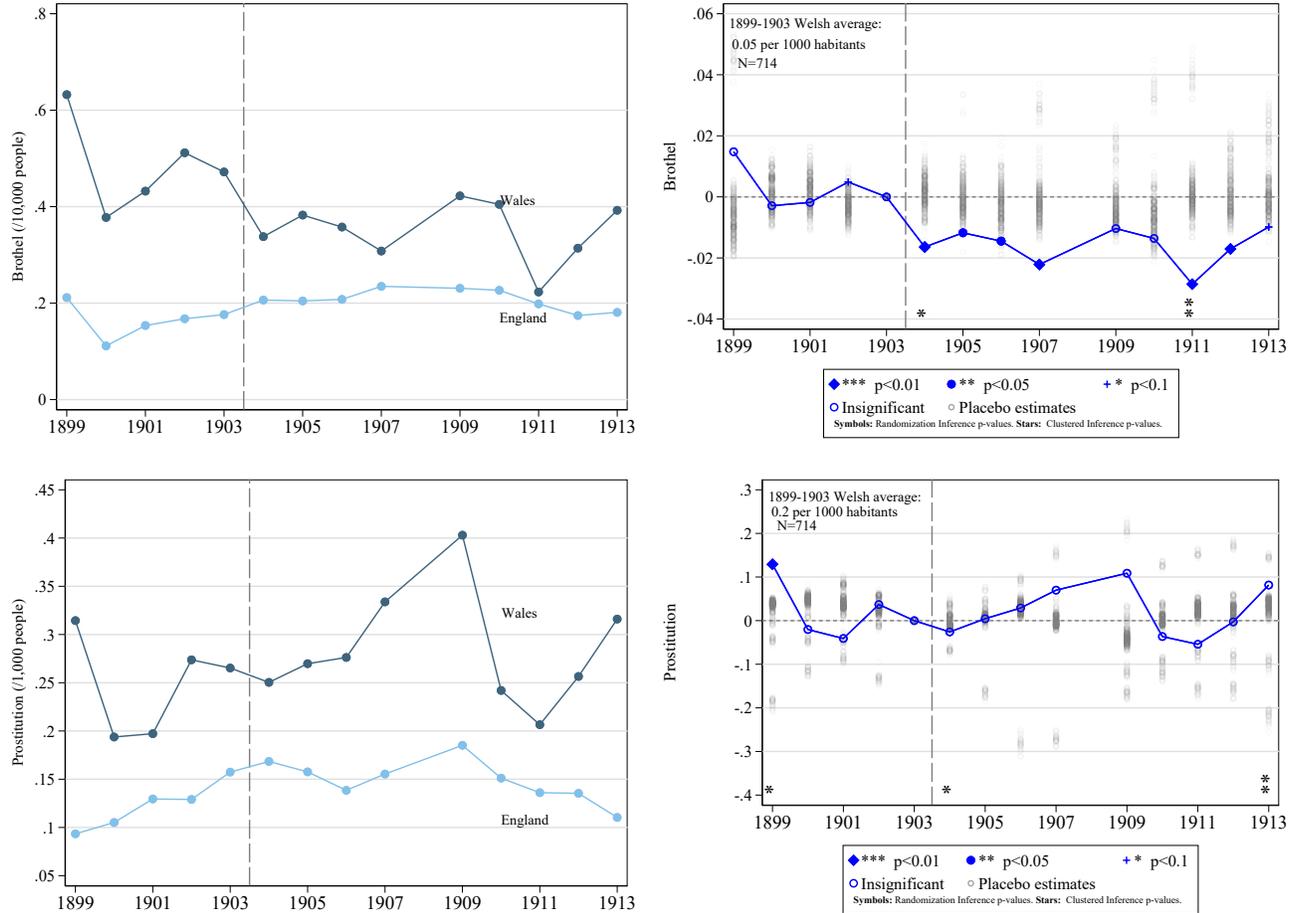
Notes: The left panel plots the drunkenness crime rate for the earlier period 1876 to 1890, with the series for England excluding three large counties (London, Lancaster, and York West Riding), and the series for Wales excluding Monmouthshire, which was exempt from the Sunday Closing Act. The right panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. The drunkenness crime rate is digitized from Table 7 of the *Judicial Statistics of England and Wales*. Prior to 1893 the offence was recorded with the label “Drunkenness, and Drunk and Disorderly”. From 1893 onwards the offence was labelled “Drunkenness”, as in Figure 5. Data for 1878 is missing due missing pages in the available scans.

Figure A6: The Revival and murder



Notes: The left panel plots the murder crime rate separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panel visualises the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. The murder crime rate is digitized from Table XXIII of the *Judicial Statistics of England and Wales*. Data for 1908 is missing due to the poor quality of available scans.

Figure A7: The Revival had a limited impact on criminal sexual behaviors



Notes: The top panels consider the rate of brothel-keeping offences, the bottom panels consider the rate of prostitution offences. The left panels plot raw crime rates separately for Wales and England, with the series for England excluding three large counties (London, Lancaster, and York West Riding). The right panels visualise the difference-in-difference estimates from Equation 1, with p-values from both county-clustered standard errors and randomization inference. The estimates from each of the 400 placebo regressions are plotted as grey circles. Both outcomes are digitized from Table XXIV of the *Judicial Statistics of England and Wales*. Data for 1908 is missing due to the poor quality of available scans.

## **B Data Appendix**

The 151 specific crimes belonging to the seven broad categories used in Figure 4 are:

### 1. Personal Crimes and Offences

- Murder
- Attempt to Murder
- Threats or Conspiracy to Murder
- Manslaughter
- Felonious Wounding
- Endangering Railway Passengers
- Malicious Wounding (Misdemeanours)
- Assault
- Intimidation and Molestation
- Cruelty to Children
- Abandoning Children under two years
- Child Stealing
- Procuring Abortion
- Concealment of Birth
- Offences Against the State and Public Order – Unlawful Assembly
- Offences Against the State and Public Order – Other Offences
- Offences Against Public Justice – Bribery, Etc.
- Offences Against Public Justice – Perjury
- Offences Against Public Justice – Escape and Rescue
- Offences Against Public Justice – Other Offences
- Offences Against Religion – Blasphemy, Etc.
- Libel
- Other Nuisances

- Suicide (Attempting to Commit)
- Assaults (Non-Indictable)
- Cruelty to Children (Non-Indictable)
- Offences Against Housing of the Working Classes Act
- Offences Against Labour Laws – Intimidation
- Offences Against Labour Laws – Breach of Contracts
- Offences Against Labour Laws – Offences Under Special Trade Acts
- Offences Against Labour Laws – Offences Under Truck Acts
- Offences Against Labour Laws – Mines Acts
- Offences Against Labour Laws – Factory Acts
- Offences Against Labour Laws – Shop Acts
- Offences Against Labour Laws – Employment of Children Acts
- Offences Against Labour Laws – Other Acts for Protection of Labour
- Offences Against Merchant Shipping Acts

## 2. Crimes and Offences Against Morals

- Unnatural Offences
- Attempts to Commit Unnatural Offences
- Indecency with Males
- Rape
- Indecent Assaults on Females
- Defilement of Girls Under 13
- Defilement of Girls Under 16
- Householder Permitting Defilement of Girls
- Procuration
- Abduction
- Bigamy
- Indecent Exposure

- Keeping Disorderly Houses
- Other Misdemeanours
- Brothel Keeping
- Indecent Advertisement
- Indecent Exposure
- Prostitution
- Offences Against Vagrancy Acts – Living On Prostitutes' Earnings

### 3. Crimes and Offences of Dishonesty

- Sacrilege
- Burglary
- Housebreaking
- Shopbreaking
- Attempts to Break Into Houses, Shops, Etc.
- Entering with Intent to Commit Felony
- Possession of Housebreaking Tools, Etc.
- Robbery
- Extortion by Threats to Accuse
- Extortion by Other Threats
- Larceny of Horses and Cattle
- Larceny From the Person
- Larceny in House
- Larceny by a Servant
- Embezzlement
- Larceny of Post Letters
- Other Aggravated Larcenies
- Simple Larceny and Minor Larcenies
- Obtaining by False Pretences

- Frauds by Agents, Etc.
- Falsifying Accounts
- Other Frauds
- Receiving Stolen Goods
- Offences in Bankruptcy
- Forgery and Uttering (Felony)
- Forgery (Misdemeanour)
- Coining
- Uttering Counterfeit Coin
- Poaching
- Adulteration of Foods and Drugs
- Offences Against Fishery Laws
- Offences Against Game Laws – Night Poaching
- Offences Against Game Laws – Day Poaching
- Offences Against Game Laws – Unlawful Possession of Games, Etc.
- Offences Against Game Laws – Illegal Buying and Selling of Game
- Offences Against Game Laws – Other Offences
- Offences Against Pawnbrokers' Acts
- Offences Against Police Regulations – Unlawful Possession
- Offences Against Revenue Laws
- Stealing Animals, Trees, Fruit, Etc.
- Receiving Stolen Animals, Trees, Fruit, Etc.
- Offences Against Vagrancy Acts – Found in Inclosed Premises Plus Possessing Picklocks Etc.
- Offences Against Vagrancy Acts – Frequenting
- Offences Against Weights and Measures Acts

#### 4. Crimes of Mischief and Cruelty

- Arson

- Setting Fire to Crops, Etc.
- Killing and Maiming Cattle
- Destroying Railways
- Destroying Trees and Shrubs
- Other Malicious Injuries
- Offences Against the State and Public Order - Riot
- Cruelty to Animals
- Malicious Damage
- Offences Against Wild Birds Protection Acts

#### 5. Drunkenness

- Habitual Drunkenness
- Offences Against Intoxicating Liquor Laws – Drunkenness
- Offences Against Intoxicating Liquor Laws – Habitual Drunkards Obtaining Drink

#### 6. Breaches of Police and Municipal Regulations

- Betting and Gaming
- Offences Against Diseases of Animals Act
- Offences in Relation to Dogs
- Offences Against Elementary Education Acts
- Offences in Relation to Explosives
- Offences Against Highway Acts
- Offences Against Intoxicating Liquor Laws, Offences by Licensed Persons – Permit Drunkenness
- Offences Against Intoxicating Liquor Laws, Offences by Licensed Persons – Selling Drink to Habitual Drunkards
- Offences Against Intoxicating Liquor Laws, Offences by Licensed Persons – Selling Drink to Children

- Offences Against Intoxicating Liquor Laws, Offences by Licensed Persons – Offences Against Closing Regulations
- Offences Against Intoxicating Liquor Laws, Offences by Licensed Persons – Other Offence by Licensed Persons
- Offences Against Intoxicating Liquor Laws – Unlicensed Sale of Drink
- Offences Against Intoxicating Liquor Laws – Other Offences
- Offences Against Military and Naval Law – Army
- Offences Against Military and Naval Law – Navy
- Offences Against Military and Naval Law – Volunteers and Territorial Force
- Offences in Relation to Parks, Commons and Open Spaces
- Offences Against Police Regulations – Metropolitan Police Acts
- Offences Against Police Regulations – Town Police Acts and Other Police Acts
- Offences Against Police Regulations – Borough Byelaws
- Offences Against Police Regulations – County Byelaws
- Offences Against Police Regulations – Local Acts and Byelaws
- Prevention of Crime Acts – Offences by License Holders
- Prevention of Crime Acts – Offences by Supervisees
- Prevention of Crime Acts – Special Offences by Twice-Convicted Persons
- Offences in Relation to Railways
- Offences Against Sanitary Law
- Offences Against Stage and Hackney Carriage Regulations
- Streets and Buildings
- Sunday Trading, Etc.
- Offences Against Tramways Act
- Offences Against Vaccination Acts
- Offences Against Vagrancy Acts – Gaming, Etc.
- Other Offences

## 7. Vagrancy

- Offences Against Poor Law
- Offences Against Vagrancy Acts – Begging
- Offences Against Vagrancy Acts – Sleeping out
- Offences Against Vagrancy Acts – Other Offences