

# Knocking on Heaven's Door? Protestantism and Suicide\*

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In his 1897 classic, Émile Durkheim presented aggregate indicators suggesting that Protestantism was a leading correlate of suicide incidence. We extend the economic theory of suicide to account for an effect of Protestant vs. Catholic denomination, modeling differences in the integration of the religious community, views about the impact of man on God's grace, and the possibility of confessing sins. We test the theory using a unique new micro-regional dataset of 452 counties in 19<sup>th</sup>-century Prussia, when religiousness was still pervasive. Exploiting the geographically concentric dispersion of Protestantism, our instrumental-variable model uses distance to Wittenberg as an instrument for Protestantism to circumvent selectivity bias. Protestantism had a significant and substantial positive effect on suicide both in 1816-21 and in 1869-71. We address issues of biases from misreporting, within-county heterogeneity, mental illness, and several correlates of suicides.

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## I. Introduction

In *Le suicide*, the classic example of using quantitative methods to investigate socially framed individual behavior, Émile Durkheim (1897) presented aggregate indicators that suggest a positive association of Protestantism with suicide. The proposition that Protestants have higher suicide rates than Catholics has been “accepted widely enough for nomination as sociology’s *one law*” (Pope and Danigelis (1981)). Several contributions have so far revealed the usefulness of investigating suicide from an economics point of view (Hamermesh and Soss (1974); Becker and Posner (2004)).<sup>1</sup> But the leading established correlate of suicide in the sociological literature, religious denomination, has received surprisingly little attention in the economic literature, despite its recent burst of interest in issues of culture and religion.<sup>2</sup> While the economic literature on happiness and subjective well-being has looked at suicide as a measure of utmost unhappiness with the particular advantage over subjective self-reports of being a revealed-preference outcome measure (e.g., Oswald (1997); Layard (2005)), these analyses have so far not been linked to religious denomination.

In this paper, we make two contributions to the economic analysis of the relation between religion and suicide. First, we model the effect of Protestantism on suicide in the spirit of recent advances in the economics of suicide. We show how a higher suicide rate of Protestants relative to Catholics can be understood as a rational outcome of several differences in the religious doctrines between the two denominations. Second, we provide new micro-regional evidence from the 19<sup>th</sup> century – a time when religiousness was still pervasive – that the effect of Protestantism on suicide may indeed be causal. While many sociological studies have confirmed Durkheim’s association since, causal interpretation is hampered by the possibility that individuals with characteristics that make them prone to committing suicide may select themselves into different religious faiths. We suggest an empirical identification strategy that exploits the fact that in Prussia, Protestantism initially tended to spread concentrically around Luther’s city of Wittenberg (Becker and Woessmann (2009)). Using a unique dataset of 452

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<sup>1</sup> Cutler, Glaeser, and Norberg (2001) and Daly and Wilson (2009) are further examples.

<sup>2</sup> The economic literature on religion and culture (see, e.g., Iannaccone (1998) and Guiso, Sapienza, and Zingales (2006) for surveys) has not placed major emphasis on suicide as a possible outcome. A noteworthy exception is the economics of suicide bombers (Benmelech and Berrebi (2007); Berman and Laitin (2006)), which addresses a special case where the prime motivation for suicide is not to end one’s own life. Evidence suggests that the typical profile of suicide bombers is very different from those who commit suicide in general (Krueger and Malečková (2003)).

Prussian counties at the beginning and end of the 19<sup>th</sup> century, our results suggest that Protestantism is a leading explanatory factor for suicide rates.

Durkheim (1897)'s hypotheses and patterns on religion and suicide have created substantial controversies in the sociological literature to these days, and the regularity of the empirical pattern has not gone without question.<sup>3</sup> Theoretically, Durkheim (1897) stressed the point that Protestantism encourages independent thought and religious individualism, decreasing the integration of the community relative to the unified Catholic community. He argued that it is this role of religion as a society which tends to protect man from committing suicide. We put this argument in the framework of a simple economic theory.

However, there are additional differences between Protestantism and Catholicism, rooted more fundamentally in religious doctrine, which have consequences for the utility or disutility of afterlife. By adding religion and the consideration of afterlife to an economic theory of suicide, we show that such doctrinal differences between the Protestant and Catholic denominations are relevant to suicidal behavior. In particular, Protestantism tends to stress that man's salvation is by God's grace alone and not by any merit of one's own work, whereas Catholicism allows for God's judgment to be affected by man's deeds and sins. Additionally, the confession of sins is a holy sacrament in Catholicism, but not in Protestantism. Consequently, extending the Becker and Posner (2004) version of the economic theory of suicide, we model the effect on suicide of the integration of the religious community, views about the impact of man on God's grace, and the impossibility (by definition) of confessing the sin of suicide. We show that within the framework of a rational theory of suicide, these differences in doctrine give rise to a higher propensity to commit suicide among Protestants than among Catholics.

To test this prediction empirically, we turn to the setting of Prussia in the 19<sup>th</sup> century. The 19<sup>th</sup> century, apart from mirroring the perspective of Durkheim (1897)'s work, has the advantage that virtually everybody was member of a religious denomination and that religion pervaded all aspects of life. The Prussian perspective offers the opportunity to compare non-minority occurrences of the two religious denominations within an otherwise common setting of political governance, institutions, jurisdiction, language, and basic culture.<sup>4</sup>

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<sup>3</sup> See Bankston, Allen, and Cunningham (1983) and Simpson (1998) for random examples over the years.

<sup>4</sup> Papers studying the empirical association between religion and suicide from an economic perspective in the framework of cross-country regressions include Huang (1996) and Helliwell (2007).

In addition, 19<sup>th</sup>-century Prussia proves to be the source of uniquely rich micro-regional data for an empirical application. In order to understand better how the incidence of suicide might be curtailed, in 1869-71 the Prussian statistical office embarked on a detailed survey of suicides, to be administered by all local police departments. These data are available at the level of the 452 Prussian counties. Combining them with rich census data on relevant background information, we build a unique new county-level dataset on suicide, religion, and relevant covariates. We also use much older data on suicide incidence, from 1816-21, where questions about the neutrality of data recording necessitate additional robustness analyses.

A fundamental challenge for an empirical identification of the effect of Protestant denomination on suicide is that people with different characteristics may self-select into religious denominations. This may be less of an issue in the 19<sup>th</sup> century compared to today. Still, as early as 1919 the Hungarian neurologist and psychiatrist Kollarits (1919) advanced the hypothesis that the higher incidence of suicide among the Protestant population may simply be the result of selection into denominational groups. To identify the causal effect of Protestantism in face of this endogeneity issue, we exploit exogenous variation in Protestant affiliation that stems from the initial geographic dispersion of the Reformation across Prussia. As shown in Becker and Woessmann (2009), Protestantism had a tendency to spread in concentric circles around Luther's city of Wittenberg during the first century after the onset of the Reformation. This allows us to use distance to Wittenberg as an instrument for Protestantism in Prussia. To vindicate the validity of this instrument, we show that it is orthogonal to several correlates of suicide rates in 1500, before Luther started the Reformation.

Our results show that Protestantism had a significant positive effect on suicide rates in Prussia both in the early and late 19<sup>th</sup> century. This is true in simple bivariate correlations as well as after controlling for rich background factors, and when employing the variation emanating from our instrument. According to our estimates, Protestantism increased the annual suicide rate per 100,000 inhabitants, which has a mean of 13 suicides in our dataset, by about 15-20 suicides. Channels such as economic modernization and literacy, which are also affected by Protestantism, seem to play only a minor role in this effect. In order to rule out that the effect stems from reporting bias in that one denominational group may be less inclined to report suicide as a cause of death (potentially relevant in the 1816-21 data), we look at whether some suicides might be hidden in the death reporting category of fatal accidents. If anything, the correlation between

reported suicides and reported fatal accidents is positive, and controlling for the fatal accident rate does not alter our results.

Not all suicides are rational acts, despite our emphasis that a relevant part can be understood within a rational framework. Psychiatrists often link suicide to mental illness, and part of the ensuing behavior may defy rational thinking.<sup>5</sup> Patients in mental hospitals, especially those with depressive disorders, tend to have high suicide rates (e.g., Dublin (1963)). To exclude that such sources of suicide drive our results, our dataset is rich enough to contain information on the share of people classified as having physical or mental disabilities, including being “insane”. The data show that the occurrence of mental illness does not vary by religious denomination (Guttstadt (1874)). Holding the shares of mentally disabled people and of people with other disabilities constant in our regression analyses does not affect our results.

In what follows, Section II develops the economic theory of religion-specific suicide rates and Section III presents the evidence from 19<sup>th</sup>-century Prussia. Section IV concludes.

## **II. An Economic Theory of Religion-Specific Suicide**

Based on the 5<sup>th</sup> Commandment (“Thou shalt not kill”), suicide was forbidden and viewed as sin both in Catholicism and in Protestantism. As Durkheim (1897) emphasized, “The Protestant believes in God and the immortality of the soul no less than the Catholic.” (p. 170) However, we see three main differences in doctrine between the two denominations that have bearing on the rationality of the act of suicide – the integration of the religious community, views about the impact of man on God’s grace, and the possibility of confessing sins – which we will model in the framework of an economic theory of suicide.<sup>6</sup>

### ***A. The Economic Theory of Suicide***

For this, we extend the economic theory of suicide developed by Becker and Posner (2004). In line with the pioneering work by Hamermesh and Soss (1974), suicide is modeled as forward-

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<sup>5</sup> See Becker and Posner (2004) for a discussion of the extent to which this may reflect rational behavior.

<sup>6</sup> When describing Protestant doctrine, we will mostly focus on the Lutheran type of Protestantism, which is the first variant of the Protestant Reformation and will also be the subject of our empirical application further below. In 1817, the two Protestant fractions, Lutherans and Reformists, were merged into the single Protestant Church in Prussia (Evangelische Kirche in Preußen), and the official statistics dropped the distinction between them. However, statistics from just before the merge show that 94 percent of Protestants in Prussia were Lutherans (Mützell (1825)).

looking utility-maximizing behavior. In a process of rational decision-making, individuals compare the expected utility from living with that from death. If the latter is greater than the former, committing suicide will maximize utility.

Let  $u(t)$  denote the utility of living at age  $t$ . Then, the necessary and sufficient condition for suicide to be rational at age  $t$  is that the discounted value of present and future utilities is not greater than the cost of committing suicide  $c$ , neither at age  $t$  nor at any segment starting at  $t$  and ending before or at the length of life without suicide  $T$ :

$$\sum_{i=t}^A \beta^{i-t} u(i) \leq -c_d, \text{ for all } A = t, t+1, \dots, T \quad (1)$$

where  $\beta$  is the discount factor. The left-hand side of the condition depicts the utility derived from carrying on living, whereas the right-hand side depicts the utility from dying by suicide. In this case, the latter is comprised only of the disutility stemming from the cost of committing suicide  $c$ , which may vary by religious denomination  $d$  (Protestant or Catholic in our case). Note that the relation has to hold for all segments of life into the future that start in  $t$ , because otherwise it might be worth living a little longer to reap some positive utility before large negative utilities set in. In the Becker and Posner (2004) specification,  $c$  is normalized to zero by choice of the utility function, but given our aim to model inter-group differences in the cost of committing suicide explicitly, we add  $c_d$  as a variable that may differ across individuals and is expressed in units commensurate with the utility function. This is similar in spirit to the “distaste for suicide” variable in the Hamermesh and Soss (1974) specification, although the latter is only subject to random variation, whereas we model systematic differences by denomination.

For simplicity, our setup assumes certainty about all future lifetime utilities. Thereby, we abstract from aspects introduced by uncertainty into the suicide decision, such as the option value of waiting (Cutler, Glaeser, and Norberg (2001); Becker and Posner (2004)) and implications for risk-taking behavior (Becker and Posner (2004)), as well as from further possible refinements of the model setup.<sup>7</sup> While these refinements raise important aspects of the

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<sup>7</sup> In particular, our setup also abstracts from differences in the probability of success between different methods of committing suicide (Becker and Posner (2004)), imitative aspects of suicide through contagion (Cutler, Glaeser, and Norberg (2001)), and signaling motives for (intentionally unsuccessful) suicide attempts (Rosenthal (1993); Cutler, Glaeser, and Norberg (2001); Marcotte (2003); Becker and Posner (2004)).

suicide decision in general, we think that they are not pivotal for understanding denominational differences in suicide and would thus just distract from the core mechanisms at work.

### ***B. Modeling the Durkheim Argument: Integration of the Religious Community***

In order to understand how religious differences may affect the propensity to commit suicide, we model three denominational differences between Protestantism and Catholicism in the framework of this simple economic model of suicide. The first interdenominational aspect, emphasized by Durkheim (1897), is that Protestant doctrine encouraged independent thought and religious individualism, which decreases the integration of the community. By contrast, Durkheim argues, Catholicism was generally more oriented towards the group, providing social support, and the specific Catholic credos, norms, and codices unified the Catholic community. As Becker and Posner (2004) point out, if there is mutual interdependence in preferences, the fact that there are others who would suffer from the suicide will tend to discourage people from committing suicide. In terms of the economic model, the greater integration of the Catholic community has two effects.

First, assuming that that individual utility  $u$  depends on the extent to which other people care about oneself, the fact that Protestants are mostly surrounded by individualists means that, *ceteris paribus*, their utility derived from living at any point in time is lower than that of Catholics. The greater cohesion and social support in an integrated community means that Catholics' utility from living is higher, thereby reducing the probability that the discounted stream of their utilities falls below the suicide threshold. This aspect models the core of Durkheim (1897)'s argument, who observes an "indivisible unity of the Catholic Church" (p. 158) because its common beliefs and practices create an integrated religious community and are "capable of supporting a sufficiently intense collective life" (p. 170).

Second, the cost of committing suicide  $c_d$  will be higher if the denomination  $d$  is Catholic rather than Protestant, both because it entails breaking from a community with stronger common codices and because of the negative effect on other people for whom a person more strongly integrated in the community is concerned more strongly. Together, these effects make it more unlikely that relation (1) holds. Thus, based on this aspect, suicide rates would be predicted to be lower in Protestant communities than in Catholic communities.

### C. *Differences in Denominational Doctrine about the Impact of Man on God's Grace*

We think that to fully understand denominational differences in suicide, we have to go beyond the sociological aspect stressed by Durkheim (1897) and take the theological aspect of the possibility of afterlife into account. Views about afterlife seem obviously crucial for considerations about ending one's life on earth. Christians – both Catholics and Protestants – believe in life after death. We assume that from this afterlife  $a$ , they derive an expected utility  $u(a)$  per unit of time (given uncertainty about whether one actually reaches afterlife, this expectation may be smaller than full afterlife utility). However, depending on denominational doctrine, the act of committing suicide may affect the probability of accomplishing these benefits of afterlife. We express this by the parameter  $p$  ( $0 \leq p \leq 1$ ), which depicts the punishment in terms of expected loss of afterlife utility for the act of committing suicide. Considering the possibility of such punishment, there are two ways in which afterlife enters the optimality condition for committing suicide:

$$\sum_{i=t}^A \beta^{i-t} u(i) \leq (1 - p_d) \sum_{i=t}^A \beta^{i-t} u(a) - \left( c_d + p_d \sum_{i=T+1}^{\infty} \beta^{i-t} u(a) \right), \text{ for all } A = t, t+1, \dots, T \quad (2)$$

The first term on the right hand side depicts the utility of dying: Because death now means that one may enter afterlife, there is a positive utility component to immediate death. For each period, the individual has to weigh the utility  $u(t)$  from living on earth against the utility  $u(a)$  from afterlife. In principle, the latter should be large, although given uncertainty about afterlife, the expected utility may be lower than actual afterlife utility. Still, in itself this aspect raises the suicide inclination of believers relative to non-religious people – heaven can't wait. However, to the extent that the act of committing suicide lowers the probability of reaching afterlife ( $p$ ), this effect is reduced. In addition, this punishment will not only affect the possible years in afterlife until  $T$ , but afterlife into eternity. As a consequence, the expected loss of afterlife utility after  $T$  will add to the cost of committing suicide, as expressed by the additional term at the end of the right-hand side. In total, then, the question whether suicide inclination is higher or lower for believers than for atheists depends on the relative size of the punishment and expected afterlife utility. In particular, suicide incidence will, *ceteris paribus*, be smaller among religious than non-religious people if the punishment  $p$  is larger than the “short-run” gain of the additional time in



afterlife until  $T$  (expressed relative to all afterlife utility until eternity).<sup>8</sup> This could explain why the literature tends to find a negative association between suicide and belief in God (Helliwell (2007); Layard (2005)).

More to the point of our topic of investigation, differences in denominational doctrines mean that punishment  $p$  will vary by denomination  $d$ . Given that traditional Catholic doctrine views suicide as a deadly sin which forfeits God’s grace and bars man from entering heaven, whereas Protestant doctrine does not provide for an impact of man on God’s grace,  $p_C > p_P$ . Thus, the utility from committing suicide – the right-hand side of inequality (2) – will be larger for Protestants than for Catholics. In the extreme, we can expect that the Catholic  $p_C=1$  – paradise is lost due to the act of committing suicide. In fact, if Catholics view suicide as a deadly sin which turns a possible afterlife of heaven into hell (or at least prolong purgatory), the act of committing suicide may turn the very utility of afterlife  $u(a)$  from positive to negative (respectively reduce it).

By contrast, following the Protestant “sola gratia” doctrine, suicide (or any other act of man) and the probability of going to heaven are orthogonal, as the latter depends only on God’s grace, which in turn is unaffected by any human deed. As a consequence, in the extreme the Protestant  $p_P=0$ . This reasoning is consistent with the fact that, at least in modern Protestant doctrine, the predestination aspect leads to a somewhat more lenient assessment of suicide. For example, the influential Protestant theologian Karl Barth (1951) argued that there may be cases where God commands the suicide, and man can commit suicide in a state of peace with God.

As a consequence, the denominational differences in the view of the extent to (and manner in) which the deeds of man can impact God’s grace will lead to a higher propensity to commit suicide of Protestants relative to Catholics.

#### ***D. Modeling the Impossibility of Confessing the Sin of Suicide***

While Catholic doctrine has confession as a holy sacrament, Protestant doctrine (generally) does not.<sup>9</sup> However, due to the irreversibility of the act of successfully committing suicide, by

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<sup>8</sup> For  $A = T$ , the condition is:  $p > \sum_{i=t}^T \beta^{i-t} u(a) / \sum_{i=t}^{\infty} \beta^{i-t} u(a)$ .

<sup>9</sup> The confession of sins is one of the seven holy sacraments of Catholicism, of which Lutheranism accepts only two (baptism and communion).

definition it is impossible to confess a successful suicide. As Becker and Posner (2004) put it, “The dominant characteristic of suicide is its finality – there is no second chance.” (p. 5) This fact reinforces the mechanism just discussed, because Catholics cannot use confession to evade the loss of afterlife utility due to the act of suicide.

But the finality of suicide gives rise to an additional mechanism in which confession affects the optimality of the suicide decision. When considering the possibility or impossibility of confession, the finality of the specific sin of suicide creates a substitution effect between committing suicide and other possible options considered by very unhappy people: The possibility of confessing sins raises the relative “price” of suicide relative to other sinful options, compared to a situation where confession is not a possibility at all.

When contemplating different possible actions as a response to extreme unhappiness, a miserable person may thus view the cost of the specific sinful action of suicide (which cannot be confessed because the person will not be there to do so) as higher relative to the cost of other sinful actions such as heavy drinking, blindfold marriage, or committing crimes. This effect will be lower, the lower a doctrine views the influence of the act of confession, and it does not arise at all in a denomination whose doctrine does not allow for the possibility of confession anyways. In light of the denominational differences in doctrine discussed above, this gives rise to an additional mechanism by which Catholics should be less prone to suicide than Protestants.

### **III. Evidence from 19<sup>th</sup>-Century Prussia**

To validate the hypothesis that Protestants are more likely to commit suicide than Catholics and that this is a causal relationship, this section provides evidence from 19<sup>th</sup>-century Prussia.

#### ***A. Data and Descriptive Statistics***

Prussia in the late 19<sup>th</sup> century is the obvious place to probe the association between Protestantism and suicide more deeply, using sub-national data. First, 19<sup>th</sup>-century Prussia has the birthplace of the Reformation at its center. Luther proclaimed his 95 Theses in Wittenberg, and the Prussian territory conserved Protestantism in its purest form. Second, Prussia had uniform laws and institutional frameworks, and official suicide figures were collected as early as 1816-1821. This makes county-level data within Prussia directly comparable, different from cross-national figures. Third, Prussia was well divided between Protestants and Catholics, with

Protestants constituting roughly two thirds and Catholics roughly one third of the total population, so that no denomination was an extreme minority. This might be crucial in the context of suicide if religious minorities behave differently independent from their denominational teachings. Furthermore, Prussia was exceptional in granting freedom of religion to each individual at least as early as in the mid-18<sup>th</sup> century. Frederick the Great, the enlightened monarch of Prussia, had famously declared in 1740 that in his country, everybody may find his salvation in his own way.<sup>10</sup> Fourth, Prussian orderliness and thoroughness yielded high-quality data at the county level in the 19<sup>th</sup> century. In particular, a concern that 19<sup>th</sup>-century statistics might systematically underreport suicide rates contrasts with the fact that suicide rates in late 19<sup>th</sup>-century Prussia are reported to be higher, not lower, than in modern-day Germany (see Organisation for Economic Co-operation and Development (2009)), as we discuss below.

Our main period of analysis is the years 1869-1871, for which we have suicide statistics as well as a rich set of variables that the literature considers as determinants of suicide rates. Most prominently, the 1871 Population Census contains Protestantism rates, demographic characteristics, and education information in the form of adult literacy rates. Furthermore, data from the 1882 Occupation Census provides information on the occupational structure that we use as indicators of the stage of industrial development. We further collected geographic information on latitude and longitude of county capitals. Our data cover all 452 Prussian counties (*Kreise*) at the time, divided into 35 districts (*Regierungsbezirke*) and 11 provinces (*Provinzen*); see Appendix A for details.

We also digitized suicide statistics for the years 1816-1821, the first time for which suicide statistics were collected for all Prussian counties (see Mützell (1825)). There is a difference in the way suicide data were collected at the beginning and end of the 19<sup>th</sup> century (see Hilde (1871)). In 1816-21, data on suicides was drawn from the local burial and death registers, which were often run by the church. This changed when, in 1868, dedicated suicide statistics were introduced. Every suicide was now counted by the local state administration (the city council or the local police). For that purpose, each suicide was measured on a separate data sheet. Background information on the suicide and the suicide circumstances were collected with the

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<sup>10</sup> “... hier mus ein jeder nach Seiner Façon Selich werden.” Frederick also wrote that “all religions are equal and good.” A unique feature in the 18<sup>th</sup> century, a Protestant and a Catholic church stood next to each other in the *Forum Fridericianum* at the origin of the central boulevard “Unter den Linden” in Berlin.

explicit aim of understanding the impact factors of suicides. After a test period in the last quarter of 1868, the new data collection method was used as the basis of very detailed suicide statistics from 1869 onwards. The Prussian Statistical Office was highly dedicated to data quality and provided 80 pages of background information and first results on the new suicide statistics in its quarterly journal (see Hilse (1871)). The care given to data collection and the amount of detail given in the suicide tables is an impressive and reassuring sign of data quality.<sup>11</sup>

Thus, whereas the suicide data in 1816-21 might suffer from some overall degree of underreporting (an issue we deal with in our econometric analysis), the data in 1869-71 are likely as accurate as modern-day statistics, as witnessed by the fact that suicide rates are even higher than in modern data.

The descriptive statistics, reported in Table 1, reveal that the average share of Protestants in a county was 64.2 percent, against 34.5 percent Catholics (the remaining shares being Jews at 1.1 percent and other Christian denominations at 0.2 percent). As noted earlier, both Protestants and Catholics are not just a small minority, but constitute a sizeable fraction of the Prussian population. Second, there is substantial variation across counties, essentially ranging from zero to 100 percent Protestants or Catholics, which provides the variation for our empirical analysis. In fact, more than 75 percent (60 percent) of the counties have a share of at least 80 percent (90 percent) of either Protestants or Catholics (see also Figure 1).

The average suicide rate over the years 1869-1871 across all Prussian counties was 13.0 per 100,000 inhabitants, ranging between 0 in only one county (Adenau) to 37.1 (Schönau). These are levels somewhat higher than in modern-day Germany where suicide rates in the year 2004 were at 10.3 per 100,000 inhabitants (Organisation for Economic Co-operation and Development (2009)). The comparison of our historic data with modern data gives no indication of a systematic underreporting in the 19<sup>th</sup> century, unless one believes that suicide rates had a significant downward trend over the 20<sup>th</sup> century. Figure 2 depicts the regional variation in the suicide rates across Prussia.

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<sup>11</sup> For instance, eleven different means of suicide are provided (hanging and drowning being the two most popular categories). Three cases of “otherwise unclassified” means of suicide are described in quite some detail, e.g. the case of a woman who had filled a cooking pot with eight buckets of water which she put on the fireplace and sat down in the boiling water. She died of her wounds five minutes after she was removed from the pot.

In alternative specifications, we use the number of suicides over a period divided by the flow of deaths in the same period, which we call the suicide proportion. This is to control for differences in mortality rates across counties.

Our dataset also contains information about fatal accidents. Suicides might be underreported and classified as fatal accidents (Kollarits (1919)). If that were the case, suicide rates and fatal accident rates should be negatively correlated. Table A.1 shows, however, that they are uncorrelated: their raw correlation is -0.004 with a standard error of 0.932. Still, in some specifications we will use fatal accident rates as a control variable.

Dublin (1963) reports that patients in mental hospitals do have particularly high suicide rates, especially those with depressive disorders. Fortunately, our data also contains shares of the population with physical or mental disabilities (blind, deaf-mute, and insane).

Demographic characteristics, information on educational and economic development, and geographic and historic variables complete our list of control variables.

### ***B. Evidence from 1869-71***

Suicide rates are strongly positively associated with the share of Protestants in a county (Table 2, column (1)). On average, all-Protestant counties have a suicide rate that is 14.5 suicides per 100,000 inhabitants higher than all-Catholic counties. Viewed against an average suicide rate of 13.0, this is a substantial difference across religious denominations.

Column (2) adds the list of basic control variables to estimate the model

$$SUIC = \alpha_1 + \beta_1 PROT + X\gamma_1 + \varepsilon_1 \quad (3)$$

where *SUIC* is the suicide rate (or the suicide proportion) in a county, *PROT* is the share of Protestants in the county, and *X* is a set of demographic control variables including the share of the county population below 15 years of age and above 60 years of age and average household size. In the multivariate specification, the significant association between Protestantism and suicide remains largely unchanged. This is also the case when we add further control variables. Urbanization, education, and income have been found to be drivers of suicide in previous work (see Helliwell (2007) for an overview). We add the share of population living in towns, the share of the labor force working in manufacturing and services, and the share of literate adults in columns (3) to (5).

Column (6) adds a whole set of 35 district dummies to the model, thereby excluding all the variation that exists across districts and exploiting only the within-district variation. To the extent that there is unobserved regional heterogeneity, district dummies should be able to capture most of its substance. While the estimated association between Protestantism and suicide is somewhat reduced in magnitude, it remains highly robust.

Column (7) uses the suicide proportion as an alternative dependent variable. Again, there is a statistically significant association of Protestantism with suicides. The lower point estimate is in line with the smaller value range of this variable (see the descriptives table).

### ***C. Identifying Exogenous Variation in Protestantism***

As argued by Becker and Woessmann (2009) the origin of denominational differences in Prussia can be viewed as an exogenous shock. Most of the denominational variation across Prussia in the 19th century can be traced back to denominational choices of local rulers in the roughly 300 political entities that made up Germany during the Reformation in 16<sup>th</sup> and early 17<sup>th</sup> century, mostly motivated by religious conviction and power politics vis-à-vis the Pope and the German Emperor.

While it is unlikely that the adoption of Protestantism was directly related to pre-Reformation patterns in suicide, it might have been indirectly related to important drivers of suicide like economic outcomes, urbanity, religiosity, and education. To rule out such potential remaining worries about endogeneity of the share of Protestants in a county, we employ an instrumental-variable strategy that uses a particular aspect of the historical diffusion of Protestantism across the German Empire in order to restrict the variation in Protestantism used in the estimation to a part that is credibly exogenous. Reformation historians refer to the diffusion of Protestantism as resembling the propagation of a wave caused by a stone thrown into water. Luther's preaching had its most imminent effect in the area surrounding his city of Wittenberg, and there is a tendency for the impact to diminish with distance to Wittenberg. In effect, in the German Empire, Protestantism dispersed around Wittenberg in a mostly concentric pattern. As evidenced in Figure 1, it seems that the Reformation spread out from Wittenberg in all directions, but then came to a halt after some distance.

The main reasons for a roughly circular dispersion around Wittenberg may have been the costs of traveling and of information diffusion through space, and these transportation and

transaction costs played a crucial role at the time. Among other things, rulers who wanted to convert their church system to Protestantism had to send priests to study the new denomination in Wittenberg. Thus, thousands of students came to Wittenberg to hear Luther's sermons and speeches, and they spread the word as preachers back in their home regions (cf. Bunkowske (1985)). Given the arduousness of travel in the early 1500s, the propensity to come to Wittenberg to listen to Luther and his successors likely declined with distance to Wittenberg. The fact that the German regions spoke ever more different dialects the further distant the regions may also have contributed to a concentric pattern of the dispersion of Protestantism, both in oral and written means of dissemination, and in the dissemination both to rulers and to the population at large.

To rule out that the spread of the Reformation from Wittenberg did not just follow pre-existing differences in economic outcomes, urbanity, religiosity, and education – which are commonly assumed to be drivers of suicide rates (see Helliwell (2007)) – we collected indicators of these variables for the time right before the onset of the Reformation.

Table 3 shows that distance to Wittenberg is unrelated to economic outcomes variables, urbanity, religiosity, and education variables before 1517. First, as for economic variables, distance to Wittenberg is completely insignificant in predicting the probability of being a free imperial city (measured in pre-Reformation status), considered to be centers of economic activity before the Reformation and for the probability of being a free Hanseatic city, which constituted major trading hubs in pre-Lutheran times. Second, as for urbanity, distance to Wittenberg is similarly uncorrelated with urban population density and city sizes in 1500, a proxy often also used for economic progressiveness before industrialization. Third, in terms of proxies for the educational situation before 1517, we estimate whether distance to Wittenberg predicts whether a county had a university before 1517. We also regress the year of foundation of universities in existence before 1517 on distance to Wittenberg. In both exercises, distance to Wittenberg is completely unrelated to the spread of universities before Lutheran times. Furthermore, we perform the same exercise for those present-day German schools that trace back their history to pre-Reformation times. Both a dummy for the existence of and the year of foundation of those schools are unrelated to distance to Wittenberg. Fourth, as a proxy for religiosity, we use the density of monasteries, measured in 1517, and find that variable to be equally unrelated to distance to Wittenberg.

As a consequence, the geographically concentric pattern of the dispersion of the Reformation provides a means to obtain a specific variation in Protestantism that is credibly exogenous to variation in important drivers of suicide rates: the variation due to distance to Wittenberg. We thus use distance to Wittenberg as an instrument for the share of Protestants in a county in 19<sup>th</sup>-century Prussia.

Table 4 reports instrumental-variable (IV) estimates of the effect of Protestantism on suicide rates. As is evident from the  $F$ -statistic of the instrument in the first stage, distance to Wittenberg is a strong instrument for the share of Protestants in a county. Each 100 km distance to Wittenberg is associated with a Protestant share that is 7-10 percentage points lower (see columns (1)-(4)). The second stage uses only that part of the Protestant share that is due to distance to Wittenberg to predict suicide rates.

The positive effect of Protestantism on suicide rates is highly robust in the IV specification. In fact, the point estimate is higher. Across the different specifications, the second-stage estimates of Protestantism on suicide are highly robust.

#### ***D. Robustness Tests***

We further probe the robustness of our results in Table 5. Column (1) adds further control variables besides the ones used in the previous table. Those include the share of females, the share of Jews, the share of the population born in municipality, and the share of population of Prussian origin. Individually, only the share of the population of Prussian origin is statistically significant and indicates higher suicide rates in counties with a stronger presence of foreigners.

Additionally, the shares of the population that are blind, deaf-mute, or insane are used as controls, but only the share of deaf-mute enters significantly.

In column (2), we add the fatal accident rate in the county to account for potential underreporting of suicide rates. That variable is statistically insignificant and leaves the effect of Protestantism unaffected.

In columns (3) and (4), we add geographic controls. First, using latitude, longitude, and their interaction, we control for potentially systematic variation in suicide rates across geographical space, e.g. due to different climatic conditions. In column (4), we use a set of dummies indicating the year in which the county became part of Prussia. Depending on the duration of



affiliation with Prussia, common norms may have settled in to a different degree. Our results indicate, however, that this does not affect the Protestantism effect on suicide.

Finally, counties that have a larger degree of heterogeneity in religious denominations may differ in their suicide rates from counties that do not. In column (5), we restrict the estimation sample to those 142 counties that have less than 2 percent Protestants or more than 98 percent Protestants. Our estimates drop somewhat and get closer to the original OLS estimates again. We can even restrict the sample to the 33 counties where Protestants make up less than 0.1 percent or more than 99.9 percent of the population. The effect of Protestantism on suicide rates is robust. This also addresses the potential concern of ecological inferences of individual associations from aggregate data (cf. Robinson (1950)). Further evidence against an ecological fallacy comes from special tables in Hilse (1871) that show simple cross-tabulations of suicide numbers by religious denomination within districts (the aggregation level above the county) from the 1869 suicide statistics. These numbers show that Protestants are over-represented among the suicides relative to their population share.<sup>12</sup>

As in the OLS case, we can use the suicide proportion as an alternative outcome measure (see column (7)). Again, we find a sizeable and statistically significant effect of Protestantism.

For the years 1869-71, we thus find a very robust positive effect of Protestantism on suicide in both OLS and IV regressions with distance to Wittenberg. Religious denomination in the form of Protestantism is a main driver of regional differences in suicide rates.

### ***E. Evidence from 1816-21***

Suicide data for the years 1816-21 are from official burial and death registers. However, suicides were only classified as such when the suicide was buried by the church. This is potentially problematic, and the descriptive statistics for 1816 show lower suicide rates than in 1871. However, while under-reporting of suicides might affect the *size* of the estimated effects, it would affect the qualitative results only to the extent that the degree of under-reporting varies by denomination. Kollarits (1919) hypothesizes that Catholic priests might have had a stronger tendency to underreport. There does not seem to be any evidence of this. Using 1869-71 as the benchmark, we can compare counties where Protestants dominate with those where Catholics

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<sup>12</sup> Note that Robinson (1950) showed that the difference between ecological and individual inference will usually be lower the more the variables are clustered within regions, and our variables – especially Protestantism – are very highly clustered in Prussian counties (cf. Figure 1).

dominate. Counties with a share of Protestants of more than 90 percent have an average suicide rate of 9.3 suicides per 100,000 inhabitants in 1816-21, compared to 17.4 in 1869-21. Reported suicides in 1816-21 are thus lower by factor  $17.36/9.33=1.85$ . Counties with a share of Catholics of more than 90 percent have an average suicide rate of 2.75 suicides per 100,000 inhabitants in 1816-21, compared to 4.7 in 1869-21. Reported suicides are thus lower by factor  $4.68/2.76=1.70$  in 1816-21. We regard this as evidence that, if anything, Protestants under-report slightly more in 1816-21, putting the stakes against finding an effect of Protestantism in 1816-21.

Descriptive statistics for the other variables are shown in Table 6. The set of control variables in 1816-21 is not as rich as in the later years. However, we have the same type of variables as main controls as in 1869-71: the share of population that is younger than 15 years and the share older than 60 years; the share of population living in towns; as a measure of economic development, the number of public buildings per capita and, as a measure of education, the enrolment rate in primary schools. Again, to guard against misclassification of suicides as fatal accidents, we can control for the fatal accident rate (per 100,000 inhabitants).

A particular feature of the 1816-21 data is that we have suicide rates separately for both genders. According to Table 6, male suicide rates are about four times higher than female suicide rates.

Table 7 shows the results from both OLS and IV estimations where, as before, we use distance to Wittenberg as an instrument for the share of Protestants in a county. Both male and female suicide rates are significantly higher in Protestant areas (see columns (2) and (3)). For both genders together, an all-Protestant county has a suicide rate that is 7.2 higher than an all-Catholic county (see column (1)). This difference goes down when we control for other variables in column (4). Also in the IV regressions, we find a strong and significant effect of Protestantism on suicide rates (see column (6)) that is very robust to controls for fatal accident rates (column (7)). Again, we find no evidence that potential misclassification of suicides is an issue. Finally, we find qualitatively similar results when using suicide proportions instead of suicide rates (column (8)). So, whereas the magnitude of the estimated effects in 1816-21 is lower than in 1869-71, we find qualitatively similar results of a strong effect of Protestantism on suicide rates for both genders.

## IV. Conclusion

This paper has analyzed the effect of Protestantism on suicide across Prussian counties over the 19<sup>th</sup> century. Our work is motivated by the prominent work by Durkheim (1897) on religious differences in suicide rates. We first extend the economic model of suicide of Hamermesh and Soss (1974) and Becker and Posner (2004) to account for effects of religion. Whereas Durkheim stressed denominational differences in group structure – the sociological aspect of religion – we also consider denominational differences in doctrine as factors influencing individual decisions to commit suicide. Both sociological and theological differences between Protestants and Catholics make suicide more likely among the former group.

We then proceed to estimate the relationship between Protestantism and suicide, using data from Prussian counties in the 19<sup>th</sup> century. Prussia is an ideal place to explore this question because of the large regional variation in Protestantism rates that goes back to the Reformation, a time when Germany consisted of hundreds of different political entities. In 1555, the Imperial Diet, the annual meeting of the local rulers of the different political entities, had agreed that the decision to convert to Protestantism should be taken by the local rulers on behalf of their citizens. This creates the historic variation in Protestantism rates that we explore in our empirical analysis.

Our regressions show that there is a strong, statistically significant effect of Protestantism on suicide rates, consistent with Durkheim's observation and in line with doctrinal differences between Protestants and Catholics.

To guard against remaining concerns of endogeneity of Protestantism to factors that are also related with suicide propensity, we use an instrumental-variable strategy. We show that distance to Wittenberg, the birthplace of the Reformation, is unrelated to important correlates of suicide rates in pre-Reformation times: Indicators of economic development, urbanity, education, and religiosity, measured in 1517 before the Reformation started, are uncorrelated with distance to Wittenberg. Distance to Wittenberg then predicts that part of the variation in Protestantism rates that is arguably exogenous to the choice of denomination by local rulers in the 16<sup>th</sup> century. Closer to Wittenberg, it was more likely to be exposed to the teachings of the Protestant reformers. Proximity to Wittenberg might have tipped the scales towards Protestantism for those rulers at the margin of conversion. Using this instrumental-variable strategy, our results are

confirmed. The concern that the higher incidence of suicide among the Protestant population may simply be the result of selection into denominational groups can thus be ruled out.

Protestantism has a strong and significant effect on suicide rates both in 1869-71 and in 1816-21. The results hold for the population at large as well as for males and females separately and they are robust in a series of robustness checks. Importantly, misclassification of suicides as fatal accidents does not bias our results.

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## **Appendix: County-Level Data for Prussia in the 19<sup>th</sup> Century**

Demographers have found county-level data for 19<sup>th</sup>-century Prussia to be a unique source of highest-quality data for analyses at a disaggregate level (cf. Galloway, Hammel, and Lee (1994)). We have compiled the county-level data from respective archives.

### ***1816 Population Census and 1816-21 Suicide Statistics***

The year 1816 is the earliest year for which the Prussian Statistical Office, founded in 1805, collected detailed data at the county level. It is thus the earliest year which lends itself to a micro-econometric analysis of suicide and religion. Whereas Protestantism rates refer to the year 1816, suicide rates are reported for the years 1816-21 combined. The data refer to 306 counties in Prussia in its borders at the time. The source of the 1816 Population Census data and the 1816-21 Suicide Statistics is Mützell (1825).

### ***1869-71 Suicide Statistics***

The second period in time for which we have county-level suicide data is 1869-71. The data refer to the 452 counties existing at the time.<sup>13</sup> The source of the 1869-71 Suicide Statistics is Preussische Statistik (1874). The data are further described in a paper by Hilse (1871) which also contains interesting cross-tabulations, although only at the district level.

### ***1871 Population Census***

The majority of our control variables is drawn from the 1871 Population Census. Besides demographic characteristics, it also contains adult literacy rates, measured as the ability to read and write among the population aged 10 years or older. As a measure of educational outcome, literacy may be a more informative measure of accumulated human capital than standard enrollment data, which may partly capture years in school that did not lead to effective educational outcomes. The 1871 Population Census also provides data on a host of demographic variables. The source of the 1871 Population Census data is Preussische Statistik (1875).

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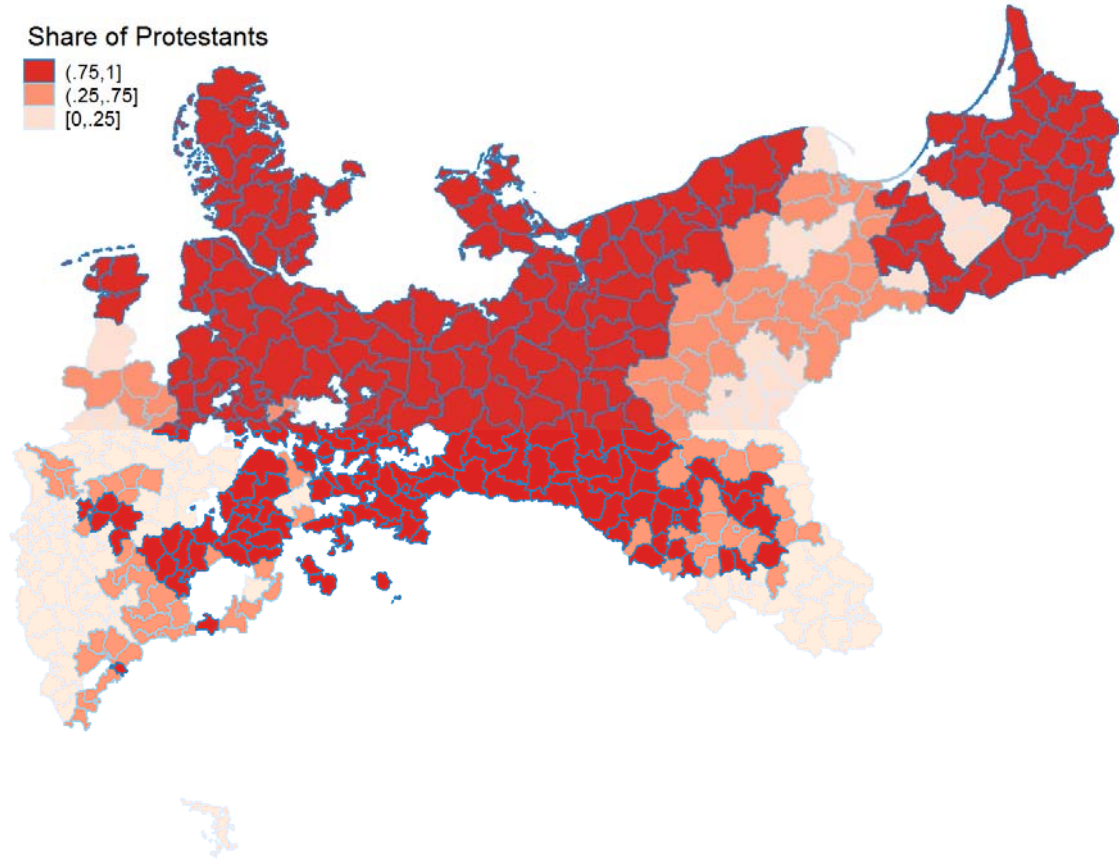
<sup>13</sup> Prussia annexed several territories between 1816 and 1871, namely Hohenzollern-Sigmaringen, Schleswig-Holstein, the Kingdom of Hannover, Hessen-Kassel, Nassau, and the free city of Frankfurt.



### *1882 Occupation Census*

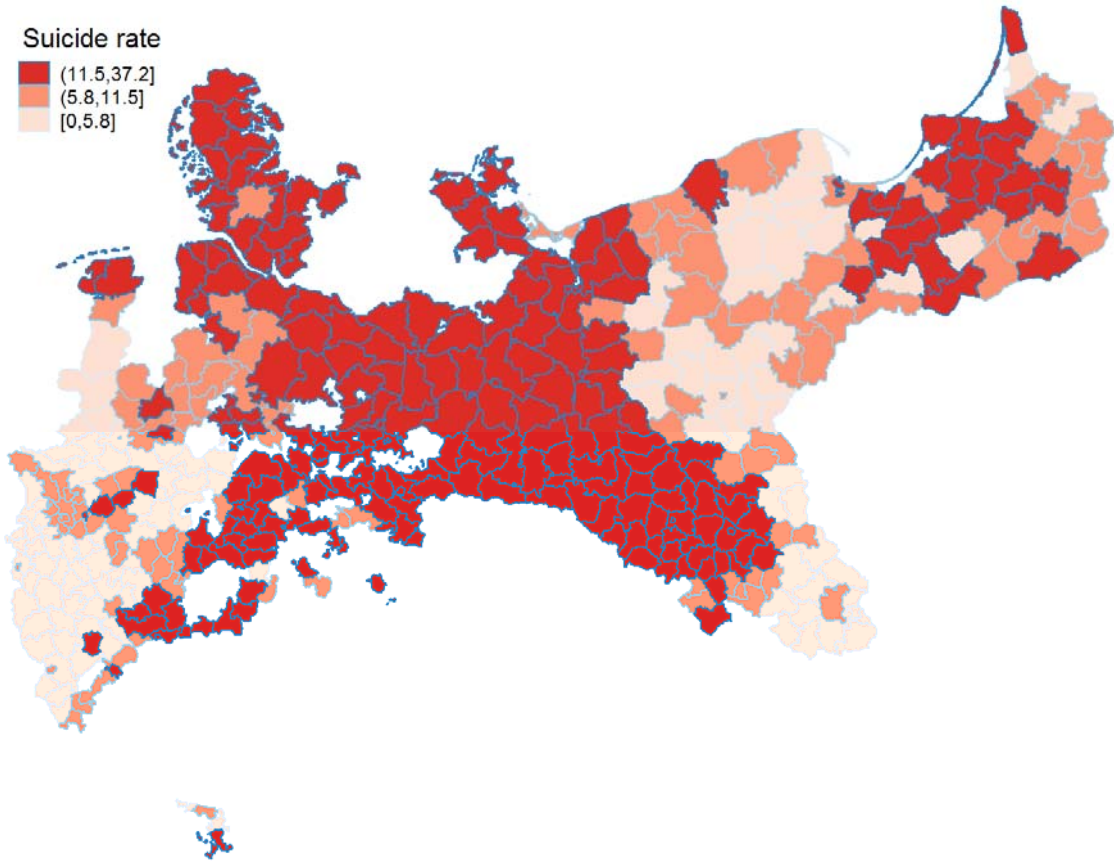
The 1882 Occupation Census collected information on employment and self-employment across two-digit sectors. We calculate the share of the labor force working in the manufacturing sector and in the service sector, using the classification provided by the Prussian Statistical Office to classify the two sectors. The manufacturing sector (sector B in the 1882 classification) includes mining, construction, and manufacture of metals, machinery, equipment, chemicals, textiles, paper, leather, food products, and wood. The service sector (sector C in the 1882 classification) includes trade business, insurance, transport, lodging, and restaurants. Note that the service sector C does not include servants and housemaids, nor does it include those working in the public administration and the military. The source of the 1882 Occupation Census data is *Preussische Statistik* (1884/85), Vol. 76b, pp. 232-695 and Vol. 76c, p. 239.

Figure 1: PROTESTANTISM IN 19<sup>TH</sup>-CENTURY PRUSSIA



Share of Protestants, 1871. County-level depiction based on 1871 Population Census. See Appendix for data details.

Figure 2: SUICIDE IN 19<sup>TH</sup>-CENTURY PRUSSIA



Suicide rate, 1869-71. County-level depiction based on 1869-71 Suicide Statistics. See Appendix for details.

Table 1: Descriptive Statistics, Prussia 1871

	Mean	StdDev	Min	Max
	(1)	(2)	(3)	(4)
Suicide rate (per 100,000 inhabitants)	12.99	8.33	.00	37.06
Suicide proportion (per 1,000 deaths)	4.78	3.17	.00	15.76
Fatal accident rate (per 100,000 inhabitants)	42.33	15.81	9.37	114.52
Fatal accident proportion (per 1,000 deaths)	15.16	5.01	3.77	37.48
Share of Protestants	.64	.38	.00	1.00
Distance to Wittenberg (in 1,000 km)	.33	.15	.00	.73
Share of population < 15 years	.36	.03	.23	.43
Share of population > 60 years	.07	.02	.03	.11
Average household size	4.79	.34	3.83	5.86
Share of population living in towns	.28	.22	.00	1.00
Share of labor force in manufacturing and services	.34	.15	.08	.82
Share of literate adults	.88	.13	.37	.99
Share of females	.51	.02	.44	.55
Share of Jews	.01	.01	.00	.13
Share of population born in municipality	.59	.12	.32	.87
Share of population of Prussian origin	.99	.02	.74	1.00
Share blind (x 100)	.09	.03	.03	.24
Share deaf-mute (x 100)	.10	.05	.02	.42
Share insane (x 100)	.23	.17	.02	1.56
Latitude (in rad)	.91	.03	.84	.97
Longitude (in rad)	.22	.08	.11	.39
Year when annexed by Prussia	1751.69	111.05	1525	1866

Data for Prussian counties from the 1871 Census; see main text and appendix for details.

Table 2: Protestantism and Suicide: Prussia 1871

Dependent variable:	Suicide rate (per 100,000 inhabitants)				Suicide proportion (per 1,000 deaths)		
	(1)	(2)	(3)	(4)		(5)	(6)
Share of Protestants	14.494 (.782)***	12.325 (.655)***	12.303 (.657)***	12.408 (.667)***	12.526 (.705)***	9.815 (1.123)***	4.927 (.275)***
Share of population < 15 years		-70.750 (8.651)***	-66.805 (12.047)***	-66.518 (12.053)***	-67.495 (12.209)***	-57.319 (14.117)***	-21.515 (4.758)***
Share of population > 60 years		-30.097 (18.055)*	-23.796 (22.486)	-22.285 (22.550)	-15.140 (26.422)	13.824 (34.406)	9.607 (10.298)
Average household size		-7.578 (.824)***	-7.532 (.830)***	-7.367 (.850)***	-7.320 (.855)***	-1.736 (1.357)	-2.078 (.333)***
Share of population living in towns			.760 (1.615)	.099 (1.770)	.097 (1.771)	.205 (1.871)	.551 (.690)
Share of labor force in manu and serv			1.801 (1.970)	1.801 (1.970)	2.435 (2.317)	5.543 (2.745)**	.117 (.903)
Share of literate adults					-1.621 (3.117)	3.877 (4.501)	.017 (1.215)
35 district dummies						yes	
Constant	3.692 (.582)***	68.930 (5.534)***	66.639 (7.373)***	65.137 (7.555)***	65.860 (7.688)***	23.675 (12.995)*	18.349 (2.997)***
Observations	452	452	452	452	452	452	452
R <sup>2</sup>	.433	.627	.628	.628	.628	.738	.611

Coefficients and standard errors from ordinary least squares (OLS) estimation. Standard errors in parentheses: \* significance at ten, \*\* five, \*\*\* one percent. Data for Prussian counties from the 1871 Census and from Preussische Statistik (1874); see main text and appendix for details.

Table 3: Exogeneity of the Distance-to-Wittenberg Instrument

Dependent variable:	Economic development			Urbanization			Education			Religiosity
	Imperial city in 1517 (1)	Hanseatic city in 1517 (2)	Urban pop. per $km^2$ in 1500 (3)	City population in 1500 (4)	University in 1517 (5)	Year of foundation of university (6)	School in 1517 (7)	Year of foundation of school (8)	Monasteries per $km^2$ in 1517 (9)	
Distance to Wittenberg <sup>a</sup>	.0034 (.0071)	.0008 (.0084)	.00006 (.00013)	.0059 (.0042)	-.0019 (.0047)	-1.626 (7.998)	-.0073 (.0099)	.0610 (.2384)	-.0020 (.0110)	
Share of municipalities beginning with letter A to L	452	452	452	148	452	16	333	59	.578	
Observations	.0005	.00002	.0004	.014	.0004	.003	.002	.001	(.121)***	
R <sup>2</sup>									.049	

Standard errors in parentheses: \* significance at ten, \*\* five, \*\*\* one percent. Column (9) uses data on monasteries in the German Empire which is available only for municipalities starting with letters A-L. See main text and appendix for details.

Table 4: Instrumenting Protestantism by Distance to Wittenberg, Prussia 1871

Dependent variable:	1st stage			2nd stage				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Share of Protestants					24.899 (2.489)***	20.293 (2.567)***	20.422 (2.605)***	23.505 (3.545)***
Distance to Wittenberg (in 1,000 km)	-1.001 (.122)***	-.873 (.134)***	-.860 (.132)***	-.700 (.132)***				
Share of population < 15 years		-.616 (.840)	-.616 (.829)	.119 (.817)				
Share of population > 60 years		-.520 (1.727)	-1.774 (1.739)	-5.750 (1.848)***				
Average household size		-.155 (.057)***	-.191 (.058)***	-.217 (.056)***				
Share of population living in towns		.014 (.117)	.181 (.124)	.164 (.121)				
Share of labor force in manu. and serv.			-.525 (.146)***	-.818 (.152)***				
Share of literate adults				1.128 (.213)***				
Constant	.972 (.059)***	1.916 (.507)***	2.371 (.516)***	1.504 (.527)***	-1.837 (2.351)	54.109 (9.257)***	49.731 (10.109)***	56.781 (10.395)***
Observations	452	452	452	452	452	452	452	452
R <sup>2</sup>	.154	.174	.198	.246	.260	.513	.513	.434
F-statistic (instrument)					67.802	42.575	42.458	28.274

Standard errors in parentheses: \* significance at ten, \*\* five, \*\*\* one percent. Coefficients and standard errors from instrumental variables (IV) estimation. Data for Prussian counties from the 1871 Census; see main text and appendix for details.

Table 5: Additional Robustness Specifications, Prussia 1871

Dependent variable:	Suicide rate (per 100,000 inhabitants)				Suicide proportion (per 1,000 deaths)	
	All counties		Counties with % Protestants <2% or >98%			
	Additional controls (1)	(2)	Geographic controls (3)	(4)		
Share of Protestants	24.753 (3.682)***	-23.923 (3.278)***	17.096 (2.263)***	26.064 (3.639)***	17.574 (7.109)**	9.262 (1.355)***
Standard controls	yes	yes	yes	yes	yes	yes
Share of females	-5.265 (29.957)	-5.800 (29.190)				
Share of Jews	52.929 (32.651)	52.971 (31.781)*				
Share of population born in municipality	10.659 (7.307)	7.347 (6.222)				
Share of population of Prussian origin	-62.725 (17.110)***	-61.084 (16.728)***				
Share blind (x 100)	7.183 (11.272)	9.158 (11.175)				
Share deaf-mute (x 100)	-23.579 (9.054)***	-21.648 (8.471)**				
Share insane (x 100)	.756 (1.957)	.603 (1.890)				
Fatal accident rate (per 100,000 inhabitants)						
Latitude, Longitude and their interaction (in rad)			yes			
36 dummies for years when annexed by Prussia				yes		
Observations	452	452	452	452	33	452
R <sup>2</sup>	.432	.462	.633	.547	.623	.838

Standard errors in parentheses: \* significance at ten, \*\* five, \*\*\* one percent. Coefficients and standard errors from instrumental variables (IV) estimation, where the instrument is distance to Wittenberg. Standard controls: share of population < 15 years, share of population > 60 years, share of population living in towns, share of labor force in manufacturing and services, share of literate adults, and a constant. Data for Prussian counties from the 1871 Census; see main text for details.



Table 6: Descriptive Statistics, Prussia 1816

	Mean	StdDev	Min	Max
	(1)	(2)	(3)	(4)
Suicide rate (per 100,000 inhabitants)	6.50	5.06	.00	26.06
Suicide rate males (per 100,000 inhabitants)	10.52	8.28	.00	47.50
Suicide rate females (per 100,000 inhabitants)	2.69	2.88	.00	22.42
Suicide proportion (per 1,000 deaths)	2.30	1.90	.00	8.82
Fatal accident rate (per 100,000 inhabitants)	42.96	16.73	14.01	123.54
Fatal accident proportion (per 1,000 deaths)	15.39	6.77	4.23	54.90
Share of Protestants	.59	.41	.00	1.00
Distance to Wittenberg (in 1,000 km)	.32	.15	.00	.73
Share of population < 15 years	.36	.03	.26	.46
Share of population > 60 years	.07	.01	.04	.11
Share of population living in towns	.12	.21	.00	1.00
Public buildings per capita	.003	.004	.00	.02
School enrollment rate	.59	.20	.02	1.10

Data for Prussian counties from the 1816 Census; see main text for details.

Table 7: Protestantism and Suicide in Prussia 1816

Dependent variable:	OLS						IV 1st stage		IV 2nd stage	
	Suicide rate (per 100,000 inhabitants)		% Protestants		Suicide rate (per 100,000 inhabitants)		Suicide proportion (1,000 deaths)			
	All	Males	Females	All	All	All	All	All		
Share of Protestants	7.221 (.574)***	11.065 (.970)***	3.605 (.346)***	4.735 (.596)***						
Distance to Wittenberg (in 1,000 km)										
Share of population < 15 years										
Share of population > 60 years										
Share of population living in towns										
Public buildings per capita										
School enrollment rate										
Fatal accident rate (per 100,000 inhabitants)										
Const.	2.262 (.411)***	4.023 (.694)***	.573 (.247)**	18.959 (4.937)***	2.649 (.434)***	-7.319 (9.617)	-7.181 (8.989)	-2.798 (3.269)		
Observations	306	306	306	306	306	306	306	306		
R <sup>2</sup>	.342	.300	.263	.509	.361	.026	.028	.089		
F-statistic (instrument)						30.065	34.516	34.516		

Standard errors in parentheses: \* significance at ten, \*\* five, \*\*\* one percent.  
Coefficients and standard errors from ordinary least squares (OLS) and instrumental variables (IV) estimation.  
Data for Prussian counties from the 1816 Census; see main text for details.

Table A.1: Correlations between the Suicide and Fatal Accident Measures, Prussia 1871

	A	B	C	D
A: Suicide rate (per 100,000 inhabitants)	1	.976 (0)	-.004 (.932)	.055 (.246)
B: Suicide proportion (per 1,000 deaths)	.976 (0)	1	-.057 (.231)	.057 (.227)
C: Fatal accident rate (per 100,000 inhabitants)	-.004 (.932)	-.057 (.231)	1	.939 (0)
D: Fatal accident proportion (per 1,000 deaths)	.055 (.246)	.057 (.227)	.939 (0)	1

Number of observations: 452. p values in parentheses.  
 Data for Prussian counties from the 1871 Census; see main text for details.

Table A.2: Correlations between the Suicide and Fatal Accident Measures, Prussia 1816

	A	B	C	D
A: Suicide rate (per 100,000 inhabitants)	1.000	.942 (0.000)	.223 (0.000)	.245 (0.000)
B: Suicide proportion (per 1,000 deaths)	.942 (0.000)	1.000	.197 (0.000)	.304 (0.000)
C: Fatal accident rate (per 100,000 inhabitants)	.223 (0.000)	.197 (0.000)	1.000	.737 (0.000)
D: Fatal accident proportion (per 1,000 deaths)	.245 (0.000)	.304 (0.000)	.737 (0.000)	1.000

Number of observations: 306. p values in parentheses.  
 Data for Prussian counties from the 1816 Census; see main text for details.