Article

The Protestant Ethic Reexamined: Calvinism and Industrialization

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Abstract

Can cultural differences affect economic change? Max Weber famously argued that ascetic Protestants' religious commitments—specifically their work ethic—inspired them to develop capitalist economic systems conducive to rapid economic change. Yet today, scholars continue to debate the empirical validity of Weber's claims, which address a vibrant literature in political economy on the relationship between culture and economic change. We revisit the link between religion and economic change in Reformed Europe. To do so, we leverage a quasi-experiment in Western Switzerland, where certain regions had Reformed Protestant beliefs imposed on them by local authorities during the Swiss Reformation, while other regions remained Catholic. Using 19th-century Swiss census data, we perform a fuzzy spatial regression discontinuity design to test Weber's hypothesis and find that the Swiss Protestants in the Canton of Vaud industrialized faster than their Catholic neighbors in Fribourg.

Keywords

politics of growth/development, European politics, political economy, religion and politics, quantitative methods

Introduction

Do religious differences explain why some countries or regions develop capitalistic economic systems while others do not? Recent studies have explored

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how religion shapes intermediate outcomes[1] that in turn affect economic change, but the direct effect remains understudied. That is not to say that it is undertheorized. In *The Protestant Ethic and the Spirit of Capitalism*, Max Weber famously argues that the religious beliefs of "ascetic Protestants"[2] inspired them to be more industrious than their Lutheran and Catholic contemporaries. He claims that this industriousness, which he terms the "Protestant ethic," was integral to the development of modern forms of capitalism.

Weber's seminal work was the foundation for subsequent work in political economy on the effects of "culture."[3] Although several scholars have empirically examined Weber's claims (Becker, Pfaff, & Rubin, 2016), his hypothesis remains contested. To date, however, none have looked for the economic effect of the Protestant ethic among *ascetic* Protestants (as opposed to Lutherans), the specific branch of Protestantism that Weber argued possessed the "spirit of capitalism." We rectify this lacuna by leveraging a quasi-experiment identified by Basten and Betz (2013) in the southwestern part of the Switzerland, where rural residents of the canton of Vaud had ascetic Protestant beliefs imposed on them during the Protestant Reformation while those living in the neighboring canton of Fribourg remained Catholic (Basten & Betz, 2013). Using 19th-century Swiss census data, we use a fuzzy spatial regression discontinuity design (RDD) to compare urbanization rates between rural ascetic Protestants and their Catholic counterparts. We find that village populations increased faster in rural areas of Catholic Fribourg than Protestant Vaud, while cities in the latter grew at a significantly higher rate than those in the former. This provides evidence that rural ascetic Protestants were more likely to move to the cities in search of economic opportunities than Catholics. Put otherwise, rural ascetic Protestants urbanized faster than Catholics. We contend that this new evidence regarding Weber's claims should inspire more empirical work on the spirit of capitalism in ascetic Protestants as well as the economic effects of religion.

We proceed as follows: The "The Effect of Culture and the Spirit of Capitalism" section provides an overview of the recent cultural turn in political economy before examining Weber's argument in more detail. The "Previous Attempts to Test Weber's Claims" section surveys recent empirical investigations of Weber's theory. The "Southwestern Switzerland" section outlines our research design, while the "Findings" section summarizes our findings and the "Competing Explanations" section considers alternative explanations. The "Conclusion" section concludes.

The Effect of Culture and the Spirit of Capitalism

Political economists have begun to explore whether "culture," defined by Guiso, Sapienza, and Zingales (2006) as "those customary beliefs and values

that ethnic, religious, and social groups transmit fairly unchanged from generation to generation," might be a cause of economic change (p. 23). This literature identifies two broad mechanisms by which culture can affect economic outcomes. First, some scholars assert that it shapes individual preferences and behavior,[4] by affecting aspects of behavior that bear directly on individual inclination to participate in market interactions. The second mechanism is the mediation of interpersonal coordination, reciprocity, and esteem. Individuals are more likely to participate in markets when doing so increases their status in the eyes of others and when they expect other participants to hold up their end of the bargain. Coordination and reciprocity are culturally mediated patterns of behavior that are necessary for functioning markets (Padgett & Powell, 2012).

The Protestant ethic is particularly central to the literature on culture and economic change: Weber believes that the set of values and beliefs he identifies operate through *both* individual and institutional channels. Regarding the former, the Protestant ethic promotes self-reliance, hard work, saving, and the willingness to relocate in pursuit of economic opportunities. Regarding the second mechanism, Weber is adamant that ascetic Protestants are motivated to be *seen* as virtuous: The Protestant ethic requires mutual surveillance and the multilateral enforcement of community norms extolling hard work and thrift. Because it acts *both* through individual preferences and through community norms, the Protestant ethic speaks to each of the mechanisms prevalent in the literature on culture and economic outcomes.

The present study does not undertake to determine which of these two mechanisms was operational in 19th-century Switzerland, nor does it attempt to demonstrate a *present-day* economic impact from this historical process. Rather, we suggest that the precise cultural difference originally examined by Weber—that between Catholics and ascetic Protestants—may have had the economic impact that Weber predicted. By providing empirical evidence for this foundational hypothesis, we contribute to the literature on the economic effects of culture for which Weber laid the groundwork. In addition, our study of the direct link between religion and economic change adds to the scholarship exploring how religion affects a host of political and legal outcomes. Our findings show that religious beliefs impact formal institutions that in turn influence economies, and that they can do so without mediation through institutions or political preferences. This finding may be of particular interest for those studying areas with weak or unstable political and legal institutions.

As noted above, we are not the first to revisit Weber's theory. There has been a proliferation of social scientific scholarship on the Protestant ethic, especially in the lead-up to the 500th anniversary of the Protestant Reformation (see Becker et al., 2016, for an exhaustive overview of the literature). Some

scholars argue that there is little empirical evidence to support Weber's claims. Delacroix and Nielsen (2001) use cross-national data to test what they call the "common interpretation" of Weber's claims—"that 'all kinds of Protestantism' are favorable to capitalist development" (p. 516)—and conclude that their results "do not constitute a strong, or even mildly plausible, case in favor of the idea that Protestantism caused, facilitated, or was in any way instrumental in the development of industrial capitalism" (p. 543). Cantoni (2015) also rejects Weber's hypothesis. Leveraging a quasi-experiment in Germany, he reports "no significant positive, causal impact of Protestantism on the growth of German cities" (p. 588).

Echoing historians and theologians long critical of Weber's thesis, others have argued that "the cultural virtues emphasized by Weber had a pre-Reformation origin" (Andersen, Bentzen, Dalgaard, & Sharp, 2017, p. 1756). Noting that Weber commented on the asceticism of the Benedictine Cistercians, Andersen et al. (2017) find that areas in England with Cistercians grew faster than those without them (p. 1791). They suggest, then, that the Protestant ethic is not really all that Protestant: "Weber was right in stressing the importance of a cultural appreciation of hard work and thrift but quite likely wrong in tracing the origins of these values to the Protestant reformation" (p. 1791). Akçomak, Webbink, and ter Weel (2016) make a similar argument, albeit with a different religious sect. The Brethren of the Common Life (BCL), a Roman Catholic religious community founded in the Netherlands in the 14th century, emphasized literacy (for theological reasons). Advancing a human capital explanation, these scholars argue that higher education levels, not a Protestant ethic, "influenced the economic and societal jump start of the Netherlands in the period of 1375 up to about 1588" (p. 824).

Other scholars, however, have found evidence to support Weber's hypothesis. Using cross-national data, Grier (1997) argues that Protestant countries are generally more prosperous than their Catholic neighbors. Becker and Woessmann (2009) contend that Weber was right but for the wrong reasons: Protestants' investments in human capital rather than work ethic drove economic change. Using a quasi-experiment in Prussia, they suggest that the Lutheran emphasis on education explains the relative prosperity of Protestant Prussian counties in comparison with their Catholic counterparts (p. 532).[5]

While these studies offer valuable insights into the potential channels through which the Protestant Reformation may (or may not) have spurred economic development, we argue that Weber's direct hypothesis remains to be conclusively tested. More concretely, recent analyses either overlook important differences between Catholics and Protestants or have sought evidence in Lutheran rather than ascetic Protestant regions. Before turning to

our results, then, Weber's argument about the differences between Catholics, Lutherans, and ascetic Protestants merits closer examination.

In his seminal work *The Protestant Ethic and the Spirit of Capitalism*, originally published near the turn of the 20th century, Weber (1958) challenged the notion that material interests alone drive economic change. He contends that the emergence of a "capitalistic culture" can, at least in part, be linked to the religious beliefs of ascetic (Reformed) Protestants.[6] Although an exhaustive overview of the Weber's claims is beyond the purview of this essay, there are three related but distinct reasons why Weber believed that the followers of John Calvin (the "ascetic" or "Reformed" Protestants) were more inclined to capitalist economic systems than Lutherans or Catholics.

First, Weber (1958) notes that the doctrine of predestination figured centrally in Calvin's theology, as distinct from Catholicism (p. 98). Although the concept is rather straightforward—Calvin believed God picked who was saved and who condemned before time—its implications are profound and worth spelling out. Because the "elect" has already been chosen, there is nothing one can do to save one's soul; a believer no longer had to earn his place in heaven.[7] Implicit in an embrace of predestination, then, is a rejection of the Catholic teaching that "good works" could be salvific. While certainly not intended to be isolating or anxiety-inducing, Weber thought that the doctrine of predestination had exactly these effects.[8] Regarding the former, isolation, Weber writes, "In its extreme inhumanity this doctrine must above all have had one consequence for the life of a generation which surrendered to its magnificent consistency. That was a feeling of unprecedented inner loneliness of the single individual" (p. 104). The Calvinist who believed in predestination had to stand before God by himself. The most important thing in his life, what happened after death, was his individual concern. Nobody could help him with his fate, nor could he ultimately help anyone else with theirs. Along with this immense sense of isolation, he is also burdened by a crushing anxiety about his standing: "The question, Am I one of the elect? must sooner or later have arisen for every believer and have forced all other interests into the background" (p. 110). Left (alone) to consider his fate, he could not help but fear damnation. And given the gravity of damnation, this fear was never far from the Calvinist's mind.

Furthermore, Weber (1958) claimed that Calvin also rejected Lutheran "mysticism" and the Catholic sacrament of confession (p. 112). This marks what Weber sees as the second difference among Calvinists and other Christians: Ascetic Protestantism offered no relief for moral mistakes. The "mystical" practices that freed Lutherans from worries about their fate had been abandoned. So too had the Priestly absolution of sin found in Catholicism. As a result, ascetic Protestants had no way to release pent-up anxiety about

their ultimate destiny (p. 106). According to Weber, this had a profound impact on the daily life of the Calvinist. Weber writes,

> In practice this means that God helps those who help themselves. Thus the Calvinist, as it is sometimes put, himself creates his own salvation, or, as would be more correct, the conviction of it. But this creation cannot, as in Catholicism, consist in a graduate accumulation of individual good works to one's credit, but rather in a systematic self-control which at every moment stands before the inexorable alternative, chosen or damned. (p. 115)

Because the gravity of the Calvinist's errors could neither be mitigated by mysticism nor be absolved by confession, the isolated and anxious Calvinist continually took stock of his piety. As a result, he sought affirmation that he was among the few that God had chosen to be saved. God, the Calvinist reasoned, would be unlikely to elect sinners. God's people were better than most because they recognized that they had received the ultimate prize: eternal life. They expressed their gratitude, then, by following God's will as expressed in their holy text. According to Weber (1958), this line of reasoning explains why the Calvinist recommitted himself to systematic ethical action. On one hand, he wanted to please God. But on the other hand, he wanted to counteract the "feelings of religious anxiety" always lingering in the back of his mind (p. 112). If he could be "good," he must be among the elect. Calvin's rejection of mysticism or confession, then, when coupled with the feelings of loneliness and anxiety that result from his doctrine of predestination, inspired his followers to develop a uniquely ascetic and rationalistic approach to life: "The god of Calvinism demanded of his believers not single good works, but a life of good works combined into a unified system" (p. 117).

Finally, Weber (1958) thought the Calvinist concept on vocation linked asceticism and rationalism with industriousness. The Protestant emphasis on a calling or vocation, of course, can be traced to Martin Luther. In part of his critique of the Catholic Church, Luther argued that each Christian had his or her own calling in life; everyone, not only the Priestly class, could do God's work in the world.[9] Calvinists embraced this doctrine. According to Weber, they also expanded on it. Weber writes, "Calvinism added something positive to this, the idea of the necessity of proving one's faith in worldly activity" (p. 121). Weber thought the idea of a "call" took on a new meaning when combined with the Calvinist emphasis on predestination and its rejection of mysticism or confession. While both the Lutheran and the Calvinist believed their calling had no bearing on one's place among the elect, the Calvinist, Weber argues, used his earthly activity to prove to himself and others that he was among God's chosen people. For the Calvinist, one's vocation becomes

"the technical means, not of purchasing salvation, but of getting rid of the fear of damnation" (p. 115). His earthly work thus served as the outlet for his fears about the afterlife.

Thus, the ascetic Protestant was supremely motivated to be not only systematically ethical, but also systematically industrious. In fact, the distinction is collapsed; worldly work, when described as vocation, becomes an ethical imperative. Weber (1958) thought that the emphasis on vocation combined with a parallel commitment to morality ensured that even the prosperous ascetic Protestant continued to live an austere and ascetic life (p. 163). Rather than spend, he *accumulated* and *reinvested* the gains from his worldly vocation: "When the limitation of consumption is combined with this release of acquisitive activity, the inevitable practical result is obvious: accumulation of capital through ascetic compulsion to save" (p. 172). Ascetic Protestants were religiously inspired to become capitalists; their religious commitments endowed within them the spirit of capitalism.

Weber (1958) pointed to divergences in prosperity among different religious sects in southern Germany, England, America, and the Netherlands to support his hypothesis. But he also acknowledges that any economic effects of ascetic Protestantism are likely small and difficult to observe (p. 91). Yet, he believes the emergence of ascetic Protestantism left its mark nonetheless:

> One of the fundamental elements of the spirit of modern capitalism, and not only of that but of all modern culture: rational conduct on the basis of the idea of the calling, was born . . . from the spirit of Christian asceticism. (p. 180)

The tripartite distinction between ascetic Protestants, Lutherans, and Catholics is particularly important because ascetic Protestants tended to be geographically located in the regions associated with the emergence of capitalism: the United States, the United Kingdom, and the Netherlands. These regions industrialized first and then most enthusiastically adopted the institutions of the market (Hall & Soskice, 2001). Meanwhile, Lutheranism remained concentrated in northern Europe, in countries that tended toward a more collective and corporatist form of capitalism.

Previous Attempts to Test Weber's Claims

As noted above, a handful of political economists have attempted to find empirical evidence to validate Weber's claims. Given the broad sweep of his hypothesis, this is a challenge. But we argue that a direct test of the Protestant ethic should do at least three things: First, Weber's hypothesis must be causally identified; second, it should focus on the strand of Protestantism Weber

was principally concerned with; and third, it must measure a dependent variable that relates directly to economic change. Previous studies, while illuminating aspects of Weber's hypothesis, have not met all of these criteria. Grier's (1997) and Delacroix and Nielsen's (2001) analysis of panel data leaves open the possibility of confounders. Ascetic Protestantism *might* explain differences in national economic change but other sources of intra-country variance like geography or institutions could drive the results. Meanwhile, although Becker and Woessmann (2009) and Cantoni (2015), for instance, use advanced causal identification strategies, they do so in mainly *Lutheran* rather than *ascetic Protestant* territories. Weber (1958) argues that only the latter possess the Protestant ethic. He writes,

> In place of the humble sinners to whom Luther promises grace if they trust themselves to God in penitent faith are bred those self-confident saints whom we can rediscover in the hard Puritan merchants of the heroic age of capitalism and in isolated instance down to the present . . . in order to attain that self-confidence, worldly activity is recommended as the most suitable means. It and it alone disperses religious doubts and gives the certainty of grace. That worldly activity should be considered capable of this achievement, that it could, so to speak, be considered the most suitable means of counteracting feelings of religious anxiety, finds its explanation in the fundamental peculiarities of religious feeling in the Reformed Church, which come most clearly to light in its difference from Lutheranism in the doctrine of justification by faith. (p. 112)

A few pages later, Weber (1958) adds,

> The process of sanctifying life could thus almost take on the character of a business enterprise. A thoroughgoing Christianization of the whole of life was the consequence of this methodical quality of ethical conduct into which Calvinism as distinct from Lutheranism forced men. (p. 125)

He continues shortly thereafter, "The differences of conduct, which are very striking, have clearly originated in the lesser degree of ascetic penetration of life in Lutheranism as distinguished from Calvinism" (p. 127). These passages demonstrate Weber thought Lutheranism and ascetic Protestantism endorsed distinctive sets of beliefs and values. They represent different *cultures*. As a result, their followers behaved differently, especially in the economic sphere. Because the Calvinist emphasis on predestination created a pervasive sense of loneliness and anxiety among its adherents, ascetic Protestants were motivated to demonstrate their place among the elect (with industriousness and moral rectitude) while Lutherans remained passive recipients of God's grace. Ascetic Protestants became systematically

rational whereas Lutherans remained "mystics." In sum, Weber thinks ascetic Protestants possessed the "spirit of capitalism" and Lutherans (and Catholics) did not.

Basten and Betz (2013) are among the few scholars interested in Weber to attempt to causally identify the effects of the Protestant ethic in areas where ascetic Protestants lived in close proximity to Catholics. They find that those living in an ascetic Protestant part of present-day Switzerland express different political preferences than their Catholic neighbors, that is, less support for "redistribution,""leisure time," and "intervention." Although their results are interesting, they are not directly related to Weber's central thesis that ascetic Protestants would embrace capitalism faster than other Christians. Moreover, Weber himself posited that the effects of the Protestant "ethic" were fading and likely to soon disappear. Thus, although Basten and Betz use Weber's thesis to motivate their research agenda, they are more interested in establishing the persistence of political preferences across time than in directly testing Weber's hypothesis that the Protestant work ethic is conducive to economic change.

Southwestern Switzerland

We leverage the quasi-experiment identified by Basten and Betz (2013) in southwestern Switzerland to test Weber's thesis. A geographically homogeneous region found in the present-day cantons of Vaud and Fribourg was divided along religious lines after the Protestant Reformation swept through Switzerland during the 16th century (p. 69). This relatively small area (only 1,885 mile^2) situated mostly in the Swiss highlands was part of the Holy Roman Empire before the Reformation (Basten & Betz, 2013, p. 69). However, after the Burgundy War near the end of 15th century, the Confederation of Swiss city-states gained control of the territory (Basten & Betz, 2013, p. 74). The area was ruled by the loose Confederation of Swiss states until it was divided between the nearest city-states (later called cantons) in the early 16th century: Fribourg to the east and Vaud to the west. At the time, both areas were Catholic, as the Reformation was still 30 years away. Basten and Betz report that the areas directly on each side of the border were virtually indistinguishable at the time of the Reformation, and there are no obvious geographical features giving rise to the border. Both were predominantly agricultural, francophone, rural areas situated on a plateau to the west and south of the Swiss Alps, which according to 15th-century data had roughly the same populations in the 1400s (Basten & Betz, 2013, pp. 75-76). As of 1855, the two cantons devoted almost identical proportions of their land area to agriculture, with agriculturally productive areas comprising 64% of Fribourg's and 63% of Vaud's total land (Ritzmann & Siegenthaler, 1996).

Moreover, those living directly on either side of the border would, on average, have had to travel the same distance to reach cities, seaports, and trade routes. Further from the border, of course, this linguistic and geographical homogeneity fades. Geneva, a major trading post, is nearer to Vaud than Fribourg; the western area of Fribourg is more mountainous than the rest of the region; and some parts in the north were (and remain) largely German-speaking (Basten & Betz, 2013, p. 75). That said, the areas directly on either side of border appear to have been similar before the Protestant Reformation.

Following the Second Berne disputation in 1531, the city-state of Berne formally broke with the Catholic Church while Fribourg did not. Berne wrested control of Vaud (a separate region ruled by the Duke of Savoy) shortly thereafter. While Bernese elites may have adopted Zwingli's teachings (which later became fused with Calvinism, one version of ascetic Protestantism) for political reasons, scholars believe that ascetic Protestant beliefs were imposed on the rural parts of its territories, including Vaud (Basten & Betz, 2013, pp. 74-75; Birmingham, 1999, pp. 37-43). Citing riots in rural areas when the authorities forced the entire canton to convert, Basten and Betz (2013) argue that the Protestant Reformation was an exogenous shock for those living in the Bernese highlands (pp. 74-75). Put otherwise, rural residents were "treated" with Protestantism and forced to comply with the tenets of the Bernese elites' new religion. As a result, both regions, virtually indistinguishable before the Reformation, were divided by religion afterward. The east (Fribourg) remained Catholic while the west (Vaud, ruled by Berne) became Protestant. In this region, then, the Reformation provides a quasi-experiment that can be used to test the possible effects of ascetic Protestantism.

It is amid a period of radical economic change sparked by the Swiss Industrial Revolution that we test Weber's claims. Although scholars debate the beginning of the Industrial Revolution in Switzerland, most agree that the Swiss economy began a period of rapid expansion after the ratification of the 1848 constitution (Fritzsche, 1996, pp. 140-141),[10] which instituted important changes. A common currency was established, intercantonal freedom of settlement was granted, tariffs between cantons were prohibited and international trade agreements were signed, and Swiss citizens were granted equality before the law (Church & Head, 2013, pp. 166-167; Lerner, 2011, pp. 319-320). Railroads were built shortly thereafter (Church & Head, 2013, p. 175). As the economy grew, a population boom followed (Church & Head, 2013, p. 184). Figure 1 shows the earliest available modern data on births in Fribourg (starting in 1807) and Vaud (from 1801). Although the raw number of births is higher in Vaud, reflecting its larger population, the two series follow very similar trends, including dips in the number of births around the

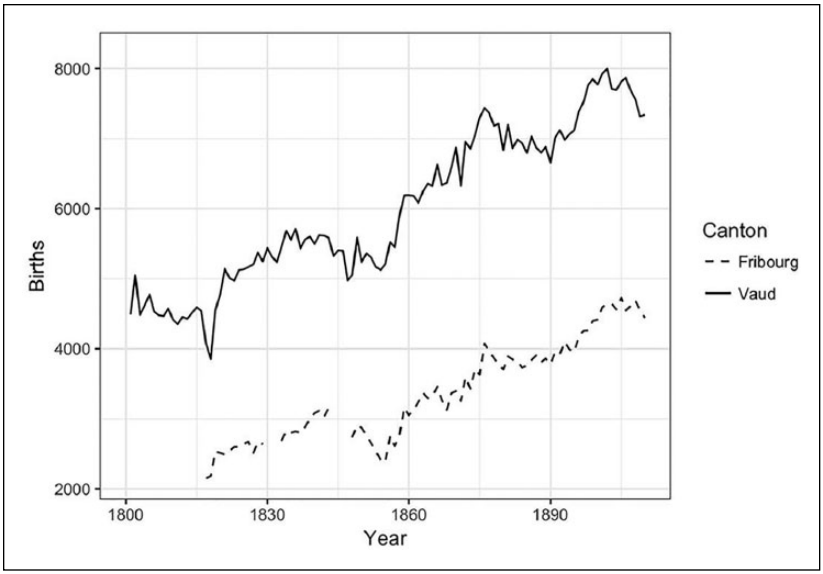

Figure 1. Births in Fribourg and Vaud.
Source. Data from Ritzmann and Siegenthaler (1996).

1816 famine and the 1848 political instability. While little data are available to analyze pretrend population, the existing data are consistent with our claim that the two cantons underwent broadly similar demographic changes *in the aggregate*, even as their internal population dynamics were affected differently by the onset of the Industrial Revolution, as we show below.

Figure 2 shows the explosion of real salaries as the economic reforms gained traction: While pay was mostly stagnant between 1830 and 1870, real wages proceeded to double over the subsequent two decades (Ritzmann & Siegenthaler, 1996). While economic change proceeded throughout the 19th century, the changes in the second half of the century were overwhelmingly greater than those in the first half.

Not all economic sectors grew at the same pace. Swiss agriculture experienced a contraction due to foreign competition; Swiss farmers were simply unable to compete with foreign producers (Church & Head, 2013, p. 175). As a result, Church and Head (2013) report that "many farmers began to leave the land—whether for the cities or [abroad] . . . The agricultural force fell rapidly, especially in the 1870s and 1880s . . . Overall the agrarian labour force halved between 1850 and 1910" (pp. 175-176).[11] Although the Swiss economy expanded in the latter half of the century, its agricultural sector

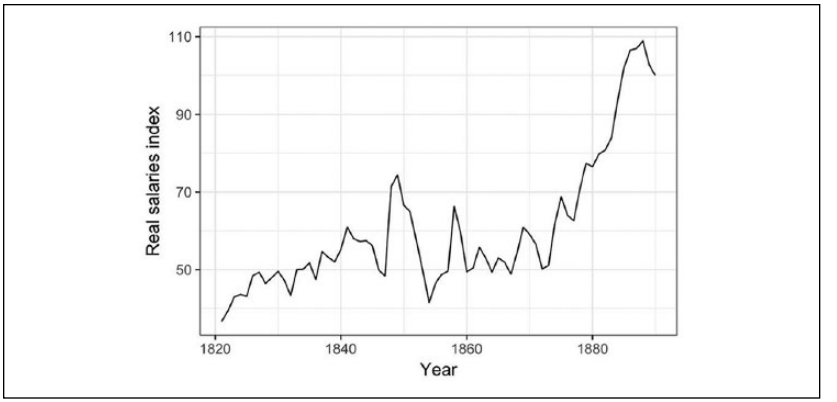

Figure 2. Real salaries in Switzerland (1890 = 100).
Source. Data from Ritzmann and Siegenthaler (1996).

declined. Farmers left their fields for rapidly expanding urban areas. While there was a push away from rural-agricultural regions, then, there was a corresponding pull into industrializing cities.

Before turning to our results, however, we acknowledge several potential concerns with our research design (that we address in greater detail in the last section). On one hand, there is a question of endogeneity: For example, perhaps institutional differences in Vaud led to the adoption of both Protestantism and economic dynamism. On the other hand, the time-lag between the "treatment" and our test raises two distinct questions about our quasi-experiment. First, our test of Weber's hypothesis requires the absence of any confounding shock that could *discontinuously*[12] have affected economic outcomes on one side of the border but not the other. Second, there is a question of mechanisms: Perhaps the "treatment" of ascetic Protestantism in the 16th century caused a divergence between the cantons prior to the Industrial Revolution, which in turn led to our result.[13] We draw on historiographical evidence as well as a separate quasi-experiment in Murten—a Protestant enclave in Fribourg—identified by Basten and Betz (2013, p. 6) to address the concerns about confounders, mechanisms, and endogeneity.

Weber's hypothesis implies two results in Southwestern Switzerland. First, following Cantoni, among others (e.g., Stasavage, 2014), we use city size to approximate economic change; as such, we expect the cities in Protestant Vaud to grow faster than the cities in Catholic Fribourg.[14] Yet, as noted above, city size itself is not sufficient to establish the veracity of Weber's claims. Elites in Protestant cities may have adopted Protestantism for endogenous reasons. This leads to our second, and key, hypothesis: Vaud Protestants should

leave their rural homelands at higher rates than their Catholic counterparts in Fribourg. Given that both regions were largely agricultural and that the agricultural sector was in decline during the period, we hypothesize that rural ascetic Protestants would be more likely to relocate to industrializing cities in search of new economic opportunities and regular work.

While our second hypothesis is a novel way to test Weber's theory, it was suggested by Weber himself. According to Weber (1958), ascetic Protestants loathed "irregular work" (p. 161):

> Irregular work, which the ordinary labourer is often forced to accept, is often unavoidable, but always an unwelcome state of transition. A man without a calling thus lacks the systematic, methodical character which is, as we have seen, demanded by world asceticism. (p. 161)

Later he adds, "If that God . . . shows one of His elect a chance of profit, he must do it with a purpose. Hence the faithful Christian must follow the call by taking advantage of the opportunity" (p. 162). We interpret this to mean that ascetic Protestants were motivated to move to booming urban areas. Somewhat counterintuitively, then, we expect the rural Catholic area of Fribourg to grow *faster* than the ascetic Protestant area across the border in Vaud: The lower growth rates in rural Vaud reflect the outflow of its residents to cities in pursuit of economic opportunity.

Findings

To test our first hypothesis, we compare the sizes of the largest cities in both cantons. As shown in Table 1, the three largest cities in Vaud grew faster than the three largest in Fribourg during the period 1860-1910.[15] Data from Van de Walle (1980) provide insight into the mechanism behind these differential rates of growth. Comparing the districts in which the largest cities, Lausanne and Fribourg, are located (Lausanne and Sarine, respectively), we find that the net migration rate in Lausanne (26 per 1,000) was dramatically higher than that of Sarine (four per 1,000). This confirms that urbanization (and thus, by proxy, industrialization) proceeded more rapidly in Vaud than in Fribourg.

We next turn to our second, and main, hypothesis. We use a fuzzy spatial RDD, using bandwidths calculated per Calonico, Cattaneo, & Titiunik (2014) (henceforth referred to as CTT) to examine the change in the rural population from 1860 to 1910. We omit German-speaking areas of Vaud to avoid potentially confounding effects of linguistic heterogeneity. We also drop any locales with populations over 1,000 because we are interested in rural growth rates; other thresholds are included as robustness checks.

Table 1. Comparison of Population Growth Between the Largest Cities in Fribourg and Vaud, and Province Totals.

State	City	Population 1860	Population 1910	Growth	Growth (%)
Vaud	Lausanne	20,515	66,227	45,712	223
Vaud	Vevey	6,494	14,031	7,537	116
Vaud	Yverdon	4,986	8,846	3,860	77
Vaud	All	213,035	323,547	110,512	52
Fribourg	Fribourg	10,454	20,367	9,913	95
Fribourg	Chatel-St-Denis	2,381	2,696	315	13
Fribourg	Bulle	2,086	4,099	2,013	97
Fribourg	All	77,304	105,407	28,103	36

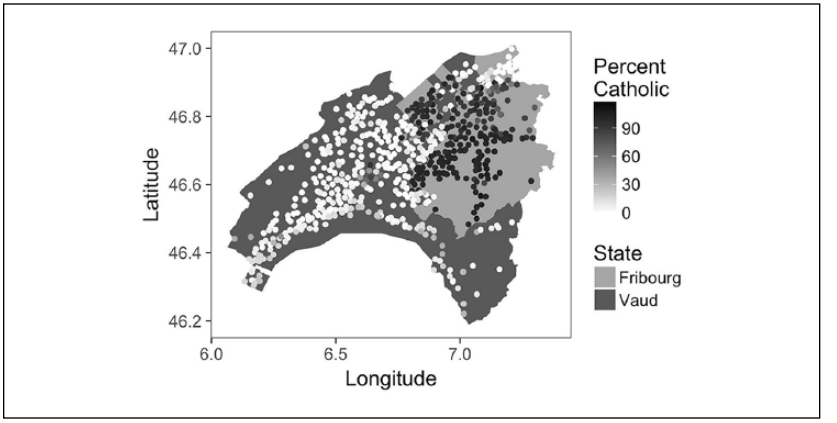

Figure 3. Religious distribution within Fribourg and Vaud.

To preview our results, rural Catholic areas added an additional 50 persons over the period. These results are robust to different population thresholds, bandwidths, and the inclusion of geographic controls.

Figure 3 shows the distribution of Catholics across Fribourg and Vaud. There is a sharp religious delineation across the border, with Fribourg being predominantly Catholic and Vaud being predominantly Protestant.

Figure 4 shows a map of towns with populations over 3,000 in 1910. Vaud has more large towns than Fribourg, which is consistent with our argument that it urbanized faster.

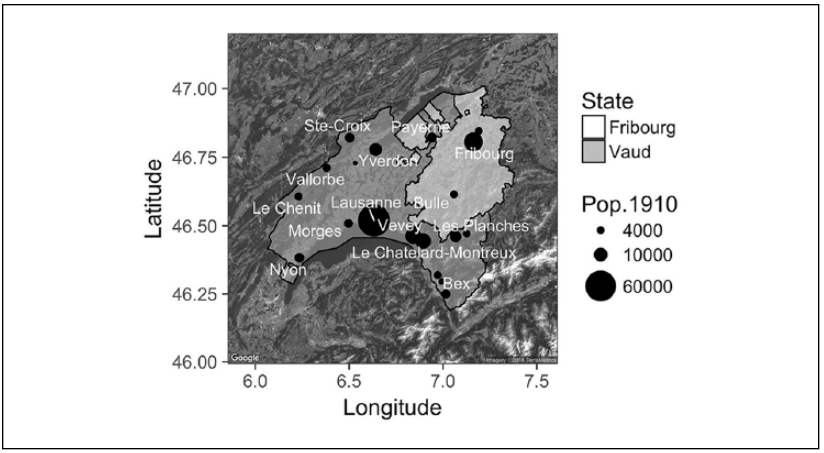

Figure 4. Map of cities with >3,000 population in 1910.

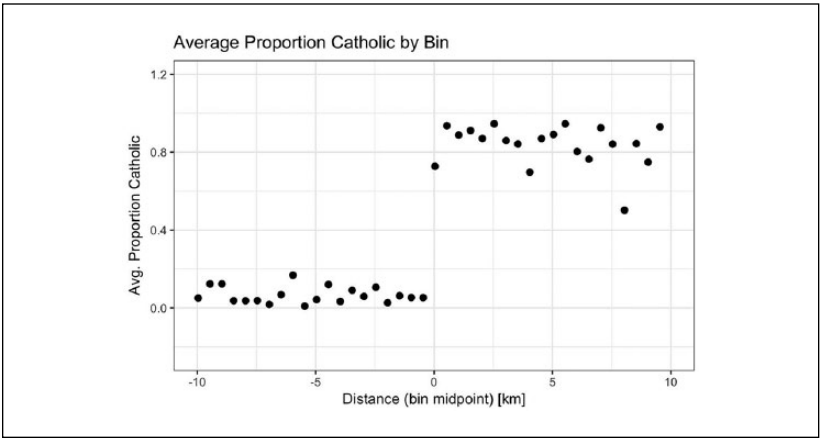

Figure 5. Proportions of Catholics, binned by the distance from the border.

Figure 5 shows the religious discontinuity at the border, with the average proportion of Catholics in the village binned by the distance from the Fribourg-Vaud border, with negative (positive) distances corresponding to Vaud (Fribourg). The plot shows a large and discontinuous jump at the border, with villages on the Vaud side being predominantly Protestant and those in Fribourg being predominantly Catholic.[16]

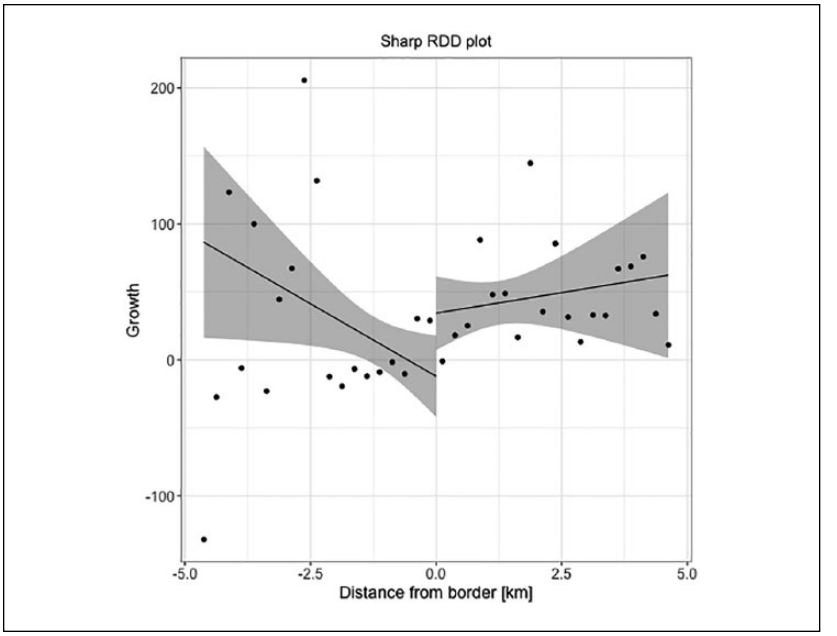

Figure 6. Population growth averages 1860-1910, villages with initial population <1,000, binned by the distance from the border, 0.25 km bin width.
Shown with local linear RDD regression and 95% confidence intervals. RDD = regression discontinuity design.

Figure 6 shows population growth averages from 1860 to 1910, for villages with initial populations less than 1,000, binned by the distance from the Fribourg-Vaud border, with negative (positive) distances corresponding to Vaud (Fribourg). The plot shows a clear discontinuity in population growth at the border: Villages on the Fribourg side grew much more over the time period than those in Vaud, where many villages *lost* population. The plot also shows the RDD regression from column 1 of Table 2, a local linear regression with triangular weights, and 95% confidence intervals.[17] The parameter of interest for the RDD regression is the average "treatment" effect at the threshold; it is reflected in Figure 6 by the gap between the regression lines on the left and right sides of the border.[18]

In Table 2, we show results from a sharp RDD. The dependent variable is the change in population per village from 1860 to 1910. The running variable is the great-circle distance in kilometers to the Fribourg-Vaud border, with negative (positive) values on the Vaud (Fribourg) side. The three columns

Table 2. Sharp RDD Results, for Base Model With No Controls, for Varying Population Thresholds.

Sharp RDD				
	Population <1,000	Population <2,000	Population <3,000	All towns
Coefficient	54	135	143	152
(*SE*)	(25)	(72)	(80)	(109)
p value	.029**	.059*	.074*	.16
Vaud observation	99	101	103	96
Fribourg observation	117	117	118	110
Bandwidth (km)	4.6	4.3	4.3	3.4
Controls	No	No	No	No
Sample frame	Population <1,000	Population <2,000	Population <3,000	All towns

Local linear polynomial with CTT bandwidth. Coefficient is estimated effect on population growth 1860-1910 of being located on the Fribourg side of the border. RDD = regression discontinuity design.
*$p < .10$. **$p < .05$. ***$p < .01$.

represent different values of the population threshold: from left to right, we omit places with 1860 populations above 1,000, 2,000, and 3,000, respectively. The regression specification is nonparametric linear local polynomial using the bias-corrected coefficient and robust standard errors (Calonico et al., 2014).

For the sample frame of villages with 1860 populations of below 1,000, the estimated effect of being on the Fribourg (Catholic) side of the border is an extra 54 people; the effect is significant at the 5% level. The estimated effect becomes larger but less precisely estimated when the population threshold is raised to 2,000 and 3,000.[19]

The results from including geographical controls are shown in the Supplemental Appendix. The controls include elevation, roughness (maximum local slope), latitude/longitude, and initial population. The inclusion of geographical and demographic controls does not meaningfully change the results. We also present the same analysis with the dependent variable being the annual compound growth rate of population over the same time period (rather than the absolute change). These results (see Supplemental Appendix) show an effect of ~0.35 percentage points in the annual growth rate.

The results from running the same specification as a fuzzy RDD are shown in Table 3, which gives the second-stage coefficients representing the effect

Table 3. Fuzzy RDD Results (Second Stage), for Various Sets of Controls: Elevation, Roughness, and Initial Population.

Fuzzy RDD (second stage)				
	Model 1	Model 2	Model 3	Model 4
Coefficient	56	58	68	64
(*SE*)	(21)	(22)	(23)	(22)
p value	.009***	.009***	.003***	.004***
Vaud observation	117	107	130	128
Fribourg observation	147	137	161	158
Bandwidth (km)	6.4	5.4	7.9	7.6
Controls	No	Elevation, roughness	Elevation, roughness, latitude/longitude	Elevation, roughness, latitude/longitude, 1860 population
Sample frame	Population <1,000	Population <1,000	Population <1,000	Population <1,000

Local linear polynomial with CTT bandwidth. Coefficient is treatment-effect-on-the-treated, on population growth 1860-1910, of a unit increase in the proportion of the population that is Catholic. RDD = regression discontinuity design.
*$p < .10$. **$p < .05$. ***$p < .01$.

of religion on growth. The instrumented variable is the percentage of the local population that is Catholic. The fuzzy design is appropriate because uptake of the "treatment" (in this case, the adoption of Catholicism on the Fribourg side of the border) is not perfect, as shown in Figure 3. The results in Table 3 show the treatment-effect-on-the-treated of an exogenous unit change in the proportion of the Catholic population. These results are even stronger than those for the sharp RDD, with slightly larger coefficients and smaller standard errors.

Figure 7 shows the estimated coefficients and 95% confidence intervals for conventional sharp RDD estimates calculated for a variety of bandwidths. Nonparametric RDD is subject to a bias-variance trade-off, with smaller bandwidths giving rise to more accurate (smaller bias) but less precise (larger variance) estimates of the "treatment" effect. The estimates are robust to bandwidth.

Competing Explanations

There is a paucity of economic data before the first national Swiss census in 1848. As such, we cannot examine the effects of the Protestant ethic until the

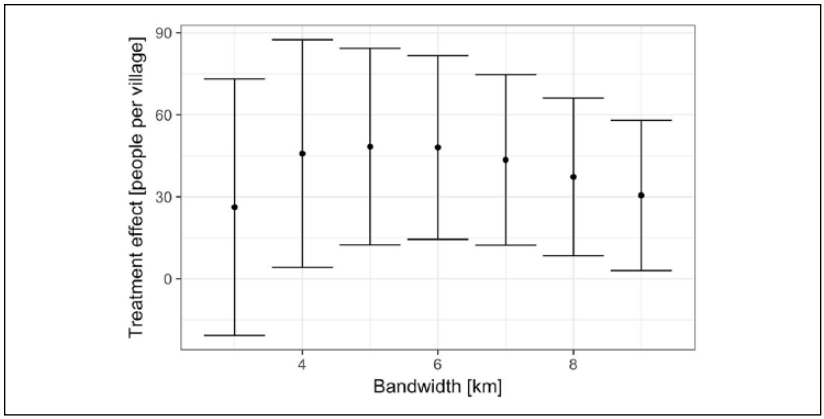

Figure 7. Sharp regression discontinuity design estimates of "treatment" effects for variety of bandwidths.

middle of the 19th century. As noted above, any shock occurring discontinuously on one side of the border,[20] but not the other, affecting urbanization rates in the years between the Reformation and our sample period would jeopardize our findings. Moreover, our results could potentially be endogenous to institutional differences between the cantons. Although we cannot definitively allay such concerns, we argue that historiographical and empirical evidence supports our test of Weber's claims.

The First and Second Villmergen Wars, in 1656 and 1712, respectively, pitted Protestants against Catholics. But most of the fighting took place in central Switzerland, far from the Fribourg and Vaud border (Nattrass, 1993; Oechsli, 1922, pp. 216-222, 233-235). Moreover, as Würgler (2008) notes, "Contemporary observers as well as modern scholars emphasized the moderate ways of handling confessional conflicts in Switzerland. Even the confessional civil wars were short and led to only few (5,000) casualties" (p. 49, Note 47). Neither war devastated rural Fribourg but not rural Vaud or vice versa. Less than a century later, Napoleon invaded Swiss territories in the spring of 1798 on the pretext of liberating the residents of francophone Vaud from German-speaking Bern. While many in Vaud did not celebrate the entrance of French soldiers, no blood was shed upon their arrival (Lerner, 2011, pp. 111-112). After negotiations failed, Napoleon's army occupied the city of Berne (Lerner, 2011, p. 114). The Helvetic Republic Napoleon established in Switzerland after the defeat of Berne lasted only 5 years. Vaud, however, was not returned to Berne upon the dissolution of the Helvetic

Republic; it was formally recognized as an autonomous Swiss canton in the 1803 Act of Mediation. Vaud would retain its status as one of the 26 Swiss cantons when a new constitution was ratified in 1815.

The peace that followed Napoleon's defeat in 1814 was relatively short-lived. Controversy about the presence of the Jesuits in the canton of Lucerne in the 1840s ultimately led to the outbreak of the Sonderbund War. Although it pitted Catholic against Protestant cantons, historians argue that the 1847 conflict is best understood as a political dispute between radicals and Catholic conservatives (Maissen, 1999, p. 13).[21] Vaud and Fribourg were on opposite sides during the brief (26 days) and relatively bloodless affair (fewer than 100 soldiers were killed) that ended with a resounding Protestant victory (Remak, 1993, pp. 145-152). Afterward, the most conservative Catholics lost power and the losing side was forced to pay for the costs of the war (6.18 million francs). In 1852, however, the Catholic cantons' remaining war debts (2.2 million francs) were canceled (Roca, 2012).[22] Despite the reparations, historians suggest that the long-term consequences of the war were negligible.[23] As Remak (1993) puts it, "The effects [of the war] on Switzerland may best be summed up in two words: cohesion and stability" (p. 175).[24]

As noted above, the 1848 constitution established after the conclusion of the Sonderbund War initiated key reforms spurring economic growth (freedom of settlement, abolishment of internal customs, etc.; Oechsli, 1922, pp. 397-398). Yet, it also upheld cantonal sovereignty; each canton retained control of education, health, roads, public works, the judiciary, and religion (Lerner, 2011, pp. 319-320).[25] In short, the newly created federal government did not invest heavily in the winners (e.g., rural Vaud) while neglecting the losing side (e.g., rural residents of Fribourg). In part a product of concerns about Prussia's growing dominance, many began calling for constitutional reforms again in the 1870s (Bonjour, Offler, & Potter, 1952, pp. 302-305). An 1872 proposal would have significantly increased the power of the federal government. It was narrowly rejected—neither Fribourg nor Vaud supported its ratification (Bonjour et al., 1952, p. 303). After making concessions to French-speaking cantons wary of a strong central government, constitutional reformers were successful in 1874 (it was endorsed by Vaud but not Fribourg or any of the other Catholic cantons).[26] Most importantly, the 1874 constitution established a federal civil code, unified the military, and guaranteed free primary education for all; the federal government was granted the authority to implement these newly enshrined constitutional principles (Bonjour et al., 1952, p. 305; Boppart, Falkinger, Grossmann, Woitek, & Wüthrich, 2013, p. 246; Oechsli, 1922, p. 410).[27] Although an empowered federal government flexed its muscles in military and educational affairs, cantons retained their authority in most other domains. Protestants were not subject to

discrimination, as a majority of Swiss cantons were Protestant at that time and had recently defeated the Catholics in the 1847 Sonderbund War.

It is also worth noting that some French Huguenots (ascetic Protestants from France), known for their watchmaking prowess, fled to Switzerland after they were expelled from France in the late 1600s (Larminie, 1998). While Larminie (1998, p. 44) reports Berne authorities attempted to expel them from its territories, including Vaud (under Bernese rule at that time), most settled near Geneva or Neuchatel, away from the border between Fribourg and Vaud. Schelbert (2007) reports that only 1,000 Huguenots stayed in Berne territories (p. 39). Moreover, there were three only watchmaking factories anywhere near the Fribourg-Vaud border in 1900, one in Fribourg and two in Vaud (Federal Statistical Office, 2015).[28]

Thus, we do not find evidence that an exogenous shock affected economic outcomes on one side of the border but not the other. No military conflicts appear to have upended life in rural Fribourg but not Vaud or vice versa. Beyond educational reforms, the same is true for changes to the central government instituted in 1848 and 1874.[29] Finally, neither of the areas was affected by an influx of immigrants. As noted above, however, political differences between the cantons would seem to pose a threat to our identification strategy. In the remainder of this section, we mobilize historiographical and empirical evidence to address these concerns.

Fribourg and Berne (which ruled Vaud until 1798) were both considered "patrician-based" cantons from the Reformation until the 1800s (Brooks, 1918, p. 35; Würgler, 2008, pp. 30-33). Although their rural areas were heavily taxed by cantonal capitols, those living in the countryside were largely ignored by urban-dwelling elites (Brooks, 1918, p. 35; Gould, 2010, pp. 90-91). This long period of neglect may help explain the absence of industry in the area (Fritzsche, 1996, pp. 140-141). In fact, both sides of the border were predominantly agricultural in 1870 (the first year we have agricultural data), well after other (rural) parts of Switzerland had begun to industrialize. The median rates of agricultural employment for the border districts of Fribourg and Vaud in 1870 were 65% and 60%, respectively, while the median district for all Switzerland had only 50% agricultural employment (Van de Walle, 1980). The difference in agricultural employment between Fribourg and Vaud is not statistically significant (see Supplemental Appendix).

Vaud's independence from Berne was secured by the Congress of Vienna in 1815 (Lerner, 2011, p. 161). Although Vaud's new government was more democratic than Berne's, Lerner (2011, pp. 137-166) ascribes its separation mainly to theoretical claims underpinning Vaud's claim to self-governance.[30] Regardless, Vaud underwent significant political change again only 15 years later; both Vaud and Fribourg were among the 11 cantons that adopted liberal

constitutions after the 1830 Paris Revolution (Lerner, 2011, p. 187).[31] But wary of a German-speaking majority, neither joined the league of seven liberal cantons calling for a strengthened central government in the early 1830s (Lerner, 2011, pp. 267-268). Thus, although the first four decades of the 19th century were a time of significant upheaval, Fribourg and Vaud followed similar paths.

In 1845, radicals upset about the presence of Jesuits in Swiss territories successfully deposed their government in Vaud, among other cantons, but failed to do so in Fribourg (Gould, 2010, p. 95; Lerner, 2011, pp. 281-286; Maissen, 2000, pp. 9-11). Even then, however, Lerner (2011) notes that while the political change in Vaud was "led by a minority of radicals, it did not produce a fully radical regime" (p. 287). Moreover, both cantons were governed by radicals in the years following the Sonderbund War. While conservatives returned to power in Fribourg in 1856, they largely accepted the state system installed by radicals while overturning their anti-clerical policies (Dorand, 2017; Maissen, 2000, p. 14). Although we doubt the political differences between Fribourg and Vaud would have had a significant effect on urbanization rates of residents living in *rural* Fribourg but not in *rural* Vaud or vice versa, in what follows we examine whether inheritance laws, education, or migration restrictions could be the source of the population changes we observe. We then leverage a separate quasi-experiment in Fribourg as a robustness check. Then, we address birth rates as a potential explanation of our findings, and finally, pre-Reformation religious differences.

First, it is unlikely that our results are driven by differences in inheritance laws. Primogeniture laws were never popular in Swiss territories, and neither Berne nor Fribourg had primogeniture laws at the time of the Reformation (Ekelund, Hébert, & Tollison, 2002, p. 660). Primogeniture was not in effect in the 19th century. Moreover, inheritance laws in Fribourg and Vaud were relatively similar in the late 1800s, the main difference being that sons had the right to an extra fifth of property in Fribourg but not in Vaud (Lloyd, 1877, p. 72).

The available data also suggest that our findings are not the product of differing education levels. We use district-level demographic data from Van de Walle (1980) to compare education rates for the districts represented in our RDD results (six in Fribourg and 10 in Vaud). In the Supplemental Appendix, we present population-weighted linear regressions for 1870, 1888, and 1910, in which the dependent variable is the percentage of military draftees with education beyond primary school. The quantity of interest is the coefficient of a dummy variable reflecting whether the draftees were from Vaud or Fribourg. The rates of educational attainment between the two cantons are practically identical, with rates of post-primary education rising from about

Table 4. Growth of Catholic and Total Populations in Vaud's Largest Cities.

City	Catholic 1860	Catholic 1910	Catholic growth (%)	Total growth (%)
Lausanne	1,601	15,597	874	223
Vevey	794	4,514	469	116
Yverdon	412	1,258	205	77

10% in 1870 to about 16% in 1910 in both cantons. In no case is the average difference between cantons more than two percentage points, nor does this difference approach statistical significance.[32] Our findings indicate, then, that the Protestant ethic operates outside of education level; rates of post-primary education were similar in both areas during the late 19th century, yet urbanization rates differed.[33]

Alternatively, one might wonder whether Vaud's cities, which were larger than those in Fribourg at the beginning of the time frame, exerted a correspondingly larger pull for internal migrants *and* welcomed Protestants but not Catholics. Perhaps our findings could be driven by that fact that Catholics on the Fribourg side were equally willing to move, but the booming cities on the Vaud side of the border were closed to them. On one hand, historiography does not support this idea. Kriesi and Trechsel (2008) write, "Industrialization gave rise to the emigration of hundreds of thousands of Catholics from their 'homelands' in the Catholic cantons to the new industrial centres in predominantly Protestant regions" (p. 7).[34] On the other hand, such an explanation is belied by the results in Table 4, which show the explosive growth in the Catholic population of the largest cities in Vaud: Clearly, it was possible for Catholics to come to Vaud, as the number of Catholics in Lausanne increased by almost 900% during the sample window, 4 times as fast as the city's general population. Rural ascetic Protestants from Vaud and rural Catholics from Fribourg with similar levels of education and speaking the same language could (and did) move to industrializing cities. But ascetic Protestants did so at higher rates; they were more sensitive to the "pull" emanating from industrializing cities. We attribute this willingness to relocate to religious beliefs about the importance of regular work.

We can empirically test whether a confounding variable is driving differences in urbanization rates by leveraging a separate quasi-experiment in the bailiwick of Murten, a small territory that became part of Fribourg in 1803. Murten was one of the three territories between Berne and Fribourg that retained its independence after the Reformation (Basten & Betz, 2013, p. 6). Due to its proximity to Berne, it adopted Protestantism in the 16th century (p. 6). If the differences in rural urbanization rates were caused by some

unobserved variable introduced by the new Vaud government, we would not expect predominantly Catholic towns in Fribourg to grow faster than predominantly Protestant towns in the same canton. Our results should not be robust to Murten if they are the product of institutional innovations introduced in post-Helvetic Vaud.

We estimate the relationship between Catholicism and village population growth in Fribourg using robust linear estimation (iterated weighted least squares).[35] The dependent variable is population growth; the result is estimated with and without controls, using 1860 population thresholds of 1,000 and 2,000. The results (see Supplemental Appendix) show that Catholic villages in Fribourg tend to grow more quickly than the Protestant ones, which is the same result that we found when comparing Protestant Vaud with the Catholic part of Fribourg.

Furthermore, evidence suggests that our results are not attributable to birth rates. Analyzing fertility patterns in four villages in Fribourg and Vaud from 1860 to 1930, Praz (2006) finds that "the differences between Catholic and Protestant marital fertility rates are rather minimal" (p. 152).[36] Our analysis of district-level data on fertility and infant mortality from 1870, 1888, and 1910 coheres with Praz's (2006) study. Using data from Van de Walle (1980), we analyze the 16 border districts containing villages in our RDD sample (see Supplemental Appendix). The fertility rate is similar between Fribourg and Vaud for 1870 and 1888, with the coefficient on the Vaud dummy variable close to zero and not statistically significant. Only in 1910, the very end of our sample period, is the fertility rate in Fribourg significantly higher than that in Vaud. Moreover, as shown in the Supplemental Appendix, infant mortality is substantially higher in Fribourg than Vaud throughout the sample period. Average infant mortality rates, for Fribourg and Vaud, respectively, are 268 and 240 in 1870, 234 and 213 in 1888, and 186 and 142 in 1910, significantly different at the 5% level (1% in 1910). Thus, while Fribourg has a higher birthrate only at the very end of our sample period, Vaud has substantially lower infant mortality throughout.[37]

In addition, the Van de Walle (1980) dataset includes overall mortality rates for the districts of Fribourg and Vaud for 1910. This comparison (see Supplemental Appendix) indicates that the total mortality rate in Vaud is lower by about three deaths per 1,000 inhabitants, statistically different at the 1% level. It is reasonable to believe, given much higher infant mortality in Fribourg before 1910, and Vaud's substantial efforts at public health starting in the 1880s (Praz, 2006), that total mortality was higher in Fribourg throughout the sample period. In sum, Fribourg and Vaud had similar birthrates until the very end of the sample period, while Vaud had lower mortality rates throughout. Differences in births, then, were unlikely to cause the

observed differences in population growth between the border regions of Fribourg and Vaud.

Finally, our results are inconsistent with the pre-Reformation roots explanation advanced by Andersen et al. (2017). Recall that they argue the (Catholic) Cistercians' asceticism drove the development of proto-capitalistic economics in England. The authors conclude, then, that Weber misidentified the source of the work ethic; it is not *Protestant*. Although we do not have detailed data on Cistercians' activity in southwest Switzerland, there were several monasteries in both Vaud and Fribourg before the Reformation (Tremp, 2015). The Cistercians, along with other Catholics, were then banned from practicing in Vaud (Bruening, 2005, pp. 100, 133-165), but remained in Fribourg. The available data thus appear to rule out a pre-Reformation roots explanation for our findings; although Cistercians were present in both regions, we observe more economic dynamism in Vaud than Fribourg (despite the fact that the Cistercians were active in Fribourg for a much longer period than in Vaud).

Conclusion

Weber argues that the emergence of capitalism in the Western world could not be understood without taking into account the religious beliefs of *ascetic* Protestants. He contends that culture affected not only economic change, but also the development of capitalist economic systems. Contrary to recent reexaminations of Weber's theory, we have found empirical evidence in urbanization rates to support Weber's claims. This may be because we test Weber's thesis in ascetic Protestant rather than Lutheran territories, consistent with Weber's original argument.

Our results show that the population of villages in rural Catholic Fribourg grew significantly faster than Protestant Vaud. Given a contemporary local decline in agriculture, and the rapid growth of nearby cities, the fact that many would have left the countryside in search of opportunity is not surprising. But given recent contributions to the literature on Weber, the magnitude of our results is striking. Ascetic Protestants living in rural Vaud were significantly more likely to move to the cities than their Catholic neighbors in Fribourg as the Industrial Revolution swept across Switzerland.

Of course, given the scarcity of data and lengthy time-horizon of our study, it is impossible to definitively prove Weber's claims one way or the other. It is also difficult to assess the external validity of our finding. That said, we are confident that our design has limited the potential effects of confounders and endogeneity. Both areas on the Swiss highland were rural, francophone, and equidistant to urban areas at the time the Industrial Revolution moved through

Switzerland. We find no evidence that an exogenous shock discontinuously affected economic outcomes on one side of the border but not the other, or that the results are endogenous to institutional differences. Our results suggest that Weber's hypothesis about the economic effect of the Protestant ethic, and of culture more broadly, merits further scholarly attention.

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Supplemental Material

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Notes

1. Outcomes such as redistribution (Stegmueller, 2013), electoral outcomes (e.g., Ignazi & Wellhofer, 2013), coalition formation (Birnir & Satana, 2013), public provision of education (Ansell & Lindvall, 2013), immigrant assimilation (e.g., Helbling & Traunmüller, 2016), propensity to challenge regimes (e.g., Hoffman & Jamal, 2014), and interstate (Alexander, 2017) and interethnic (Isaacs, 2017) conflict. Moreover, see Kuran (2012) on how secondary legal traditions associated with particular religions can affect economic trajectories.
2. He refers to Christians in the Reformed tradition (Calvinism, Pietism, Methodism, and the Baptist sects) as "ascetic Protestants" (Weber, 1958, p. 95).
3. For example, Alesina and Giuliano (2010) and Gorodnichenko and Roland (2011).
4. Scholars in this camp have considered the effects of culture on individual preferences over redistribution and inequality (e.g., Alesina & Glaeser, 2004), savings and investment (Carroll, Rhee, & Rhee, 1994), as well as beliefs regarding the importance and efficacy of individual effort (e.g., Gorodnichenko & Roland, 2011).
5. A host of other studies have examined how the Reformation affects educational outcomes (without making a human capital argument). See, for example, Becker

and Woessmann (2009), Boppart, Falkinger, Grossmann, Woitek, and Wüthrich (2013), Boppart, Falkinger, and Grossmann (2014).

6. Weber (1958) explicitly rejects the idea that "capitalism as an economic system is a creation of the Reformation" (p. 91). He merely wants to "as far as possible clarify the manner and the general *direction* in which . . . the religions movements have influenced the change of material culture" (p. 92).
7. We use masculine pronouns throughout, following Weber's focus on the beliefs of men.
8. Although Lutherans also believed in predestination, the idea was not as central to Lutheran theology as in Calvinist traditions (Weber, 1958, p. 102).
9. Although some Catholics might be ascetics, Weber (1958) does not think asceticism alone instilled the spirit of capitalism. Asceticism must be combined with a worldly vocation. Because Catholicism did not place the same emphasis on vocation, Catholic asceticism—that of the Cistercians or any other Catholic order—is incompatible with the *Protestant* ethic: "Asceticism, the more strongly it gripped an individual, simply served to drive him farther away from everyday life, because the holiest task was definitely to surpass all world morality . . . Sebastian Franck struck the central characteristic of [Protestantism] when he saw the significance of the Reformation in the fact that now every Christian had to be a monk all his life" (p. 121).
10. Change in urban areas with specialized goods, like Jura, occurred prior to 1848 (Fritzsche, 1996, p. 130). But Fritzsche unequivocally states that industrialization did not occur in most regions until the second half of the 19th century (pp. 140-141). At any rate, there is no evidence that the largely rural, agricultural area we examine had industrialized prior to the emergence of a common Swiss market.
11. Also see Bonjour, Offler, and Potter (1952, p. 316).
12. The regression discontinuity design (RDD) controls for any difference that varies *continuously* at the border. Only *discontinuous* confounders could affect the result.
13. Our argument does not require economic or institutional stasis in rural Fribourg and Vaud between the Reformation and the Industrial Revolution. We contend only that the effect of ascetic Protestantism was particularly pronounced and visible during that period of rapid economic upheaval.
14. Cantoni (2015) writes, "In a Malthusian world in which population growth reacts to economic conditions, or in a model with unlimited supply of labor from the countryside, improvements in urban total factor productivity should be reflected in city sizes. Hence, if Protestantism did indeed increase the productivity of urban dwellers . . . this should translate into larger city sizes" (p. 570).
15. Empirically, cities within a given country, during a given time period, tend to grow at approximately the same proportional rate, regardless of initial size (Gabaix, 1999). This gives rise to the regularity known as Zipf's law, whereby the number of cities with populations greater than some value S is proportional to 1/S.
16. Values are shown for towns up to 10 km from the border, because bandwidths of up to 10 km are used in the robustness check shown in Figure 7.
17. The shaded regions in the figure represent the confidence intervals from the local linear regressions. These confidence intervals become wider away from the border because these regions are far from most of the data points used to estimate the linear

regressions, and because the triangular kernel (standard for nonparametric RDD) downweights observations far from the border. The wide confidence intervals away from the border do not affect the validity of the RDD estimate, because the parameter of interest (the treatment effect at the threshold) is estimated *at* the border.

18. Because the optimal bandwidth for the RDD regression shown in Figure 6 is 4.6 km, as shown in Table 2, the *x* axis for Figure 6 is scaled to show data for 5 km on either side of the border.
19. The optimal bandwidth for the RDD regression becomes narrower as the population threshold is raised, dropping from 4.6 km to 3.4 km. This keeps the number of observations roughly constant even as larger towns are included, because the cutoff distance from the border becomes lower. The bandwidth is chosen to optimize the bias-variance trade-off for the estimation.
20. It bears noting that spatial regression discontinuity does *not* require Fribourg and Vaud to be identical aside from religion to be identified. Rather, it requires that all other relevant variables change *smoothly*, that is, that they do not jump at the border.
21. The generals of both sides, for instance, were liberal Protestants. More generally, radicals wanted centralized authority, Catholic and Protestant liberals preferred cantonal sovereignty, and Ultramontanist Catholics preferred closer ties with the papacy. See Remak (1993) and Maissen (1999, 2000) for detailed accounts of the Sonderbund War.
22. We thank an anonymous reviewer for pointing this out.
23. If anything, one would think that economic headwinds in Fribourg would make rural Catholics more likely to urbanize than their Protestant counterparts. This is the opposite of what we find.
24. Church and Head (2013) write, "No real purge of Sonderbund supporters took place. Rather, by taking measures against the Jesuits and a few Sonderbund leaders, the new government gave the impression that the war had been a plot by outsiders in which the Catholic population at large was not involved" (p. 165).
25. Notably, Fribourg was the only Sonderbund canton that voted to approve the 1848 constitution.
26. The Catholic cantons were upset about the federal government's ability to establish primary schools. This was seen as posing a threat to religious education.
27. It also established a uniform civil code and Federal Court (Bonjour et al., 1952, p. 305). Vaud voted in favor of the 1874 document while Fribourg did not. The capitol of Vaud, Lausanne, was named the site of the newly established Federal Judiciary as a concession to the French-speaking cantons wary of Bernese dominance (Brooks, 1918, p. 168).
28. The watchmaking industry is largely located in Geneva as well as Neuchatel, a canton northwest of Vaud.
29. Data on post-primary school attendance show no significant differences in education levels between rural Fribourg and rural Vaud. We discuss this in more detail below.
30. In the 19th-century Swiss context, "radical" refers to defenders of popular sovereignty and direct democracy as opposed to more representative forms of government. As Boppart et al. (2013) note, "Contrary to the general conservative movement in Europe, Swiss conservatives were not anti-democratic. They rather

'worked to extend plebiscitary participation in the political process,' based on the direct democratic traditions of some of the cantons of the Old Confederacy" (p. 246, Note 9, citing Altermatt, 1979, p. 591).

31. Lerner (2011) reports that the new constitutions "guaranteed liberal ideals and rights such as equality before the law for all citizens of the canton, the equality of political rights, the right to petition and freedom of the press, in addition to confirming popular sovereignty . . . these 'Regenerated' constitutions also eliminated the last remnants of privileged status" (p. 187).
32. This might seem counter to the conclusions of others who have examined education in 19th-century Switzerland (e.g., Boppart et al., 2014; Boppart et al., 2013). But as Boppart et al. (2013) note, denomination alone does not determine educational outcomes, it is mediated by political attitudes—suggesting similar political attitudes prevailed in rural Fribourg and rural Vaud (p. 264).
33. Although not a test of the human capital explanation advanced by Becker and Woessmann (2009) and Akçomak, Webbink, and ter Weel (2016), our results suggest that the Protestant ethic can operate independently of education levels.
34. Also see Zimmer (2003, pp. 168-169).
35. The results are substantively similar using ordinary least squares.
36. This coheres with other studies on rural birth rates during that time period. Cantoni (2015) notes that Catholics in Oppenheim, Germany, averaged 4.2 children per family whereas Calvinists averaged 4.0 (p. 588). Knodel's (1978) study of 10 German villages finds little evidence of family limitation before the end of the 19th century (p. 483).
37. Praz (2006) suggests this divergence is due to Protestant's commitments to public health.

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