Three Essays on Social Capital, Culture, and Education

Inaugural-Dissertation
zur Erlangung des Grades
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an der Ludwig-Maximilians-Universität München

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Referent:	Prof. Davide Cantoni, Ph.D.
Koreferent:	Prof. Dr. Ludger Wößmann
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To Markus and Julian

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Introduction

Over the past decades economists have increasingly recognised the importance of considering factors beyond the purely selfish pursuits of the neoclassical homo oeconomicus. There is a growing consensus, that we need to take trust, reciprocity, and pro-social investments into account to achieve a more complete picture of determinants of sustained economic development. Economic growth is fostered when we can rely on contracts being fulfilled, transactions are expedited when we have a social frame of conduct, and a social climate encouraging participation can help overcome free-rider problems. At the base of these issues lie social norms and values which govern connections and interactions between individuals, and of people with institutions. We often summarise these norms and values as social capital (Putnam, 2000). More social capital is usually connected with better developmental conditions on all levels: individual, firm-based, and aggregate. The focus of this dissertation is on the connection of social capital and education.

We have been aware that social capital and education interact for at least three decades. Coleman (1988), for example, introduced the idea that social capital influences students' achievements. Beyond current day outcomes, changing values can also help to explain historical developments, such as the Industrial Revolution (Mokyr, 2016). Both education and social capital individually and jointly influence long-run development. Yet, the nature of the relationship of education and social capital is difficult to ascertain as there are feedback mechanisms that often impede a clear determination of causal channels of influence.

This thesis consists of three chapters that shed further light on the interaction of social capital and education. I provide evidence on both channels: education decisions influence social capital and changing values are connected to education development. To inform the debate on social capital and add to our understanding of these issues, I first turn to history and then show a modern day quasi-natural experiment. First, Chapter 1 focuses on a pivotal point in time around the Industrial Revolution. Here I show that changing values and the spreading of modernised beliefs are connected to better educational outcomes later on by introducing the so-called Popular Enlightenment movement. Popular Enlightenment shows an unprecedented clear connection of how the change in values through Enlightenment encompassed all social classes and led to more emphasis of the importance of so-called useful knowledge and education for all of society. This chapter suggests how education may be influenced by cultural change. In Chapter 2 and 3, I turn towards the modern day and show causal evidence that education policy can affect social capital investment both negatively and positively. I use a large education reform in Germany, the so-called G8 ("Gymnasium in eight years") reform as a quasi-natural experiment. The reform reduced total years of schooling for academic-track high school students while leaving taught materials mostly unchanged. This impacted students' engagement in social capital activities while they are at school, but increased incentives to do so in the form of a gap year after graduation. In Chapter 2, I show that the increased work load at school negatively affected volunteering in clubs and organisations in the short run as it reduced time for outside of school activities. Chapter 3, which is joint work with Felix Hagemeister, shows that the reform also had the unintended side-effect of increasing trust in European institutions. We hypothesise that this is due to the increase in gap year participation after graduation which is often used for going abroad, thus, increasing international exchanges. Both chapters on education policy show causal evidence how schooling optimisation can lead to changes in social capital.

All three chapters rely on extensive data sources for their empirical analyses. Chapter 1 is based on a rich and novel historical dataset. I show the development of the Popular Enlightenment movement in the German-speaking territories drawing on data collected from previous historic research which I combine with a large number of additional historical data sources from the 18th and 19th century at county level for the example of Bavaria. Chapter 2 relies on the German-wide Socio-Economic Panel Study (GSOEP), which provides a large array of individual and household questions as longitudinal survey. This data includes individual-level information on education, which allows me to identify which individuals were affected by the educational reform that increased schooling intensity. I combine this with data on voluntary activity of adolescents as well as after graduation. A large pool of individual background, parent, sibling, and post-graduation information serves as additional controls. We employ this data again in Chapter 3, to show that gap year participation significantly increased due to the school reform and that many use this time to volunteer. Chapter 3 additionally employs the German General Social Survey (allbus). The allbus survey provides rich data on attitudes and political opinions in Germany in a repeated cross-section amongst a representative sample of individuals. We can identify changing levels of trust towards the European Union based on this data.

In Chapter 1, I introduce a movement which actively tried to modernise cultural values around the time of the Industrial Revolution. Cultural change is part of the process that fostered the Industrial Revolution and long-run growth of the modern world. The large economic changes of the 18th and 19th went hand-in-hand with equally large changes in peoples' mindsets. There was a new emphasis on the importance of innovation, modernisation, and in particular useful knowledge. Enlightenment is one aspect of these cultural changes as it argued for rational thinking above superstition and encouraged a greater understanding of nature. Through the example of Popular Enlightenment in the German-speaking territories, I can show that Enlightenment was not confined to an elite. The movement introduced mod-

ernised beliefs for all social classes. I measure Popular Enlightenment through the presence of a knowledge elite in Enlightenment associations which built a foundation of Enlightenment-minded people. The movement accelerated with increasing interactions of the middle and upper classes. Towards the end of the 18$^{\text{th}}$ century the proponents of the movement directly attempted to modernise attitudes of the peasantry and farmers through the distribution of an Enlightenment handbook, the so-called *Need and Assistance Book* by R. Z. Becker. This book was intended to broaden peoples' minds and emphasised the importance of useful knowledge.

This chapter contributes to our understanding of a period in time that is pivotal for the development of the modern world. I introduce the Popular Enlightenment movement and its proponents to an economic setting. The movement was originally connected to the academic discussion of Enlightenment and became increasingly direct in approaching the lower social classes. I show how the movement spread and developed relying on the knowledge elite. Cultural changes and in particular the expansion of useful knowledge are connected to long-run growth. I provide new evidence on factors that drive this expansion of useful knowledge. I show detailed and novel information on who the knowledge elite is and how it is connected to early human capital. Finally, I show that Popular Enlightenment of the 18$^{\text{th}}$ century can be connected to education in the 19$^{\text{th}}$ century, in particular founding of upper-tail education schools as well as schools and groups fostering useful knowledge for all social classes. I show a channel of elite impact on industrial and long-run development besides entrepreneurial efforts. The results of this chapter further indicate a possible way in which education may be endogenously influenced through a change in culture.

In Chapter 2, I show that policy to optimise schooling duration can have a negative effect on outside-of-school activities. Increasing schooling intensity combines two potential policy aims: the number of years of schooling are reduced while still conveying a large array of knowledge to students. Policy makers face a trade-off

implementing such a reform. On the one hand, increased schooling intensity is connected to better student test performance and labour market outcomes. On the other hand, outside of school activities can be negatively affected as students have less free time. So far, there is little evidence on these side-effects of education optimisation. I provide evidence that volunteering, an important contributor to personal and economic development, is reduced as a result of the increase in schooling intensity, at least in the short-run. I further consider mid-term effects of the reform after graduation. Treated adults who do not attend university still show reduced voluntary participation even after finishing high school. I also show that this decrease is mostly driven by a comparison of last untreated to first treated cohorts. The reform, hence, only resulted in a reduction of volunteering in the short-run and does not imply a long-term aggregate or individual-level negative effect.

This chapter adds evidence on optimal schooling decisions and highlights an important trade-off for policy makers. Education policy affects social capital and these effects may even change individuals' behaviour after graduation; policy makers should be aware of this. The evidence also shows that individuals and institutions adapt to changes through this education policy. Treated cohorts by and by increase their voluntary investment after the treatment shock for the first treated generations. There is also evidence that suggests that volunteering organisations, such as sports clubs, adapt to changed schedules in order to enable continued participation. Still, policy makers should be aware that education decisions also influence important factors outside the classroom.

Chapter 3 follows from Chapter 2 and considers the effect of post graduate behavior of treated cohorts in more detail. We can show that the G8 reform had the unintended side-effect of increasing trust in the European Union. At the same time we see no comparable increase in trust either towards politics or people. In fact, political interest seems to be reduced after the reform is introduced. We hypothesise that the reform had a unique positive effect on trust in European institutions as gap

year uptake is increased. Students were "gifted" an additional year after graduation. Many use this time to gain international experience, for example, through volunteering abroad. We argue that these international exchanges contribute to trust in the European Union. As for the analyses in Chapter 2, event study evidence shows that the reform effect is mostly driven by individuals who were amongst the first to be treated.

In this chapter we contribute evidence that the unintentional increase in gap year uptake due to the G8 reform had a positive indirect effect on international political trust. It thus links to the literature on social capital by examining the determinants of trust in particular towards the European Union in more detail.

Each of the following three self-contained chapters is followed by an Appendix which provides supplementary materials. References are presented in a consolidated bibliography at the end of the thesis.

1 | Popular Enlightenment: An Attempt to Change Cultural Beliefs by Spreading Enlightenment Values

And in all matters the people asked how? where? why? for what? and through what means? [...] And by and by, through this, changes occurred that would have otherwise been thought impossible.

Becker (1789, p. 415)

So concludes the history of the fictional town of Mildheim in the *Need and Assistance Book*[1] of the 1780s, a happy-ending, after the people experienced many downfalls through folly. They learned from their mistakes how to improve their situation and live a prosperous life based on rational thought and reason. In a very modern notion, the book's story encourages (self-)improvement and betterment as the goals of every human life. It introduces a culture of modernisation and stresses the importance of understanding nature through useful knowledge[2]. The *Need and Assistance Book* is part of a larger movement, called Popular Enlightenment.

In this 18$^{\text{th}}$ century movement, educated elites attempted to spread Enlightenment values in particular amongst the lower social classes. Based on a novel data set from the 18$^{\text{th}}$ and 19$^{\text{th}}$ century, I show how the academic discussions of Enlightenment led

[1] Translated from the original title *Noth- und Hülfsbüchlein.*

[2] Useful knowledge refers to necessary skills to adopt new technologies, for example. This requires an understanding of basic natural principles and initially, a culture that encourages learning about nature and cause-effect relationships.

to hands-on attempts to reform behaviour and beliefs. This change encompassed all social classes not just an intellectual elite. My results inform our understanding of both the causes of the spreading of Enlightenment values and its effects. This allows me to show a channel of elite impact on industrial and long-run development besides entrepreneurial efforts. The results of this paper further indicate a possible way in which education may be endogenously influenced through a change in culture which appeared alongside large economic change around the Industrial Revolution contributing to long-run growth.

Popular Enlightenment emphasises the importance of Enlightenment values for economic development, similar to *Industrial Enlightenment* (Mokyr, 2002, 2005).[3] It goes one step further, however. Both concepts focus on the importance of increasing understanding and acceptability of useful knowledge for development. For *Industrial Enlightenment* this is mostly focused on elite institutions, such as the Royal Society or the Republic of Letters which served as platforms for researching and increasing access to useful knowledge amongst the upper tail of society. But was Enlightenment then limited to this elite? Popular Enlightenment shows that this was not the case. The movement evolved from discussions amongst an intellectual elite in the beginning to ultimately addressing Enlightenment directly to the common people.[4] Common people then drove economic change by adopting new technologies and applying this useful knowledge.

This paper has three goals. First, I introduce the Popular Enlightenment movement and its proponents. Second, I show how the movement spread and developed relying on the knowledge elite. Third, I show that Popular Enlightenment of the 18$^{\text{th}}$ century can be connected to education in the 19$^{\text{th}}$ century, in particular founding

[3] *Industrial Enlightenment* argues that the lasting economic growth of the modern age after stagnation throughout most of human history may be traced back to the expansion of useful knowledge and a change in mindsets.

[4] Early Popular Enlightenment representatives can be connected to *Industrial Enlightenment* through memberships in the Royal Society in London, as well as the Republic of Letters, for example.

of secondary education schools as well as schools and groups emphasising useful knowledge for all social classes.

I measure Popular Enlightenment through the presence of associations and the handbook quoted above. Enlightenment associations were organised by an educated elite that had the goal of spreading Enlightenment values amongst all layers of society. Early associations tried to raise awareness of the academic discussion of Enlightenment. Over the course of the 18th century they increasingly emphasised the importance of useful knowledge for all social classes. This culminated in directly addressing peasants and farmers in the 1780s through the distribution of the Enlightenment handbook. The goal was to increase interest in gaining new knowledge and inspire a modern culture overcoming traditionalism in farming, financial planning, and education. With over 27,700 original copies, the Enlightenment handbook was one of the most widely distributed worldly books in the German-speaking territories around 1800 (Siegert, 1978, p. 1112).

I show that Popular Enlightenment encompassed all German-speaking territories and substantiate the historical evidence on the movement through empirical analyses for the example of Bavaria for which I accumulate an extensive dataset.[5] Through the subscription lists to the Enlightenment handbook I can add to our understanding of the movement's proponents, the knowledge elite.

This paper shows that the spreading of Enlightenment was expedited by two main factors connected to the knowledge elite: First, early education is at the basis of the movement's development. Proponents were mostly well educated. Their motivation to participate was most likely based on their professions through which they often had direct contact to the lower social classes. Second, proponents were from both the middle and the upper class and the movement accelerated when cooperation

[5]Bavaria was a late joiner of Popular Enlightenment, but is representative for the proponents of the movement compared to the rest of the German territories, and furthermore shows active involvement, for example, with the largest single order of the Enlightenment handbook across all German-speaking territories.

and interaction beyond the boarders of these social classes increased. This built the foundation for the vast success of later handbook subscriptions which relied on the existing base of Enlightenment advocates as subscribers and promoters.

Finally, I analyse an important possible effect of Popular Enlightenment. I show a positive correlation of Popular Enlightenment activity and education in 19th century Bavarian counties. The elites which had previously tried to change attitudes of the general population, later on also showed higher investments into the education of their own children. To alleviate omitted variable concerns I include a large number of controls relying on a rich set of historical data. Furthermore, I analyse the effect in sub-samples and excluding outliers. Results are robust. The main source of formal education of the general population through primary schools is mostly positively but not statistically significantly connected to Popular Enlightenment. This may be due to convergence of formal basic education amongst counties by 1850. The movement was successful in emphasising the importance of useful knowledge for all social classes. Counties where the movement was active were more likely to invest in modern secondary schools in the 1830s and 1850s and show a higher probability of continued private efforts outside the classroom to promote education and useful knowledge through the existence of lobby groups for education in the 1830s.

This paper adds to our understanding of the history of this important period that determined long-run growth of our modern world. The historical literature mostly discusses Popular Enlightenment on the basis of notable events, people, and institutions relying on individual examples.[6] Through this, there is a large pool of information, but most of this research is focused on specific elements. I rely on this research and offer a more quantitative approach as well as new insights into drivers and possible outcomes of the movement of cultural change.

[6]Bachmann (2013), for instance, provides anecdotal evidence on one specific Enlightenment publication format. Holger Böning and Reinhart Siegert have published a large number of books and articles on elements of Popular Enlightenment, such as, for example on the connection of the press and Enlightenment (Böning, 2001) and one of the main proponents of the movement, R. Z. Becker (Siegert, 1978). Boening and Siegert also offer a large collection of published works in connection to Popular Enlightenment (Böning and Siegert, 2016).

In the economic literature culture has been put forward as contributing factor for long-run development. Alesina and Giuliano (2015), for example, offer an overview of how cultural traits may be connected to institutions and how culture can impact development. Mokyr (2016) argues that changing cultural values are important factors in the development of the modern world. McCloskey (2006, 2010, 2016) considers in particular the values of the bourgeoisie. This paper adds to this by providing new quantifiable evidence that Enlightenment was not merely an academic discussion but it actually reached the common people. Popular Enlightenment also emphasises the importance of interactions of the upper and middle classes.

This paper further relates to literature on the importance of human capital during the Industrial Revolution and long-run development. Mokyr (2005) stresses the importance of useful knowledge, and Squicciarini and Voigtländer (2016, 2015) focus on the so-called knowledge elites as proponents of the importance of useful knowledge. Meisenzahl and Mokyr (2012), or Kelly et al. (2014) emphasise the role of upper-tail human capital for long-term development. Recently, Sarid et al. (2019) analyse how human capital may be endogenously determined through early technological skill advantages. Concerning basic education, Galor (2005), for example, argues that education was not a main contributing factor in the first phase of the Industrial Revolution, whereas Becker et al. (2011) show that literacy was important in catching up to Great Britain's industrial lead. Semrad (2015b) analyses the connection of education and industrial growth for the example of Bavaria and finds that schools furthering useful knowledge are positively connected to later industrial growth. I contribute to this literature by providing insights into how education may be endogenously influenced by a change in values.

The paper is structured as follows: The first part of the paper introduces Popular Enlightenment. Section 1.1 offers a short historical distinction of Enlightenment versus Popular Enlightenment. Section 1.2 shows how Popular Enlightenment in form of Enlightenment associations were connected to the academic discussion and

became a movement that increasingly attempted to influence the common people which culminated in the direct distribution of the Enlightenment handbook. Section 1.3 provides insights into the background of the knowledge elites, who are the proponents of Popular Enlightenment. The second part of the paper starting in section 1.4 confirms the previous results quantitatively for the example of Popular Enlightenment in Bavaria. Section 1.5 then shows the empirical analysis for connecting Popular Enlightenment and education development. Section 1.6 concludes.

1.1 From Enlightenment to Popular Enlightenment

Enlightenment began as an academic discussion in the 17$^{\text{th}}$ century with a public dispute about the modern age thereby introducing new cultural values. It was centred around leading thinkers such as Voltaire, Rousseau, Kant, and Christian Wolff. The new philosophy emphasised the importance of rational thought above blind belief in authority and the emancipation from superstition. Kant (1784) described Enlightenment as: *Sapere aude*, or "Have the courage to make use of your own mind".

The discussion of Enlightenment spread amongst the layers of society in the German-speaking territories throughout the 18$^{\text{th}}$ century. The early academic discussion was followed by founding of academic societies. These clubs increased visibility of Enlightenment ideas beyond university circles. The educated middle class and progressive elite, such as bureaucrats, country clergy, and doctors were now actively participating.[7] The ruling nobility also took an interest, in parts, but often due to a lack of finances or also ability, the movement was essentially a citizens' initiative (Böning et al., 2007).

[7]Publications, for example in weekly journals, often known as *Moral weekly journals* ("Moralische Wochenschriften") offered discussions and further increased visibility of the movement. See Wittmann (1991, p. 180) or Raabe (1984, pp. 106) for further details.

During the second half of the 18th century focus shifted towards communicating Enlightenment values to the general population. It aimed, in short, at emancipating the peasantry and general population.[8] The intended recipients were mainly peasants, farmers, and servants. One author summarised these efforts as follows: "He [the farmer] should cultivate his fields more effectively, should better use his gardens, his trees, and better farm his livestock; he should learn to help himself in difficult situations, which can easily befall him." (Ewald, 1790, p. 40). Thus, Popular Enlightenment ensued.

Lacking education specifically regarding useful knowledge with respect to how nature works was seen as one of the main reasons for persistence of superstition and slow adaptation to change. The *Need and Assistance Book*, for example, states in the story of a man's warning to his children on his death-bed to learn from his mistakes: "In my day we learned little at school, except for the catechism. Barely a word was heard about all those things that are useful and good for people in their earthly lives. The little ones unthinkingly did what the older ones did; no matter if it was good or bad." (Becker, 1789, p. 167). Popular Enlightenment was meant to improve societys view on a rational thinking approach in order to foster progress and self-improvement and emphasised the importance of modern education for all social classes.

Thus, the academic discussion of *Sapere aude* was communicated to the general public through Popular Enlightenment as: "Doubt every opinion until you understand why it should be considered true; Examine everything; Keep only the true and the good." (Becker, 1800, p. 4).

[8]The Popular Enlightenment movement was mainly focused on the German-speaking territories. Some of its forms were Europe-wide occurrences, especially the learned societies, as for example the Royal Society in London, which encouraged research into useful sciences. See McNeely (2002) for a short introduction of Popular Enlightenment in English.

1.2 The Development of Popular Enlightenment from Enlightenment Associations to Book Subscriptions

Popular Enlightenment took various forms. Associations were a popular platform for proponents of the movement. They connect the academic discussion to elite Enlightenment which then turned to Popular Enlightenment. Information on associations is largely based on van Dülmen (1996) and Prüsener (1972).

Popular Enlightenment developed into a movement of actively influencing beliefs with the distribution of the Enlightenment handbook at its peak in the 1780s (Wehrmann, 1981). Its large number of copies alone gives importance to the book in an historical account of the spreading of Enlightenment in the German-speaking territories. Information on the handbook is based on the historical subscription lists, as well as on Siegert (1978).

1.2.1 Popular Enlightenment associations

Enlightenment associations had the common goal of furthering the spreading of Enlightenment values. New about them at the time was their trans-regional nature independent of denomination, in line with the Enlightenment value of tolerance.[9] A reading cabinet, for example, described themselves as "an organisation that has the aim of being of public benefit, for Enlightenment, dissemination of good taste, increased distribution of useful knowledge, and providing equally pleasant as well as useful discussion" (Lesekabinett Wittwer in Nürnberg, 1788)[10]. Motivation to participate in the movement was often based on philanthropy. Lowood (1987, p.

[9]Only a few decades earlier, the Thirty-years war had been fought, which began rooted in religious disparities, thus, making cooperation without regards to religious and regional differences quite remarkable.

[10]As cited by Prüsener (1972, p. 419) and translated into English.

26) argues that elites were more likely to act if they perceived the situation of the general population to be particularly destitute, for example, due to the consequences of war.

The movement developed from high-level Enlightenment as suggested by *Industrial Enlightenment* to encompassing changes affecting the common people. Early Enlightenment associations raised awareness of the academic discussion and increased accessibility to the general public. Societies founded as early as the 17$^{\text{th}}$ century proposed the cultivation of German as scientific and publishing language instead of Latin so as to enable larger parts of the population to access new publications. This opened the academic debate to a larger public.[11] The learned societies, such as the Academy of Science in Berlin founded in 1700, raised further awareness. Their purpose was supporting research and spreading of useful sciences.[12]

During the 18$^{\text{th}}$ century the movement became more direct (more "popular") in its approach to reform beliefs and in particular emphasised the importance of useful knowledge for all social classes. The patriotic societies, for example, wanted to raise awareness of the results of the research into useful sciences amongst farmers and peasants.[13] They aimed at promoting modernised production techniques by publishing pamphlets or organising debates. An important step in achieving greater understanding and willingness to adapt to these new methods was seen in improving education.

[11]The later empirical analysis in section 1.4.2 shows that connections between the academic Enlightenment elite and proponents of Popular Enlightenment were an important driver for the movement to spread. Publication platforms, for example through periodicals, increased accessibility of the discussion to wider parts of society.

[12]The Academy of Science was founded following the example of the Royal Society in London. International connections of the German societies, for example to the Republic of Letters (Mokyr, 2016) are also evident, based on the membership lists, for example of the patriotic society of Homburg, and show that the movement was German based, but had connections across (Western) Europe.

[13]Members of these societies were mainly civil servants and belonged to the middle class and nobility. van Dülmen (1996) estimates that there were about 4,000 to 5,000 members throughout the German-speaking territories.

The movement was not merely a platform of discussion amongst the elite, however, but rather propelled by increasing cooperation of the upper and the middle class.[14] Enlightenment associations provided the first platforms where the social classes could organise and communicate. Masonic societies, for example, were such platforms and were amongst the most wide-spread associations (van Dülmen, 1996, pp. 55).[15] Through this, expansion of the movement accelerated during the second half of the 18th century. With spreading of the movement interest in new knowledge increased across all social classes. The emerging reading associations towards the last quarter of the 18th century, for example, provided access to new publications and were vastly popular.[16]

The Enlightenment associations established a base of Popular Enlightenment-minded people. Often, several associations occur within the same region forming central points of the movement. The Enlightenment handbook could rely on these proponents as subscribers and advertisers. Figure 1.1 provides a visual impression of this. The figure shows a map of the German[17] territories marking all counties that founded an Enlightenment association by 1800 and all counties where the Enlightenment handbook was subscribed to later on.[18] A clear overlap is obvious.

The map further shows that Popular Enlightenment encompassed all German regions, independent of denomination and rule. City states, such as Hamburg, are equally affected as provincial areas.[19] Middle Germany was very active in Popular

[14]Previous research has often focused on the effect of the middle class and elite individually while this shows the importance of their cooperation.

[15]Membership lists and biographical research reveal that many of the people who founded other associations were also members of masonic societies which formed a network of cooperation. van Dülmen (1996, p. 57) reports that up to an estimated 20,000 people across the German territories may have participated in masonic societies alone.

[16]Prüsener (1972) reports that the reading experience spread through all social classes during the 18th century, even down to the serving classes. The main driver of reading associations were, however, the upper and in particular the middle class.

[17]German territories here refers to the later members of the German Empire which was only founded in the last decades of the 18th century.

[18]Figure A.2 additionally distinguishes the number of subscriptions and associations.

[19]Most Popular Enlightenment activity originated in cities. As the goal was to reach the common people, in particular farmers, however, the movement was carried to the intended recipients outside of towns (see, for example, the description of reception of the Enlightenment handbook in section 1.2.2 further below.) Therefore, I argue that the Popular Enlightenment associations (and book

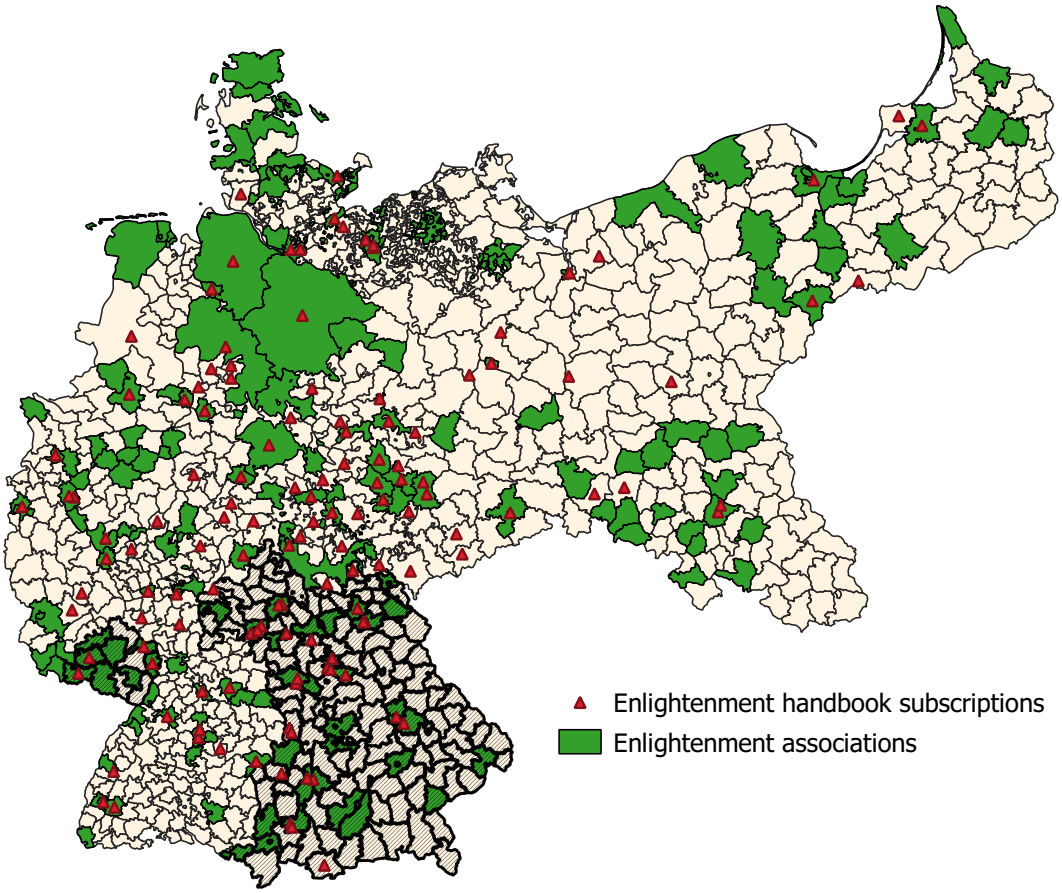


Figure 1.1: Enlightenment associations and handbook subscriptions in the German territories by 1800

Notes: The figure shows the distribution of all Enlightenment associations in the German counties in the shaded areas: societies of the 17th century, learned societies, German societies, patriotic societies, masonic societies, and reading associations of the 18th century. The triangles mark subscriptions to the Enlightenment handbook in a county. The Bavarian territory, which is the focus of the empirical analysis, is slightly emphasised by a darker shading and stronger border lines. All maps are based on shapefiles from CGG and MPIDR (2011).

Enlightenment. As these regions were also at the centre of the academic Enlightenment discussion in Germany, this further shows the connection of the movement to the academic elite. In addition, the Protestant church there was more accommodating towards Enlightenment teachings. The handbook is also clustered here as it was printed in Gotha (Thuringia), in middle Germany.

1.2.2 Popular Enlightenment through book subscriptions

The *Need and Assistance Book* published during the 1780s by R. Z. Becker was one of the most direct approaches to change attitudes of the lower social classes.[20] Instead of discussing what peasants should do, as many associations had done before, the book was directly handed to the general population to influence their beliefs and behaviour.

Individuals subscribed to the book with the intention of spreading Enlightenment values through its distribution amongst the peasantry and in particular to people capable of reading and conveying the message or reading aloud to the rest of the neighbourhood, as for example pastors and teachers.[21] It was advertised for purchase in Becker's magazine and sent to subscribers all over the German territories (and even some abroad). Personal connections were an important transmission channel, for example, through contacts to Enlightenment association members.[22]

I have information on the location and profession of the subscribers of the book, as well as the number of orders placed. The book sold roughly 27,700 original documented copies, not including later re-prints. The handbook was bought in

subscriptions) occur throughout an entire county. The later empirical analysis additionally controls for city population size as confounding factor.

[20]Siegert (1978, p. 1112), for example, describes the handbook as one of the most influential books of the Popular Enlightenment movement in the 18th century.

[21]Becker even designed a catalogue of questions that teachers could use to incorporate the handbook in lessons (Becker, 1790).

[22]Becker was a member of two masonic associations in Gotha. Personal contacts though these associations connected him, for example, to later subscribers in Nuremberg and through their connections to Erlangen and, also Bayreuth. In all these areas, large quantities of Becker's book were ordered. Subscriptions in Nuremberg can, in fact, be directly traced back to correspondence of Becker and his Bavarian contacts. See Appendix A.3 for further details.

large quantities. Orders range from eight to 1,500 copies. With an order of 30 books, the subscriber was named in Becker's published subscription lists.[23]

The book is written in a simple, easily understandable style and is supposed to entice the reader's interest through providing stories of the fictional town of Mildheim.[24] Becker's intention was to gain the readers' (or listeners') interest through eye-catching stories and, thus, also for more informative knowledge that was included in the book, such as advice on child raising, or modern agricultural techniques.[25]

The importance of useful knowledge is implicitly and also explicitly stressed throughout the book: "Make sure that they [your children] are taught in useful knowledge and skills, and that they understand their nature and their dignity as humans early on." (Becker, 1800, p. 15). In general the intention was to increase interest in self-improvement and education. Hence, even if specific living advice was not adhered to, the book may still have inspired a greater thirst for reading and knowledge in the receiving public (Siegert, 1978). Hence, at the very least, it had an indirect effect on people's attitudes.

The anecdotal evidence indicates that the distribution of the handbook amongst the general population was successful. Siegert (1978, pp. 1087) reports in his extensive research on the handbook that the ruling nobility in Würzburg, for example, distributed the book to pastors, teachers, and civil servants with the instruction of conveying its contents to the peasantry. In another example, a club president reported that their order of books was distributed amongst the peasantry of their region by people, who frequently interacted with the farmers due to their visits to

[23]The minimum order was eight books. The analyses of the subscription lists further below shows that the large majority of subscribers is listed with at least 30 books. Of the 27,772 copies sold, merely 2,623 were listed as orders smaller than 30 books and collected as "single orders".

[24]Figure A.1 shows a picture of the original book for a chapter on overcoming superstition.

[25]Part one of the book offers advice on how the peasantry may achieve a pleasant and prosperous home life, for example in matters of married life and child raising. Part two elaborates on how the financial standing can be improved through incorporating modern knowledge on farming and sound economic planning. Part three is a collection of advice on self-help in various situations, such as health rules or how to behave in the event of a catastrophe. All stories encompass the importance of using a rational approach to problems and emphasise the importance of asking questions as to the nature of the issue and the answer.

the countryside. On these visits, they would occasionally take the book as a gift. Further evidence can be found in pastoral sermon notes. A Pastor Röller (Röller, 1790, p. 296), for example stated: "Occasionally also read a different good book than the Bible. [...] For example, there is the unparalleled *Need and Assistance Book* [...]."[26] A journal article from 1799 reads: "The first part of the *Need and Assistance Book* has undoubtedly contributed a lot to the culture and Enlightenment of the peasantry, through being one of those books that can be encountered almost everywhere, and which many farmers, next to their calendar and Bible, consider their vital third book", Ettinger (1799, p. 577).

1.3 The Knowledge Elite as Proponent of Popular Enlightenment

The handbook subscription lists provide information on the professional background of proponents of Popular Enlightenment.[27] The following analysis of this knowledge elite clearly shows the importance of early education for the movement to develop.

Buyers mostly held professions that tended to require higher education and were in positions that confronted them with the needs of the common people. They are listed below according to the HISCO[28] classification by van Leeuwen et al. (2002). Table 1.1 gives an overview of the largest groups of subscribers with at least five representatives. These groups constitute 70 percent of all buyers. The table details the number of subscribers within that profession. It additionally provides the mean number of ordered books as well as the standard deviation and minimum and max-

[26] As cited by Siegert (1978, p. 1101), translated into English.

[27] I thank Prof. Dr. Reinhart Siegert from the Albert-Ludwigs-Universität Freiburg for kindly providing me with his photo-copies of the original subscriber lists based on Becker (1786, 1788a, 1787).

[28] HISCO, by the International Institute of Social History in Amsterdam, offers an historical equivalent to the modern isco classification scheme by the International Labour Organization of professions. Table A.19 in Appendix A.3 shows an overview of the original classification scheme.

Table 1.1: Professional background of the most important groups of subscribers according to HISCO classification and their book orders

HISCO	Profession	Number subscribers	Mean nr. books	SD	Min.	Max.
14120	Minister of Religion	43	63.56	46.01	30	200
20210	Government Administrators	40	73.35	70.21	30	315
20110	Legislative Officials	29	153.41	286.76	30	1,500
13940	Headmaster/Head Teacher	15	99.33	120.58	30	500
41030	Working Proprietor (Retail)	15	120.60	147.61	30	600
58320	Military	13	105.92	108.91	30	360
13100	Professor	9	48.22	29.21	30	120
21110	Minister of State	9	64.67	29.68	30	100
14990	Church Administrator	7	39.00	8.47	30	50
22450	Praefectus Curiae	6	63.83	36.17	30	100
21200	Production Manager	5	65.00	28.25	40	100
41025	Merchant	5	180.80	163.01	30	400
Total		196	93.12		30.77	449

Notes: Professional background of largest groups of subscribers to the Enlightenment handbook in Germany according to the HISCO classification scheme. The table provides the profession, as well as the total number of subscribers within that profession. The table additionally shows the mean, standard deviation, minimum, and maximum number of books ordered by the referred to profession. The last line provides the total values for subscribers and the average mean, minimum, and maximum number of books subscribed to for the shown professions.

imum number of orders. The unlisted subscribers are mostly more diversely split across various professions.[29]

The largest purchasing group is the clergy, followed by government administrators (e.g. councillors and bailiffs), legislative officials (mainly the ruling nobility), and headmasters or teachers. These groups often had immediate contact to the local lower social classes. Church representatives, such as pastors, had the most direct account on the situation of their congregations and, thus, a high motivation to foster improvement. Councillors and bailiffs too tended to have contact with the common people through legal disputes or property management. The ruling nobility usually refers to local gentry with legal obligations and who, furthermore, partially owned the land that was being worked. Headmasters, of course, were aware of the (lack of) knowledge amongst their students.

[29]The full classification of subscribing professions can be found in Table A.1. Table A.2 shows a comparison of the Bavarian subscribers which is the focus of the later empirical analysis. The Bavarian knowledge elite are representative for subscribers in general.

Legislative officials show a large average number of ordered books with over 150 books per order, but this is strongly driven by the outlier of 1,500 orders by the ruler of Ansbach-Bayreuth. Retailers as well as merchants (and bookbinders) show on average the highest number of books with between 121 and 181 books per order. They mostly stocked the book for selling it to further customers. The book was priced relatively low, so it could be afforded by farmers themselves (Siegert, 1978). The book sold well: a book shop in Nuremberg, for example, had to re-stock the handbook with the second wave of releases.

Popular Enlightenment representatives in Enlightenment associations were from both the upper and middle classes. The Enlightenment handbook subscribers also reflect this. I translate subscribers professions to the HISCLASS[30] scheme by van Leeuwen and Maas (2011) to determine social backgrounds. I summarise HISCLASS groups one and two as elite, and groups three to seven as middle class.[31] Table A.3 gives an overview of the social classes of Popular Enlightenment advocates. The elite classes make up about 60 percent of subscribers and ordered almost 15,000 books alone. The middle class boasts a higher average of ordered books than the elite classes. Thus, Popular Enlightenment was carried by both social classes.

1.4 Quantitative Analysis for the Example of Bavaria

The analyses above show that two factors in particular matter for the expansion of Popular Enlightenment. First, pre-existing education is the basis for the development of Popular Enlightenment. This enabled access to the academic debate of Enlightenment to which Popular Enlightenment is clearly connected. Second,

[30]HISCLASS assigns the occupational groups of HISCO into one of twelve social classes, differentiating between non-manual and manual labour and further by skill-level, supervision, and sector in descending order (van Leeuwen and Maas, 2011, p. 26).

[31]See, for example, Maas and Van Leeuwen (2005).

spreading of Enlightenment values was then fostered by increasing personal connections and interactions amongst Enlightenment-minded people bridging social class borders between the upper and middle class. These further increased awareness of the movement, for example, through publishing discussions on it. This built the foundation for the success of the later handbook subscribers.

I provide further quantitative evidence for these results through an empirical analysis for the example of Bavaria in the following section. Bavaria serves as an example of a late joiner. Additionally, Popular Enlightenment only had limited support by the Bavarian ruler towards the end of the century. This example clearly shows how important individual efforts and personal connections were for the spreading of Enlightenment during the 18^{th} century, and, hence, for a change of cultural values. With the founding of the Statistical Office in 1830, Bavaria, furthermore, provides extensive data on the economy, population, and education. In the last section of this paper, I show a connection of the Popular Enlightenment movement, with its emphasis on the importance of education and useful knowledge, to later (upper-tail) education development and in particular the expansion of useful knowledge.

1.4.1 Historical background for the example of Bavaria

Mostly Catholic Bavaria was slower to develop, both economically and regarding Enlightenment, than comparable Protestant regions. It followed the Popular Enlightenment movement with a delay starting in the 1740s. The censorship practices encouraged by the Catholic church, for example, inhibited an earlier wide-spread uptake of the movement here.[32]

[32] Attempts to spread Enlightenment values were mostly independent, though sanctioned, by the state. The new Bavarian ruler Max III. Joseph since 1745 was a supporter of Enlightenment ideas, but was faced with a bankrupt state. He had benefited from a modern education, which connected him to main proponents of the philosophical academic discussion of Enlightenment. Due to his lack of finances, the spreading of Enlightenment values amongst the general population relied on private endeavours.

As for the rest of the German-speaking territories, the first common form of organisation in Bavaria was through the Enlightenment associations, which spread throughout the 18th century and became more direct in their approach to reforming the general population.[33] Subscriptions to the Enlightenment handbook were mostly focused on the edge of the territory which only officially joined Bavaria in the early 19th century. Core Bavaria faced a change in rule during the height of Popular Enlightenment. Some of the more liberal policies were retracted under the influence of the conservative religious Jesuit order. The censorship office continued to allow the spreading of Enlightenment books, as many of the officials were proponents of the movement.[34] Uptake was relegated to the periphery, however, as the new regulations of Enlightenment endeavours increased uncertainty amongst proponents. Communication amongst masonic societies, for example, decreased. Thus, Popular Enlightenment had a more difficult standing in Bavaria, yet, we still see evidence of its effects.

Popular Enlightenment finally ceased with the beginning of the French Revolution. Rulers impeded encouraging independent thought in peasants, as it was feared that the people may begin to question the social order and, thus, attempt revolution themselves. By that time, however, change had already taken hold. Siegert (2005), for example, argues that the great increase in newspaper distribution and reception shows an increased interest of the general public in political world events during the French Revolution, which may be based on Popular Enlightenment broadening people's horizons.

[33]Bavaria exhibits all forms of Enlightenment associations. Further details can be found in Wehrmann (1981), Siegert (1999, pp. 374), and Weber (1987, p. 235).

[34]Three of the seven ministers for censorship were active participants of spreading Enlightenment values, such as the later reformer of the Bavarian state, Count of Montgelas. Minister Montgelas contributed to modernisation, also regarding education (Weis, 1997).

1.4.2 The drivers of Popular Enlightenment

I apply a series of simple univariate correlation regressions that provide additional quantitative evidence for the development and spreading of Popular Enlightenment.

The following linear model builds the basis for the analysis:

$$PE_c = \alpha_0 + \theta_x D_c + \epsilon_c,$$

with $x \in \{1, 2, ..., 13\}$. PE_c, the dependent variable, is a dummy variable that turns 1 with the presence of any Popular Enlightenment activity in the 18^{th} century, be it through Enlightenment associations or subscribers to the Enlightenment handbook in county c. Without adding any further covariates, I test the correlation of Popular Enlightenment and four supersets of potential drivers D. These groups of drivers are: (1) Early education, as the knowledge elite consists of educated professions. (2) Popular Enlightenment is more likely when there is easier access to publication platforms that may increase awareness of the movement. (3) Contact to the academic discussion of Enlightenment furthers Popular Enlightenment. Finally, (4), analyses whether visible destitution of the population encouraged Enlightenment activity by an educated elite. ϵ_c denotes the error term.

Altogether, I run 13 independent regressions for these four groups. Variables θ_1 to θ_{13} are the coefficients of interest and show whether or not a significant correlation of a potential driver and the probability of a county participating in Popular Enlightenment can be established. The data set is comprised of 105 districts that were "untreated" by Popular Enlightenment and 43 "treated" districts.

Figure 1.2 displays the coefficients and 95-percent confidence intervals for these regressions. The results reveal that the positive correlation of Popular Enlightenment and early education, as well as the connection to the initial academic discussion stated in the last section above can also be quantitatively shown. Increasing aware-

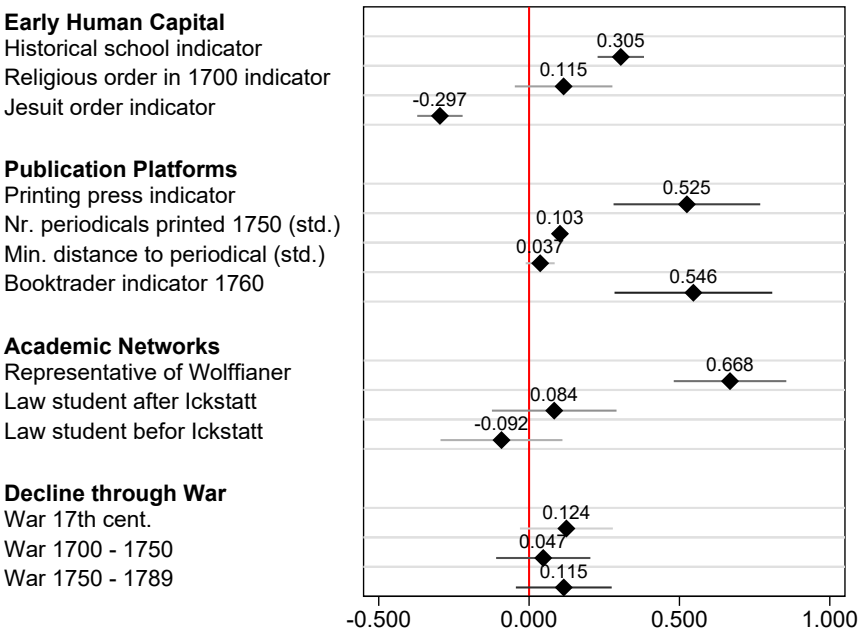


Figure 1.2: Potential drivers of Popular Enlightenment

Notes: The graph shows coefficients for univariate regressions of the Popular Enlightenment dummy variable on potential drivers of the movement with 95% confidence intervals based on robust standard errors and indicating the magnitude of the coefficient. Most independent variables are dummy variables. The number of printed periodicals and the minimal distance to periodical publications are continuous variables and standardised to mean zero and variance one for comparability.

ness of the movement, for example, through publications also contributes positively to the movement. These factors are significantly positively correlated with the probability of a county investing in Popular Enlightenment.

(1) Early education

The knowledge elite are educated themselves and are the proponents of Popular Enlightenment. Therefore, I expect that a county with higher early schooling is more likely to participate in the movement. First, I measure the presence of historical schools. Second, I take the presence of religious orders, as main suppliers of education in the past, as indicator that schooling may be increased. Third, the Jesuit orders in particular provided higher education (Liedtke, 1991, p. 371). They were, however, also opponents of spreading Enlightenment. I use all three factors

as dummy variables that respectively turn 1 if a school/religious order/Jesuit order was present in the county before 1700.

Data on historical schools is based on the Städtebuch on Bavaria and Pfalz in Keyser (1964) and Keyser and Stoob (1971, 1974).[35] The Städtebuch provides information on when a school was first mentioned.[36] Data on religious orders is based on Jürgensmeier and Schwerdtfeger (2005 - 2008).[37]

As can be seen from Figure 1.2, historical schools are correlated with an increased probability of investing in Popular Enlightenment in the 18th century. Religious orders, on the other hand, also show a positive coefficient, but have no significant correlation with Popular Enlightenment. The presence of a Jesuit order is even significantly negatively correlated with the probability of a district investing in Popular Enlightenment. This is in line with the historical accounts. The order was a supplier of higher education, but was often also one of the main opponents of the spreading of Enlightenment, as they feared atheism as a result.

(2) Information access through publication platforms

Enlightenment associations increased awareness of Enlightenment amongst a wider population. I measure this by taking periodical production and book traders as means for spreading information on the movement. I expect a positive correlation of both factors with the probability to engage in Popular Enlightenment. In addition, I test the correlation of a county having access to an early printing press, as basis for periodical and book production, with Popular Enlightenment. The printing press also serves an additional proxy for earlier higher levels of education, as previous research by Dittmar (2011) has shown that the distribution of printing

[35]I thank Prof. Sascha Becker for kindly providing me with his collected data on education in Bavaria from the Städtebuch. In order to cover all Bavarian districts in the 19th century, I further added the equivalent information from the Städtebuch on Pfalz. The data has been previously used, for example in Cantoni and Yuchtman (2014) and Becker and Pascali (2019).

[36]I have information on 302 schools founded before 1700 in 141 counties in Bavaria. There are, hence, only 7 counties without a school being mentioned before 1700 in Bavaria.

[37]I thank Prof. Davide Cantoni for kindly providing me with this data.

presses also has long-term consequences for the development of human capital. I take the presence of a printing press and book traders as dummy variables that turn 1 if a printing press/book trader was present in the county. Periodical production is taken at the intensive level and measures the number of periodicals printed by 1750. I additionally use minimal distance of a county's administrative centre to the closest periodical production site as independent variable. Both continuous variables are standardised[38] for better comparability of coefficient magnitudes.

Data on periodical production in the 18th century is based on Kirchner (1931), who provides an overview of places where periodicals were printed and the number of printed periodicals.[39] Information on the number of book traders is based on the trade fair registry of the two largest book trade fairs of the 18th century in Leipzig and Frankfurt. This information was published by Schwetschke (1850).[40] Data on printing presses is collected by the British Library and available at ISTC (1998).[41]

Figure 1.2 shows that access to Enlightenment information, and a platform for discussing Popular Enlightenment, are indeed significantly positively correlated with the probability of a district participating in the movement. Having a printing press and book trader show large coefficients. The movement is more likely to spread with a larger production of periodicals in the county before the main phase of Popular Enlightenment set in. The distance to this production of periodicals, on the other hand, does not appear to play a significant role. Periodical production is a proxy for the presence of the knowledge elite, but this knowledge elite is most active at a local level.

[38]Standardised coefficients have mean zero and variance of one. For coefficient interpretation this implies that one standard deviation increase in the independent variable changes the probability for a county to participate in Popular Enlightenment by the coefficient's magnitude percentage points.

[39]His research lists 25 places in Bavaria were periodicals were published. In total, there is information on 332 periodicals in these cities between 1700 and 1800. The number of periodicals increases largely during this century from five around 1700 to 127 around 1790.

[40]His research provides information on book traders from from 22 Bavarian districts in 1760.

[41]I can identify 13 cities in Bavaria that are listed as printing press locations.

(3) Connection to the academic discussion of Enlightenment

Early exposure to the academic Enlightenment discussion should result in a higher probability of a district participating in Popular Enlightenment. I measure contact to the academic discussion through personal connections to main academic representatives of Enlightenment.

A main influential factor in the academic discussion was Christian Wolff. Next to Leibnitz and Kant, Wolff was one of the most important philosophers of Enlightenment in the German-speaking territories. His teachings were widely discussed. He enjoyed a network of supporters (and also of opponents), on which information is available based on Ludovici (1737).[42] These supporters are often the first connection to spreading Enlightenment ideas amongst the knowledge elite.

One of these "Wolffianer" was Johann Adam von Ickstatt, who plays a prominent role for Enlightenment in Bavaria.[43] He influenced the Bavarian academic elite through his position as professor of law at the University of Ingolstadt, where he reformed and modernised the studies. Through the matriculation registry data on doctoral students at the university I was able to collect information on students before and after Ickstatt (1746). I have information on their birthplace which serves as a location indicator as proxy for access to the academic discussion of Enlightenment.[44]

Figure 1.2 suggests that there is a large significant advantage of having a representative of the "Wolffianer" in a district concerning the probability to participate in Popular Enlightenment later on. In fact, the coefficient is the largest in magnitude

[42] Ludovici collected a large array of information on the network known as "Wolffianer". On some of these proponents, his work provides further information, on others I collected further location data from the Deutsche Biographien or based on their published works. All in all I have location data on 90 percent of the 262 listed members of the network. For Bavaria there are eleven districts with about 20 supporters of Wolff.

[43] As tutor to Max III. Joseph he influenced the ruler's views on Enlightenment, which led to the state-sanctioned forming of associations and also lax censorship of the prevalent literature (Hammermayer, 1974).

[44] There are 25 districts which sent students to the university of Ingolstadt as doctoral students of law after Ickstatt's reforms.

for all potential drivers. Having a law student after Ickstatt's reforms is also positively correlated with Popular Enlightenment, but this correlation is not statistically significant. Both factors show, however, that Popular Enlightenment is indeed more likely to develop and spread if there is a connection to the academic elite in favour of Enlightenment.

(4) Visible pauperisation through wars

Lowood (1987, p. 26) argues that one of the main reasons for the wish to spread Popular Enlightenment was the devastation of the population for example through wars in the 18th century, in particular the Seven Year's War. The middle class and progressive upper class witnessed the economic despair and hunger that hit the lower social classes most strongly following war. The Popular Enlightenment movement had the goal of reducing their suffering and allow a greater understanding and enthusiasm for modernisation. Thus, a positive coefficient may be expected.

I have data on cities which were affected by or involved in conflicts. This data is again based on the Städtebuch on Bavaria and Pfalz.[45] The Städtebuch provides information on conflicts and wars in all cities throughout the Holy Roman Empire. I use this as a proxy for whether a district was affected by conflict in the first half of the 18th century, the second half (until the French Revolution) and also in the previous century.[46] Preluding the peak of Popular Enlightenment were the Seven Year's War from 1756 to 1763 and the war over Bavarian succession in 1778/1779.[47]

[45]I thank Prof. Davide Cantoni for kindly providing me with his collected data on conflicts and wars from the Städtebuch. The data is also used in, for example, Cantoni (2015) or Cantoni et al. (2019).

[46]The Städtebuch lists over 300 conflicts for 88 Bavarian counties in the 18th century.

[47]Bavaria participated in the Seven Year's War as part of the Holy Roman Empire, but soon communicated neutrality. In 1758 Prussia raided Franconia and Upper Palatine several times. The war over succession began when the intended heir for Bavarian rule, Karl Theodor, arranged to exchange Lower Bavaria and Upper Palatinate for money and parts of Lower Austria. Prussia protested and sent troops to Bohemia. The conflict parties faced substantial logistic difficulties. No battles were fought. In both wars, the local population temporarily suffered from extortion through stationed troops. Neither war, however, is reported to having led to long-lasting pauperisation of the local population. See Szabo (2013), Bosel (1990) and Spindler et al. (1988) for more details.

Figure 1.2 shows that there is no significant connection of wars and Popular Enlightenment in Bavaria.[48]

1.4.3 Acceleration of Popular Enlightenment through interaction of the upper and middle class

I now turn towards the movement's expansion. Spreading of Popular Enlightenment increased with growing personal connections especially amongst the upper and middle class and built the foundation for the later success of the Enlightenment handbook. In the following section, I will provide further evidence for this for the case of Bavaria.

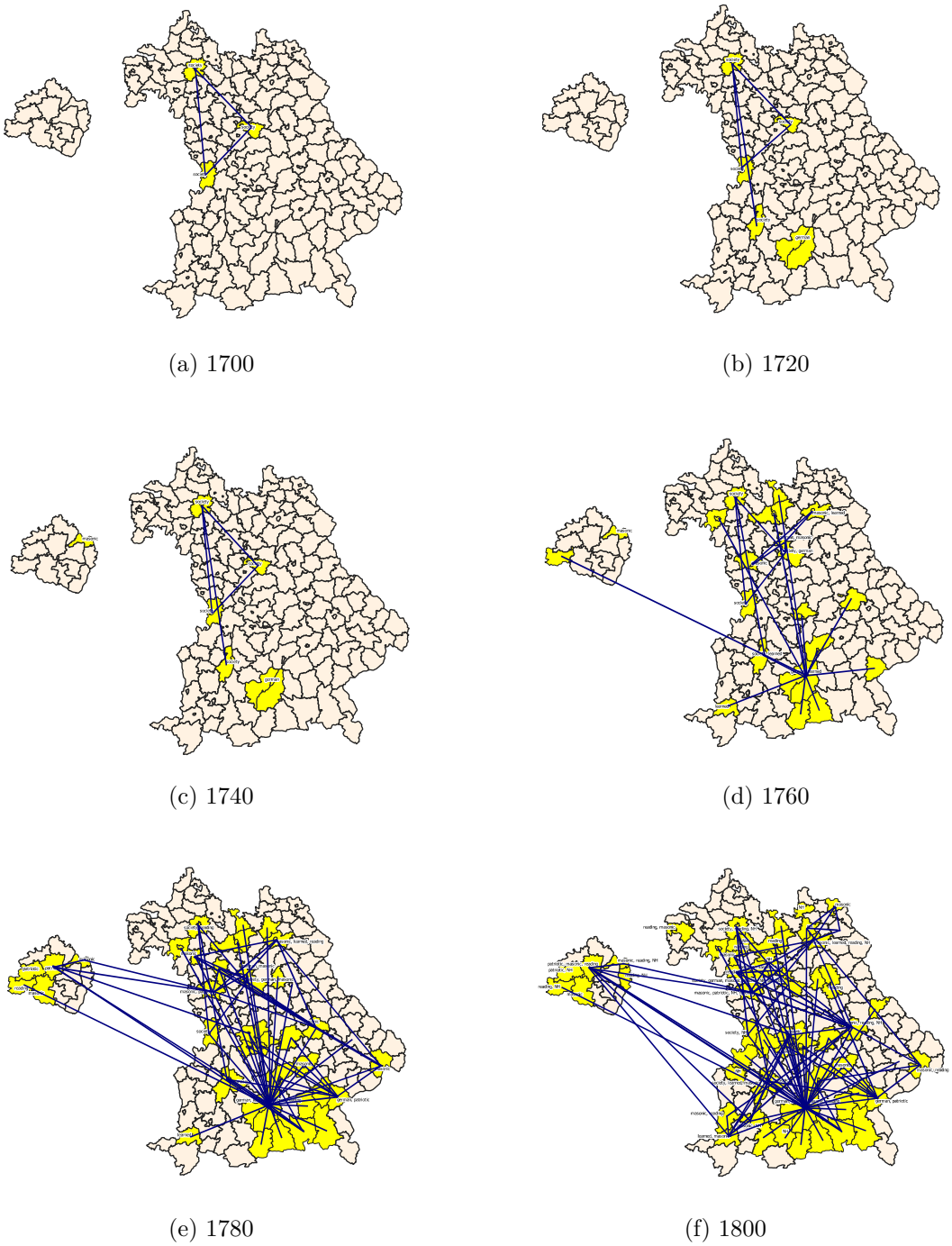
Figure 1.3 provides a series of maps of Bavaria and shows a schematic spreading of the movement from 1700 to 1800 in 20-year intervals. Each line connects counties where individuals and associations were active in Popular Enlightenment. I draw a connection when individuals were members in multiple societies or when societies stated cooperation or interactions with other associations.[49]

The figure shows the small number of early Enlightenment associations in Panel (a) around 1700. These were already connected. Over the next decades, a few more counties independently developed Enlightenment associations. Wider spreading of the movement only took off around 1760, in Panel (d). The Academy of Science was founded in 1759 in Munich with the goal of promoting useful knowledge and provided an impulse for the second half of the century.[50] The movement was then accelerated

[48]This also holds true when further distinguishing the effects of a war, such as destruction of property and loss of funds due to extortion.

[49]These connections are based on detailed research into the founding members of associations, as well as, membership lists where available, such as, for example, of the Academy of Science in Munich as one of the largest associations at the time. Appendix A.3 provides additional information on the here depicted connections and the people behind them. This network only offers a schematic of personal ties and is not a full account of all connections. It serves as an example of how the spreading of the Popular Enlightenment idea worked in Bavaria and how it inspired like-minded people to participate.

[50]The Bavarian "Churbayerische Akademie der Wissenschaften" in Munich had over 300 members in the 18th century. The academy was strongly connected to the main proponents of Popular



(a) 1700 (b) 1720

(c) 1740 (d) 1760

(e) 1780 (f) 1800

Figure 1.3: Popular Enlightenment development in Bavaria 1700 to 1800

Notes: The figure shows connections amongst Popular Enlightenment proponents in Bavaria. Shaded areas show counties that have Enlightenment-minded people through Enlightenment associations or members of such. Lines between counties show personal connections of these Enlightenment-minded people either by being members of multiple associations or by cooperation amongst societies.

through increased cooperation amongst the upper and middle class in particular through the masonic societies. By 1780 there is a large network with central locations of the movement. Most shaded counties contained several societies. The 1780s mark the high phase of Popular Enlightenment activity. The Enlightenment handbook could rely on this existing network for promotion and subscription during this time. Only three out of 25 subscribers were in a county without a connection to the here documented base of the knowledge elite.

1.5 Connecting Popular Enlightenment and Education

Lastly, I analyse a potential outcome of Popular Enlightenment. The movement's advocates stressed the importance of (modern) education, in particular regarding useful knowledge, which should motivate the peasantry to apply a rational approach and enable innovation.[51] I expect a positive correlation of Popular Enlightenment activity and education.

There are several ways of how Popular Enlightenment may be connected to more education. First, a reformed peasantry may have demanded more schooling as a result of the movement. Second, if the economic situation improved as a result of the movement, the lower social classes may have had the necessary funds to educate their children or even support a new school. Third, representatives of the movement

Enlightenment throughout Bavaria. I thank the Bayerische Akademie der Wissenschaften in Munich for kindly providing me with the membership list.

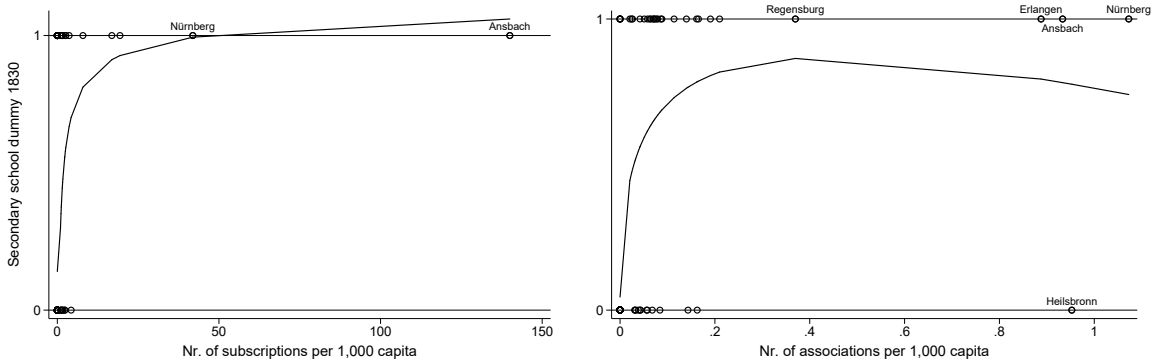
[51] Popular Enlightenment aimed at improving the situation of the lower social classes and foster modernisation. At the base of most of the addressed problems stood a lack of understanding about basic natural principles. In fact, proponents criticised that there was not even any interest in acquiring basic knowledge about how nature works or any cause-and-effect relationships in their daily lives. See, for example, the initial quotation introducing Popular Enlightenment and the Enlightenment handbook in this paper. Here the population of Mildheim is praised for finally asking questions and applying a rational approach to the problems they faced at the end of the book.

could go further in their attempts to change society by not only trying to persuade the lower social classes to invest more in education, but by directly providing schools.

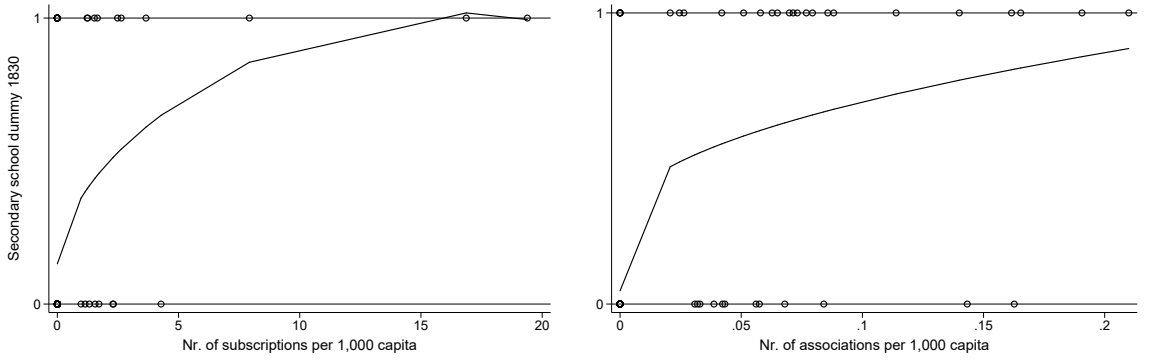
The third option is supported by anecdotal evidence. The margrave of Bayreuth, for example, who participated in Enlightenment associations and subscribed to the handbook, also founded the University of Bayreuth. A patriotic society in Nuremberg actively tried to improve educational access for the lower social classes by lobbying for the founding of a school.[52] This school was converted into a modern secondary school in the 19th century (Gesellschaft zur Beförderung vaterländischer Industrie, 1831). This example also shows that provision of education may have been supply driven, but the lower social classes made use of them. Education in Bavaria profited from Enlightenment advocates in general, as Bauer (1983, p. 209), for example, reports that the school reforms of the 19th century were mainly led by Enlightenment advocates.

Figure 1.4 gives a first visual impression that areas where more Popular Enlightenment occurred also exhibit a higher probability later for investing in education. The figure shows the scatterplot and a fractional-polynomial prediction plot for the correlation of a dummy variable indicating that a county in Bavaria had a secondary school in 1830 and the number of book subscriptions (left plot) and number of Enlightenment associations (right plot). The graph shows that there is a positive correlation of both forms of Popular Enlightenment in the 18th century and education in the 19th century, in particular when excluding outliers in Panel (b).

[52]Members of this society can be further connected to subscriptions to the Enlightenment handbook. See Appendix A.3 for more details.



(a) Correlation of both forms of Popular Enlightenment and secondary schools



(b) Excluding outliers

Figure 1.4: Popular Enlightenment and education

Notes: The scatterplots show the distribution of observations for secondary schools, measured as a county having a grammar or modern secondary school, and the number of book subscriptions per 1,000 capita (left) and the number of Enlightenment associations per 1,000 capita (right) in a county during the 18^{th} century. When a district has a secondary school in 1830, the dummy turns 1, and 0 otherwise. Each point in the scatterplot represents a county in Bavaria. The fractional-polynomial prediction shows the correlation of the dummy variable for secondary schooling and Popular Enlightenment. The plots in part (a) show a correlation for all counties. Plots in part (b) exclude the outliers, which are indicated by district name in part (a).

1.5.1 Empirical approach and data description

Empirical set-up

The empirical approach is based on a linear framework to establish a link between the Popular Enlightenment movement and education:

$$Education_{c,t} = \beta_0 + \beta_1 PE_c + \boldsymbol{X'_{c,t}}\boldsymbol{\gamma} + \epsilon_{c,t}.$$

$Education_{c,t}$ denotes the dependent variable and measures a variety of educational outcomes in county c at time t (1830 or 1850).[53] These are the presence of a secondary school, a lobby group for education, and the existence of a primary school, the number of primary school teachers, students, and the student-teacher-ratio. PE_c is Popular Enlightenment in the 18$^{\text{th}}$ century. I mostly measure Popular Enlightenment activity as a dummy variable that turns 1 if either associations or book subscriptions occurred in county c. The main results also hold when alternatively taking the number of associations or subscriptions per capita as independent variables. Vector $\boldsymbol{X'_{c,t}}$ consists of a variety of control variables for county characteristics, religion, occupational backgrounds, and historical idiosyncrasies. $\epsilon_{c,t}$ denotes the error term. Table A.4 provides descriptive statistics for the variables of the main analysis.[54]

[53] Counties are administratively grouped into eight regions. I test robustness of the main results to clustering. As inference is unreliable under clustered standard errors here due to the low number of clusters (there are about four effective clusters (Lee and Steigerwald, 2018)) I employ wild (and score) bootstrapping according to Cameron et al. (2008) and Roodman et al. (2019). Bootstrapping is set at 1,000,000 repetitions and random weights are set to normal. I additionally test robustness using alternative weights. The Webb distribution allows for well over a million repetitions (Webb, 2014). In most cases, these alternative standard errors do not imply different inference. I rely on robust and spatial auto-correlation adjusted standard errors for the main analysis, as decisions regarding educational outcomes were made either at the state level for all of Bavaria, or depended on local initiative. Both these levels are independent of the region, which should, hence, not play a role here.

[54] Analyses are based on administrative borders from 1862 which offer the most consolidated regional organisation in Bavaria in the 18$^{\text{th}}$ and 19$^{\text{th}}$ century. I adapt all variables according to these administrative borders. Information on counties is based on Bauer (1983).

The coefficient of interest is β_1. It estimates the relationship between Popular Enlightenment and education. I expect a positive coefficient.

Several empirical issues arise in this setting. First, it is possible that development of counties is correlated. Counties may imitate local education decisions or Enlightenment efforts of their neighbours. I address this issue by adjusting standard errors for spatial auto-correlation based on distance following Conley (1999). I apply a 50 km radius as the main area of correlation.[55] I further test robustness to de- and increasing the area where correlation may occur by applying a distance of 10 km and 100 km. Robust standard errors are usually larger than the corrected standard errors. They are, therefore, the more conservative choice.[56]

Second, the linear probability model operates under the assumption of homoscedasticity of the error term. I also test all results in a probit setting, allowing for heteroscedasticity, and the conclusions remain the same.[57]

Third, to add evidence that results are not driven by an omitted variable, I control for a large variety of factors for development in the 19$^{\text{th}}$ and 18$^{\text{th}}$ century. The main conclusions remain unchanged when including all controls, as well as in subsamples. I cannot finally exclude the possibility that further unobserved variables may influence both Popular Enlightenment and education; the professions of the knowledge elite, for example, show that initially higher schooling is an important factor for Popular Enlightenment and may, of course, also persist into the 19$^{\text{th}}$ century. When controlling for the drivers of Popular Enlightenment, however, the indicator for Popular Enlightenment remains positive and significant. Hence, none

[55]This 50km radius is based on the calculation of the distance to the nearest neighbour's administrative centre based on Jeanty (2010) both for 18$^{\text{th}}$ and 19$^{\text{th}}$ century district organisation. Based on this cut-off I calculate the corrected variance-covariance-matrix for the standard errors provided in square parenthesis.

[56]Kelly (2019) analyses the effects of strong spatial autocorrelation for inflated t-statistics in persistence research. In reference to this, I further calculate Moran's I statistic for main regression residuals (also varying weights and distance thresholds). Results do not appear to be driven by spatial clustering.

[57]The alternative results are available upon request. These probit results are further robust to clustering standard errors and score bootstrapping.

of the accounted for factors which are connected to Popular Enlightenment occurring in the first place cancel out the correlation of the movement and education later on. The results are robust to all model variations and covariates.

Data description

Education is measured for different layers of society. Information is based on Statistisches Bureau (1855b).[58] For education of the upper and middle class, I design a dummy variable that turns 1 if a district had founded a secondary school, either in form of a grammar school, or a modern secondary school by 1830 or 1850.[59] Grammar schools provided a religious and moral higher education in order to prepare students for university.[60] Modern secondary schools had a greater focus on technical subjects and prepared for a career in the commercial and industrial sectors, or entry to a technical university.[61] These schools are a main conveyors of useful knowledge (Semrad, 2015b). An analysis of students' social backgrounds reveals that the upper class favoured grammar schools, whereas the middle class predominantly attended modern secondary schools.[62] Modern secondary schools, furthermore, contributed to social mobility for the lower social classes.

The main source of education for the majority of the population in the 19$^{\text{th}}$ century was, of course, primary education. Compulsory schooling was officially decreed in 1802 in Bavaria (Regierungsblatt Pfalz-Bayern, 1802, p. 911). Largely due to the lack of state finances, local government and church officials were a main source of elementary school supervision throughout the century. In addition, lobby groups for education serve as a proxy for interest in furthering basic education outside the

[58] Appendix A.3 shows the distribution of schools in Figures A.3 and A.4.

[59] Liedtke (1991), Bauer (1983), and Döllinger (1839) provide information on secondary schooling. Secondary schools appear, if at all, for the most part only once of each type in a district.

[60] Grammar schools already existed in previous centuries, but were reformed in the 19$^{\text{th}}$ century as secularisation had mitigated the churches influence over education.

[61] As commercial organisations had strongly lobbied for the introduction of these schools in 1829, they were largely based on private endeavours.

[62] I thank Alexandra Semrad for kindly providing me with her data on Bavarian secondary education based on Semrad (2015a) which I further complemented with so far missing data. Figure A.5 provides further information on secondary school students and their social background.

official classroom around 1830/1840.[63] These lobby groups in particular stressed the importance of useful knowledge in education. Information on lobby groups is based on Statistisches Bureau (1874).

I control for a large number of 19th century covariates that may be connected to Popular Enlightenment and education. City level controls are important as Popular Enlightenment and schools are more likely to originate in cities as organisation of elites is easier and may show a financial or developmental advantage. I add a dummy variable for having a district free city in a county based on Hugo (1838).[64] I additionally control for the presence of nobility based on Gothaischer genealogischer Hofkalender (1825, 1832), and for having a large city with a population over 5,000 citizens based on Bairoch et al. (1988).

I further control for population composition. The previous introduction to Popular Enlightenment already described that religious background played a role for the movement. Becker and Woessmann (2009) further show that religion is connected to human capital. I control for religious composition as the share of Catholics, Protestants and Reformed in the district population. The share of non-Christian population is the excluded category here. I additionally control for the number of boys and girls per capita.[65]

Economic performance is likely connected to both factors as it provides insights into the financial background, on the one hand. On the other hand, it also provides insights into employment options for the local population: the Enlightenment handbook, for example, mainly targeted farmers. I account for the share of the popu-

[63]These lobby groups were founded on the basis of increasing education outside the official schooling system for varying focus groups amongst the population. I include groups focused on the education of the youth as well as for general education of the population in this dummy variable. The groups for improving general education are in particular of interest regarding useful knowledge, as these include, for example, educational groups focused on workers ("Arbeiterbildungsvereine"). There are 33 counties with a lobby group interested in furthering education.

[64]Guiso et al. (2016), for example, show how a history of being a free city may influence long-run development.

[65]All none-binary variables are taken as per capita values. The schooling outcomes are taken per number of children. The results are also robust to including population size as a control variable in order to account for scale effects.

lation employed in agricultural productivity and industrial productivity, as well as the share of the population that lives on rental income. I also account for the share of land that is used as agricultural surface.[66] Population and economic information is based on Statistisches Bureau (1850, 1855a).

1.5.2 The connection of the knowledge elite with upper-tail schools and schools for useful knowledge

Figure 1.5 shows a visible connection of Popular Enlightenment and secondary schooling. Clearly, there is an overlap of Popular Enlightenment activity and later founding of secondary schools.

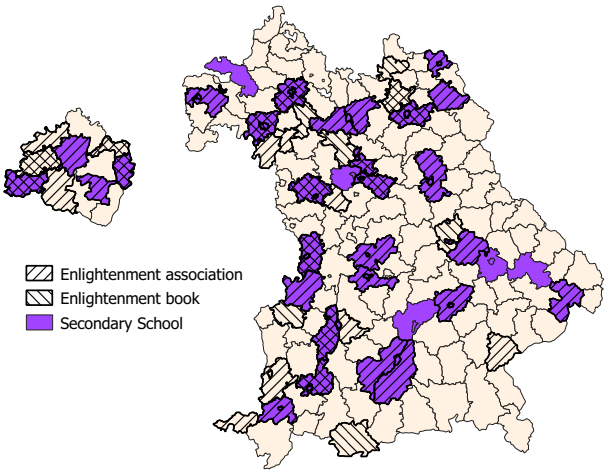


Figure 1.5: Popular Enlightenment and secondary schools in Bavaria

Notes: The figure shows the distribution of subscribers to the Enlightenment handbook (stripes from left to right), Enlightenment associations (stripes from right to left), and secondary schools (shaded) around 1850 in Bavaria.

Table 1.2 presents the results of the linear probability model for this analysis in four Panels. Panel A shows the correlation of the dummy variables on secondary schooling with the dummy variable indicating any Popular Enlightenment activity. Panel B includes region fixed effects. Panel C and D measure Popular Enlightenment as

[66] I thank Prof. Davide Cantoni for providing me with some of this data.

a continuous variable for the number of book subscriptions and the number of associations per 1,000 capita respectively. I standardise these continuous variables to mean zero and variance one. The table presents the main coefficient of interest, robust standard errors in round parentheses, and standard errors corrected for spatial correlation in square parentheses.[67]

Table 1.2 reveals a strong, significant positive correlation of the Popular Enlightenment dummy with both types of secondary schools around 1830 in column (1). The knowledge elite interested in spreading Enlightenment values of the 18$^{\text{th}}$ century is connected to upper-tail education in the 19$^{\text{th}}$ century. Coefficient sizes suggest a very large effect of Popular Enlightenment relative to the mean of the probability of a district having a secondary school of 0.203. In fact, the effect is larger than one.[68] Most likely there are further confounding factors that I cannot observe in this setting.

The connection is particularly strong for modern secondary schools in columns (2) and (5), which promoted the distribution of useful knowledge and contributed to social mobility for the lower social classes. The connection is, furthermore, stronger in 1830 (columns (1) to (3)) than in 1850 (columns ((4) to (6)).[69] It is conceivable that convergence in education between treated and untreated districts occurred during the 19$^{\text{th}}$ century.

These results are confirmed when considering proxies of Popular Enlightenment as continuous variables instead of a dummy variable. Both forms of Popular Enlightenment, the number of Enlightenment handbook subscriptions in Panel C and the

[67] Tables A.5 and A.6 provide full regression results.

[68] Coefficient sizes are reduced to less than half of this when applying a probit instead of a linear probability model. In this case having any Popular Enlightenment activity in the 18$^{\text{th}}$ century is connected to an increase in the probability of a district founding a secondary school of about 12 percentage points in the setting of Panel A. Relative to the mean of 0.203 this is an increase of 60 percent, which is obviously still very large. See Table A.7 in the Appendix for further details.

[69] The probit model coefficient implies an increase in the probability of having any secondary school of eight percentage points in 1850 relative to the mean of 0.21. This implies that by 1850 areas with past experience in Popular Enlightenment still had a significantly higher probability of founding a secondary school of 38 percent.

Table 1.2: Relationship of Popular Enlightenment as dummy and continuous variable and both types of secondary education (dummy) 1830 and 1850

	1830			1850		
	(1) All secondary	(2) Modern secondary	(3) Grammar schools	(4) All secondary	(5) Modern secondary	(6) Grammar schools
Panel A. Any Popular Enlightenment						
Dummy any PE	0.229***	0.221***	0.182***	0.167**	0.144*	0.109*
	(0.083)	(0.079)	(0.068)	(0.084)	(0.077)	(0.065)
	[0.077]	[0.073]	[0.056]	[0.077]	[0.070]	[0.058]
Conley p 10	0.005	0.004	0.006	0.038	0.052	0.080
Conley p 100	0.002	0.000	0.001	0.024	0.010	0.070
Panel B. Region fixed effects						
Dummy any PE	0.216**	0.201***	0.187***	0.153*	0.123*	0.099
	(0.085)	(0.076)	(0.069)	(0.083)	(0.071)	(0.064)
	[0.076]	[0.067]	[0.058]	[0.073]	[0.062]	[0.058]
Region FE	✓	✓	✓	✓	✓	✓
Conley p 10	0.007	0.005	0.004	0.048	0.065	0.095
Conley p 100	0.004	0.000	0.001	0.036	0.019	0.103
Panel C. Handbook						
Subscriptions p.c. * 1,000 (std.)	0.027*	0.042**	0.042**	0.013	0.028	0.021*
	(0.015)	(0.018)	(0.021)	(0.013)	(0.019)	(0.012)
	[0.012]	[0.015]	[0.017]	[0.010]	[0.016]	[0.010]
Conley p 10	0.061	0.018	0.036	0.299	0.119	0.056
Conley p 100	0.006	0.001	0.001	0.147	0.027	0.007
Panel D. Associations						
Associations p.c. * 1,000 (std.)	0.063**	0.074**	0.089***	0.051*	0.063*	0.056*
	(0.030)	(0.034)	(0.032)	(0.029)	(0.034)	(0.029)
	[0.028]	[0.031]	[0.030]	[0.027]	[0.030]	[0.027]
Conley p 10	0.029	0.024	0.004	0.071	0.053	0.042
Conley p 100	0.020	0.010	0.000	0.032	0.010	0.017
N	148	148	148	148	148	148
City Controls	✓	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust	Robust

Notes: The table shows the relationship of the dummy for both types of secondary schools (modern secondary and grammar schools) in 1830 and 1850, which turns 1 if there is any secondary school of the indicated type in the county, and Popular Enlightenment (PE) activity in the county in the 18^{th} century. Columns (1) to (3) show the results in 1830. Columns (4) to (6) show the results in 1850. Panel A and B measure Popular Enlightenment at the extensive margin as a dummy variable, which turns 1 of there is any activity, be it through an Enlightenment association or the handbook. Panel C and D measure Popular Enlightenment as a discrete variable for the number of handbooks per 1,000 capita and the number of Enlightenment associations per 1,000 capita receptively with standardised variables. All columns include all basic control variables at city level, for population composition, and economic development. Panel B additionally adds region fixed effects for eleven historical Bavarian regions. All columns are based on a linear probability model. Standard errors in round parentheses are robust. Standard errors in square parentheses are corrected for spatial correlation (Conley SE). The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of each Panel. Asterisks mark the significance level and are based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

number of associations in Panel D, show a positive connection to the probability of having secondary schools of both types in 1830.[70] A one standard deviation increase in the number of handbooks per 1,000 capita (the number of associations per 1,000 capita) is connected to an increase in the probability of a district having a secondary school of two (six) percentage points in 1830 in column (1). Panel D shows that the connection remains significant for both school types in 1850 for the number of associations. The association in case of the number of handbooks is still present in 1850 but statistically weaker.

Robustness to additional controls

I add region fixed effects for the eleven historical Bavarian regions in Panel B to account for unobserved time-invariant factors that may impact regions differently, and could influence both Popular Enlightenment and education.[71] One such factor could be differences in institutions as several of these districts were outside of Bavarian rule in the 18th century. The Palatinate area, for example, was Prussian at that time. Panel B shows that in particular the earlier results in 1830 and the correlation of Popular Enlightenment with modern secondary schools are robust in significance and magnitude to including region fixed effects.

In an additional robustness check I account more explicitly for historical idiosyncrasies that may indicate a differential development of counties in Bavaria. I control for early population size around 1810, based on Statistisches Bureau (1850). I add a dummy for the exclave territory Palatinate. The year of joining Bavaria can also largely differ for territories.[72] The free cities, on the other hand, may have developed differently from the rest of the Bavarian territories through their experience

[70]Note that the number of treated districts for the handbook is quite low. Results should be treated with care.

[71]I further test robustness to including fixed effects after the regional reforms of the 19th century. These reforms reduced the number of regions to eight. Main conclusions remain the same.

[72]By 1817, 93 additional counties had joined Bavaria.

as mostly self-governed city states.[73] Having a developmental advantage may be also indicated by a large city population (over 5,000 inhabitants) in the 18th century which I control for. I control for economic advantage further by including the number of traders around 1810 based on Rode (2001).[74] As final historical control, I account for the presence of a university in the 18th and 19th century.

The results are presented in Table A.8. The correlation of Popular Enlightenment and secondary education remains highly significant and positive to including all additional controls. Furthermore, the coefficients remain similar in magnitude alleviating concerns about endogenous treatment.

Following Oster (2019), I quantify the role of potential omitted variable bias based on R-squared and coefficients' magnitudes. For this analysis I rely on the full controls model. Measured R-squared when including all controls is quite high at 0.7. I estimate how large the effect of unobserved covariates would have to be to reduce the coefficient of Popular Enlightenment regressed on the presence of any secondary schools in 1830 to zero. I assume a maximum R-squared of one (a fully explained model). The resulting coefficient of proportionality, δ, is equal to 0.63.[75] Unobserved characteristics would have to be almost two–thirds as "important" as the already included control variables. $\delta = 1$ would imply that unobserved characteristics are just as important as all observed characteristics in order to explain the full model variation. In this case, potentially crucial confounding factors would be missing from the model. The here calculated 63 percent lie within reasonable bounds implying that there are indeed most likely further variables that are correlated with education and Popular Enlightenment which I do not observe. Still, assuming that the most important covariates have already been included (Oster, 2019), the coefficient of proportionality is also not negligible.

[73]There are 19 cities in Bavaria with past experience as a "freie Reichsstadt", such as, for example, Augsburg, Nuremberg, and Regensburg. Four of these ended before the 18th century, which I, hence, excluded from the list.

[74]Sample size is reduced as not all districts were part of the Bavarian territory at this time.

[75]When including only basic controls as described in the data section above, $\delta = 0.56$.

Catholic and Protestant sub-samples

All analyses include the share of population of Catholic and Protestant faith. It stands to reason, however, that areas with a Protestant or Catholic majority may have had different implications for the spreading of Enlightenment values. Catholic censorship, for example, officially limited the import of Protestant teachings, which may have hampered Enlightenment to reach some Bavarian regions as much of the literature was produced in Protestant territories. The Enlightenment handbook originated in Protestant Gotha, for example.

I consider the effect of Popular Enlightenment for Protestant and Catholic counties separately. The results can be found in Tables A.9 and A.10.[76] The analysis shows that the connection of Popular Enlightenment and education for areas with a Protestant majority differ from Catholic areas but the main implications of the analysis hold.[77] Both denominations experienced Popular Enlightenment with significant correlations to later secondary education.

Exclusion of outliers

Apart for differences in reception and spreading of Enlightenment it is also important to note that there are some regions which show vastly larger investment in Popular Enlightenment than the rest of the Bavarian counties. The independent ruler of Ansbach, for example, invested heavily in the Enlightenment handbook with an order of 1,500 copies which largely exceeds the average of 76 ordered books.[78] Nuremberg on the other hand, was the only county which had three separate subscribers to the book. This resulted in almost 17 books per 1,000 capita in Nuremberg. Additionally, Nuremberg hosted 14 Enlightenment associations. The average number of

[76] I define Catholic/Protestant regions dependent on the population's majority denomination.

[77] The coefficients show a significant positive correlation of in particular modern secondary schools for Protestant counties. In Catholic counties, grammar schools are also significantly positively connected in 1830, though coefficient sizes are generally reduced.

[78] As he was simultaneously ruler of Bayreuth, I assume that he distributed the handbook in both regions.

associations, if any existed, lies at just below three per county. Figure 1.4 above showed that several outliers exist. I, hence, exclude Ansbach[79], Nuremberg, Erlangen, Heilsbronn, and Regensburg from the analysis to ensure that the results above are not driven by these outlier regions.

The results are presented in Table A.11 and remain largely unaffected by the exclusion of these counties.

Robustness regarding potential drivers of Popular Enlightenment

The emergence of Popular Enlightenment is not a perfect natural experiment. I include the significant drivers of Popular Enlightenment derived in previous analysis as additional control variables to the analyses of the results above. I add the dummy variable for presence of historical schools, the Jesuit order, a printing press, the number of periodicals printed around 1750, the dummy for book traders, and for a district having a representative of the Wolffian network. For the analysis of factors that affect Popular Enlightenment, I rely on the full controls setting. Through this, I can analyse whether any of the drivers cancel out the correlation of Popular Enlightenment and secondary education.

The results are presented in Table A.12. The potential drivers are partially connected to later education outcomes. The coefficients for Popular Enlightenment remain positive and significant and largely similar in magnitude, however. Hence, even though these drivers of Popular Enlightenment influence the movement's development and spreading, they do not seem to finally determine secondary education.

[79]Results are also robust when additionally excluding Bayreuth.

1.5.3 Popular Enlightenment and basic education

The analyses so far have considered the effects on secondary schooling. The main source of education for the lower social classes was elementary education. As a main focus of Popular Enlightenment was not only to increase education per se, but rather reforming education as to spread useful knowledge, I additionally consider lobby groups around 1839, which had the goal of furthering education outside the official classroom by providing useful knowledge, for example, through vocational education.

Table 1.3 presents the results for regressing education of the general population on Popular Enlightenment. The results reveal a significant positive correlation between Popular Enlightenment and the probability of the district having a lobby group for education in column (1).[80] Districts that previously experienced Popular Enlightenment were more likely to have a group furthering the spreading of useful knowledge and providing education outside the classroom by 1839.[81] Full regression results and further robustness checks are presented in Tables A.13 to A.18. The correlation is robust.[82]

Primary schooling outcomes in 1850 also show a positive (negative for the student-teacher-ratio), but statistically weaker correlation with Popular Enlightenment in columns (2) to (5) in Table 1.3. When alternatively calculating significance levels

[80]The alternative probit model supports this result, also when separately considering lobby groups focused on the youth and general education. Results are robust to using clustered and wild-bootstrapped standard errors. Table A.13 shows a comparison of education groups with alternative groups focused on the promotion of scientific knowledge, and with an economic focus. Popular Enlightenment is only significantly connected to groups focused on education.

[81]Note that these lobby groups can be quite similar in nature to the Popular Enlightenment groups of the previous century and are, in a way, a continuation of these. They are, for example, also reading groups. Their focus, however, is no longer spreading Enlightenment values, but rather to explicitly increase knowledge. Their common purpose is listed as "General education - vocational education. Sociable entertainment for their member" (Statistisches Bureau, 1874, p. XI). They can be associations with a focus on agriculture, a specific profession, or simply citizen associations offering training courses.

[82]The coefficient turns insignificant in the Protestant sub-sample and when including all additional controls. When applying standard errors that are corrected for spatial correlation correlations are significant in all settings.

Table 1.3: Relationship of Popular Enlightenment and basic education

	(1) Education lobby 1839	(2) Nr. of schools 1850	(3) Nr. of teachers 1850	(4) Nr. of students 1850	(5) Student-teacher-ratio 1850
Dummy any PE	0.189**	0.191	0.409	4.786	-3.588
	(0.087)	(0.345)	(0.306)	(8.419)	(2.654)
	[0.075]	[0.261]	[0.242]	[8.088]	[2.074]
Observations	148	148	148	148	148
City Controls	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust
Conley p 10	0.025	0.556	0.165	0.549	0.163
Conley p 100	0.005	0.354	0.056	0.518	0.045

Notes: The table shows the relationship of the dummy variable for lobby groups for education in 1839, which turns 1 if a district lists a lobby group, in column (1), the basic education outcomes in 1850, and the dummy variable for any Popular Enlightenment activity in the 18$^{\text{th}}$ century, be it subscriptions to the handbook or associations. Basic education is measured as the number of primary schools per children in column (2), the number of primary school teachers per children in column (3), the number of primary school students per children in column (4), and the student-teacher-ratio in column (5). All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses show standard errors adjusted for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

using standard errors corrected for spatial correlation Popular Enlightenment and the number of teachers are significantly correlated. The student-teacher-ratio is also significantly lower.[83] If there is a connection of Popular Enlightenment and primary education, then it is through larger investment in teachers. Primary education in 1850, however, is not robustly significantly connected to Popular Enlightenment.

This non-significant result suggests two possible effects: First, the proponents of Popular Enlightenment were unsuccessful in achieving a higher interest in education of the general population compared to areas without Popular Enlightenment. Second, Popular Enlightenment may have increased the uptake of education in the affected areas, but the other districts converged by 1850, hence, leading to insignificant results. Compulsory schooling laws were already in effect in the early 19$^{\text{th}}$ century. These would have contributed to increasing student attendance for all

[83]These results are further confirmed when excluding outliers. Here, the number of teachers and Popular Enlightenment are significantly connected even applying the more conservative robust standard errors.

Bavarian counties and decreased variation due to previous Popular Enlightenment. Convergence to some degree is, therefore, likely.[84]

1.6 Conclusion

This paper shows that Popular Enlightenment expands on previous evidence on the importance of spreading Enlightenment. *Industrial Enlightenment* introduced the idea that the large economic changes of the Industrial Revolution appeared alongside changes of cultural beliefs. Next to the important role of institutions, we also need to consider the expansion of skills connected to useful knowledge that allowed common people to adopt new technologies as an important factor for long-run development. The expansion of useful knowledge is connected to modernised attitudes which encouraged embracing these changes. The so-called knowledge elites emphasised this useful knowledge. But Enlightenment is not limited to these elites.

Popular Enlightenment serves as an example that shows how these new cultural values reached social classes beyond the upper-tail. Early forms of the movement are in line with *Industrial Enlightenment*. The learned societies of the 18$^{\text{th}}$ century with their focus on research into useful sciences show an early increased emphasis of useful knowledge through the movement. Popular Enlightenment goes beyond this, however, as it took active steps in order to encourage rational thinking above superstitious beliefs and achieve modernisation instead of traditionalism amongst all and especially the lower social classes. Through this, Popular Enlightenment helps to fill an important gap in how changing cultural beliefs through Enlightenment encompassed all of society.

This paper provides an introduction to Popular Enlightenment in an economic setting and adds to our understanding of the period. I show, based on novel and

[84]Primary schools still varied at a local level. Even as late as 1875, a report of the Bavarian Statistical office stated: "[...] the elementary school system in particular is, more than any other area of public schooling, despite of the same instructions [for all schools], being modified in its everyday appearance at a province and local level" (Statistisches Bureau, 1875, p.CXVIII).

extensive data from the 18th and 19th century, the spreading of Popular Enlightenment. Initially there was a close connection of Enlightenment associations to the academic elite. The movement then increasingly directly approached the lower social classes. The subscription and distribution of the Enlightenment handbook in the 1780s occurred at its peak. Historical evidence provides a convincing account that the contents of the handbook successfully reached the intended recipients of farmers and peasants. I identify ex-ante higher levels of education and personal interactions beyond social class borders as two main contributing factors for Popular Enlightenment to emerge and spread. This shows evidence that both the middle and the upper classes are important for the large societal changes that shaped long-run development. It also emphasises the essential role of the interaction of these social classes.

We gain information on who the knowledge elite is. Popular Enlightenment advocates are from professions that require education and have (mostly) direct connections to the lower social classes. This adds evidence that elites do not only impact economic growth through entrepreneurial efforts, but can also introduce cultural changes that lead to improved development.

The knowledge elite strongly emphasised the importance of education and in particular useful knowledge for all social classes. The empirical analysis shows that areas where Popular Enlightenment occurred have significantly higher investments in education later on for the example of Bavaria. In particular upper-tail education schools are more likely in areas where the movement was active. I can, furthermore, show that the movement is connected to more provision of useful knowledge inside and outside of schools, which affected all social classes. Through this, Popular Enlightenment provides an example of how encouraging cultural changes may be connected to development of education. Both these factors, jointly and separately, are important for explaining long-run development and economic growth.

A Appendix to Chapter 1

A.1 FIGURES

Figure A.1: Example from the Enlightenment handbook

Notes: Example from the *Need and Assistance Book* (Becker, 1788b) on why superstition is harmful.

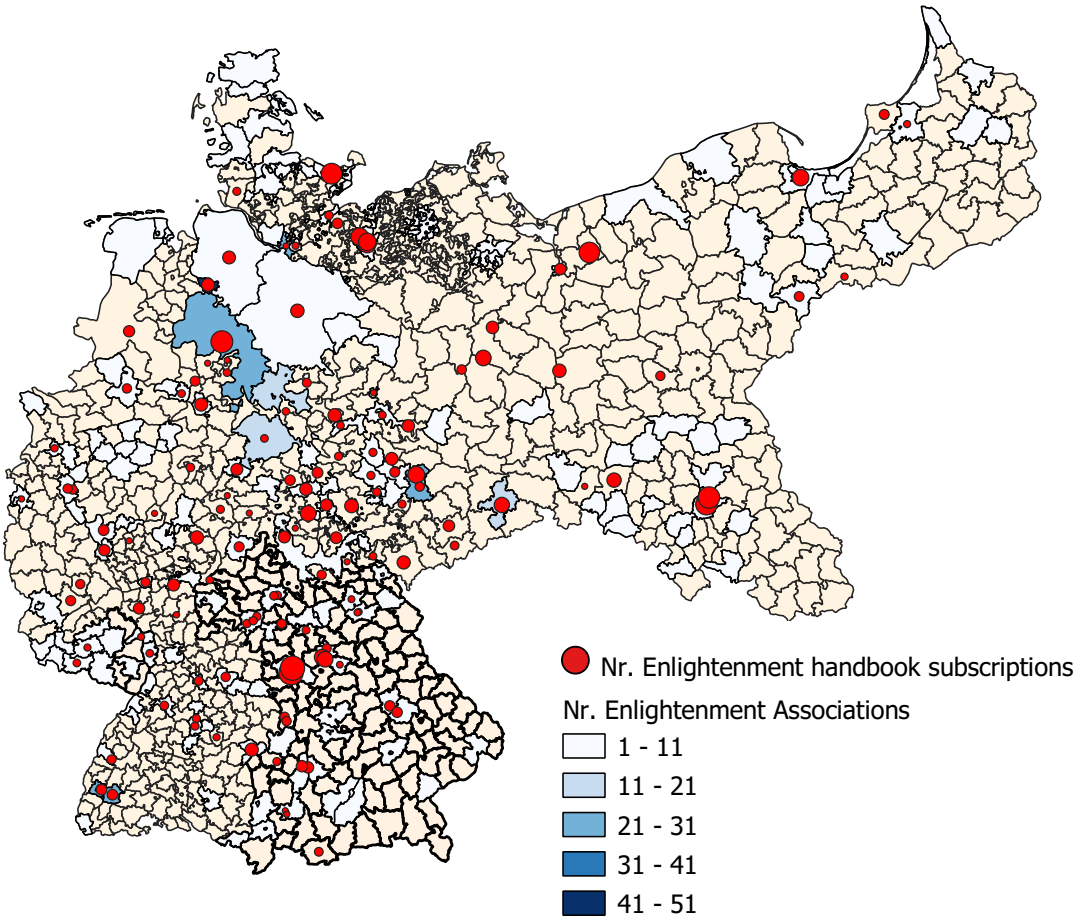
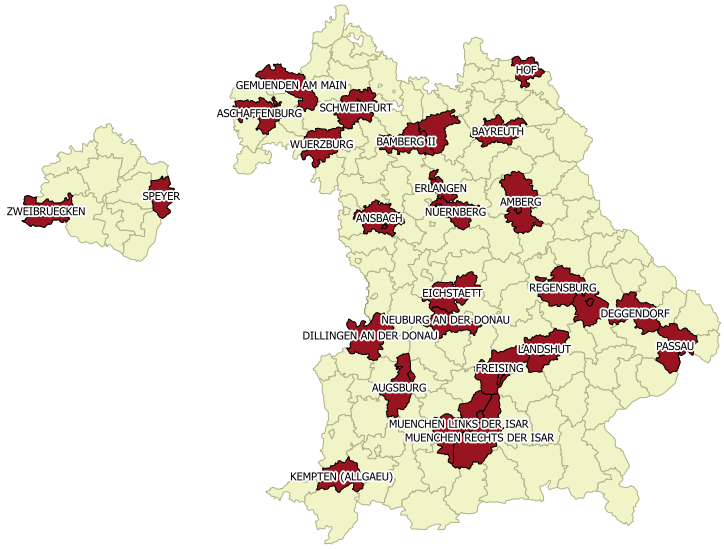
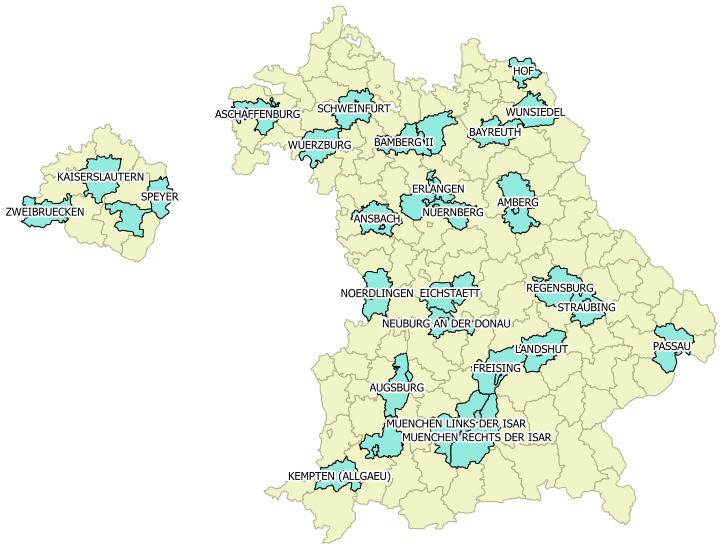


Figure A.2: Distribution and number of Enlightenment associations and Enlightenment handbooks in the German territories

Notes: Figure on the number of Enlightenment associations by 1800 and the number of Enlightenment handbook subscriptions between 1786 and 1788 in the German territories. The maximum order was reached in Bavarian Bayreuth-Ansbach with 1,500 books. The minimum order is 30 volumes. The Bavarian counties, on which the empirical analysis is based, are marked separately by a darker shading and slightly emphasised border lines.



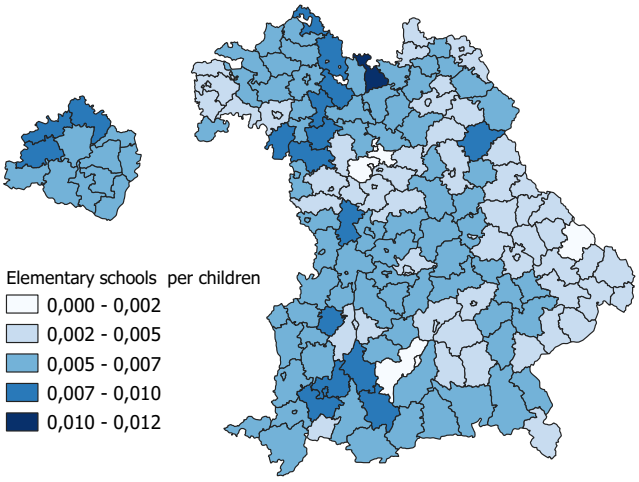
(a) Grammar schools



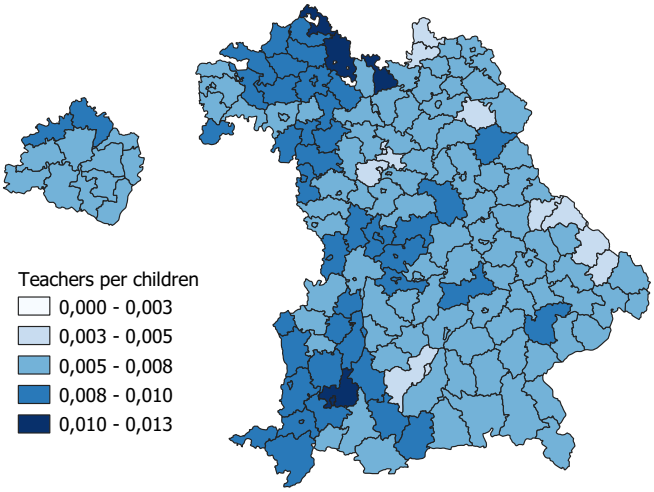
(b) Modern secondary schools

Figure A.3: Secondary schools in Bavaria

Notes: Figure on distribution of modern secondary (a) and grammar schools (b) in 1850 in Bavaria. Shaded areas mark the presence of these schools. County names are indicated.



(a) Nr. of primary schools per children



(b) Nr. of teachers per children

Figure A.4: Basic education schools in Bavaria

Notes: Figure on number of elementary education schools and teachers at elementary education schools relative to the number of children in the district in 1850. Darker shading marks a higher number of schools or teachers per children.

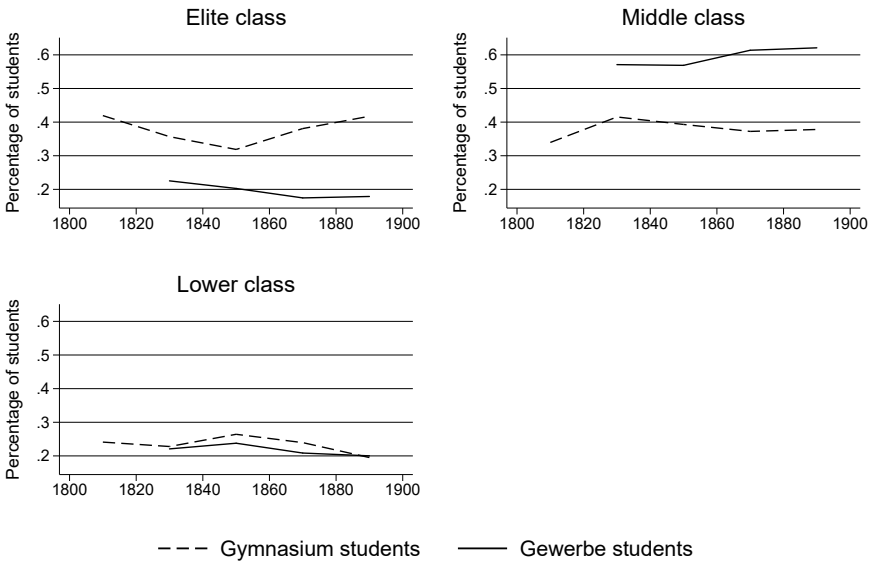


Figure A.5: Development of social composition of students at grammar and modern secondary schools

Notes: Figure on development of the average student numbers at grammar school (dashed line) and modern secondary school (solid line). Students are sorted according to their social background: HISCLASS classes 1 and 2 are combined into the "Elite class", HISCLASS classes 3 to 7 are classified as "Middle class", and HISCLASS classes 8 to 12 are "Lower class" students. The number of students at each social class level is taken relative to the total number of students, thus, giving the percentage of students at a certain social class and school. This figure is based on social backgrounds of over 24,000 students.

A.2 TABLES

Table A.1: Employment background of all subscribers according to HISCO classification

HISCO	Profession	Number subscribers	Mean nr. books	SD	Min.	Max.
	Societies and single orders	50	132.82	221.61	30	1,492
14120	Minister of Religion	43	63.56	46.01	30	200
20210	Government Administrators	40	73.35	70.21	30	315
20110	Legislative Officials	29	153.41	286.76	30	1,500
13940	Headmaster/Head Teacher	15	99.33	120.58	30	500
41030	Working Proprietor (Retail)	15	120.60	147.61	30	600
58320	Military	13	105.92	108.91	30	360
13100	Professor	9	48.22	29.21	30	120
21110	Minister of State	9	64.67	29.68	30	100
14990	Church Administrator	7	39.00	8.47	30	50
22450	Praefectus Curiae	6	63.83	36.17	30	100
21200	Production Manager	5	65.00	28.25	40	100
41025	Merchant	5	180.80	163.01	30	400
92625	Bookbinder	4	149.00	234.02	30	500
6110	Medical Doctor	3	49.33	19.01	30	68
12910	Legal Counsellor	3	55.33	27.30	26	80
13020	Teacher	2	40	14.14	30	50
31090	School Inspector	2	74	36.77	48	100
39320	Office Writer	2	103	74.95	50	156
41020	Commercial Office	2	65	49.50	30	100
4217	Captain	1	40		40	40
6105	Medical Staff	1	240		240	240
12110	Lawyer	1	30		30	30
17150	Cantor	1	100		100	100
19120	Librarian	1	30		30	30
19130	Archivist	1	72		72	72
22220	Post Official	1	142		142	142
22280	Post Administrator	1	300		300	300
22440	Lord Chamberlain	1	40		40	40
30000	Registrator	1	100		100	100
32120	Secretary	1	367		367	367
37010	Post Secretary	1	141		141	141
39340	Chancery Clerk	1	60		60	60
39520	Office Registrar	1	72		72	72
55140	Artist	1	50		50	50
63220	Head Forester	1	30		30	30
Total		280	98.89		68	242

Notes: Professional background of all subscribers to the Enlightenment handbook in Germany according to the HISCO classification scheme. The table provides the profession, as well as the total number of subscribers within that profession. The table additionally shows the mean, standard deviation, minimum, and maximum number of books ordered by the referred to profession. The last line provides the total values for subscribers and the average mean, minimum, and maximum number of books subscribed.

Table A.2: Employment background of subscribers in Bavaria compared to Germany according to HISCO classification

HISCO	Profession	Freq.	Perc.	Mean	SD	Min.	Max.
a) Germany							
14120	Minister of Religion	43	15.58	63.56	46.01	30	200
20110	Legislative Official	29	10.51	153.41	286.76	30	1,500
20210	Government Admin.	40	14.49	73.35	70.21	30	315
41030	Working Proprietor (Retail)	15	5.43	120.30	147.61	30	600
58320	Military	13	4.71	105.92	108.91	30	360
21200	Production Manager	5	1.81	65	28.25	40	100
12110	Lawyer	1	0.36	30	.	30	30
12910	Jurist	3	1.09	55.33	27.30	26	80
13100	Univ.& Higher Educ.Teacher	9	3.26	48.22	29.21	30	120
13940	Head Teacher	15	5.43	99.33	120.58	30	500
Total		173	63	99		31	381
b) Bavaria							
14120	Minister of Religion	5	20	90	65.57	40	200
20110	Legislative Official	5	20	353.6	642.67	30	1,500
20210	Government Admin.	4	16	102.75	102.45	30	250
41030	Working Proprietor (Retail)	3	12	109.33	44.00	65	153
58320	Military	2	8	77	32.53	54	100
21200	Production Manager	1	4	40	.	40	40
12110	Lawyer	1	4	30	.	30	30
12910	Jurist	1	4	80	.	80	80
13100	Univ.& Higher Educ.Teacher	1	4	34	.	34	34
13940	Head Teacher	1	4	33	.	33	33
Total		24	96	145		44	238

Notes: Professional background of subscribers to the Enlightenment handbook in Germany (a) and Bavaria (b) according to the HISCO classification scheme. The table provides the profession, the number of representatives as well as the percent of subscribers within that profession. The table additionally provides the mean, standard deviation, minimum, and maximum number of books ordered by the referred to profession. Note that the total number of subscribers in Bavaria is 25; one subscriber in Bavaria was listed without profession. These indicators can be compared to the frequency, percentage, mean, standard deviation, minimum, and maximum values of that profession and subscription numbers amongst subscribers across all German territories overall in (a). The last line provides the total values for subscribers and percentages, the average mean, minimum, and maximum number of books subscribed to for Bavaria and Germany for the relevant professions.

Table A.3: Social background of subscribers in Germany overall and Bavaria specifically according to HISCLASS classification

HISCLASS	Social Class	Freq.	Perc.	Mean	SD	Min.	Max.	Total
a) Germany								
1	Higher managers	106	37.86	102.19	168.19	30	1.500	10,832
2	Higher professionals	69	24.64	59.48	45.04	26	240	4,104
3	Lower Managers	11	3.93	87.91	79.29	30	300	967
4	Lower Professionals	30	10.71	118.07	125.76	30	600	3,542
5	Lower clerical and sales	3	1.07	172.33	170.43	50	367	517
6	Foreman	7	2.50	60.43	34.22	30	100	423
7	Medium skilled worker	4	1.43	149.00	234.02	30	500	596
Total		230	82	107		32	515	20,981
b) Bavaria								
1	Higher managers	12	48	197.17	415.45	30	1,500	2,366
2	Higher professionals	8	32	74.25	56.13	30	200	594
3	Lower managers	1	4	40	.	40	40	40
4	Lower professionals	3	12	109.33	44	65	153	328
Total		24	96	105		41	473	3,328

Notes: Social background of subscribers to the Enlightenment handbook in Germany (a) and Bavaria (b) according to the HISCLASS classification scheme. The table provides the social class, as well as the number and percent of subscribers within that class. The table additionally provides the mean, standard deviation, minimum, maximum, and total number of books ordered by the referred to class in Bavaria. Note that the total number of subscribers in Germany is 280, in Bavaria 25; in Germany, 50 subscribers are only listed as part of an association or private people. One subscriber with 200 books was a private person in Bavaria given without his profession. For all of the German territories together, 6,641 book orders are made by associations (or private individuals without professional background information), which I do not assign to a social class. These indicators can be compared to the frequency, percentage, mean, standard deviation, minimum, maximum, and total values of that social class and subscription numbers amongst subscribers across all German territories overall. The last line provides the total values for subscribers and percentages, the average mean, minimum, and maximum number of books subscribed to for Bavaria and Germany for the relevant social classes.

Table A.4: Descriptive Statistics

	Mean	SD	Min	Max
Dummy for Popular Enlightenment	0.291	0.456	0.000	1.000
Nr. of book subscriptions p. 1,000 c.	1.731	12.152	0.000	139.991
Nr. PE associations p. 1,000 c. (1810)	0.047	0.162	0.000	1.073
Dummy for Grammar and/or Modern sec. in 1830	0.203	0.403	0.000	1.000
Dummy Modern sec. in 1830	0.169	0.376	0.000	1.000
Dummy for Grammar in 1830	0.162	0.370	0.000	1.000
Dummy for Grammar and/or Modern sec. in 1850	0.209	0.408	0.000	1.000
Dummy for Modern sec. in 1850	0.176	0.382	0.000	1.000
Dummy for Grammar in 1850	0.169	0.376	0.000	1.000
Economy lobby 1839 dummy	0.446	0.499	0.000	1.000
Education lobby 1839 dummy	0.223	0.418	0.000	1.000
Science lobby 1839 dummy	0.081	0.274	0.000	1.000
Elementary schools p. 1,000 children 1850	5.529	1.580	1.979	11.766
Elementary teachers p. 1,000 children	6.996	1.454	3.863	12.326
Elementary students p. 1,000 children 1850	436.256	46.610	297.356	696.901
Elementary stud-teach-ratio 1850	64.646	12.119	35.503	110.614
Dummy for city 'reichsfrei'	0.101	0.303	0.000	1.000
Dummy for nobel/residenc city	0.230	0.422	0.000	1.000
City with pop>5,000 1800	0.203	0.403	0.000	1.000
City with pop>5,000 1850	0.223	0.418	0.000	1.000
District free city in 1840	0.189	0.393	0.000	1.000
District free city in 1850	0.189	0.393	0.000	1.000
Nr. boys p.c. 1840	0.138	0.018	0.073	0.190
Nr. boys p.c. 1852	0.141	0.017	0.102	0.188
Nr. girls p.c. 1840	0.142	0.017	0.071	0.192
Nr. girls p.c. 1852	0.144	0.017	0.109	0.189
Share catholic 1840	0.728	0.331	0.003	1.000
Share catholic 1852	0.737	0.335	0.003	1.146
Share protestant 1840	0.243	0.321	0.000	0.995
Share reformed 1840	0.000	0.002	0.000	0.018
Share lutheran 1852	0.250	0.325	0.000	0.992
Share reformed 1852	0.000	0.002	0.000	0.016
Share non-christian 1840	0.012	0.017	0.000	0.098
Share non-christian 1852	0.011	0.015	0.000	0.088
Share agricultural prod. 1840	0.674	0.143	0.169	0.919
Share agricultural prod. 1852	0.713	0.145	0.229	0.942
Share industrial prod. 1840	0.240	0.105	0.055	0.629
Share industrial prod. 1852	0.184	0.097	0.035	0.549
Share rent income 1840	0.046	0.029	0.001	0.228
Share rent income 1852	0.038	0.015	0.007	0.079
Share agricultural surface 1853	0.610	0.132	0.138	0.850

Notes: The table shows the descriptive statistics with mean, standard deviation, minimum and maximum values for all Popular Enlightenment variables, all education variables, and all control variables for the main analysis. Variables are measured at the district level. There are 148 districts in total. The data set is balanced in the main analysis.

Table A.5: Relationship of any Popular Enlightenment (dummy) and both types of secondary education (dummy) 1830 full results

	1830		
	(1) All secondary	(2) Modern secondary	(3) Grammar school
Dummy any PE	0.229***	0.221***	0.182***
	(0.083)	(0.079)	(0.068)
	[0.077]	[0.073]	[0.056]
District free city in 1830	0.228*	0.161	0.152
	(0.134)	(0.142)	(0.133)
Dummy for nobel/residenc city	0.109*	0.069	0.129*
	(0.065)	(0.063)	(0.067)
City with pop>5,000 1800	0.267*	0.289*	0.260*
	(0.154)	(0.161)	(0.150)
Nr. boys p.c. 1840	0.187	2.165	3.063
	(2.493)	(2.489)	(2.803)
Nr. girls p.c. 1840	4.768	0.419	0.217
	(2.935)	(2.846)	(3.054)
Share catholic 1840	-0.875	-0.620	-0.008
	(0.556)	(0.526)	(0.566)
Share protestant 1840	-1.078*	-0.688	-0.201
	(0.601)	(0.560)	(0.609)
Share reformed 1840	-5.938	-21.601	8.643
	(15.929)	(25.180)	(16.144)
Share agricultural prod. 1840	-0.178	-0.171	-0.681
	(0.236)	(0.222)	(0.451)
Share industrial prod. 1840	0.246	0.284	-0.785
	(0.370)	(0.376)	(0.545)
Share rent income 1840	1.548	0.674	2.144*
	(1.095)	(1.020)	(1.195)
Share agricultural surface 1853	0.103	-0.053	0.135
	(0.159)	(0.180)	(0.183)
Constant	0.141	0.319	0.062
	(0.361)	(0.398)	(0.273)
Observations	148	148	148
City Controls	✓	✓	✓
Population Controls	✓	✓	✓
Economy Controls	✓	✓	✓
SE	Robust	Robust	Robust
R-squared	0.630	0.571	0.618
Conley p 10	0.005	0.004	0.006
Conley p 100	0.002	0.000	0.001

Notes: Table shows the relationship of the dummy for both types of secondary schools (modern secondary and grammar schools) in 1830, which turns one if there is any secondary school of the indicated type in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18^{th} century, which also turns one of there is any activity, be it through an Enlightenment association or the Enlightenment handbook. The results are displayed for any secondary school (1), modern secondary schools (2), and grammar schools (3). All columns include all basic control variables at city level, population composition, and economic development measures. For religious composition the excluded category is "Share of non-Christian population". All columns are based on a linear probability model. Standard errors in round parentheses are robust. Standard errors in square parentheses are corrected for spatial correlation (Conley SE). The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level and are based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.6: Relationship of any Popular Enlightenment (dummy) and both types of secondary education (dummy) 1850 full results

	1850		
	(1) All secondary	(2) Modern secondary	(3) Grammar school
Dummy any PE	0.167**	0.144*	0.109*
	(0.084)	(0.077)	(0.065)
	[0.077]	[0.070]	[0.058]
District free city in 1850	0.210	0.169	0.079
	(0.142)	(0.150)	(0.118)
Dummy for nobel/residenc city	0.069	0.010	0.071
	(0.067)	(0.062)	(0.067)
City with pop>5,000 1850	0.306*	0.369**	0.331**
	(0.166)	(0.168)	(0.143)
Nr. boys p.c. 1852	9.991*	6.727*	10.699**
	(5.637)	(3.820)	(5.215)
Nr. girls p.c. 1852	-7.827	-6.098*	-9.120*
	(5.495)	(3.476)	(5.140)
Share catholic 1852	0.324	0.212	1.479**
	(0.738)	(0.731)	(0.746)
Share lutheran 1852	0.132	0.149	1.286*
	(0.763)	(0.757)	(0.755)
Share reformed 1852	-12.751	-30.179	5.464
	(22.510)	(31.720)	(22.801)
Share agricultural prod. 1852	-0.877***	-0.695**	-1.020***
	(0.318)	(0.305)	(0.290)
Share industrial prod. 1852	-0.636	-0.348	-1.254***
	(0.424)	(0.381)	(0.339)
Share rent income 1852	3.161*	1.495	2.950*
	(1.668)	(1.284)	(1.759)
Share agricultural surface 1853	0.112	0.024	0.196
	(0.176)	(0.184)	(0.178)
Constant	0.048	0.257	-0.845
	(0.706)	(0.730)	(0.754)
Observations	148	148	148
City Controls	✓	✓	✓
Population Controls	✓	✓	✓
Economy Controls	✓	✓	✓
SE	Robust	Robust	Robust
R-squared	0.631	0.628	0.651
Conley p 10	0.038	0.052	0.080
Conley p 100	0.024	0.010	0.070

Notes: Table shows the relationship of the dummy for both types of secondary schools (modern secondary and grammar schools) in 1850, which turns one if there is any secondary school of the indicated type in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18^{th} century, which also turns one of there is any activity, be it through an Enlightenment association or the Enlightenment handbook. The results are displayed for any secondary school (1), modern secondary schools (2), and grammar schools (3). All columns include all basic control variables at city level, population composition, and economic development measures. For religious composition the excluded category is "Share of non-Christian population". All columns are based on a linear probability model. Standard errors in round parentheses are robust. Standard errors in square parentheses are corrected for spatial correlation (Conley SE). The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level and are based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.7: Relationship of any Popular Enlightenment (dummy) and any secondary education (dummy) 1830 subsequently adding controls and model variations

	(1)	(2)	(3)	(4)	(5)	(6)
Dep.: Dummy secondary school 1830	City	City and Population	All	Clustered SE	Probit	Margins
Dummy any PE	0.257***	0.255***	0.229***	0.229**	1.314***	0.124***
	(0.083)	(0.084)	(0.083)	(0.071)	(0.390)	(0.035)
			[0.077]			
District free city in 1830	0.175	0.227	0.228*	0.228*	1.502***	0.141***
	(0.143)	(0.148)	(0.134)	(0.102)	(0.530)	(0.052)
Dummy for nobel/residenc city	0.119*	0.120*	0.109*	0.109*	0.623*	0.059*
	(0.061)	(0.062)	(0.065)	(0.053)	(0.365)	(0.035)
City with pop>5,000 1800	0.357**	0.337**	0.267*	0.267*	0.339	0.032
	(0.154)	(0.163)	(0.154)	(0.125)	(0.538)	(0.050)
Nr. boys p.c. 1840		-0.477	0.187	0.187	-1.612	-0.152
		(2.514)	(2.493)	(1.559)	(28.974)	(2.726)
Nr. girls p.c. 1840		3.615	4.768	4.768*	56.341*	5.302*
		(2.745)	(2.935)	(2.245)	(31.547)	(3.059)
Share catholic 1840		-0.764	-0.875	-0.875	-9.550**	-0.899**
		(0.471)	(0.556)	(0.473)	(3.734)	(0.381)
Share protestant 1840		-0.866*	-1.078*	-1.078*	-11.777***	-1.108***
		(0.512)	(0.601)	(0.546)	(4.087)	(0.421)
Share reformed 1840		-4.625	-5.938	-5.938	-36.993	-3.481
		(15.614)	(15.929)	(18.092)	(70.866)	(6.652)
Share agricultural prod. 1840			-0.178	-0.178	-1.748	-0.164
			(0.236)	(0.201)	(2.035)	(0.190)
Share industrial prod. 1840			0.246	0.246	3.453	0.325
			(0.370)	(0.242)	(2.946)	(0.277)
Share rent income 1840			1.548	1.548	19.456*	1.831*
			(1.095)	(0.878)	(10.408)	(1.034)
Share agricultural surface 1853			0.103	0.103	1.017	0.096
			(0.159)	(0.108)	(1.236)	(0.118)
Constant	-0.005	0.311	0.141	0.141	-1.594	
	(0.022)	(0.397)	(0.361)	(0.225)	(2.070)	
Observations	148	148	148	148	148	148
City Controls	✓	✓	✓	✓	✓	✓
Population Controls		✓	✓	✓	✓	✓
Economy Controls			✓	✓	✓	✓
SE	Robust	Robust	Robust	Clustered	Robust	Robust
R-squared	0.595	0.609	0.630	0.630		
B p-value				0.006		
Conley p 10			0.005			
Conley p 100			0.002			

Notes: Table shows the relationship of the dummy for any secondary school (modern secondary, grammar, school or both) in 1830, which turns one if there is any secondary school in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18th century, which also turns one of there is any activity, be it through an Enlightenment association or the Enlightenment handbook. Columns (1) to (3) subsequently add additional controls, first at city levels, then for the composition of the population, including religious denominations, and third adding economic controls at the county level as the share of people employed in agriculture, industry, etc. and further including the share of the counties' surface that is being used for agriculture. Columns (5) and (6) use a probit model approach instead of the linear probability model. Column (6) shows the average marginal effect for column (5). Standard errors in parenthesis. The first three and columns (5) and (6) show results when including standard errors that are robust. Column (3) additionally gives the results when adjusting standard errors for spatial correlation (Conley SE in square parentheses). The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the column. Column (4) provides standard errors that are clustered at the district level. There are eight clusters. In order to account for the low number of clusters, wild bootstrapped clusters are applied in column (4), showing the resulting p-value at the bottom of the table. Asterisks mark the significance level: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.8: Relationship of any Popular Enlightenment (dummy) and both types of secondary education (dummy) 1830 and 1850 including additional historical controls

	1830			1850		
	(1) All secondary	(2) Modern	(3) Grammar	(4) All secondary	(5) Modern	(6) Grammar
Dummy any PE	0.249**	0.210**	0.194**	0.211**	0.159*	0.134**
	(0.095)	(0.090)	(0.084)	(0.091)	(0.083)	(0.066)
	[0.083]	[0.081]	[0.067]	[0.082]	[0.073]	[0.060]
Observations	117	117	117	117	117	117
City Controls	✓	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓
Additional Controls	✓	✓	✓	✓	✓	✓
Conley p 10	0.004	0.011	0.011	0.011	0.037	0.026
Conley p 100	0.002	0.003	0.006	0.004	0.009	0.015

Notes: Table shows the relationship of the dummy for both types of secondary schools (modern secondary and grammar schools) in 1830 and 1850, which turns one if there is any secondary school of the indicated type in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18^{th} century, which also turns one of there is any activity, be it through an Enlightenment association or the Enlightenment handbook. Columns (1) to (3) show the results for any secondary school, modern secondary schools, grammar schools in 1830, columns (4) to (6) for 1850. All columns include all basic control variables at city level, population composition, and economic development measures. For religious composition the excluded category is "Share of non-Christian population". Further historical controls include population size in 1830/1850, population around 1810, the year of joining the Bavarian territories, a dummy indicating that there is a city with a history as a free city, a dummy indicating a city with more than 5,000 inhabitants in the 18^{th} century, trade data from 1812 (only available for 117 districts), and the presence of a university city in the 18^{th} and 19^{th} century. All columns are based on a linear probability model. Standard errors in round parentheses are robust. Standard errors in square parentheses are corrected for spatial correlation (Conley SE). The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level and are based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.9: Relationship of Popular Enlightenment and secondary education 1830 and 1850 in Protestant counties

	1830			1850		
	(1) All secondary	(2) Modern	(3) Grammar	(4) All secondary	(5) Modern	(6) Grammar
Dummy any PE	0.351**	0.351**	0.176	0.406***	0.406***	0.073
	(0.148)	(0.148)	(0.107)	(0.134)	(0.134)	(0.075)
	[0.104]	[0.104]	[0.071]	[0.100]	[0.100]	[0.061]
Observations	30	30	30	30	30	30
City Controls	✓	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust	Robust
Conley p 10	0.006	0.006	0.043	0.001	0.001	0.213
Conley p 100	0.001	0.001	0.026	0.000	0.000	0.289

Notes: Table shows the relationship of the dummy for any secondary school (modern secondary or grammar school or both) in column (1), the dummy for a modern secondary school in column (2), and the dummy for a grammar school in column (3) in 1830 and 1850, which turns one if there is a school of the indicated type in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18^{th} century, which also turns one of there is any activity, be it through an Enlightenment association or the Enlightenment handbook. Observations are limited to counties with a Protestant majority. All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.10: Relationship of Popular Enlightenment and secondary education 1830 and 1850 in Catholic counties

	1830			1850		
	(1) All secondary	(2) Modern	(3) Grammar	(4) All secondary	(5) Modern	(6) Grammar
Dummy any PE	0.183**	0.160*	0.193**	0.112	0.068	0.115
	(0.087)	(0.083)	(0.083)	(0.081)	(0.067)	(0.073)
	[0.078]	[0.079]	[0.072]	[0.069]	[0.059]	[0.061]
Observations	118	118	118	118	118	118
City Controls	✓	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust	Robust
Conley p 10	0.028	0.045	0.015	0.141	0.287	0.094
Conley p 100	0.019	0.057	0.006	0.096	0.193	0.059

Notes: Table shows the relationship of the dummy for any secondary school (modern secondary or grammar school or both) in column (1), the dummy for a modern secondary school in column (2), and the dummy for a grammar school in column (3) in 1830 and 1850, which turns one if there is a school of the indicated type in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18^{th} century, which also turns one of there is any activity, be it through an Enlightenment association or the Enlightenment handbook. Observations are limited to counties with a Catholic majority. All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.11: Relationship of Popular Enlightenment and secondary education 1830 and 1850 excluding outliers

	1830			1850		
	(1) All secondary	(2) Modern	(3) Grammar	(4) All secondary	(5) Modern	(6) Grammar
Dummy any PE	0.230***	0.217***	0.175***	0.163*	0.133*	0.104*
	(0.085)	(0.080)	(0.066)	(0.083)	(0.074)	(0.062)
	[0.078]	[0.074]	[0.054]	[0.077]	[0.070]	[0.055]
Observations	143	143	143	143	143	143
City Controls	✓	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust	Robust
Conley p 10	0.006	0.006	0.006	0.042	0.063	0.079
Conley p 100	0.003	0.000	0.001	0.032	0.020	0.081

Notes: Table shows the relationship of the dummy for any secondary school (modern secondary or grammar school or both) in column (1), the dummy for a modern secondary school in column (2), and the dummy for a grammar school in column (3) in 1830 and 1850, which turns one if there is a school of the indicated type in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18^{th} century, which also turns one of there is any activity, be it through an Enlightenment association or the Enlightenment handbook. Five observations were excluded due to disproportionally large numbers of Enlightenment associations or handbooks; see main text for further details. All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.12: Popular Enlightenment and secondary education 1830 and 1850 including drivers of Popular Enlightenment

	1830			1850		
	(1) All secondary	(2) Modern secondary	(3) Grammar schools	(4) All secondary	(5) Modern secondary	(6) Grammar schools
Panel A.						
Dummy any PE	0.250**	0.212**	0.195**	0.209**	0.158*	0.131*
	(0.095)	(0.090)	(0.084)	(0.091)	(0.083)	(0.066)
Historic school indicator	-0.052*	-0.059**	-0.037	-0.091**	-0.099**	-0.063
	(0.027)	(0.029)	(0.026)	(0.044)	(0.049)	(0.044)
Panel B.						
Dummy any PE	0.248**	0.209**	0.195**	0.201**	0.151*	0.127*
	(0.096)	(0.091)	(0.084)	(0.092)	(0.084)	(0.067)
Jesuit order indicator	-0.051	-0.099	0.036	-0.247*	-0.217*	-0.122
	(0.093)	(0.111)	(0.103)	(0.133)	(0.118)	(0.122)
Panel C.						
Dummy any PE	0.245**	0.205**	0.183**	0.212**	0.163**	0.133**
	(0.099)	(0.092)	(0.086)	(0.092)	(0.081)	(0.067)
Dummy for printing press around 1500	0.079	0.116	0.234	-0.120	-0.198	-0.093
	(0.274)	(0.295)	(0.243)	(0.217)	(0.237)	(0.163)
Panel D.						
Dummy any PE	0.232**	0.182**	0.164**	0.203**	0.147*	0.125*
	(0.096)	(0.092)	(0.079)	(0.090)	(0.079)	(0.064)
Nr. periodicals printed 1750	0.053	0.090***	0.097***	0.084*	0.151***	0.075**
	(0.033)	(0.027)	(0.030)	(0.045)	(0.033)	(0.037)
Panel E.						
Dummy any PE	0.251**	0.199**	0.181**	0.210**	0.158*	0.131*
	(0.098)	(0.092)	(0.087)	(0.092)	(0.083)	(0.066)
Dummy booktraders at tradefair 1760	-0.025	0.131	0.153	-0.044	0.125	0.041
	(0.148)	(0.158)	(0.157)	(0.147)	(0.157)	(0.130)
Panel F.						
Dummy any PE	0.236**	0.175**	0.184**	0.210**	0.159*	0.131**
	(0.096)	(0.085)	(0.086)	(0.092)	(0.084)	(0.066)
Representative of Wolffianer	0.157	0.419***	0.117	0.078	0.336*	-0.174
	(0.133)	(0.147)	(0.181)	(0.159)	(0.187)	(0.170)
N	117	117	117	117	117	117
SE	Robust	Robust	Robust	Robust	Robust	Robust
City Controls	✓	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓	✓
Additional Controls	✓	✓	✓	✓	✓	✓

Notes: Table shows the relationship of the dummy for both types of secondary schools (modern secondary and grammar schools) in 1830 and 1850, which turns one if there is any secondary school of the indicated type in the county, and the dummy variable for any Popular Enlightenment (PE) activity in the county in the 18th century, which also turns one of there is any activity, be it through an Enlightenment association or the handbook. Columns (1) to (3) show the results for any secondary school, modern secondary schools, grammar schools in 1830. Columns (4) to (6) show the results for any secondary school, modern secondary schools, grammar schools in 1850. All columns include all basic control variables. In addition, all further controls form the Robustness checks are added. These include population size in 1830/1850, population around 1810, the year of joining the Bavarian territories, a dummy indicating that there is a city with a history as a free city, a dummy indicating a city with more than 5,000 inhabitants in the 18th century, trade data from 1812 (only available for 117 districts), and the presence of a university city in the 18th and 19th century. Standard errors in round parentheses are robust. There are Panels A to F giving the regression results when additionally including a potential driver of Popular Enlightenment. Each Panel gives the coefficient for Popular Enlightenment and the potential driver as indicated. Asterisks mark the significance level: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.13: Relationship of Popular Enlightenment and lobby groups 1839

Dep.: Lobby Dummy	(1) Education	(2) Science	(3) Economy
Dummy any PE	0.189**	0.063	0.092
	(0.087)	(0.041)	(0.112)
	[0.075]	[0.042]	[0.112]
District free city in 1830	0.122	0.051	-0.107
	(0.149)	(0.083)	(0.185)
Dummy for nobel/residenc city	0.116	0.067	0.090
	(0.085)	(0.049)	(0.113)
City with pop>5,000 1800	0.228	0.040	0.106
	(0.162)	(0.070)	(0.188)
Nr. boys p.c. 1840	4.454	-2.787	6.350
	(8.746)	(1.902)	(5.165)
Nr. girls p.c. 1840	-2.239	3.894*	-7.487
	(8.819)	(2.046)	(6.137)
Share catholic 1840	-0.088	-0.183	1.450
	(0.449)	(0.367)	(1.023)
Share protestant 1840	-0.117	-0.211	1.576
	(0.490)	(0.401)	(1.113)
Share reformed 1840	-19.418	35.679***	-12.237
	(21.837)	(10.046)	(19.879)
Share agricultural prod. 1840	-0.290	-0.346	-0.861
	(0.290)	(0.304)	(0.768)
Share industrial prod. 1840	0.526	-0.299	-1.456
	(0.424)	(0.371)	(0.962)
Share rent income 1840	0.104	3.516***	0.554
	(1.105)	(0.979)	(1.954)
Share agricultural surface 1853	-0.282	0.006	0.384
	(0.339)	(0.134)	(0.323)
Constant	0.113	0.171	-0.179
	(0.402)	(0.205)	(0.588)
Observations	148	148	148
City Controls	✓	✓	✓
Population Controls	✓	✓	✓
Economy Controls	✓	✓	✓
SE	Robust	Robust	Robust
R-squared	0.428	0.518	0.060
Conley p 10	0.025	0.114	0.406
Conley p 100	0.005	0.214	0.412

Notes: Table shows the relationship of the dummy variables for lobby groups, which turns one if a district lists a lobby group for either education (1), science (2), or the economy (3) in 1839, and the dummy variable for any Popular Enlightenment activity in the 18^{th} century, be it subscriptions to the Enlightenment handbook or associations. All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.14: Relationship of Popular Enlightenment and basic education 1850

Dep.: Basic Education	(1) Nr. of schools	(2) Nr. of teachers	(3) Nr. of students	(4) Student-teacher-ratio
Dummy any PE	0.191	0.409	4.786	-3.588
	(0.345)	(0.306)	(8.419)	(2.654)
	[0.261]	[0.242]	[8.088]	[2.074]
District free city in 1850	-0.038	0.609	-2.128	-3.736
	(0.475)	(0.497)	(13.295)	(3.533)
Dummy for nobel/residenc city	0.537	0.737**	22.977*	-1.494
	(0.396)	(0.343)	(11.868)	(2.378)
City with pop>5,000 1850	-0.273	-0.696	-12.372	4.048
	(0.443)	(0.442)	(16.790)	(3.220)
Nr. boys p.c. 1852	-5.912	-26.176	823.891	390.934*
	(25.595)	(25.121)	(635.262)	(205.339)
Nr. girls p.c. 1852	8.329	5.377	-154.033	-116.272
	(25.857)	(25.600)	(768.575)	(212.077)
Share catholic 1852	-12.032*	-11.328*	-281.818	33.026
	(6.842)	(6.292)	(170.333)	(40.317)
Share lutheran 1852	-11.417	-10.470	-219.144	33.685
	(6.978)	(6.424)	(171.398)	(41.890)
Share reformed 1852	-122.802	-81.408	-2,034.616	583.646
	(88.784)	(81.770)	(1,319.097)	(609.760)
Share agricultural prod. 1852	3.505**	3.532***	12.832	-23.799**
	(1.420)	(1.306)	(57.787)	(10.540)
Share industrial prod. 1852	-1.425	-0.331	-49.296	3.779
	(2.346)	(2.191)	(70.412)	(21.002)
Share rent income 1852	28.690***	17.709**	258.321	-78.690
	(8.611)	(7.489)	(254.900)	(65.104)
Share agricultural surface 1853	1.949**	1.786**	-19.396	-18.230**
	(0.860)	(0.818)	(26.951)	(7.220)
Constant	12.321*	16.445***	604.414***	24.936
	(6.781)	(6.225)	(169.179)	(36.354)
Observations	148	148	148	148
City Controls	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust
R-squared	0.280	0.262	0.427	0.335
Conley p 10	0.556	0.165	0.549	0.163
Conley p 100	0.354	0.056	0.518	0.045

Notes: Table shows the relationship of basic education outcomes in 1850, and the dummy variable for any Popular Enlightenment activity in the 18th century, be it subscriptions to the Enlightenment handbook or associations. Basic education is measured as the number of primary schools per children in column (1), the number of primary school teachers per children in column (2), the number of primary school students per children in column (3), and the student-teacher-ratio in column (4). All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.15: Relationship of Popular Enlightenment, education lobby 1839, and basic education 1850 including region fixed effects (A) and additional historical controls (B)

	1830	1850			
	(1)	(2)	(3)	(4)	(5)
	Education lobby	Nr. of schools	Nr. of teachers	Nr. of students	Student-teacher-ratio
Panel A. Region fixed effects					
Dummy any PE	0.157*	-0.075	0.174	-1.206	-2.183
	(0.084)	(0.248)	(0.242)	(6.910)	(2.177)
	[0.072]	[0.207]	[0.213]	[6.391]	[1.928]
Observations	148	148	148	148	148
Region FE	✓	✓	✓	✓	
Conley p 10	0.044	0.727	0.434	0.849	0.277
Conley p 100	0.013	0.694	0.389	0.844	0.236
Panel B. Additional controls					
Dummy any PE	0.139	-0.034	0.289	5.803	-1.359
	(0.100)	(0.366)	(0.286)	(8.448)	(2.463)
	[0.081]	[0.312]	[0.250]	[7.875]	[2.021]
Observations	117	117	117	117	117
Additional Controls	✓	✓	✓	✓	✓
Conley p 10	0.122	0.918	0.268	0.448	0.543
Conley p 100	0.046	0.890	0.202	0.450	0.443
City Controls	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust

Notes: Table shows the relationship of education lobby groups in 1839 and basic education outcomes in 1850, and the dummy variable for any Popular Enlightenment activity in the 18th century, be it subscriptions to the Enlightenment handbook or associations. Basic education 1839 is measured as the dummy variable indicating the presence of lobby groups for education in column (1). Further lobby groups are for science in column (2), and education in column (3). Basic education 1850 is measured as the number of primary schools per children in column (2), the number of primary school teachers per children in column (3), the number of primary school students per children in column (4), and the student-teacher-ratio in column (5). All columns include all basic control variables. In addition, all further Panel A adds historic region fixed effects, Panel B adds additional historical controls. These include population size in 1830/1850, population around 1810, the year of joining the Bavarian territories, a dummy indicating that there is a city with a history as a free city, a dummy indicating a city with more than 5,000 inhabitants in the 18th century, trade data from 1812 (only available for 117 districts), and the presence of a university city in the 18th and 19th century . Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.16: Relationship of Popular Enlightenment and basic education 1830 and 1850 in Protestant counties

	1830	1850			
	(1)	(2)	(3)	(4)	(5)
	Education Lobby	Nr. of schools	Nr. of teachers	Nr. of students	Student-teacher-ratio
Dummy any PE	0.117	-0.123	0.037	-15.723	-3.701
	(0.236)	(0.634)	(0.461)	(16.745)	(4.384)
	[0.174]	[0.440]	[0.288]	[11.852]	[2.847]
Observations	30	30	30	30	30
City Controls	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust
Conley p 10	0.519	0.798	0.915	0.229	0.274
Conley p 100	0.478	0.757	0.868	0.227	0.104

Notes: Table shows the relationship of basic education outcomes in 1830 and 1850, and the dummy variable for any Popular Enlightenment activity in the 18th century, be it subscriptions to the Enlightenment handbook or associations. Basic education 1839 is measured as the dummy variable indicating the presence of lobby groups for education in column (1). Basic education 1850 is measured as the number of primary schools per children in column (2), the number of primary school teachers per children in column (3), the number of primary school students per children in column (4), and the student-teacher-ratio in column (5). Observations are limited to counties with a Protestant majority. All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.17: Relationship of Popular Enlightenment and basic education 1830 and 1850 in Catholic counties

	1830	1850			
	(1)	(2)	(3)	(4)	(5)
	Education Lobby	Nr. of schools	Nr. of teachers	Nr. of students	Student-teacher-ratio
Dummy any PE	0.268**	-0.309	-0.024	2.919	0.619
	(0.113)	(0.297)	(0.255)	(8.402)	(2.254)
	[0.094]	[0.281]	[0.244]	[7.941]	[2.157]
Observations	118	118	118	118	118
City Controls	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust
Conley p 10	0.013	0.273	0.921	0.713	0.771
Conley p 100	0.003	0.194	0.917	0.682	0.740

Notes: Table shows the relationship of basic education outcomes in 1830 and 1850, and the dummy variable for any Popular Enlightenment activity in the 18^{th} century, be it subscriptions to the Enlightenment handbook or associations. Basic education 1839 is measured as the dummy variable indicating the presence of lobby groups for education in column (1). Basic education 1850 is measured as the number of primary schools per children in column (2), the number of primary school teachers per children in column (3), the number of primary school students per children in column (4), and the student-teacher-ratio in column (5). Observations are limited to counties with a Catholic majority. All columns include all basic control variables. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

Table A.18: Relationship of Popular Enlightenment and basic education 1830 and 1850 excluding outliers

	1830	1850			
	(1)	(2)	(3)	(4)	(5)
	Education Lobby	Nr. of schools	Nr. of teachers	Nr. of students	Student-teacher-ratio
Dummy any PE	0.192**	0.357	0.554*	7.573	-4.699*
	(0.089)	(0.334)	(0.299)	(8.388)	(2.681)
	[0.076]	[0.277]	[0.266]	[8.335]	[2.338]
Observations	143	143	143	143	143
City Controls	✓	✓	✓	✓	✓
Population Controls	✓	✓	✓	✓	✓
Economy Controls	✓	✓	✓	✓	✓
SE	Robust	Robust	Robust	Robust	Robust
Conley p 10	0.027	0.254	0.055	0.341	0.070
Conley p 100	0.005	0.130	0.023	0.300	0.030

Notes: Table shows the relationship of basic education outcomes in 1830 and 1850, and the dummy variable for any Popular Enlightenment activity in the 18$^{\text{th}}$ century, be it subscriptions to the Enlightenment handbook or associations. Basic education 1839 is measured as the dummy variable indicating the presence of lobby groups for education in column (1). Further lobby groups are for science in column (2), and education in column (3). Basic education 1850 is measured as the number of primary schools per children in column (4), the number of primary school teachers per children in column (5), the number of primary school students per children in column (6), and the student-teacher-ratio in column (7). All columns include all basic control variables. Five observations were excluded due to disproportionally large numbers of Enlightenment associations or handbooks; see main text for further details. Standard errors in round parentheses are robust. The square parentheses additionally give the results when adjusting standard errors for spatial correlation. The cut-off is 50 km. The p-values when applying alternative cut-offs of 10 km and 100 km are given at the bottom of the table. Asterisks mark the significance level based on robust standard errors: * $p < 0.1$, ** $p < 0.05$, and *** $p < 0.01$.

A.3 Detailed Description of Popular Enlightenment Associations, Representatives, and the *Need and Assistance Book*

Enlightenment Associations

van Dülmen (1996) presents an overview of research on Enlightenment associations and includes an extensive list of associations throughout the German-speaking territories. For Bavaria, I have information on altogether 105 associations. The following section will provide a more detailed description of these associations, their goals, some important representatives, and research into where their interest in spreading Enlightenment values may be rooted based on notable examples.

Societies of the 17th century

The societies of the 17th century were mainly based on intellectual members, as non-academic interest in Enlightenment mainly arose during the 18th century. Their main goal was the cultivation of the German language. Despite not (yet) approaching the general population directly, these societies often were interested in involving the general population in the Enlightenment debate and process.

Two notable examples: First, the "Pegnische Blumenorden", which was founded in Nuremberg in 1644 and exists until today.[85] The founder of this association wrote a book, which was, quite unusually at the time, not written in Latin, but aimed at being readable also by non-academics. The founder of the "Pegnische Blumenorden" was not originally from Nuremberg, but from Northern Germany. It is, hence, possible that he brought the idea from other parts of Germany to Bavaria. All founding members engaged in educational journeys and were in correspondence with

[85] Information on the "Pegnische Blumenorden" is based on information provided by the association in Kügel (2019).

academics and learned people all across Europe. Nuremberg would later on become the main hub of Popular Enlightenment in Bavaria, boasting elven associations of different formats.

Second, the "Oettinger Blumengenossen". It was based at the court of the count of Oettingen who himself was a poet and writer. It was early on connected to the Nuremberg association through personal ties. The later headmaster of the local grammar school and member of the association was originally from Nuremberg and was also a member in the "Pegnische Blumenorden" (Layer, 1968, p. 177). Even the early association landscape shows that personal ties and networks affected the founding of Enlightenment associations and spreading of Enlightenment ideas.

Learned societies

The early and mid 18th century also produced a variety of mostly academically focused associations. The learned societies began in the German territories with the founding of the "Berliner Akademie" in 1700. Bavaria followed suit in 1759 with the "Churbayerische Akademie der Wissenschaften" that is today's "Akademie der Wissenschaften" in Munich.

The academy in Munich lists over 300 members in the 18th century, many of which would become very influential for Bavaria's development throughout the 18th and also 19th century. The goal of the academy was to further communication and support research into all "useful sciences".[86] It was internationally connected, for example to the Royal Society in London (its president Joseph Banks became a member in 1785). The academy spread across Bavaria over the course of the 18th century. Based on the membership list kindly provided by the "Akademie der Wissenschaften", which is linked to "Katalog der Deutschen Nationalbibliothek", I could determine the location of about $\frac{2}{3}$rd of the earliest members. For the 18th century, this reveals a link of 34 Bavarian counties through the Akademie der Wissenschaften.

[86] See `https://badw.de/geschichte.html` (last accessed 02-03-2020).

A strong focal point of members was, of course, Munich. The founding of the academy was strongly lobbied for by Georg Lori, a high-ranking civil servant who also had personal ties to Enlightenment-minded people across Germany (Hammermayer, 1987).[87]

German societies

Mostly founded in the 1750s to 1760s, their goal was to further the cultivation of a proper (dialect and mistakes free) usage of the German language in academia but in particular also in the general population (van Dülmen, 1996, pp. 43). This should enable people to follow and participate in informed discourses. These societies mostly used literature outlets, such as weekly "Moral Magazines" ("Moralische Wochenschriften"). In these publications they discussed the importance of Enlightenment values for the general population. Some of these weekly magazines soon reached a very high number of subscribers.[88] These magazines also had the goal of furthering patriotic interest amongst its readership, thus promoting the spreading of Popular Enlightenment amongst potential proponents. Moral education was supposed to be taken from the up till then sole interpretation of the church and rulers and given a secular spin. Through this, these societies were the first privately founded institutions that stressed the importance of enlightened values for the general

[87]He corresponded, for example, with Johann Gottsched, a professor in Leipzig, a proponent of Popular Enlightenment, and founder of a German society himself, who is listed as a follower of the Enlightenment proponent Wolff, who was also a teacher of Johann Ickstatt (Wölfel, 1964), one of the leading individuals for Enlightenment in Bavaria. Ickstatt's influence over the spreading of Enlightenment in Bavaria was quite vast, in fact. As an example: He was a professor for Law at the University in Wurzburg, which is sometimes referred to as the gate-way of Enlightenment for Catholic Bavaria, and a former teacher of the man, who would later become the supervisor for the doctoral thesis of Georg Lori; personal contact of the two is documented in their biographical information. Ickstatt himself was a student and follower of the influential Christian Wolff (a so called "Wolffian") at the University of Marburg through his studies there. Wolff is a main character in the German Enlightenment movement (Schrader, 1898). He was a professor of Philosophy and Mathematics at the University in Marburg (1723 - 1740). Wolff was a member of varies scientific societies, for example, of the Royal Society in London. He was also in contact with the early Enlightenment proponent Gottfried Leibnitz.

[88]A publication in Hamburg, for example, reached a potential readership of about 12,000-15,000 people (van Dülmen, 1996, p. 45).

population in order to enable rational thinking and civil moral amongst all layers of society.

The German society in Altdorf, for example, was founded by Georg Andreas Will, who was Professor of Philosophy in Altdorf, but had been in personal contact with Enlightenment advocate Johann Gottsched in Leipzig since 1746 (Mummenhoff, 1898). Gottsched was a main driver of German societies and the publication of their moral journals. In this capacity, he tried to inspire the founding of spin-offs of his own German society in Leipzig throughout the German territories, in particular in university cities. Gottsched additionally kept in contact with the academic associations, for example in Munich (van Dülmen, 1996, p. 48).

There were also associations by people outside the university towns, however. The founding of an association of this type in Altöttingen was the prelude of the development of a patriotic association, which will be discussed further below.

Patriotic societies

Patriotic in the 18th century referred to a focus on the common good of all the people, not a nationalist view. The patriotic societies had a clear goal of changing society for the better and educating the general population, stressing the importance of useful knowledge and the merits of using Enlightenment values. Members of these societies did not intend to produce new knowledge, which also distinguishes them from the previous (mostly academic) associations. They had the goal of increasing the application of already known modernised methods for (agricultural) production and the application of the natural sciences (van Dülmen, 1996, pp. 66). Further aspects of their activities were the improvement of local trade and industry, as well as the situation of the lower social classes, in particular through addressing the lack of modern education.

The patriotic societies generated large public interest. The author and publisher of the Enlightenment handbook, for example, discussed the possibility of a cooperation of these associations across the German territories for the good of the nation as a whole (Becker, 1794). One of the affirmatively signing associations willing to cooperate in this manner, was a society in Nuremberg.

The patriotic societies were mainly founded in two waves in the German-speaking territories; the first wave occurred during the 1760s, the second during the 1790s.[89] Members of these societies were mainly civil servants and belonged to the middle class and nobility.[90] van Dülmen (1996) estimates that there were about 4,000 to 5,000 members throughout the German territories.

One such association in Altötting-Burghausen, for example, evolved from a German society. Its founder, Franz Hoppenbichl (Haushofer, 1972) stood in contact to Ingolstadt (Johann Strixner, a doctor who had studied in Ingolstadt while Ickstatt was active there (Baader, 1825)) and an important publication outlet by Franz Kohlbrenner (the publisher of the first "Intelligenzblatt" (Westermayer, 1882)). Its goals were the improvement of education and agricultural productivity. The members met on a yearly basis and published their own magazine. van Dülmen (1996) also suggests, however, that the association mostly remained a society of and for learned men who failed to actively reach the farmers and lower social classes. Even though their efforts may not have resulted in an immediate improvement of agricultural production, it still served to further the spreading of the awareness of Enlightenment

[89] In Bavaria, five patriotic societies are documented by van Dülmen (1996). These were founded in Burghausen (1765), Ansbach (1765), Kaiserslautern (1769), Homburg (1778), and Nuremberg (1792).

[90] The membership list analysed by van Dülmen (1996, p. 68) suggests a strong participation of nobility and civil servants with 205 members in total between 1765 and 1778.

values and, hence, Popular Enlightenment.[91]

Masonic societies

Most masonic societies were founded in the German territories between the 1730s and 1800. In Bavaria, there are altogether 24 districts with 36 masonic societies in my data set between 1737 and 1792. The masonic societies differ from other associations as they were founded as secret societies of the nobility and middle class.[92] Their association was independent of denomination and trans-regional. They are the first platform for cooperation amongst the upper and middle class. Members used the masonic societies as an opportunity for self-organised and self-determined discourse in the absolutist state. Being secret societies, however, they did not communicate with the public (van Dülmen, 1996, pp. 55). Masonic societies were probably one of the most widely spread associations of the 18th century and van Dülmen (1996, p. 57) reports that up to an estimated 20,000 people across the German-speaking territories may have participated in one of these societies. Many joined these associations against the expressed wishes of the Catholic church.

Membership lists and biographical research shows that many of the people who were active in other Enlightenment associations were also in a masonic association. Hence, even if the masonic societies were not directly involved in spreading Enlightenment values, they are a measure of the organisation of the initiators of Popular Enlightenment.[93]

[91]The association is further an important milestone in the development of a modern agricultural organisation of Bavaria. Hoppenbichl was connected to other Enlightenment-minded people in Bavaria, for example the learned society in Augsburg (Haushofer, 1972). Members were further connected to the University of Ingolstadt, the Munich "Academy of Science", Passau, Freising, Kehlheim, Neuburg, Landshut and beyond the Bavarian boarders (Graf, 1993, pp. 98), where further various associations were founded.

[92]Note, however, that although members were supposed to be anonymous, some were still very well known even back in the day. One such example is the Minister Montgelas (Weis, 1997).

[93]Masonic societies varied greatly in their connection to Enlightenment. Many promoted the values of tolerance and rationality above superstition. Others, however, also shifted towards belief in the mystical. The most extreme forms were the Illuminati on the one hand (proponents of radical Enlightenment). Illuminati in the historical sense are in fact Bavarian Illuminati, as the order was founded here by Adam Weishaupt in 1774 and elicited great interest by politicians, scholars, and

A notable example for freemasons was founded in Bayreuth (1741). In fact, two associations were founded here, firstly the "Grossloge zur Sonne", secondly the "Eleusis zur Verschwiegenheit"[94]. The margrave of Bayreuth was the main force behind the founding of the masonic societies in Bayreuth, which were also situated at his court there. In 1740 the margrave had been introduced into the masonic society of his brother-in-law, Frederick the Great (later king of Prussia) and founded his own society upon his return to Bayreuth. The margrave of Bayreuth later also founded a learned society with an active educational goal in 1756. Beyer (1954) analysis the early history of the society and gives the societies in Erlangen and Ansbach as follower associations and further connections to Regensburg. The margrave's later successor, Karl Alexander, was one of the largest investors in the Enlightenment handbook. His bibliography also emphasises his investments in education in his territories, for example in the grammar school, and also the University of Erlangen (Haenle, 1882). He also founded his own masonic society in Ansbach, where a patriotic society was later founded in the 1760s.

Reading associations

Reading societies were the probably most common form of association in the 18$^{\text{th}}$ century (van Dülmen, 1996, pp. 82). Prüsener (1972) provides an extensive collection of reading associations for the German-speaking territories in the 18$^{\text{th}}$ century which I further cross-referenced and built upon using the newer research of van Dülmen (1996, pp. 150). I have information on over 300 reading associations.

artists far beyond the Bavarian boarders. For further information, see, for example Lennhoff et al. (2006) or Project "Illuminatenaufsätze im Kontext der Spätaufklärung: Ein unbekanntes Quellenkorpus unter Leitung von Prof. Martin Mulsow", based on Schüttler (1991) and built upon by biographical data at the Forschungszentrum Gotha by the University of Erfurt. They propose over 1,300 supposed members of the Illuminati, and deem over 1,200 as certain or very likely members. At the other end of the spectrum were the Rosicrucians, who attempted alchemy, for example. Both orders often had subgroups of supporters within existing societies.

[94]The association exists until today: `https://www.eleusis-zur-verschwiegenheit.de/geschichte.html` (last accessed 20-03-2020).

They were an in-between form of masonic and patriotic societies. They were as popular as the former, but had a philanthropic goal through emphasising the value of education, similar to the latter. Reading associations are connected to Popular Enlightenment as many had the expressed goal of furthering the interest and distribution of useful knowledge and books. They were mostly founded during the second half of the 18$^{\text{th}}$ century, in particular starting in the 1770s, and mainly motivated by people's search for new reading materials.[95] Whether this increased interest in reading materials was demand or supply driven is not entirely clear. The market for books and periodicals is reported to having changed drastically, however, during this time. Not only did it increase significantly in volume, but also the reading experience itself changed from being mostly Latin and with a religious context to German and having an informative and amusing focus (van Dülmen, 1996, p. 83). Hence it also became more common to not continuously re-read old materials, but rather require new reading materials.

Prüsener (1972) reports that the reading experience spread through all social classes during the 18$^{\text{th}}$ century, even down to the serving classes. The main driver of reading associations were, however, the upper and in particular the middle class. Members were mostly from the middle class, such as clerks, doctors, pastors, learned people, and also primary teachers. These types of associations allowed access to a wide variety of topics and, hence, helped keep up to date on new information regarding many different areas, be it agriculture, history or current events (van Dülmen, 1996, pp. 82).

There are different forms of reading associations. The first associations appear to having been mainly a pulling of funds in order to gain access to a larger amount of reading materials. These associations could simply be a cooperation in order to subscriber to a periodical that was then passed around its members. This type of

[95] In Bavaria there are 45 reading associations documented for 20 cities. For the majority of cities, the founding date or date of first mention is known: They existed between 1772 and 1802 with the first ones founded in Bayreuth in Oberfranken.

cooperation could also be extended to books, however. Lending libraries were organised on a private basis mostly by book-traders. The reading cabinets met up in order to read and discuss together, often organised in public rented rooms. These associations often also founded their own libraries. Many reading associations formulated their own statutes which very often resulted in democratic structures for these societies in which members were all regarded as equal.[96] It was also common to have a monthly meeting of all members were a lecture was held. Documents on these lectures and ensuing discussions indicate that all topics of the Enlightenment area were relevant here (van Dülmen, 1996, p. 88). The most common form was the classic association with rooms available to gather and discuss the works of interest.

Details on the Enlightenment Handbook

Siegert (p. 1112 1978) describes the "Noth - und Hülfsbüchlein" by Rudolf Zacharias Becker as one of the most widely distributed and influential books of the Popular Enlightenment movement in the 18th century. It was advertised for purchase in Becker's magazine "Deutsche Zeitung für Jugend und ihre Freunde", produced in Gotha, and sent to subscribers all over the German territories (and even some abroad). Altogether, the book sold roughly 27,700 documented copies, not including later re-prints. In Bavaria, 3,528 books were ordered in 21 cities.

Personal networks played a role in distribution. Becker was a member of two masonic associations in Gotha. [97]. Personal contacts though these associations connected him, for example, to the lodges in Nuremberg, which were further connected throughout Bavaria, for example, to Erlangen and Bayreuth. In all these cities, large quantities of Becker's book were ordered. In addition, Becker was connected

[96] This is not an implicit situation in the confines of 18th century enlightened absolutism and strict societal structures.

[97] See `https://projekte.uni-erfurt.de/illuminaten/Rudolph_Zacharias_Becker` (last accessed 20-12-2019) and Zu den drei Pfeilen (1864, p. 11, p. 14)

to the Illuminati network of Weishaupt in Bavaria.[98] Personal letters of Becker even point to a direct utilisation of the network by Becker in order to spread news of his handbook.[99]

The book was always intended as a means for Popular Enlightenment. Becker even devised a strategy, how the Enlightenment of the general population could be achieved with the help of his book. The Enlightenment handbook was meant to be bought in large quantities by people interested in furthering Popular Enlightenment of the masses and distributed amongst them, in particular to the population capable of reading and conveying or reading aloud, as for example pastors and teachers. Becker even devised a book of question for teachers to incorporate the book in their lessons. Here he states: "The teachings [of the handbook] are, with good reason, not told in a scholastic order, but incorporated in the story. For it is a common experience that happy and sad events, which we ourself or others experience, move our spirits in such a way that the lessons we draw from them are more firmly engraved in our minds than an ordinary lecture." (Becker, 1790, pp. 5).

The book is written in a simple, easily understandable style and is supposed to entice the reader's interest by providing stories of the fictional town of Mildheim. Becker's intention was to gain the readers' (or listeners) interest through eye-catching stories and, thus, also gain their attention for more informative knowledge that was included in the book. In general, however, it was meant to increase the reader's or listener's interest in self-improvement and -education; to raise awareness that it is not necessary to solely rely on what others instruct you to do and belief, but rather to being able to use a rational thinking approach.

[98] Based on research by the University of Erfurt, Project "Correspondence amongst Illuminati", see `https://projekte.uni-erfurt.de/illuminaten/Projekt:Die_Korrespondenz_des_Illuminatenordens` (last accessed 20-12-2019).

[99] First, Becker assured access to the postal-routes of Thurn und Taxis in Regensburg (discussed in a letter to Bode on 1784-11-07), second in a letter on 1786-06-20 from Siebenkees in Altdorf to Weishaupt, they discussed that Grattenauer (a book trader) in Nuremberg would subscribe to the handbook, which he subsequently did (based on research by Markner and Schüttler for the University of Erfurt research project "Correspondence of the Illuminati-order").

The book was well received by buyers throughout most of the German regions, in particular in middle, and northern Germany (Province of Saxony and other Prussian regions). The Prussian districts contribute over 7,000 purchases to the total amount, with Pomerania (situated in the far north at the Baltic coast) being the largest contributor. The largest single order, in the entire purchase book, however, occurred in the Bavarian territory of Ansbach-Bayreuth, with 1,500 books in total, which were ordered by the ruling nobility, the Earl of Ansbach-Bayreuth. At first glance, it may appear that the Prussian districts ordered the bulk of the books, but relative to the size and in particular population size, the Bavarian territories have a high probability for the average commoner to having received the book. The most densely affected area is middle Germany, firstly due to being the centre of Enlightenment in Germany, secondly, the book was printed in Gotha in Thuringia, and thirdly the church there was, for the most part, more accommodating towards Enlightenment teachings. The empirical analysis, therefore, controls for the religious composition of the population.

The subscriber lists for the Enlightenment handbook were published in Becker's magazine, "Deutsche Zeitung für die Jugend und ihre Freunde, oder moralische Schilderungen der Menschen, Sitten und Staaten unsrer Zeit" (Becker, 1786, 1788a, 1787). This was meant to be an additional incentive for subscribers. Altogether, buyers had to order at least eight copies of the book, but when ordering at least 30, they were cited by name in the subscriber lists of Becker's magazine, which was distributed all over the German territories. [100] I digitalised the entire subscriber lists and assigned the subscribers to their geographic location. I further classified their listed profession, which I then cross-referenced with HISCO, from the History of work information centre, and then translated into HISCLASS, the social structure scheme, for further analysis, which is detailed in the main part of the paper.

[100] Of the 27,772 copies sold, merely 2,623 were listed as orders smaller than 30 books, and, hence, not cited by name, but simply collected as "single orders". These orders cannot be assigned to a region or individuals.

HISCO, by the International Institute of Social History in Amsterdam, offers an historic equivalent to the modern isco classification scheme by the International Labour Organization of professions in the 20th century for the 19th and early 20th century.[101] It is a widely used classification scheme for historic occupations. The data was mainly collected for various (western) European countries and mostly researched in registration documents between 1690 to 1970, with a focus on the modern era. HISCO codes occupations into nine major groups with over 70 minor groups, which are then further split up into actual occupational titles of the 1,000 most frequent occupational titles in the data set.[102] The database can be accessed online[103] or as book by van Leeuwen et al. (2002). Table A.19 shows the original classification structure. The organisational scheme classifies professions in ten major categories, ranging from professional/technical workers to administrative, clerical, sales, service, agricultural, and production workers with several subclasses of occupations indicated a five-digit code. For example, a "Bergrat" in the subscription lists can be classified as belonging to the administrative workers (2), as a legislative and government worker (20), and further as a government administrator (20210). There are 276 individually listed subscribers in total, 25 in Bavaria [104].

Table A.19: Major groups in the HISCO classification scheme

Major groups	Title
0/1	Professional, technical and related workers
2	Administrative and managerial workers
3	Clerical and related workers
4	Sales workers
5	Service workers
6	Agricultural, animal husbandry and forestry workers, fishermen and hunters
7/8/9	Production and related workers, transport equipment operators and labourers

Notes: Based on van Leeuwen et al. (2002, p. 39).

[101] I cross-referenced the professions with the Thesaurus Professionum of the University of Marburg in order categorize some of the given professions as this data collection is more specific with German profession designations; e.g. to help determine whether a profession should be categorised as belonging to the government or as an administrative position (Marburg, 2020).

[102] For Germany, this data is based on 17,011 family records between 1692 and 1950. See van Leeuwen et al. (2002, p. 11 ff).

[103] `https://historyofwork.iisg.nl/` (last accessed 20-12-2019)

[104] There is one subscriber in Bavaria, who's profession was not listed.

I assign social backgrounds to subscribers and gain further insight into the people, who were interested in spreading Enlightenment values and took active measures to achieve this. The social class of the subscribers can be determined using the HISCLASS classification scheme developed by van Leeuwen and Maas (2011). HISCLASS assigns the occupational groups of HISCO into one of twelve social classes, differentiating between non-manual and manual labour, and further by skill-level, supervision, and sector in descending order (van Leeuwen and Maas, 2011, p. 26). van Leeuwen and Maas (2011) rely on the *Dictionary of Occupational Titles*, which offers 13,000 occupations (van Leeuwen and Maas, 2011, p. 35) in order to research information on these determinants of occupations. Table A.20 shows the classification groups.

Table A.20: Overview of social classes and HISCLASS classification scheme

Social class	Class number	Class label	(Non-) Manual	Skill level	Supervision	Sector
Elite	1	Higher managers	non-manual	high	yes	mainly other
	2	Higher professionals	non-manual	high	no	other
Middle	3	Lower managers	non-manual	medium	yes	mainly other
	4	Lower professionals, and clerical and sales personnel	non-manual	medium	no	other
	5	Lower clerical and sales personnel	non-manual	low	no	other
	6	Foremen	manual	medium	yes	other
	7	Medium skilled workers	manual	medium	no	other
Lower	8	Farmers and fischermen	manual	medium	no	primary
	9	Lower skilled workers	manual	low	no	other
	10	Lower skilled farm workers	manual	low	no	primary
	11	Unskilled workers	manual	unskilled	no	other
	12	Unskilled farm workers	manual	unskilled	no	primary

Notes: Based on van Leeuwen and Maas (2011, p. 57) and own social class assignment.

The distinction between manual and non-manual labour refers to whether an occupation is mainly hands, or head based. No significant relationship to things, barely any physical demands, and light work are, hence, qualified as non-manual work (see van Leeuwen and Maas (2011, p. 47 f)). Skill levels is high, when some form of higher (and longer) level of training is required in order to perform the occupation. Low skills would imply some reading and writing requirements, otherwise the occupation is unskilled (see van Leeuwen and Maas (2011, p. 49 ff)). Occupations may also include a supervision element. When a person is required to instruct other workers

in the same organisation (thus exuding school teachers, for example), he is in a supervising position and, thus, classified as higher up in the social class hierarchy than otherwise. Finally, the economic sector is either the primary, agricultural, sector, or simply other (see van Leeuwen and Maas (2011, p. 53 ff)). I assign HISCLASS groups one and two to the elite social class. These are highly-skilled non-manual occupations. The middle class are also mostly non-manual workers, except for foremen and medium skilled workers, but these still have a medium level of skill. The middle class are HISCLASS groups three to seven. The lower social classes, HISCLASS groups eight to twelve, are all manual workers with no supervision tasks and mainly in the primary sector.

The subscriber lists encompass seven of the twelve social classes for all German territories, in Bavaria, however, only classes 1 through 4. The "Bergrath" subscriber from above, for example, who was classified as a 20210 HISCO, is cross-referenced into the social class 1 of HISCLASS according to the list provided by van Leeuwen and Maas (2011), which refers to the highest social class of a higher manager, with mostly non-manual work, a high skill level, and supervisory position. The ruling nobility, which plays a substantial role in the subscription lists, is classified as belonging to the elite, hence, class number 1. Most clerical workers are situated in class 2 of higher professionals, but without supervisory competences. I classify HISCLASS groups 1 and 2 as "elite", and the groups 3 to 7 as middle class.[105]

[105]See, for example, Maas and Van Leeuwen (2005) or Semrad (2015a).

2 | Increasing Schooling Intensity: The Effect of a German School Reform on Social Capital

Policy makers across the world aim to optimise education and schooling outcomes to enhance economic development and individual opportunities. One important aspect is the optimal duration of schooling. While spending more years in school means that students can receive a broader education, it also implies that graduates enter the labour market later and that the tax base is, thus, reduced. One way of how governments have approached this potential trade-off is by increasing schooling intensity[1], i.e. reducing the years spent in school while increasing hours per year. This, however, gives rise to a new trade-off: Requiring students to spend more time on their school work reduces leisure time and opportunities to develop and contribute outside the classroom. As a result, it is more difficult for students to invest in social capital. This paper sheds light on this potentially adverse effect of schooling intensity on social capital formation.

Measuring the effect of schooling intensity on social capital formation empirically is difficult. While schooling intensity might influence social capital, it is also plausible that societies' preferences for social capital determine schooling intensity. I use a large educational reform in Germany to overcome this problem. The so-called

[1]Previous literature has also termed this learning intensity, which refers to the effect of compressing the same learning contents into less instructional time. See, for example Huebener and Marcus (2015).

German G8 reform ("Gymnasium in 8 years") reduced total years of academic-track schooling from nine to eight years, while leaving graduation requirements unchanged. Students were required to spend more afternoons in class and to process taught materials at a higher rate.[2] The sequential introduction of the reform in the German federal states increased schooling intensity for some school cohorts, but not for others. This allows me to apply a difference-in-difference approach. Thus, I can exclude all general changes in social capital among youths. This paper goes beyond existing research (Huebner et al., 2017; Meyer and Thomsen, 2015; Krekel, 2017) in not only considering the effect of the reform on treated students, but also later on in life after graduation and longer-term effects. I provide causal evidence that the reform had an overall negative effect. I confirm that the overall reform effect is mostly driven by students at high school who were amongst the first to be exposed and less strong for individuals after graduation. This paper further shows that there is no continued negative effect of the reform in later treated cohorts.

I consider the effect of increasing schooling intensity on social capital measured as volunteering in social clubs and organisations. Volunteering is an important economic factor along several dimensions. First, it is part of social capital investment. Social capital is an important contributing factor to economic growth and very persistent in nature (Putnam, 1993; Guiso et al., 2011, 2016). It fosters trust and social behaviour (Alesina and Giuliano, 2015). Second, volunteering is important at an individual level in particular at younger ages. It may serve as a signal for social skills, for example, which can contribute to labour-market entry opportunities (Piopiunik et al., 2018).

This paper shows the importance of considering spillover effects in order to measure a precise treatment effect. The effect of the reform is only correctly measured when taking partially-treated individuals into account. These are individuals who experienced both schooling systems. The negative effect of the reform is less pronounced

[2]On average, the weekly amount of time spent at school increased by 12.5 percent with the G8 reform. See, for example, Huebener and Marcus (2017).

in these cases. Students get used to a certain leisure time routine when still in the old system. Then they get treated and schooling intensity increases. Partially treated individuals appear to carry their voluntary investment behaviour over even after being treated. This may be due to keeping up social contacts in clubs beyond the classroom, for example. Family also matters for voluntary investment. People without siblings are more negatively affected by the reform than individuals with siblings.

I show that there is a decrease in volunteering in the overall sample across age groups 17 to 30. This effect is largely driven by students in the sample. Their reduction in voluntary activity by about six percentage points relative to mean participation of 29 percent is substantial and robust. The treated adult sample after graduation – that is not attending university – shows a similar reduction of volunteering when sample size is large enough. This effect appears mainly driven by individuals right after graduation and is not persistent across later observed periods. Graduates who attend university show no significantly lower voluntary activity as part of treated compared to untreated cohorts.[3]

This paper further provides new evidence that the reform does not appear to have a lasting aggregate effect over time. Event study evidence shows that the negative effect of the reform is mainly driven by the difference in investments by the last untreated to first treated cohorts. The first treated cohorts reduced volunteering, while the last untreated cohorts significantly increased their activities. Later treated cohorts show higher voluntary investment than early treated cohorts. This may be due to individuals and institutions adapting to the new schooling intensity over time by providing volunteering opportunities based on the remaining free time in the new schedules. On the other hand, this may also imply a media effect. The first treated individuals were most intensely exposed to the public discussion on

[3]University students generally tend to have higher social capital investment (OECD, 2015).

the negative reform effect which may have led to a stronger reduction of outside of school activities in these cohorts.

I assess the effect of the reform on additional social capital outcomes besides voluntary activity. The reform does not seem to significantly affect political interest or cultural activity overall. Social interactions, such as meeting friends and neighbours, are significantly reduced, but the magnitude is very small. Treated individuals are, furthermore, significantly more likely to engage in a voluntary social or military year after graduation. For the student sample I measure further leisure time activities as sports and music activity. There is very little to no robust significant effect of the reform on these additional outcomes.

This paper contributes to the literature on the effect of education and optimal schooling policy on social capital investment. Previous literature on optimal schooling has often focused on education and labour market outcomes. School duration is association with better outcomes in both aspects (Card, 2001; Morin, 2013). There is also evidence that higher learning intensity can reduce student performance (Pischke, 2007). Analyses of the effects outside of school are more limited. Helliwell and Putnam (2007); Milligan et al. (2004), for example, connect education to higher levels of trust and political participation. Siedler (2010) on the other hand argues that there is no causal effect of increasing school duration on political interest or democratic participation in post-war Germany. Oreopoulos and Salvanes (2011) show that schooling improves trust and social interactions. Glaeser et al. (2002) analyse factors that determine social capital investment and show that human capital and social capital investment are positively connected. Algan et al. (2013) focus on the effect of different teaching practices on various social capital outcomes. I contribute to this literature by using a quasi-natural experiment to provide causal evidence on how policy that optimizes schooling outcomes can also have adverse effects outside the classroom by showing that an increase in schooling intensity impacts social capital investment, in particular voluntary activity.

This paper is organised as follows: Section 2.1 provides background information on the G8 reform and previous literature on the reform effects. Section 2.2 describes the data and empirical approach. Section 2.3 shows the main results of the empirical analysis on the overall sample and the importance of considering spillover effects in order to clearly identify the treatment effect. Section 2.4 distinguishes the treatment effect for the sub-samples of high school students, university students, and adults. Section 2.5 provides event study analyses. Section 2.6 concludes.

2.1 Description of the G8 Reform

The widely and swiftly implemented German G8 reform ("Gymnasium in 8 years") reduced school duration at academic-track schools[4] from nine to eight years and, hence, reduced the time until graduation from altogether 13 to 12 years. The goal of the reform was to achieve that high school graduates enter the labour market younger in order to compensate for demographic change, and to increase international competitiveness by earlier job market entries.[5] Between 2001 and 2008, 14 out of 16 German federal states reduced school duration. It affected students beginning secondary school as part of the 1999 cohorts. Academic track high schools are attended by over 30% of children in Germany (Hoffmann and Malecki, 2018). The reform, thus, affects a sizeable amount of the population.

The reduction of school duration was accompanied by an increase in learning intensity. Subjects and taught contents remained overall the same, as university entry qualifications were not changed. The Standing Conference of Education Ministers

[4]German students can choose between two to three types of secondary schools after primary school. These are lower-secondary school ("Hauptschule"), modern secondary school ("Realschule"), and academic-track school ("Gymnasium"). Graduating from the academic track allows university entry. Most children change schools at age 10.

[5]All federal states follow a similar line of argument: German high school graduates, and thus, also university graduates were at a disadvantage internationally due to their comparatively old age at graduation. Additionally, earlier job market entries would serve to increase the tax base to compensate for demographic change in Germany. See, for example, Ministerium für Bildung Kultur und Wissenschaft (2001) or Bayerischer Landtag (2004).

specifies that all upper secondary students need to fulfil at least 265 yearly week hours until graduation. Curricula show that the increase in instructional time affects in particular the middle grades as the number of taught subjects increases over time in the German school system.[6] Many students in G8 are in class for 30 instructional hours per week in fifth grade increasing up to 36 hours per week by tenth grade.[7] This implies that they spend on average up to three hours more in the classroom than older cohorts.[8] Afternoon leisure time of students is further reduced by an estimated two hours a day for homework (Gramm, 2007).[9] This leaves less time for leisure and social capital activity.

Previous research has shown varying effects of the reform. This research is mostly focused on the immediate effect on students. Student performance is increased for high-performing students (Huebener et al., 2017), but performance at graduation reduced (Buettner and Thomsen, 2015). Repetition rates have increased due to the reform (Huebener and Marcus, 2017). Graduates are younger, but university enrolment is delayed (Marcus and Zambre, 2019). There is evidence that G8 students are more stressed compared to untreated cohorts (Huebner et al., 2017; Marcus et al., 2020). Many studies on the G8 reform have focused on a particular state or the double graduation cohort of G8 and the previous G9 system. Studies across several cohorts and states, which apply a similar empirical approach as this paper, can be found, for example, by Dahmann (2017), Anger and Dahmann (2015), Huebener and Marcus (2017), and Krekel (2017).

Interestingly, previous research has shown that the leisure time of G8 students appears to be reduced (Huebner et al., 2017; Meyer and Thomsen, 2015) and that

[6] An example of timetable changes between the old and the new schooling system can be found in Table B.1 in the Appendix.

[7] One instructional hour equals 45 minutes.

[8] See, for example, Huebener et al. (2017) or Marcus et al. (2020).

[9] Time use surveys conducted by the statistical office for the population in general show that between 2001 and 2012 the age group 10 to 17 reduced their daily time spent on leisure activities by 0.13 percentage points and increased the time spent on education by 1.2 percentage points. The age group 18 to 29, on the other hand, reduced their social and cultural activities in favour of more sports and media time, but their overall leisure time remained unchanged. See Table B.2 for further details.

pro-social behaviour in form of voluntary activity of students is negatively affected (Krekel, 2017).

I contribute to this literature in several ways. First, I not only consider the reform effect on students' behaviour but go beyond this and show how the reform effect can carry over into adult life. Second, I show evidence on what is driving the aggregate reform effect shown in previous studies and that no long-lasting effect of the reform is to be expected.

2.2 Data and Empirical Approach

2.2.1 Data description

This paper is based on survey data from the German Socio-Economic Panel Study (GSOEP).[10] GSOEP is a representative Panel of households in Germany and provides a wide array of household and individual based information. Over 25,000 individuals have been sampled every year since 1984. Since 2001 the pool of participants includes adolescents in the year they turn 17. Thus, I have data available for adults, as well as for students. GSOEP offers extensive background information, such as gender, age, marital status, on education, occupation, and family. This data allows me to generate a dataset of treated and untreated individuals.

I regard individuals born after 1980 and focus on survey years after 2000 for which the youth responses are also available. The data is limited to survey participants who are at or have graduated from academic-track secondary school, as this is where the reform was introduced.[11]

[10] This paper is based on the 34th wave, encompassing survey data from 1984 to 2017.

[11] I focus on individuals who have graduated from academic-track school as their first secondary degree, in order to clearly identify the treatment status of individuals who attain their university entrance degree. Comprehensive schools are excluded, as well as basic- and middle-track schools of the three-tiered German high school system.

Figure 2.1 details the basis for the empirical analysis as it shows the sequential introduction of the reform across the German federal states. Figure 2.1 lists the year when the shortening of school duration was introduced in the respective federal state. The map further shows federal states that introduced the reform for several grades at once (darker) compared to one grade (lighter). Individuals from federal states where the schooling system was never changed or the reform was only partially introduced are excluded from the analysis (white). These are Hesse, Thuringia, Rhineland-Palantine, and Saxony. Several states have (partially) revoked the reform by now. None of the individuals included in this dataset are affected by this.

Definition of sub-groups

I consider the effect of increasing schooling intensity for the overall sample, and also for three sub-groups in order to allow for higher comparability of treated and untreated individuals. Table 2.1 shows the different sub-samples, the age groups that are encompassed within these groups and the number of individuals and mean volunteering within this group based on the cross-section of first observations for volunteering and the Panel data structure within each of the groups.[12]

The first group is classified as at school, when individuals answer the survey while still at secondary school. The second group answers the survey while attending university.[13] Being at university may in itself be an endogenous outcome, as the G8 reform has been shown to influence university enrolment (Marcus and Zambre, 2019; Meyer et al., 2018).[14] I, therefore, further consider a third group. These high school graduates include individuals who never attend university.[15] I call this group

[12]Tables B.3 and B.4 provide descriptive statistics of the main variables in the overall Panel setting and for the sub-group cross-sectional data.

[13]Universities also include technical colleges.

[14]University enrolment is, for example, delayed in order to go abroad or take part in a voluntary year. It is, therefore, possible that the sample that I observe when they attend university is differently voluntary minded.

[15]Note that this is not the exact complement of the university sample. The university sample only includes individuals who are currently enrolled, but not individuals who will at some point in their life get a university degree. The adult sample excludes both.

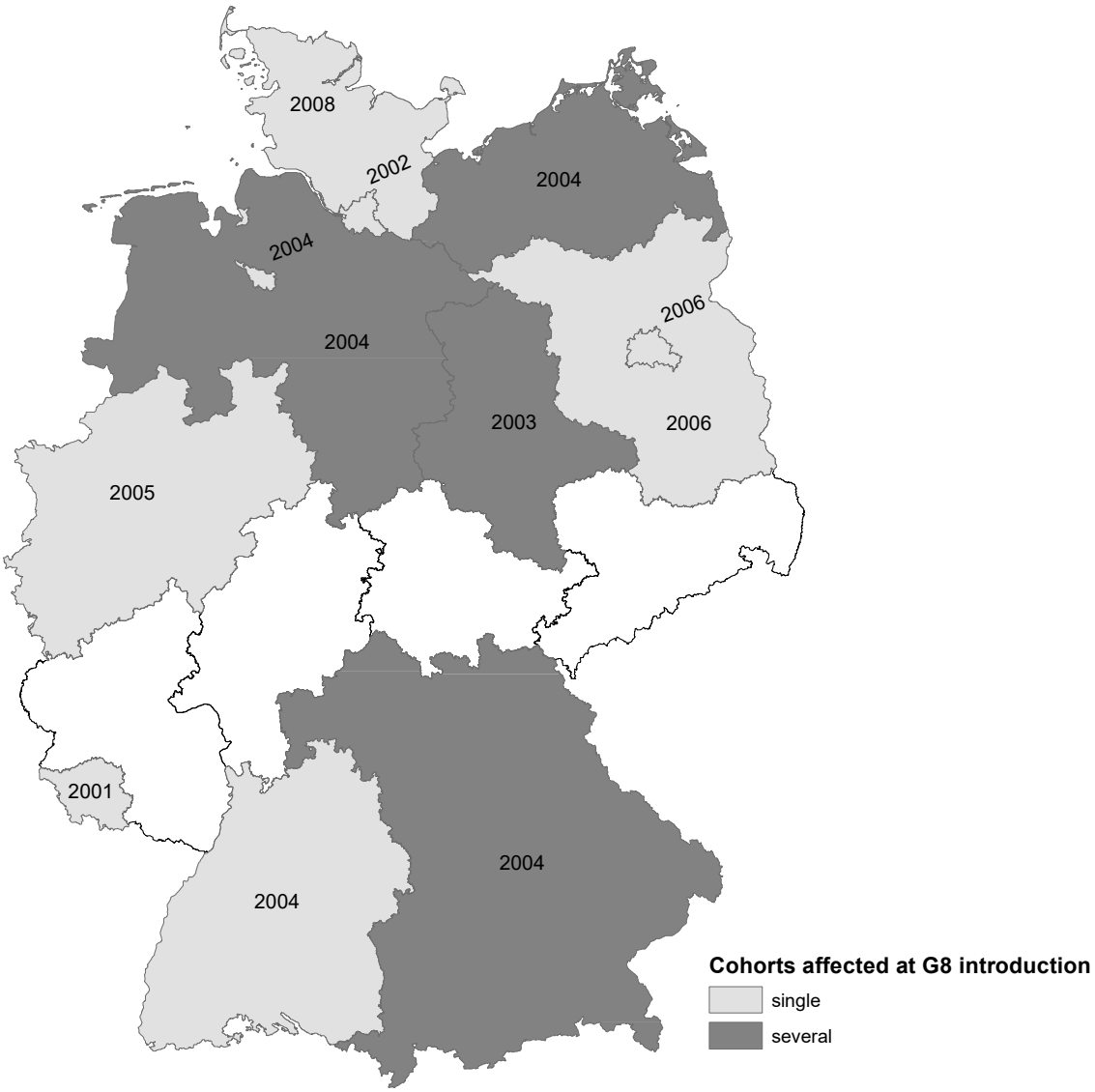


Figure 2.1: The G8 reform in Germany's federal states

Notes: The graph shows a map of the German federal states and the year when the G8 reform was introduced in each state. Federal state introduced the reform for several grades at once are shaded darker. States that are excluded from the analysis here are marked in white. Reform information is based on Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (2018).

Table 2.1: Definition of sub-samples

Subgroups	Age groups	Number of individuals cross-section	Mean volunteering cross-section	Number of observations Panel	Mean volunteering Panel
At school	17 – 24	2,583	0.28	–	–
Attending university	17 – 26	1,076	0.24	2,085	0.23
Adult	18 – 29	724	0.21	1,125	0.22

Notes: The table shows the different sub-samples used for the empirical analysis and the encompassed age groups. Sub-groups are defined as "at school" when individuals answer the survey while still at high school. "Attending university" are survey respondents who are enrolled at university. "Adults" are high school graduates who never enrol at university. The number of individuals and mean value of the probability to volunteer in these groups is based on the cross-section of earliest observations within the group. The table further shows the number of observations and mean of volunteering in the Panel data for the university and adult sample. The school sample is limited to a cross-section.

"adults". I compare the results of this group to an adult group that encompasses all individuals who are not currently enrolled at university, which doubles the number of observations, thus, adding more power to estimations.

As voluntary activity varies for individuals over time, I analyse the effect of increasing schooling intensity in a Panel setting where possible. Respondents in the student sample mostly only answer the survey once while still at school, therefore, analyses in this group are limited to a cross-section of first responses. University and adult sample results are presented for both cross-sectional and Panel data. This allows me to show the decrease in the reform effect across time as last responses tend to indicate higher average voluntary activity than analyses based on the first response of individuals.[16]

Outcome variables

The outcome of interest is social capital measured as voluntary activity in clubs or social services. Survey participants are asked to answer questions on how they spend their leisure time. They state the frequency of participating in a variety of activities, including "Doing volunteer work in clubs, associations, or social services". This includes, for example, volunteering in sports clubs or the voluntary fire department.

[16]First response implies the first available survey year for an individual answering the survey question on voluntary activity. Last response is the last available survey year the outcome variable is observed in.

Possible answers are "at least once a week"[17], "once a month", "less frequently", and "never". The youth survey has included this information every year since 2000, the adult questionnaire every second year. I aggregate this into a binary variable indicating that voluntary investment takes place at least once a month. Answers "less frequently" and "never" are, hence, defined as zero. In the Panel of all included individuals, about 25 percent invest in voluntary activity in my sample.[18] In the student sample, about 28 percent of individuals volunteer, in the university sample 24 percent, and in the adult sample 22 percent.

Figure 2.2 shows the development of the volunteering indicator across school cohorts from 1992 to 2010. All school cohorts before 1999 are untreated. Starting in 1999 the number of treated individuals increases. After 2008, all individuals in the sample are treated. The graph shows an increase in volunteering across time, which has already been documented in Burkhardt and Schupp (2019).[19] This trend is slightly dampened when the G8 reform is introduced after 1999. Volunteering decreases during the main wave of reforms after 2004, but shows a tendency to increase after 2007. The overall development of voluntary activity in this graph already indicates what will be confirmed in the analysis further below: there is a drop in volunteering after the reform is introduced, but later treated cohorts appear to recover voluntary investments.

I employ several further measures of social capital. First, I take political interest as outcome. Individuals of all ages indicate whether they are "very strongly", "strongly", "not strongly" or "not at all" interested in politics.[20] About 30 percent are strongly

[17] A few survey years (2003, 2008, 2013) and the youth questionnaire also include the option "daily". As this option is not available for every year, I aggregate "daily" and "once a week" into the category "at least once a week".

[18] Overall in the Panel, about 15 percent of individuals volunteer at least once a week, 9 percent once a month, 18 percent less frequently.

[19] The research shows that voluntary activity has contentiously increased in Germany for the past 30 years. The increase is particularly large amongst younger cohorts. One reason for this may be that public appreciation and encouragement of volunteering has increased in particular since 1990 (Burkhardt and Schupp, 2019, p. 772).

[20] This question is included every year in the adult sample and since 2006 annually in the youth sample.

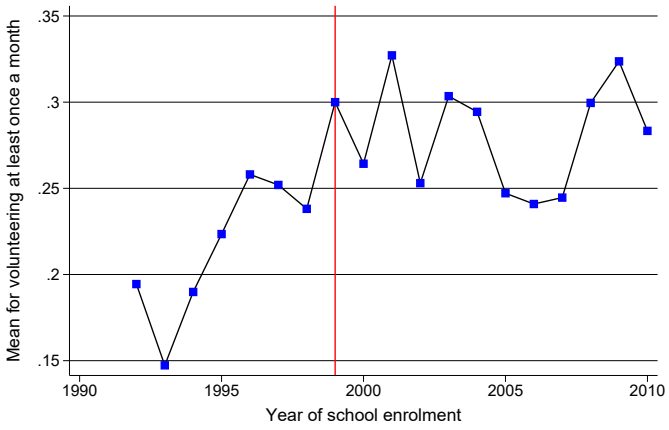


Figure 2.2: Mean development of volunteering by school cohorts in the overall sample
Notes: The graph shows the development of the percentage of individuals that volunteer at least once a month for school cohorts from 1992 to 2010. Mean values are based on the cross section across all individuals in the sample based on their response on voluntary activity. There are at least 100 individuals per school enrolment year. Treated cohorts start in 1999 with an increasing number of treated until 2010. From 2008 to 2010 there are only treated individuals in the sample. The main phase of G8 reforms was around 2004.

to very strongly interested in politics with the highest interest in the university sample.

I further estimate the effect of the reform on participating in voluntary services after graduation based on the provided biographical information. Voluntary services can encompass voluntary military or social services such as in hospitals. About 20 percent of high school graduates engaged in voluntary services, most of these immediately after graduation.[21]

The remainder of outcome variables lean stronger towards leisure than civic investment.[22] I estimate the reform effect on the probability to engage in cultural activities, such as visiting concerts.[23] Additionally, I measure the probability of social interactions by meeting friends and neighbours.[24] Both these binary variables turn one, if an individuals engages in either activity at least once a month. These

[21]The voluntary social year is often limited to ages 16 to 26 (Initiative Engagementförderung, 2020).
[22]Bauernschuster et al. (2014, p. 6) refer to these as "elements of social connectedness".
[23]This is a combination of two measures. Individuals can state how often they engage in classical cultural activity (going to concerts or museums) and also in modern cultural activity (going to the cinema). This information is available every second year since 2001 for the adult sample.
[24]This measure is available for 2003, 2008, and 2013.

measures apply to the graduate sample as they are only included in the adult questionnaire. In the student sample leisure time activities are engaging in sports and making music, which are provided as frequency from "daily" to "never" and taken as binary variables that turn 1 if either is at least performed once a month. The large majority (86 percent) of students engages in outside-of-school sports activities at least once a month, whereas music is actively played by just below half the sample.

Definition of treatment

An individual is treated as part of a G8 school cohort if she was enrolled in a grade at secondary school the year and class the reform was introduced in by her federal state or any year thereafter. The control group consists of individuals in the old G9 system. Timing differed across federal states (see Figure 2.1). Table B.5 provides details on the reform year, the grades the reform affected, as well as the first treated cohorts. A child starting secondary school in 2003, for example, was affected by the reform in Bavaria, but not in the neighbouring state of Baden-Wuerttemberg. Additionally, both these federal states have untreated cohorts before the reform was introduced. At least a third of individuals in each of the three groups are treated.[25] The reform was implemented between 2001 and 2008 resulting in affected school cohorts starting in 1999.[26] The first affected cohort and the last untreated cohort graduated during the same year throughout all federal states, creating double graduate cohorts which I control for.

I use the available education information in SOEP which lists the first year of starting secondary school, which type of secondary school was attended, the federal state of this school, and the achieved degree (Lohmann and Witzke, 2011).[27]

[25]The distribution of observations in treatment and control group can be found in Tables B.6 to B.8 in the Appendix.

[26]Information on the reform across the federal states is based on the conference of ministers of education, Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (2018).

[27]When the federal state of secondary school is unknown, I substitute this with the federal state of residence instead. Over 90 percent of individuals still list their federal state of graduation as the

Accounting for spillover effects

Leisure time, and, thus, also social capital investment is not only determined by time availability, but also by social interactions. When making a decision on how to spend leisure time, the activity of friends and family will play a role. Thus, it is important to control for spillovers.

I propose two ways to account for potential spillover effects. First, I consider partially treated individuals, who started high school in the old system and were then treated. There are several federal states that introduced the G8 reform not only for first year high school students, but for several grades at once. Saxony-Anhalt, for example, introduced the reform for grades five to nine.[28] Partially treated students may carry over their previous social capital investment even after being treated despite having less time available. This may be due to habit formation or that they are more likely to form friendships outside of school through their previous activities in clubs. In order to still meet these friends, partially treated individuals may carry on their voluntary activity independent of the reform. Thus, I expect partially treated individuals to be less strongly affected by the reform. Three percent of individuals in my sample are partially treated.

federal state of residence. When the year of starting school is unavailable, I extrapolate the school starting year based on month and year of birth. I take regulations for school entry for each federal state into account allowing for changes of these regulations across states and time. The German federal states can autonomously decide when children turn of age to enter school. When a child turns six years old before a state-determined deadline, she usually starts attending primary school at the age of six that year. When she turns six after this due date, she will generally wait one year until the next term. The extrapolated data shows that 50 percent of individuals started primary school by the age of six in my sample. The Statistical Office lists 64% of all six year old children as enrolled in school in 2018 (Hoffmann and Malecki, 2018). This implies that my sample of treated individuals may be increased as having more seven year old children impacts the school cohorts when the reform was introduced. These cohorts, however, are also part of the double graduate years when the last untreated and the first treated cohorts graduated together, which I control for.

[28]Partially treated cohorts were not more intensely treated. Affected school cohorts were simply introduced to the new curriculum of the G8 system without having to fulfil additional classes in order to compensate for not having had the treatment already in an earlier grade. The Bavarian constitutional court, for example, ruled in 2006 that the claim that the treatment of the sixth grade had been unlawful void. The court ruled that the switch from the old G9 system to the new G8 system did not put an unnecessarily high burden on students who were treated post-entry. The partially treated students were simply treated to the new G8 timetables without additional steps.

Second, I consider spillover effects through siblings.[29] Siblings' leisure time activities will play a role in several ways. First of all, similar activities are more likely to be carried out by all siblings, as awareness and accessibility will be higher if a brother or sister is already engaged. Furthermore, parents are likely to encourage similar leisure time activities amongst siblings, as this saves on potential equipment costs as well as time and organisational costs. I have sibling information for over 90 percent of all individuals in the sample; about 80 percent of these individuals have at least one sibling. I expect that having a sibling will reduce the impact of the reform relative to having no sibling.

For the student sample, I additionally consider the effect of having a single parent. A single parent will generally have less time to help with school work at home. Since the learning material is more condensed due to the G8 reform, an increase in homework is also to be expected. Children with single parents, who have less help at home, will, therefore, be more strongly affected by the reform, as they loose comparatively more time on managing the increased work-load.

Covariates

Basic control variables account for factors that contribute to the probability of investing in voluntary activity and may be correlated with the treatment.[30] These are gender, migration background, marital status (excluded in student sample), age[31], age squared, living in eastern Germany, and being part of the double graduate cohort.

[29]SOEP provides information on siblings living within the household. I match the personal IDs of all listed siblings with the treatment and social capital investment of these individuals. For the student sample I further distinguish between the effects of having an older versus a younger sibling, and having an untreated versus a treated sibling. Over 60 percent of individuals with siblings have at least one untreated siblings in my sample.

[30]See, for example, OECD (2015) or OECD (2016) for factors correlated with voluntary activity. The proposed basic control variables may be correlated with the increase in schooling intensity, as the reform effect may differ, but should be exogenous.

[31]I additionally test robustness of students' results by including grade fixed effects instead of controlling for age. Coefficients are slightly smaller, but significance remains unchanged in both cases. Results are available upon request.

Women and individuals with migration background tend to volunteer less on average, whereas married people invest more.[32] The overall sample consists of 54 percent females, and 26 percent have a migration background (either direct or indirect). Barely any of the individuals are married, as the average age overall is 18. Volunteering at first increases with age, but an eventually decreasing age effect is reasonable. The eastern German states already had a shortened school duration as part of their socialist history.[33] Fifteen percent of the sample live in eastern Germany. Basic controls further control for an individual having been part of the double graduation cohort when the last G9 and the first G8 cohorts graduated during the same year which may differ from other cohorts through this special circumstance.

Additional control variables are added to confirm robustness of the main results. I add background information for individuals' parents characteristics: having a parent that is a blue-collar worker, a parent that is married instead of single or separated/divorced, and having at least one parent with a tertiary degree.[34] I expect parental background controls to be most important for students. I also include additional robustness checks based on these variables for the university and adult sample, however, as the average age in both groups is still low at 21 which may indicate that their voluntary activity is still affected by their family background.

The student sample additionally controls for having lived in the countryside. Living in a rural area during childhood may imply that parents have to cover larger distances in order to enable volunteering. On the other hand, rural areas also offer less outside options for spending leisure time, which may make volunteering more attractive.

[32]Evidence on the effect of gender on social capital investment appears mixed. OECD (2015) suggests there is more volunteering amongst females than males. Glaeser et al. (2002) on the other hand show that social capital investment is lower for women.

[33]Apart from Saxony and Thuringia, these states adapted the longer school duration after joining the FRG in 1990 and returned to the shorter schooling system later on.

[34]This is based in line with previous research, e.g. Krekel (2017).

The high school graduate sample includes occupational categories.[35] As this may be endogenous to the G8 reform, I only consider this in additional specifications, but do not rely on it for main interpretation of results. I add covariates for holding a blue-collar rather than a white collar job, being an apprentice, and being employed. I further include the net monthly household income.

2.2.2 Empirical Strategy

The empirical approach relies on the comparison of cohorts prior and after the school reform based on students school entry dates and on the states introduction dates of the shorter schooling system relative to individuals in the previous system. This implies the following basic regression equation for a linear probability model[36] in the Panel data setting:

$$SC_{i,t} = \beta_0 + \beta_1 G8_{s,c} + X'_{i,t}\lambda + \mu_s + \gamma_c + \theta_t + \eta_g + \epsilon_{i,t}$$

with $G8_{s,c}$ as dummy variable that turns 1 if individual i was affected by the introduction of the G8 reform in state s as part of school cohort c. The main coefficient of interest β_1 measures the impact of the reform on social capital of individual i as reported in the survey at time t. The model includes state, μ_s, and cohort, γ_c, fixed effects. The main estimations additionally include survey year fixed effects, θ_t , in order to account for factors that may have affected answers in a particular survey year. One such event may have been, for example, the refugee wave in 2015, which may have increased voluntary activity in this particular year and, thus, increased the stated social capital frequency for this survey year across all federal states. As the SOEP is collected for different sub-groups, I also include survey sub-group fixed effects, η_g, in the main specifications. In additional robustness checks, I add lin-

[35] See e.g. Oreopoulos and Salvanes (2011), Heliwell and Putnam (2007) or Glaeser et al. (2002).

[36] I test the robustness of the results to using a probit instead of the LPM model. The main conclusions hold. Furthermore, the resulting margins coefficients are very close in magnitude to the here presented results. Results are available upon request.

ear time trend variables in order to account for differential trends across treated regions. Individual level control variables are gathered in vector $X_{i,t}$. These are the basic controls described in section 2.2.1 above. Standard errors are clustered at the state level. I account for the low number of clusters by additionally applying wild bootstrapping according to Cameron et al. (2008) and Roodman et al. (2019). [37]

Several threats to identification may occur. First, the common trend assumption that treated and non-treated individuals would have developed similarly in absence of the reform requires that the G8 reform did not coincide with other changes that would be correlated with social capital investment. Some additional school reforms took place during the early 2000s. These include the introduction of central exit examinations in eight states, so schools do not prepare individual A-level exams anymore, but these are organised at state level. The tracking grade at which students first change from primary to secondary school was changed in three states.[38] The secondary schooling choices outside of academic-track school were limited in five states through combination of lower and middle secondary schools into one comprehensive school. Seven federal states first introduced and then retracted university tuition fees. All these reforms took place between 2005 and 2014.

I do not expect these reforms to bias the results. In order for these effects to confound the results, treated and untreated cohorts would have to be differently affected and the reforms would have to be correlated with social capital investment. None of the reforms are perfectly collinear with the introduction of the G8 reform. It is possible, however, that these additional controls increased uncertainty amongst students and parents leading to a stronger focus on schoolwork in order to finish the degree without being exposed to more reforms. I add dummy variables for whether

[37] In the cross-sectional data, the regression equation is reduced to the first or last observation per individual and, hence, looses the time dimension t, reducing the dependent variable to SC_i and individual level controls to X_i' . Note, however, that I still control for survey year fixed effects, as first (last) responses may be based on different survey years.

[38] The tracking year in Germany varies between 5^{th} and 7^{th} grade.

or not an individual was affected by these reforms in additional robustness checks to control for this.

Second and equally important for causal inference is the assumption that no sample selection occurred. It stands to reason that selection would have generated substantial costs as the G8 reform was introduced quickly for entire federal states and families would have had to move to different states in order to select in or out of the G8 treatment. Selection bias, therefore, seems unlikely. The total number of grammar school students was not affected by the reform and has remained high (Hoffmann and Malecki, 2018). Furthermore, graduation rates have also not decreased due to the reform (Huebener and Marcus, 2015, 2017).[39]

Third, Goodman-Bacon (2018), amongst others, recently stressed the importance of changing treatment effects through variations in treatment timing for the interpretation of treatment effects in a difference-in-difference setting. I, therefore, not only consider the aggregate effect of the G8 reform, but additionally add event study evidence.[40]

2.3 Main Results

Table 2.2 presents the results of the regression equation above and shows the effect of the increase in schooling intensity on volunteering in the overall sample across all age groups.[41] Panel A shows the results for Panel data, Panel B in the cross-section

[39] Anger and Dahmann (2015), Andrietti (2015), Huebener et al. (2017), or Meyer and Thomsen (2015), for example, have previously analysed the possibility of selection bias in this treatment and come to the same conclusion.

[40] It is important to note that the event study relies on the assumption that the treatment effect did not vary for the different federal states introducing the reform. Looking at the public discussion this is reasonable. All federal states experienced heavy discussion of the G8 reform. The argument that schooling intensity is too high and, hence, leisure time strongly reduced can be seen in public discussions throughout all reforming states.

[41] Sample size is reduced when including siblings, as sibling information is not available for all individuals. Table B.9 presents the extensive margin regression results when reducing the number of observations in all regressions to a fully balanced sample. The effect of the reform on non-partially treated individuals is less precisely estimated in the Panel results here. The cross-sectional results are fully robust. The main implications hold in both samples. Table B.10 provides the regression

of first observations. Columns (1) and (2) add controls for cohort, state, survey year, and survey sub-group fixed effects, without accounting for spillovers.

A significant negative reform effect becomes evident when controlling for partially treated individuals. Column (3) based on the Panel structure in Panel A and the cross-section in Panel B shows that individuals who experienced both schooling systems are significantly different from individuals who did not. The coefficient for partially treated individuals even suggests a slightly positive effect of the reform on partially treated individuals of 0.4 percentage points in Panel A.[42] Non-partially treated individuals reduce their voluntary activity in the overall sample by four to six percentage points.[43]

Columns (4) and (5) further show that the negative effect of the reform is even larger for individuals who do not have any siblings who may influence leisure time activities. When adding basic controls, voluntary activity for individuals without siblings is significantly reduced by almost eleven percentage points. Individuals who have at least one sibling also reduce their voluntary participation, but only by three percentage points in the Panel analysis. The cross-sectional analysis in Panel B also reflects this result, although here the interaction of reform and sibling indicator suggests that people with siblings are not significantly different. This analysis shows that the reform affects subgroups of individuals (people without siblings here) differently. As their schooling intensity did not increase more strongly by policy design, their reaction is driven by other factors in addition to the reform. Social spillovers matter in this context.

results taking voluntary activity at the intensive margin. The main treatment effect seems to occur at the extensive margin, however, as these results are more robust.

[42]Note that the coefficient of partially treated needs to be interpreted as an interaction as it can only turn 1 if an individual is treated. Also note that the number of partially treated individuals is low, hence, coefficients should be interpreted with care.

[43]The coefficient for the reform impact on non-partially treated individuals in Panel A is very close to significant at the 10 percent level when applying wild-bootstrapped clustered standard errors. In the cross-section, the coefficient is significant at the 5 percent level.

Table 2.2: The effect of increasing schooling intensity on the probability to volunteer at least once a month

	Overall effect		Acounting for spillovers		
	(1)	(2) Survey	(3) Partially	(4) Sibling	(5) Adding
	FE	FE	treated	effect	controls
Panel A. Panel structure					
Reform	-0.020	-0.021	-0.041	-0.107**	-0.107**
	(0.021)	(0.020)	(0.026)	(0.037)	(0.037)
Partially treated			0.045**	0.064**	0.054*
			(0.020)	(0.025)	(0.026)
Dummy for siblings				0.021	0.018
				(0.028)	(0.028)
Has Sibling x Reform				0.072	0.073*
				(0.042)	(0.040)
Observations	9,662	9,662	9,662	9,175	9,175
WB p-value	0.390	0.327	0.100	0.015	0.016
Mean	0.253	0.253	0.253	0.259	0.259
Panel B. Cross section					
Reform	-0.008	-0.014	-0.064**	-0.079*	-0.091**
	(0.022)	(0.020)	(0.024)	(0.040)	(0.040)
Partially treated			0.110**	0.114*	0.119**
			(0.042)	(0.054)	(0.046)
Dummy for siblings				0.037	0.036
				(0.033)	(0.033)
Has Sibling x Reform				0.015	0.016
				(0.047)	(0.046)
Observations	3,079	3,079	3,079	2,867	2,867
WB p-value	0.723	0.455	0.013	0.069	0.043
Mean	0.262	0.262	0.262	0.269	0.269
Cohort FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓
Linear trend					✓
Basic controls					✓
Clustered SE	✓	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns 1 if an individual engages in voluntary activity such as volunteering at clubs at least once a month and zero if less than that or never. Panel A shows the regression results in the Panel structure of the data, allowing for repeated observations per individuals and weighted by the inverse of the number of answered surveys. Panel B shows the same regression results in a cross section only taking the first observation per individual into account. The mean value of the dependent variable is provided at the bottom of each Panel. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state given school entry year. Partially treated individuals experienced both school systems. The sibling dummy variable turns 1 if the individual has at least one sibling. Control variables are as indicated. Basic controls include age, age squared, gender female (omitted category is male), migration background (omitted category is no migration background), living in the East, marital status (omitted category is single), and a dummy for being part of the double graduation cohorts. The linear trend accounts for trends in voluntary activity in the federal states that introduced the G8 reform. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table as "WB p-value". *** p<0.01, ** p<0.05, * p<0.1.

As the number of observations decreases when adding sibling information, my preferred specification includes all fixed effects, basic controls, and controlling for partially treated individuals. The decrease in probability to volunteer at least once a month is sizeable in both the Panel and the cross-sectional data. Given the sample means of volunteering of 0.26, a four to six percentage point decrease suggests a reduction of on average between 16 to 23 percent relative to the respective means of volunteering for individuals who never experienced the old schooling system. Table B.11 shows the full regression results for the cross-section when adding additional controls for parental background, financial/occupational controls, a linear trend, and additional reform controls. The results are robust and remain very similar in magnitude. Covariates are, furthermore, in line with evidence in previous literature (Glaeser et al., 2002).

Alternative, more socially oriented social capital outcomes show weaker treatment effects in response to the increase in schooling intensity. The results are presented in Table 2.3. The G8 reform has no overall effect on political interest in column (1), or cultural activity in column (2). Cultural activity even shows a positive coefficient for the reform effect, which is insignificant, however. Social activity, measured as meeting friends and neighbours is significantly reduced for treated individuals as shown in column (3). The coefficient suggests that people tend to be less social by six to seven percentage points, which amounts to a small effect of at most 0.7 percent relative to the mean as 90 percent of survey respondents tend to meet friends or neighbours at least once a month.[44]

An alternative measure of voluntary activity is participating in a gap year for voluntary services after graduating high school presented in column (4). Individuals show an on average increased probability of participating in voluntary services by 12.6 percentage points. This is a very large effect, compared to the sample mean

[44]Spill-over effects matter less for these outcomes. The results are presented in Table B.12. Only political interest is significantly affected and shows higher interest by partially treated individuals, which may be a result of their experience with large political reforms through the G8 reform.

Table 2.3: The effect of increasing schooling intensity on further social capital outcomes accounting for partially treated individuals and basic controls

	(1) Political interest	(2) Cultural activity	(3) Social activity	(4) Voluntary year
Panel A. Panel				
Reform	-0.010	0.006	-0.068**	
	(0.094)	(0.029)	(0.029)	
Observations	8,875	7,524	2,213	
WB p-value	0.932	0.851	0.067	
Mean	2.274	0.743	0.941	
Panel B. Cross: First observation				
Reform	-0.054	0.019	-0.056**	0.126**
	(0.128)	(0.043)	(0.024)	(0.049)
Observations	2,348	2,664	1,607	1,254
WB p-value	0.766	0.741	0.043	0.028
Mean	2.239	0.758	0.940	0.171
Cohort FE	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Survey year FE	✓	✓	✓	✓
Sub-sample FE	✓	✓	✓	✓
Linear trend	✓	✓	✓	✓
Basic controls	✓	✓	✓	✓
Clustered SE	✓	✓	✓	✓

Notes: The dependent variable is social capital measured as political interest (0 – none to 3 – very strong), a dummy variable indicating cultural activity at least once a month, social activity at least once a month, and a dummy variable that indicates whether an individual participates in a voluntary social or military year. The mean value of the dependent variables are provided at the bottom of each Panel. Panel A shows the regression results in the Panel structure of the data, allowing for repeated observations per individuals and weighted by the inverse of the number of answered surveys. Panel B shows the same regression results in a cross section only taking the first observation per individual into account. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state given school starting year. Control variables are as indicated. All regressions control for partially treated individuals who experienced both school systems. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table as "WB p-value". *** p<0.01, ** p<0.05, * p<0.1.

of about 17 percent. When additionally controlling for family background and participation in the compulsory military or civil service, which was abolished 2011, the coefficient decreases to about seven percentage points and remains significant. This still implies an increase in the probability to participate in voluntary services after graduation due to the reform of 38 percent.[45] This may imply that students compensate for earlier lack of voluntary experiences after graduation. The following section considers the effect of the reform in different sub-groups for varying life phases.

2.4 Medium-Term Effects of Increased Schooling Intensity on Volunteering

Figure 2.3 shows that the G8 reform effect varies for different phases in life. The figure shows the coefficients and 90% confidence intervals for the effect of the increase in schooling intensity on the probability of engaging in voluntary activity at least once a month in the Panel data (left), based on a cross-section of fist observations (middle), and last observations (right). For each Panel, three to four different regression results with basic controls and accounting for spillover effects due to partially treated individuals (as in column (3) of Table 2.2 above) are presented.

The coefficient at the top shows the effect of the G8 reform for the overall sample, below this are the sub-sample results. The second coefficient shows the reform effect for individuals who answered the survey while they were still at high school. The student sample is always based on the cross-section of first responses and only shown in the middle Panel. The third coefficient shows the effect for university students. I expect that social capital investment is generally positively affected by university attendance, as organisation and coordination of voluntary efforts should be easier

[45]This is in line with previous research (Meyer et al., 2018). Chapter 3 of this thesis adds evidence on voluntary services. Further analysis also shows that the voluntary year is significantly more likely for both the university and the adult sample.

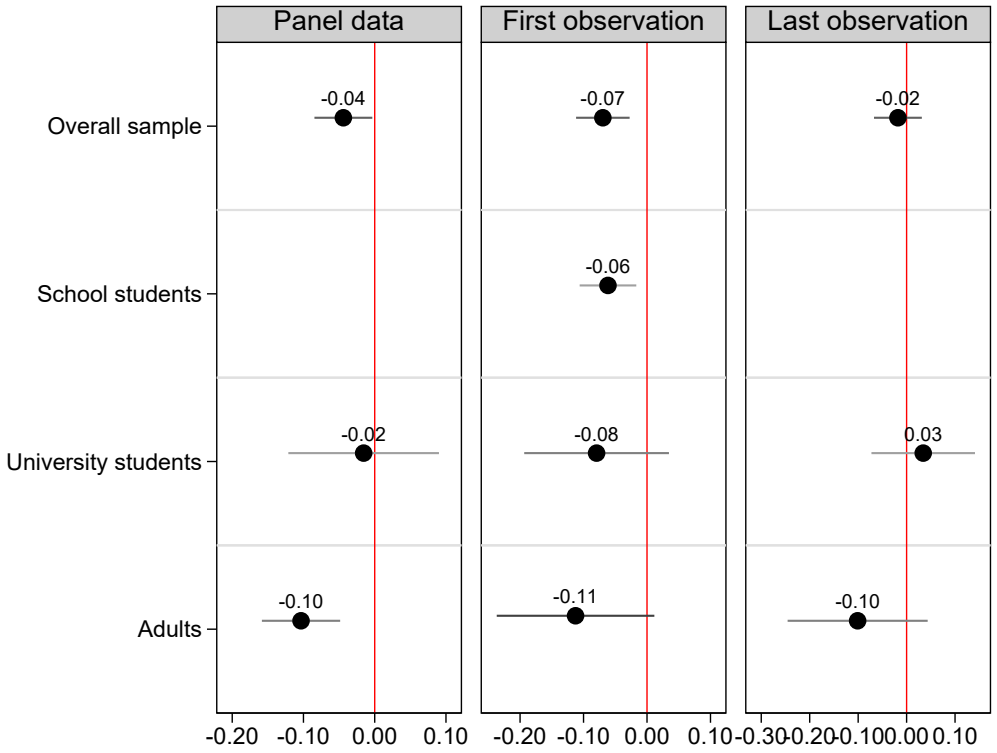


Figure 2.3: Effect of increasing schooling intensity on voluntary activity from school sample to adulthood in the Panel dataset and first to last observation

Notes: The graph shows regression coefficients and confidence intervals (90%) based on clustered standard errors for estimating a dummy variable that turns 1 for volunteering at least once a month. The main independent variable, G8 reform, equals one if the individual was affected by the G8 reform in his or her federal state given their school entry year. The first coefficient shows the effect in the overall sample for all age groups. The second coefficient shows the effect in the sub-sample group of school students, who were at secondary school when they answered the survey. The student sample is only analysed in a cross-section of first observations. The third coefficient shows the effect on a sub-sample of students who were attending university at the time of answering the survey. The fourth coefficient shows the effect on a sub-sample of people who have graduated secondary school and are never at university, "adults". The coefficient size is given above the coefficient marker. The regressions control for basic controls as described in section 2.2. All regressions additionally control for partially treated individuals and double graduate cohorts.

here.[46] The fourth shows the reform effect for the sub-group of individuals who have graduated high school and are never at university, classified as adults.

The figure shows that the overall negative effect of the G8 reform is evident in the school student sample and in the Panel setting adult sample. School students reduce the probability to volunteer by six percentage points in response to the increase in schooling intensity. Relative to the sample mean of 29 percent, this implies a sizeable reduction of 21 percent. This is very close to the reduction in volunteering in previous research by Krekel (2017), who finds a reduction of 18 percent for a similar age group.[47]

Table B.13 in the Appendix shows that the reform effect in the student sample is robust to including a large number of individual and parental background controls, a linear trend, and dummy variables for additional school reforms. The coefficient is slightly increased when including additional controls (and reducing sample size) but stays very similar in magnitude throughout all additionally added controls.[48]

The reform effect on volunteering is not reflected in further outcomes for the student sample. Table B.15 shows no comparable reduction in leisure time activities like sports or making music due to the reform.[49] Political interest, when taken as a dummy variable that turns 1 if interest in politics is stated, shows a significant

[46] When controlling for university attendance (or degree) in the overall analyses above, there is a significant positive effect of university on voluntary activity both at the intensive as well as the extensive margin.

[47] Note however, that Krekel (2017) assumes that partially treated individuals are untreated.

[48] Table B.14 considers various further sub-sample effects. The results here indicate that the reform has a large negative effect on individuals without siblings showing that spillover effects through family play a role especially in this age group. This effect is independent of whether or not a sibling is older/younger or treated/untreated. Of course, there are feedback effects amongst siblings. Older (untreated) siblings influence their younger (treated) siblings, but also the other way round. The analyses of these additional siblings effects are reduced to individuals who have any siblings. Single parents increase the impact of the reform on their children confirming that the reform also increases work at home, where single parents are less likely able to support their children compared to having a partner (at home). Single parents are, of course, also less flexible in taking children to participate in volunteering, when clubs can only be reached by car, for example.

[49] When including sibling spillovers making music is significantly reduced at both the intensive as well as the extensive margin. The effect is very small, however. The probability to make music is decreased by 0.005 percentage points for individuals with siblings relative to 48 percent of students making music at least once a month. The effect on individuals without siblings is much larger, but the sample size is quite small in this sub-group.

reduction as a result of the reform, which is, however, not robust when applying wild-bootstrapped standard errors.[50] As volunteering is more work than other leisure time activities, a larger reduction in response to additional school work in particular in this domain seems reasonable.

After graduation, the reform effect differs. University students show no persistent negative effect of the reform.[51] The coefficient here is insignificant in the Panel as well as the cross-sectional data. Organisation is most likely easier here and, hence, university attendance tends to increase social capital investment (OECD, 2016, 2015). Table B.16 confirms this result when adding additional covariates.

The adult sample shows a mixed result. The Panel data suggests a sizeable reduction of voluntary activity by ten percentage points, which would indicate a persistent negative effect of the reform into adulthood. The cross-sectional data show a similarly sized effect, but these are insignificant as standard errors become larger. As sample size is comparatively small in the adult sample, insignificance may be due to a lack in statistical power. In Table B.17, I therefore compare the reform effect for the sample of adults who never go to university and for an increased sample that includes all individuals who are not currently at university. Coefficients in the not-currently-at-university sample are mostly similar to the never-at-university sample, but standard errors are reduced. In this setting, a significant negative reform effect is evident and robust. As half the sample in the larger Panel will at a later point attend university, this suggests a continued reduction of volunteering right after graduation which possibly does not persist over the following years.[52]

[50] Note that a significant reduction in political interest can be shown when the sample size increases and in a slightly varied setting, when including all observations and controlling for individuals at school. These results are presented in Chapter 3 of this thesis. Hence, it is possible, that the G8 reform negatively affected political interest (and through this activity) at young ages.

[51] When taking sibling spillover effects into account, a significant reduction of volunteering is also evident in this sample. Individuals with siblings then volunteer with eight percentage points lower probability. See Table B.14.

[52] The average age in the adult sample is 20 excluding later university attendants and 19.5 including later university attendants.

This is also supported by evidence in Figure 2.3 which shows that the negative reform effect declines between the first and the last observation for university, as well as the adult sample. The overall negative effect of the reform is mostly driven by the student sample and may still be evident shortly after graduation, but it does not appear to persist for much longer throughout adult life.[53] The following event study adds further evidence that there is no long-term persistence of lower volunteering through the G8 reform.

2.5 Event Study of the Effect of Increasing Schooling Intensity on Volunteering

In addition to considering whether the G8 reform has a continued effect on an individual level in different life phases, I also analyse whether future years will reveal a persistent negative reform effect. Thus, I conduct an event study of the effect of increasing schooling intensity on voluntary activity. The event study analysis is, furthermore, important as it lends further evidence to the aggregate treatment effect of the G8 reform. The reform varied in treatment timing which may lead to biased aggregate estimates (Goodman-Bacon, 2018).

For this analysis, I re-centre the dataset around the reform with lead and lag years before and after the reform was implemented. Thus, instead of comparing the aggregate treatment effect, I analyse the reform effect for individual school cohorts to show the dynamics of responses. This implies a slight change in the econometric model from above by replacing the single G8 reform dummy by a series of dummy variables for whether an individual is part of a school cohort before or after the reform was introduced.

[53] Note that even in the larger sample, the reform effect is insignificant for the cross-section of last observations in the adult sample.

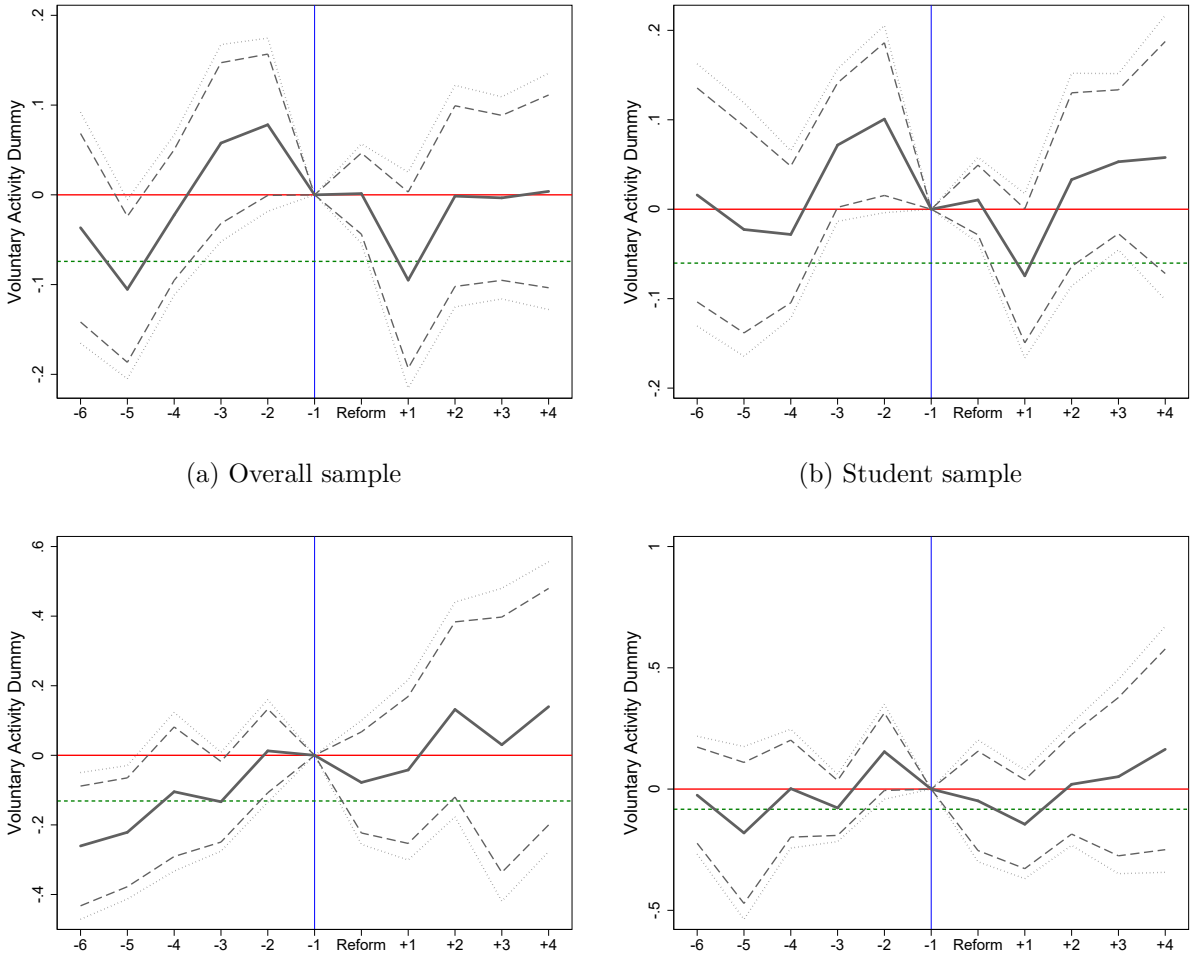
$$Volunteering_i = \delta_0 + \sum_y \delta_y SchoolEntry^y_{s,c} + \Psi_s + \Theta_t + \Gamma_c + \epsilon_{2,i},$$

where $SchoolEntry$ is a series of eleven dummy variables that turn 1 if individual i started high school as part of school cohort c, y years before or after the reform was introduced in her federal state. Thus, we have four lag cohort years when individuals are treated: these start high school the year the reform is introduced, or one, two, three, or four years later.[54] The series of dummy variables further includes leads for up to six years before the reform was introduced. These turn 1 respectively if an individual started secondary school six years, five years, four years, etc. before the reform was introduced. The last G9 cohort is the omitted category. The regression equation remains otherwise unchanged.[55] I include all cohort, state, and survey fixed effects, as well as controls for being part of the double graduate cohort and partially treated.

Figure 2.4 shows the development of investment in voluntary activity as a dummy variable that turns 1 if any investment takes place for the same sample groups as presented in the analysis above. Panel (a) shows the development of voluntary activity investment for the overall sample, Panel (b) for the student sample, Panel (c) for the university sample, and Panel (d) for the adult sample. Figure 2.4 displays the cohort year specific coefficients and the 90% (dashed line) and 95% (dotted line) confidence intervals. The horizontal dashed line additionally provides the coefficient from the difference-in-difference analysis above as the aggregate treatment effect for comparison.

[54] I exclude later treated school cohorts as the number of observations decreases over time.

[55] All analyses are based on the cross-section of first observations. Each school cohort year has well over 100 observations in the overall sample. For students at school, the bin sizes are equally large. The other sub-samples are smaller. The university sample has around 50 observations per year, except for the last two years when there are just above 30 observations. The adult sample is smaller, with only 20 observations towards the last observed cohorts. Figure B.1 confirms the results in the Panel structure of the university and adult samples. Panel data sample sizes are increased to mostly above a 100 and at least 50 observations per cohort year.



(a) Overall sample

(b) Student sample

(c) University sample

(d) Adult sample

Figure 2.4: Event study and fixed-effects estimates of the G8 treatment on voluntary activity indicator in varying samples based on the cross section of first observations

Notes: The graph shows regression coefficients and confidence intervals (90% as dashed line and 95% as dotted line) for estimating the development of the dummy variable indicating voluntary activity at least once a month across school cohorts before and after the school reform. The last untreated cohort year before the reform is introduced is omitted. The graph further shows the aggregated effect through difference-in-difference estimates in short dashed green lines in the given sample. Individuals were included when they started secondary school up to six years prior to the reform, and up to four years after the reform. All regressions control for double graduate cohorts, partially treated individuals, cohort fixed effects, survey year fixed effects, survey sub-group fixed effects and federal state fixed effects. Panel (a) shows the results for the overall sample, Panel (b) in the subgroup of individuals who answer the survey while still at high school, Panel (c) for students attending university, Panel (d) for adults never attending university. The sub-samples are based on cross sectional data for the first observation per individual. Standard errors are clustered at federal state level.

The event study adds evidence that the reform will not lead to a long-term reduction of voluntary activity. The overall negative treatment effect is mainly driven by the student sample. When comparing results of Panels (a) and (b), we can clearly see large similarities in movement. Students make up the largest share of individuals in the overall sample of first observations.

The aggregated negative effect of the student sample from the analysis above is clearly related to comparing the large increase in volunteering before the reform takes place and a drop in volunteering afterwards. Panel (b) shows that students who are part of the cohorts that started secondary school three to two years before the reform was introduced are significantly more likely to invest in volunteering than the last untreated cohort. Students of the cohort that started secondary school one year after the reform was introduced, on the other hand, invest significantly less. This effect is not encompassed by the double graduate cohorts as it includes more than just the last/first cohorts, but it is clearly closely centred around the reform introduction. By the third treated cohort, the probability to volunteer turns positive relative to the last untreated cohort. A similar picture is presented in the (never at university) adult sample in Panel (d). There is a slight increase in volunteering amongst last untreated cohorts and a slight drop for the first treated cohorts. The effect is less pronounced in the adult sample compared to the student sample in Panel (a) adding further evidence that the reform effect may not transfer into adult life after graduation. The university sample in Panel (c) shows a slight drop in the pre-reform upwards trend after the reform is introduced, but quickly follows the positive trend again.

The evidence suggests that there was a substitution effect. The decrease in volunteering by the first treated cohorts was compensated by the last untreated cohorts, who were closest in age, but did not experience the increase in schooling intensity. The untreated cohorts compensated for the sudden lack of participation. This is in line with evidence on volunteering in aggregate data. According to OECD (2016),

the largest area of volunteering in Germany is in sports clubs. Figure B.2 shows the development of sports club memberships in the treated German federal states based on information from the German Olympic Sports Confederation.[56] There is no evidence that club participation in sports clubs overall suddenly dropped after the reform was introduced. Thus, there was still substantial need for volunteers and these had to come from other cohorts.

Several factors may explain the increase in volunteering by treated cohorts after the first treatment shock passed. Possibly adjustments were made to G8 curricula in response to student and parent protests and lessened the workload. Subject density was in fact slightly reduced (Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland, 2008). Schooling intensity still remained high, however, as graduation requirements were unchanged.[57]

Alternatively, the recovery of volunteering activity may be due to individuals or institutions adapting to the reform effect. There is evidence for both. First, the initial drop in volunteering after the reform may be more due to perceived stress and schooling intensity than was actually the case. The intensity of the public debate arguing for overworked students may have led parents to discourage their children from investing in voluntary activities at first. When the public discussion decreased, so did the treatment effect. Figure B.3 shows the mean development of Google trends from 2004 to 2014 for those federal states that introduced the reform in 2004 based on the broad topic "schooling in Germany". More Google searches imply higher interest in the topic at the time. The search results for the example of Bavaria at the top very clearly show a spike in searches around the reform introduction and a sharp drop soon after. Evidence on the other federal

[56]Four out of 14 states show a decrease in membership numbers after the reform was introduced where they had positive growth beforehand. All other federal states remain on their overall growth paths.

[57]In 2008 the Standing Conference of Education Ministers published guidelines on possible improvements. These recommendations included, for example, reducing teaching contents to "core curricula" (Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland, 2008).

states is more mixed.[58] Second, volunteering institutions may have adapted to the change in schooling. Sports clubs, for example, shifted schedules towards evenings and week-ends in order to enable participation (Sportjugend Hessen, 2011). Thus, both, individuals and institutions adapted in order to accommodate volunteering after an adjustment period.

2.6 Conclusion

Previous literature on optimal school duration and learning intensity has mainly focused on outcomes such as student performance, post-graduation education, and labour market outcomes. The effects of these optimisations outside of the classroom are less clear, so far. One adverse side effect of increasing schooling intensity, by simultaneously reducing total school duration and compressing learning materials into the shorter time-frame, is shown in this paper. Social capital appears to be negatively affected.

Volunteering decreased as a first response to the increase in schooling intensity. This decrease is stronger in sub-groups of individuals who do not benefit from sibling spillovers or help with school-work at home. The overall decrease is mainly driven by the student sample. Their reduction in voluntary activity is large and robust. Further social capital/leisure time activities show no comparable reduction as more work-intense volunteering.

This paper has focused on the particular example of Germany. Social capital and in particular volunteering tends to be high in Germany in international comparisons (OECD, 2016). About 40 percent of the population (older than 14) are active volunteers (Bundesregierung, 2016). The OECD average lies at about 34 percent

[58] A drop in searches across the observation period for all considered federal states is obvious, however. The spike in Lower Saxony and Baden-Wuerttemberg in 2006 and 2007 are most likely due to alternative reforms.

(OECD, 2016). Can a school reform like the G8 reform reduce high participation rates in volunteering through the increase in schooling intensity?

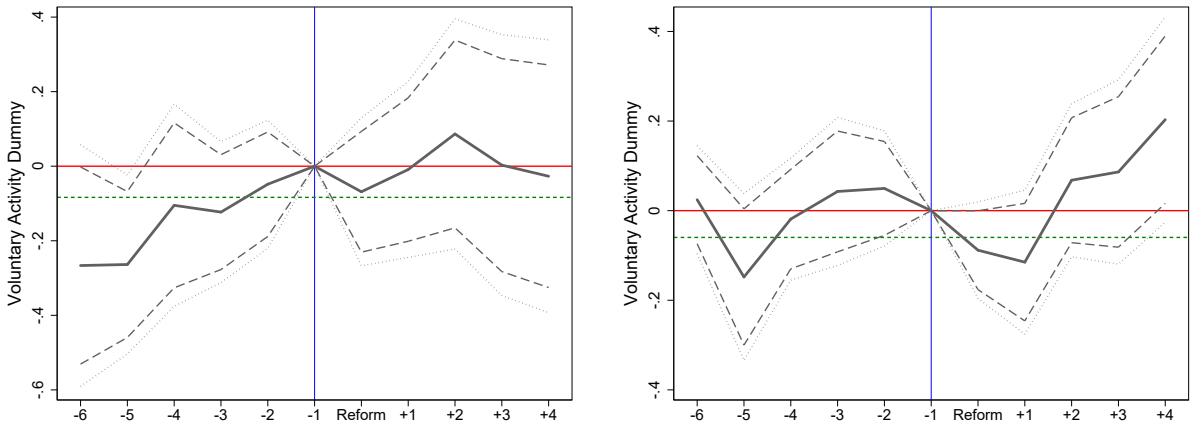
The evidence presented here suggests that this is not the case. This paper can show that there is a short-term reduction in volunteering. There is no lasting negative effect of the reform, however, at the individual or at the aggregate level. The treatment effect decreases from the first to the last observation at the individual level. After graduation, a reduction in voluntary activity by treated individuals in the adult sample is shown in the data. At the same time, there is a significantly higher probability for treated cohorts to participate in a voluntary year after graduation showing a disparity of effects. For students at university there is no significant reduction post high school. Furthermore, reduction of voluntary activity is mainly driven by the difference of last untreated to first treated cohorts. Later treated cohorts appear to recover voluntary activity. Individuals and institutions adapt, and, hence, a persistent effect of a reform such as the G8 reform appears unlikely as long as shifting of schedules still remains possible.

For policy makers this suggests that increasing schooling intensity may have a negative effect on outside-of-school volunteering in the short run but not in the medium run. There is little evidence that supports returning to the old schooling system based on a lack of developmental opportunities in students' free time. These results do not imply, however, that the described shift and recovery of voluntary activity is a desirable one.

The reform did increase schooling intensity. Previous research has shown that treated students' health may be adversely affected. In combination with the evidence presented here, these negative effects may also be driven by increased strain to accommodate leisure time activities in addition to the increased school work. All-day schools with an increased cooperation of schools and clubs for afternoon activities may be a preferable solution to the current system. Further research into these options will be necessary.

B Appendix to Chapter 2

B.1 FIGURES



(a) University sample

(b) Adult sample

Figure B.1: Event study and fixed-effects estimates of the G8 treatment on voluntary activity indicator in varying samples with reform controls

Notes: The graphs show regression coefficients and confidence intervals (90% as dashed line and 95% as dotted line) for estimating the development of the dummy variable indicating voluntary activity at least once a month across school cohorts before and after the school reform. Figure (a) shows the results in the sampe of individuals who respond while attending university. Figure (b) shows the reulsts in the sample of adults who never attend university. The last year before the reform is the excluded category. The graph further shows the aggregated effect through difference-in-difference estimates in short dashed lines in the given sample. Individuals were included when they started secondary school up to 6 years prior to the reform, and up to 4 years after the reform. All regressions control for double graduate cohorts, partially treated individuals, cohort fixed effects, survey year fixed effects, survey wave fixed effects and federal state fixed effects. The sub-samples are based on panel data. Standard errors are clustered at the federal state level. All regressions are weighted in order to account for individuals participating in more than one survey; weights are calculated as the inverse of the number of answered surveys.

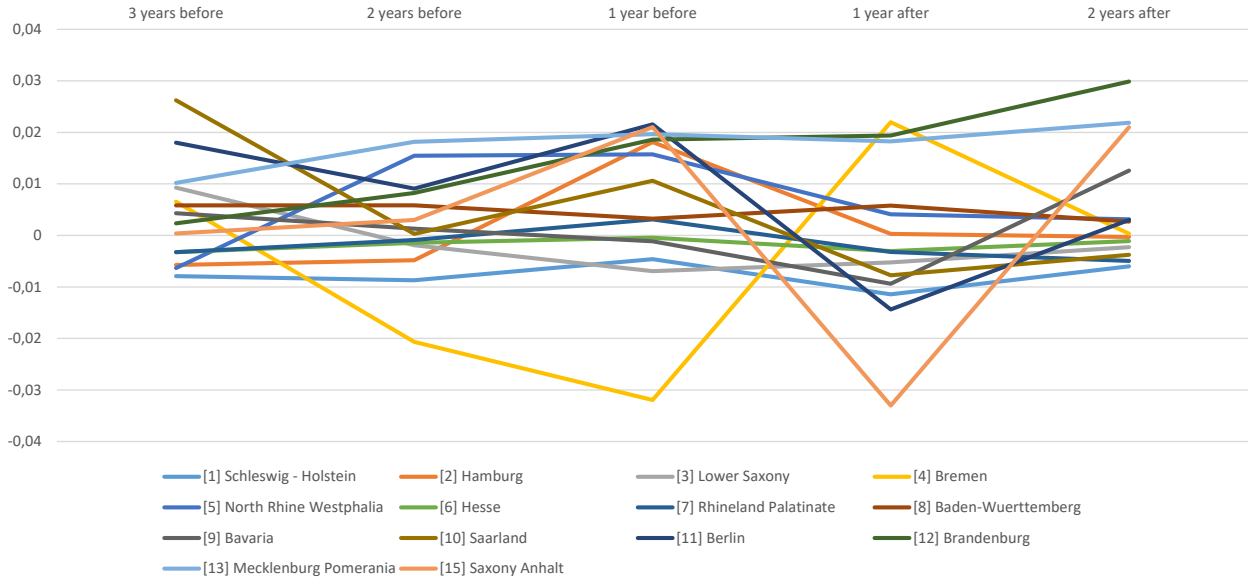


Figure B.2: Yearly growth rate of sport club memberships around the introduction of the G8 reform

Notes: The graph shows the development of growth rates in sport club membership numbers three years before and two years after the reform of the schooling system for each federal state that introduced the reform. Membership information is based on data by the German Olympic Sports Confederation membership reports from 2000 to 2011 available at `https://www.dosb.de/medien-service/statistiken/`(last accessed on 17.02.2020).

(a) Bavaria

(b) All reforming states from 2004

Figure B.3: Google searches for topics in "Schooling system in Germany" from 2004 to 2014

Notes: The graph shows the mean development of Google searches per federal state for the example of states that introduced the reform in 2004. Figure (a) shows results for Bavaria, Figure (b) for Bavaria, Baden-Wuerttemberg, Mecklenburg Pomerania, Bremen, and Lower Saxony. Lower Saxony searches spike in 2006 because of the introduction of central exit examinations. Baden Wuerttemberg introduced university tuition fees in 2007.

B.2 TABLES

Table B.1: Example of timetable changes between the new schooling system, G8, and the old schooling system, G9, in grades five to ten

	Grade 5		Grade 6		Grade 7		Grade 8		Grade 9		Grade 10	
	G8	G9	G8	G9	G8	G9	G8	G9	G8	G9	G8	G9
Religion	2	2	2	2	2	2	2	2	2	2	2	2
German	5	5	4	5	4	4	4	4	4	3	3	3
1st foreign language	5	6	4	6	4	4	3	4	3	3	3	3
2nd foreign language			4		4	5	4	4	3	3	3	3
Maths	4	4	4	4	4	4	3	4	4	4	3	4
Computer science									2		2	
Physics							2	2	2	2	2	3
Chemistry							2		2	3	2	3
Biology		2		2		2	2	1	2	2		2
Nature and technology	3		3		3							
History (and social studies)			2	2	2	2	2	2	2	2	2	2/1
Geography	2	2		2	2	1	2	2		1	2	1/2
Economics and law								1	2	1	1+1	1
Arts	2	2	2	3	2	2	1	1	1	1	1	1
Music	2	3	2	2	2	2	1	1	1	1	2	1
Sports	3	2(+2)	3	2(+2)	3	2(+2)	2	2(+2)	2	2(+2)	2	2(+2)
Intensifying lessons	3		3		2		2		0/2		0/2	
Total	31	28(+2)	33	30(+2)	34	30(+2)	34	30(+2)	34/36	30(+2)	34/36	34(+2)

Notes: The table on the timetable structure in reformed G8 system and the old G9 system for the example of the German federal state of Bavaria. Unit of measure are instructional hours. Information in brackets (+2) are optional and based on school decision. Intensifying lessons marked as "0/2" imply that the number of additional lessons can differ for individuals based on their personal needs. "2/1" means two lessons in the first term , one in the second. "1/2" is the same vice verca. "1+1" means one lesson in each. Information is based on official time tables by Staatsministerium für Unterricht und Kultus (2018) and Bayerisches Staatsministerium für Unterricht und Kultus (2007).

Table B.2: Change in daily time use between 2001 and 2012

	Hours : Minutes		Percentage		
	2001/2002	2012/2013	2001/2002	2012/2013	Δ
Panel A. Age group 10 to 17					
Sleeping, eating, grooming etc.	11:42	11:48	49,1	49,8	0,7
Employment	0:19	0:18	1,3	1,3	0
Education	3:32	3:48	14,8	16,0	1,2
Household tasks and family	1:09	1:04	4,8	4,5	-0,3
Voluntary activity	0:13	0:11	0,9	0,8	-0,1
Social activity and culture	1:53	1:52	7,9	7,9	0
Sports, hobbies, and games	2:19	2:08	9,7	9,0	-0,7
Media	2:43	2:34	11,4	10,8	-0,6
Panel B. Age group 18 to 29					
Sleeping, eating, grooming etc.	10:50	10:57	45,4	46,2	0,8
Employment	03:24	03:34	14,2	15,0	0,8
Education	01:19	01:11	5,5	5,0	-0,5
Household tasks and family	02:01	01:50	8,4	7,7	-0,7
Voluntary activity	00:18	00:14	1,3	1,0	-0,3
Social activity and culture	02:35	02:11	10,8	9,2	-1,6
Sports, hobbies, and games	00:58	01:05	4,0	4,6	0,5
Media	02:26	02:40	10,2	11,3	1,1

Notes: The table shows changes in daily time use between studies from 2001 and 2012. Panel A shows the results for ages 10 to 17. Panel B for ages 18 to 29. Information is based on data collected for time use surveys by Statistisches Bundesamt (2015).

Table B.3: Descriptive statistics for overall sample Panel observations

	Mean	SD	Min	Max	Number
Reform	0.53	0.50	0.0	1.0	9,662
Volunteering [0-3]	0.84	1.13	0.0	3.0	9,662
Volunteering indicator	0.25	0.43	0.0	1.0	9,662
Age	19.11	2.70	17.0	30.0	9,662
Age squared	372.42	115.30	289.0	900.0	9,662
Female	0.54	0.50	0.0	1.0	9,662
Status: Married	0.01	0.11	0.0	1.0	9,662
Migration background	0.27	0.44	0.0	1.0	9,662
Still at school	0.63	0.48	0.0	1.0	9,662
University attendance	0.16	0.36	0.0	1.0	9,662
University attendance/degree	0.38	0.49	0.0	1.0	9,662
Childhood in countryside	0.28	0.45	0.0	1.0	9,579
Lives in East	0.14	0.35	0.0	1.0	9,662
Monthly HH income (net)	3,408.87	1,592.30	150.0	7,500.0	8,605
Occupation: Blue collar	0.03	0.17	0.0	1.0	9,662
Occupation: Apprentice	0.19	0.39	0.0	1.0	9,662
Occupation: Employed	0.18	0.39	0.0	1.0	9,662
Military/Civic year	0.04	0.20	0.0	1.0	7,892
Double graduate cohort	0.11	0.31	0.0	1.0	9,662
Partially treated	0.03	0.16	0.0	1.0	9,662
Parent: Blue collar	0.30	0.46	0.0	1.0	9,539
Parent: Married	0.77	0.42	0.0	1.0	9,367
Parent: Tertiary	0.39	0.49	0.0	1.0	9,637
Dummy for siblings	0.88	0.32	0.0	1.0	9,175

Notes: Summary statistics based on the the panel data of all observations on volunteering. Mean values and standard deviations are weighted by the inverse of the number of answered surveys.

Table B.4: Descriptive statistics for sub-sample cross-sectional observations

	School Sample			University Sample			Adult Sample		
	Mean	SD	Number	Mean	SD	Number	Mean	SD	Number
Reform	0.55	0.50	2,583	0.29	0.45	1,076	0.50	0.50	724
Volunteering [0-3]	0.91	1.17	2,583	0.80	1.07	1,076	0.72	1.06	724
Volunteering indicator	0.28	0.45	2,583	0.24	0.42	1,076	0.21	0.41	724
Age	17.46	0.92	2,583	20.61	1.51	1,076	20.02	1.43	724
Age squared	305.83	34.24	2,583	427.03	64.29	1,076	402.70	59.40	724
Female	0.54	0.50	2,583	0.53	0.50	1,076	0.58	0.49	724
Migration background	0.26	0.44	2,583	0.24	0.43	1,076	0.25	0.43	724
Childhood in countryside	0.28	0.45	2,583	0.23	0.42	1,076	0.31	0.46	719
Lives in East	0.14	0.34	2,583	0.13	0.34	1,076	0.18	0.38	724
Double graduate cohort	0.12	0.32	2,583	0.14	0.34	1,076	0.11	0.31	724
Partially treated	0.03	0.17	2,583	0.04	0.20	1,076	0.03	0.17	724
Parent: Blue collar	0.29	0.45	2,535	0.26	0.44	1,066	0.39	0.49	700
Parent: Married	0.77	0.42	2,514	0.84	0.37	1,043	0.76	0.42	688
Parent: Tertiary	0.40	0.49	2,575	0.46	0.50	1,074	0.29	0.45	719
Dummy for siblings	0.89	0.32	2,432	0.89	0.31	1,018	0.86	0.34	681
HH income (net)	3,565.22	1,504.83	2,583	3,478.79	1,728.84	949	3,145.05	1,561.13	641
Occupation: Employed				0.18	0.39	1,076	0.63	0.48	724
Occupation: Apprentice				0.47	0.50	1,076	0.52	0.50	724
Occupation: Blue collar				0.03	0.17	1,076	0.09	0.28	724
Married				0.00	0.06	1,076	0.01	0.10	724

Notes: Summary statistics based on the the cross-section of the first answer on volunteering for the individuals who were still at school, who attend university, and who never attend university (adults) when answering the survey. Occupation information and marital status is only included in the university and adult sample as this does not yet apply to students at high school.

Table B.5: Timing and affected cohorts of the G8 reform for all German federal states

	Reform year	Affected grades	First G8 cohort
Saarland	2001	5	2001
Hamburg	2002	5	2002
Saxony-Anhalt	2003	5 – 9	1999
Mecklenburg-Pomerania	2004	7 – 9	2002
Lower Saxony	2004	5 – 6	2003
Bavaria	2004	5 – 6	2003
Bremen	2004	5	2004
Baden-Wuerttemberg	2004	5	2004
North Rhine-Westphalia	2005	5	2005
Hesse	2006	5	2006
Berlin	2006	7	2006
Brandenburg	2006	7	2006
Schleswig – Holstein	2008	5	2008
Rhineland- Palatinate	2008	5	2008
Saxony	–	–	–
Thuringia	–	–	–

Notes: The table shows the introduction year of the G8 reform for all German federal state, the grades it was introduced for and the resulting first affected G8 cohorts.

Table B.6: Distribution of treatment and control group in federal states for voluntary activity in the school sample

Part of G8	No	Yes	Total
1 Schleswig - Holstein	91	38	129
2 Hamburg	18	34	52
3 Lower Saxony	124	204	328
4 Bremen	13	19	32
5 North-Rhine Westphalia	386	363	749
6 Baden-Wuerttemberg	229	231	460
7 Bavaria	120	271	391
8 Saarland	6	15	21
9 Berlin	65	53	118
10 Brandenburg	67	61	128
11 Mecklenburg-Pomerania	12	54	66
12 Saxony-Anhalt	31	78	109
Total	1,162	1,421	2,583

Notes: Number of observations per treatment (Yes) and control (No) group in the considered federal states when limiting the data set to individuals' first responses on voluntary activity while still at school.

Table B.7: Distribution of treatment and control group in federal states for voluntary activity in the university sample

Part of G8	No	Yes	Total
1 Schleswig - Holstein	36	2	38
2 Hamburg	12	7	19
3 Lower Saxony	75	50	125
4 Bremen	10	3	13
5 North-Rhine Westphalia	248	77	325
6 Baden-Wuerttemberg	148	44	192
7 Bavaria	101	78	179
8 Saarland	6	6	12
9 Berlin	46	11	57
10 Brandenburg	31	3	34
11 Mecklenburg-Pomerania	14	8	22
12 Saxony-Anhalt	35	25	60
Total	762	314	1,076

Notes: Number of observations per treatment (Yes) and control (No) group in the considered federal states when limiting the data set to individuals' first responses on voluntary activity while at university.

Table B.8: Distribution of treatment and control group in federal states for voluntary activity in the adult sample

Part of G8	No	Yes	Total
1 Schleswig - Holstein	26	13	39
2 Hamburg	7	12	19
3 Lower Saxony	36	71	107
4 Bremen	3	9	12
5 North-Rhine Westphalia	117	100	217
6 Baden-Wuerttemberg	56	46	102
7 Bavaria	25	52	77
8 Saarland	0	2	2
9 Berlin	25	11	36
10 Brandenburg	38	14	52
11 Mecklenburg-Pomerania	14	11	25
12 Saxony-Anhalt	17	19	36
Total	364	360	724

Notes: Number of observations per treatment (Yes) and control (No) group in the considered federal states when limiting the data set to individuals' first responses on voluntary activity after graduating high school in the group of individuals who never go to university.

Table B.9: The effect of increasing schooling intensity on the probability to volunteer at least once a month for fully balanced sample

	Overall effect		Acounting for spillovers		
	(1) FE	(2) Survey FE	(3) Partially treated	(4) Sibling effect	(5) Adding controls
Panel A. Panel structure					
Reform	-0.015	-0.016	-0.043	-0.107**	-0.107**
	(0.025)	(0.024)	(0.031)	(0.037)	(0.037)
Partially treated			0.062**	0.064**	0.054*
			(0.025)	(0.025)	(0.026)
Dummy for siblings				0.021	0.018
				(0.028)	(0.028)
Has Sibling x Reform				0.072	0.073*
				(0.042)	(0.040)
Observations	9,175	9,175	9,175	9,175	9,175
WB p-value	0.618	0.557	0.131	0.015	0.016
Panel B. Cross section					
Reform	-0.010	-0.014	-0.065**	-0.079*	-0.091**
	(0.025)	(0.023)	(0.025)	(0.040)	(0.040)
Partially treated			0.114*	0.114*	0.119**
			(0.052)	(0.054)	(0.046)
Dummy for siblings				0.037	0.036
				(0.033)	(0.033)
Has Sibling x Reform				0.015	0.016
				(0.047)	(0.046)
Observations	2,867	2,867	2,867	2,867	2,867
WB p-value	0.715	0.550	0.007	0.070	0.043
Cohort FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓
Linear trend					✓
Basic controls					✓
Clustered SE	✓	✓	✓	✓	✓

Notes: The table shows regression results when reducing the number of observations to the sibling sample size in all regressions. The dependent variable is a dummy variable that turns one if an individual engages in voluntary activity such as volunteering at clubs at least once a month, and zero if less than that or never. Panel A shows the regression results in the Panel structure of the data, allowing for repeated observations per individual and weighted by the inverse of the number of answered surveys. The mean value of the dependent variable in Panel A is 0.259. Panel B shows the same regression results in a cross section only taking the first observation per individual into account. The mean value of the dependent variable is 0.269 in the cross section. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. Partially treated individuals experienced both school systems. The sibling dummy variable turns one if an individual has at least one sibling. Control variables are as indicated. Basic controls include age, age squared, gender female (omitted category is male), migration background (omitted category is no migration background), living in (former) East Germany, marital status (omitted category is single), and a dummy for being part of the double graduation cohorts. The linear trend accounts for differing trends in voluntary activity in the federal states that introduced the G8 reform. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.10: The effect of increasing schooling intensity on the frequency of voluntary activity

	Overall effect		Acounting for spillovers		
	(1) FE	(2) Survey FE	(3) Partially treated	(4) Sibling effect	(5) Adding controls
Reform	-0.039	-0.042	-0.087	-0.281**	-0.270**
	(0.070)	(0.066)	(0.087)	(0.117)	(0.111)
Partially treated			0.104*	0.111*	0.049
			(0.056)	(0.054)	(0.063)
Dummy for siblings				0.087	0.080
				(0.084)	(0.082)
Has Sibling x Reform				0.218*	0.224**
				(0.103)	(0.093)
Observations	9,175	9,175	9,175	9,175	9,175
WB p-value	0.647	0.590	0.349	0.034	0.031
Cohort FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓
Linear trend					✓
Basic controls					✓
Clustered SE	✓	✓	✓	✓	✓

Notes: The dependent variable is social capital measured as the frequency of voluntary activity (0 – never, 1 – seldom, 2 – at least monthly, 3- at least weekly). All regressions are based on the Panel structure of the data and weighted by the inverse of the number of answered surveys and the number of observations is fully balanced on basic controls as well as sibling information. The main independent variable, G8 reform, equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. Control variables are as indicated. Partially treated individuals experienced both school systems. The sibling dummy variable turns one if an individual has at least one sibling. Control variables are as indicated. Basic controls include age, age squared, gender female (omitted category is male), migration background (omitted category is no migration background), living in (former) East Germany, marital status (omitted category is single), and a dummy for being part of the double graduation cohorts. The linear trend accounts for differing trends in voluntary activity in the federal states that introduced the G8 reform. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.11: The effect of increasing schooling intensity on the probability to volunteer at least once a month controlling for partially treated and adding all additional controls

	(1) Baseline FE	(2) Survey FE	(3) Basic controls	(4) Linear trend	(5) Additional controls	(6) Parent controls	(7) All controls	(8) Reform controls
Reform	-0.070**	-0.078**	-0.074**	-0.085**	-0.082**	-0.080**	-0.081**	-0.084***
	(0.031)	(0.028)	(0.026)	(0.031)	(0.030)	(0.034)	(0.032)	(0.025)
Partially treated	0.151***	0.155***	0.137***	0.142***	0.136***	0.140***	0.143***	0.157***
	(0.043)	(0.034)	(0.028)	(0.029)	(0.029)	(0.032)	(0.032)	(0.027)
Age			-0.090	-0.083	-0.078	-0.077	-0.078	-0.080
			(0.063)	(0.066)	(0.061)	(0.064)	(0.065)	(0.071)
Age squared			0.002	0.002	0.002	0.001	0.002	0.002
			(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Female			-0.026	-0.025	-0.023	-0.022	-0.022	-0.022
			(0.021)	(0.021)	(0.021)	(0.020)	(0.020)	(0.020)
Migration background			-0.060*	-0.059*	-0.052*	-0.054*	-0.054*	-0.053*
			(0.028)	(0.028)	(0.028)	(0.025)	(0.025)	(0.026)
Lives in East			-0.022	-0.030**	-0.022	-0.020	-0.020	-0.022
			(0.013)	(0.013)	(0.018)	(0.015)	(0.017)	(0.017)
Status: Married			-0.051	-0.033	-0.033	-0.046	-0.035	-0.030
			(0.149)	(0.147)	(0.136)	(0.159)	(0.146)	(0.149)
Double graduate cohort			0.007	0.012	0.014	0.014	0.013	0.009
			(0.019)	(0.020)	(0.020)	(0.019)	(0.020)	(0.021)
Occupation: Blue collar					-0.031		-0.016	-0.018
					(0.045)		(0.042)	(0.042)
Occupation: Apprentice					0.018		0.020	0.018
					(0.025)		(0.027)	(0.027)
Occupation: Employed					-0.066		-0.073	-0.074
					(0.043)		(0.044)	(0.043)
Monthly HH income (net)					0.000**		0.000	0.000
					(0.000)		(0.000)	(0.000)
University attendance/degree					0.039		0.033	0.034
					(0.024)		(0.024)	(0.024)
Parent: Blue collar						-0.033	-0.029	-0.029
						(0.020)	(0.019)	(0.019)
Parent: Married						0.106***	0.103***	0.102***
						(0.020)	(0.022)	(0.022)
Parent: Tertiary						0.039**	0.034**	0.034*
						(0.013)	(0.015)	(0.016)
Observations	2,952	2,952	2,952	2,952	2,952	2,952	2,952	2,952
WB p-value	0.044	0.023	0.024	0.034	0.031	0.056	0.042	0.012
Cohort FE	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓	✓	✓
Linear trend			✓	✓	✓	✓	✓	✓
Basic controls			✓	✓	✓	✓	✓	✓
Occupational controls					✓		✓	✓
Parent Controls						✓	✓	✓
Clustered SE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns one if an individual engages in voluntary activity such as volunteering at clubs at least once a month and zero if less than that or never. The mean value of the dependent variable is 0.26. Regressions are based on the cross section of first observations per individual. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. All regressions control for partially treated individuals who experienced both school systems. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.12: The effect of increasing schooling intensity on further social capital outcomes accounting for partially treated individuals, basic controls, and sibling interaction

	(1) Political interest	(2) Cultural activity	(3) Social activity	(4) Voluntary year
Panel A. Panel				
Reform	-0.070	-0.028	-0.068	
	(0.132)	(0.049)	(0.071)	
Partially treated	0.238*	0.024	0.086	
	(0.119)	(0.088)	(0.050)	
Dummy for siblings	-0.050	-0.020	0.003	
	(0.045)	(0.022)	(0.020)	
Has Sibling x Reform	0.013	0.033	-0.010	
	(0.068)	(0.049)	(0.062)	
Observations	8,429	7,150	2,100	
WB p-value	0.711	0.591	0.475	
Panel B. Cross-Section: First observation				
Reform	-0.066	-0.017	-0.049	0.079
	(0.171)	(0.056)	(0.064)	(0.061)
Partially treated	0.310*	0.060	0.069	0.014
	(0.160)	(0.074)	(0.071)	(0.078)
Dummy for siblings	-0.005	-0.021	0.009	0.040
	(0.072)	(0.019)	(0.029)	(0.050)
Has Sibling x Reform	-0.065	0.030	-0.018	0.046
	(0.078)	(0.041)	(0.059)	(0.075)
Observations	2,195	2,495	1,524	1,167
WB p-value	0.781	0.803	0.555	0.141
Cohort FE	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Survey year FE	✓	✓	✓	✓
Sub-sample FE	✓	✓	✓	✓
Linear trend	✓	✓	✓	✓
Basic controls	✓	✓	✓	✓
Clustered SE	✓	✓	✓	✓

Notes: The dependent variable is social capital measured as political interest (0 – none, 4 – very strong), a dummy variable indicating cultural activity at least once a month, social activity at least once a month, and a dummy variable that indicates whether an individual participates in a voluntary social or military year. The mean value of the dependent variables are provided at the bottom of each Panel. Panel A shows the regression results in the Panel structure of the data allowing for repeated observations per individuals and weighted by the inverse of the number of answered surveys. Panel B shows the same regression results in a cross section only taking the first observation per individual into account. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. All regressions control for partially treated individuals who experienced both school systems. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.13: The effect of increasing schooling intensity on voluntary activity in student sample

	Overall effect		Acounting for spillovers				
	(1) FE	(2) Survey FE	(3) Partially treated	(4) Student controls	(5) Background controls	(6) Linear trend	(7) Additional reforms
Reform	-0.028	-0.032	-0.100***	-0.096***	-0.090***	-0.102***	-0.118***
	(0.028)	(0.028)	(0.026)	(0.031)	(0.029)	(0.030)	(0.036)
Partially treated			0.150*	0.132*	0.134*	0.142**	0.154**
			(0.071)	(0.070)	(0.064)	(0.062)	(0.058)
Observations	2,408	2,408	2,408	2,408	2,408	2,408	2,408
WB p-value	0.354	0.281	0.006	0.012	0.008	0.008	0.014
Cohort FE	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓	✓
Student Controls			✓	✓	✓	✓	✓
Parent Controls					✓	✓	✓
Linear trend						✓	✓
Reform Controls							✓
Clustered SE	✓	✓	✓	✓	✓	✓	✓

Notes: The table shows regression results reduced to the sample of individuals who answer the survey while still at school. The dependent variable is a dummy variable that turns one if an individual engages in voluntary activity such as volunteering at clubs at least once a month, and zero if less than that or never. Regressions are based on a cross section only taking the first observation per individual into account. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. Partially treated individuals experienced both school systems. Control variables are as indicated. Student controls include age, age squared, gender female (omitted category is male), migration background (omitted category is no migration background), living in (former) East Germany, living in the country-side, and a dummy for being part of the double graduation cohorts. Parent controls include a parent having a teriary degree, being a blue-collar worker, and married. The linear trend accounts for differing trends in voluntary activity in the federal states that introduced the G8 reform. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.14: The effect of increasing schooling intensity on voluntary activity including various sub-group effects

	(1) Partially treated	(2) Sibling effect	(3) Older sibling	(4) Untreated sibling	(5) Single parent	(6) University sample	(7) Adult sample
Reform	-0.102***	-0.134**	-0.071	-0.072	-0.159***	-0.246**	-0.243
	(0.030)	(0.043)	(0.044)	(0.042)	(0.040)	(0.100)	(0.190)
Partially treated	0.142**	0.140*	0.101*	0.090	0.133*	0.030	0.289
	(0.062)	(0.064)	(0.056)	(0.060)	(0.062)	(0.109)	(0.180)
Parent: Married	0.113***	0.108***	0.115***	0.112***	0.065**	0.049**	0.020
	(0.020)	(0.020)	(0.020)	(0.020)	(0.024)	(0.018)	(0.034)
Dummy for siblings		0.004				-0.095***	-0.025
		(0.038)				(0.022)	(0.044)
Has Sibling x Reform		0.036				0.188**	0.091
		(0.047)				(0.069)	(0.124)
Dummy for has older siblings			-0.026				
			(0.023)				
Has Older Sibling x Reform			0.016				
			(0.037)				
Dummy for has untreated sibling				-0.062*			
				(0.031)			
Has Untreated Sibling x Reform				0.023			
				(0.038)			
Parent married x Reform					0.081*		
					(0.041)		
Observations	2,408	2,408	2,123	2,123	2,408	2,085	1,125
WB p-value	0.008	0.013	0.148	0.107	0.010	0.021	0.434
Cohort FE	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓
Survey year FE	✓	✓	✓	✓	✓	✓	✓
Sub-sample FE	✓	✓	✓	✓	✓	✓	✓
Student Controls	✓	✓	✓	✓	✓	✓	✓
Parent Controls	✓	✓	✓	✓	✓	✓	✓
Linear trend	✓	✓	✓	✓	✓	✓	✓
Clustered SE	✓	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns one if an individual engages in voluntary activity such as volunteering at clubs at least once a month and zero if less than that or never. The sample in columns (1) to (5) is reduced to first responses for individuals at high school. Columns (3) and (4) are reduced to individuals with at least one sibling. Columns (6) is based on panel data for individuals who are attending university, column (7) for adults who never attend university. The mean value of the dependent variable is 0.295 in the student sample, 0.23 in the uni sample, and 0.22 in the adult sample. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. Partially treated individuals experienced both school systems. The sibling dummy variable turns one if an individual has at least one sibling. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.15: The effect of increasing schooling intensity on further social capital outcomes in student sample

	(1) Political interest	(2) Political indicator	(3) Frequency sports	(4) Sports indicator	(5) Frequency music	(6) Music indicator
Panel A. Basic student controls						
Reform	-0.212	-0.147*	-0.0732	-0.0449	-0.264	-0.0525
	(0.130)	(0.0722)	(0.141)	(0.0540)	(0.148)	(0.0493)
WB p-value	0.262	0.130	0.672	0.513	0.237	0.433
Panel B. Parent controls						
Reform	-0.171	-0.124*	-0.0116	-0.0336	-0.208	-0.0290
	(0.119)	(0.0685)	(0.138)	(0.0530)	(0.161)	(0.0554)
WB p-value	0.369	0.221	0.944	0.624	0.362	0.683
Panel C. Sibling effect						
Reform	-0.101	-0.104	-0.242	-0.117	-0.863***	-0.215**
	(0.182)	(0.115)	(0.217)	(0.076)	(0.238)	(0.073)
Dummy for siblings	0.029	-0.000	-0.054	-0.022	-0.313	-0.106
	(0.075)	(0.059)	(0.270)	(0.069)	(0.283)	(0.062)
Has Sibling x Reform	-0.080	-0.023	0.260	0.094	0.739**	0.210**
	(0.139)	(0.087)	(0.225)	(0.058)	(0.314)	(0.078)
WB p-value	0.697	0.581	0.369	0.223	0.014	0.033
N	1715	1715	1530	1530	1527	1527
Cohort FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Survey year FE	✓	✓	✓	✓	✓	✓
Sub-sample FE	✓	✓	✓	✓	✓	✓
Linear trend	✓	✓	✓	✓	✓	✓
Student Controls	✓	✓	✓	✓	✓	✓
Clustered SE	✓	✓	✓	✓	✓	✓

Notes: The table presents results in the sub-sample of individuals who answer the questionnaire while at school. The dependent variable is social capital measured as political interest (0 – none, 4 – very strong), leisure time activity measured as the frequency of doing sports (0 – never, 5 – daily), the frequency of making music (0 – never, 5 – daily), a dummy variable for political interest at least on level two, and for each sports and music indicating activity at least once a month. All regressions are based on the cross-section of fist responses and include spill-overs due to partially treated individuals. Panel A shows the regression results including basic student controls. Panel B and C include parental background information. Panel C shows the sibling effect. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.16: The effect of increasing schooling intensity on voluntary activity in university sample

	Overall effect		Acounting for spillovers					
	(1) FE	(2) Survey FE	(3) Partially treated	(4) Basic controls	(5) Financial controls	(6) Background controls	(7) Linear trend	(8) Additonal reforms
Reform	-0.046	-0.062	-0.085	-0.089	-0.092	-0.091	-0.080	-0.104
	(0.058)	(0.057)	(0.081)	(0.078)	(0.080)	(0.085)	(0.095)	(0.088)
Partially treated			0.039	0.041	0.042	0.035	0.038	0.042
			(0.082)	(0.089)	(0.092)	(0.102)	(0.107)	(0.089)
Observations	2,085	2,085	2,085	2,085	2,085	2,085	2,085	2,085
WB p-value	0.581	0.433	0.431	0.346	0.348	0.392	0.527	0.363
Cohort FE	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓	✓	✓
Basic Controls				✓	✓	✓	✓	✓
Parent Controls						✓	✓	✓
Linear trend							✓	✓
Reform Controls								✓
Clustered SE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The table presents results in the sub-sample of individuals who answer the questionnaire while at university. The dependent variable is a dummy variable that turns one if an individual engages in voluntary activity such as volunteering at clubs at least once a month and zero if less than that or never. The regression results are based on the Panel structure of the data, allowing for repeated observations per individuals and weighted by the inverse of answered surveys. The mean value of the dependent variable is 0.23. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. Partially treated individuals experienced both school systems. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table B.17: The effect of increasing schooling intensity on voluntary activity in adult sample

	Overall effect		Acounting for spillovers					
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	FE	Survey FE	Partially treated	Basic controls	Financial controls	Background controls	Linear trend	Additional reforms
Panel A. Panel structure								
Reform	-0.002	-0.009	-0.137	-0.147*	-0.140	-0.135	-0.167	-0.181**
	(0.101)	(0.101)	(0.085)	(0.078)	(0.088)	(0.091)	(0.107)	(0.059)
Partially treated			0.263*	0.304*	0.286	0.281	0.288	0.355**
			(0.126)	(0.164)	(0.175)	(0.185)	(0.180)	(0.150)
Observations	1,125	1,125	1,125	1,125	1,125	1,125	1,125	1,125
WB p-value	0.991	0.958	0.315	0.259	0.336	0.375	0.360	0.042
Panel B. Including observations that will obtain a university degree								
Reform	-0.031	-0.045	-0.145**	-0.153***	-0.151**	-0.152**	-0.165**	-0.177***
	(0.052)	(0.051)	(0.049)	(0.047)	(0.052)	(0.053)	(0.066)	(0.046)
Partially treated			0.216***	0.251**	0.247**	0.251**	0.260**	0.263**
			(0.059)	(0.089)	(0.093)	(0.092)	(0.090)	(0.085)
Observations	2,226	2,226	2,226	2,226	2,226	2,226	2,226	2,226
WB p-value	0.634	0.487	0.040	0.033	0.053	0.056	0.098	0.014
Cohort FE	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓	✓	✓
Basic controls				✓	✓	✓	✓	✓
Parent Controls						✓	✓	✓
Linear trend							✓	✓
Clustered SE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The table presents results in the sub-sample of individuals who answer the questionnaire after graduation. Panel A includes only graduates who never attend university. Panel B increases this sample by including individuals who are not currently attending university. The dependent variable is a dummy variable that turns one if an individual engages in voluntary activity such as volunteering at clubs at least once a month and zero if less than that or never. The regression results are based on the Panel structure of the data, allowing for repeated observations per individuals and weighted by the inverse of the number of answered surveys. The mean value of the dependent variable is 0.22. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school starting year. Partially treated individuals experienced both school systems. Control variables are as indicated. Panel B additionally controls for obtaining a university degree at some point in life. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

3 | The Impact of Reducing School Duration on Gap Year Participation and Trust in the EU

The decision of the United Kingdom to leave the European Union might be seen as symptomatic of what has been called the "European trust crisis" in recent economics literature (Dustmann et al., 2017). Low levels of trust not only engender the rise of populist parties (Algan et al., 2017), but also impede economic growth (Bjørnskov, 2018) and cast doubt on the European project itself (Ciaglia et al., 2018). It is, thus, not surprising that the question of how to promote trust into the European Union and its institutions has recently received substantial attention in both economics and political science.

Our paper sheds light on an interesting – though unintended – link between a school reform in Germany and trust levels in European Union institutions. Introduced subsequently in different German federal states in the early 2000s, the so-called G8 reform lowered school duration by one year for German academic-track high school students. In comparison to previous cohorts, treated individuals "gained" one year after graduation. The goal of the reform was to allow for earlier job market entries of school and university graduates, and to increase the tax base in view of demographic change in Germany. Many students, however, opt to delay entry into university or

This Chapter is joint work with Felix Hagemeister.

the labour market and choose to do a gap year abroad. We hypothesise that this contact with other countries led to a higher trust in EU institutions.

We show that a non-negligible share of treated graduates wait before entering the next career phase of their life after graduation, such as an apprenticeship, university, or employment. About half of the individuals in our sample use this time for voluntary services, which is often done abroad. Thus, the reform indirectly affected international experiences, which then affected attitudes towards EU institutions.[1] The G8 reform is associated with a 20 percent increase in the probability to show trust in European Parliament and Commission in our analyses. The positive side-effect of the reform on this form of trust appears quite unique. Differentiating between further types of trust, we can show that the reform effect did not increase trust in general or trust in political parties, or political interest.

Our work is related to literature on the importance of trust and especially trust in EU institutions. First, trust has been recognised as a key outcome in the economics literature (e.g. Alesina and Giuliano, 2015; Algan and Cahuc, 2014). Dustmann et al. (2017) provide an extensive overview on the roots of distrust in EU institutions. Algan et al. (2017) show how economic insecurity after the Great Recession has led to both rising vote shares of populist parties and lower levels of trust in EU institutions. Dotti Sani and Magistro (2016) show that the decline in trust in the European Parliament after 2009 was most pronounced in countries that were hit hardest by the economic crisis, and among subjects with low social status.

The paper proceeds as follows. Section 3.1 provides information on the G8 reform in Germany. Section 3.2 details the data we use. Section 3.3 specifies our econometric setting. Main results are presented in section 3.4. Section 3.5 shows that the G8

[1]Research on whether encouraging international exchanges and interactions impacts trust has come to mixed conclusions. Whereas Stoeckel (2016), for example, argues that social interaction abroad contributes to a European identity (and thus probably also to higher levels of trust into the EU), Kuhn (2012) argues that the Erasmus programme as a large exchange program misses its mark by addressing university students who are already very likely to feel European. On top of this selection and "preaching to the converted", Sigalas (2010) finds that Erasmus does not strengthen students' European identity, but on the contrary can have an adverse effect on it.

reform did not generally affect trust levels and in particular in politics. Section 3.6 discusses further potential channels how the G8 reform may have affected trust in EU institutions, besides increasing gap year uptake. Section 3.7 concludes.

3.1 Background of the G8 Reform

The German G8 reform reduced school duration at academic-track high schools from previously nine to eight years post-reform.[2] The goal of the reform was to achieve younger high school graduates in order to compensate for demographic change, and increase international competitiveness by earlier job market entries.[3] The reform was never intended to increase gap year participation, volunteering, or affect trust in institutions, but was specifically labour-market oriented.[4] Between 2001 and 2008, 14 out of 16 German federal states reduced their school duration. Academic-track high schools are attended by over 30% of children in Germany (Hoffmann and Malecki, 2018).[5]

Figure 3.1 shows the timeline of reform introductions for all federal states. The school years when the G8 reform was introduced are listed here, as well as the school cohorts that were affected by the reform. The reform was first introduced in Saarland

[2]The reduction of school duration was accompanied by an increase in schooling intensity due to university entry qualifications remaining unchanged. The Standing Conference of Education Ministers specifies that all upper secondary students need to fulfil at least 265 yearly week hours until graduation, independent of total school duration.

[3]We can expect the introduction of G8 to be independent of trust in European institutions. The Ministry of Education in Saarland (Ministerium für Bildung Kultur und Wissenschaft, 2001), for example, argued: German high school graduates, and, thus, also university graduates, were at a disadvantage internationally due to their comparatively old age at graduation. Additionally, earlier job market entries would serve to increase the tax base to compensate for demographic change in Germany. In another example Bavarian Parliament (Bayerischer Landtag, 2004) argued: "Germany is one of the countries with the longest education duration. Our university graduates are on average too old in international comparisons. [...] The reduction in school duration is furthermore essential on a social level. Long training periods [...] place a burden on our social security systems and inter-generational consensus."

[4]Changes in trust in EU institutions were an unintended side-effect of the reform. The increase in gap year participation, for example, was also part of the public discussion on how the reform failed to produce the younger university graduates it had originally aimed for. See, for example, Michler (2017) in "Die Welt", or Meck (2017) in the 'FAZ'.

[5]The majority of participants in a voluntary year are also academic-track high school graduates (BMFSFJ, 2006; AKLHUE, 2018).

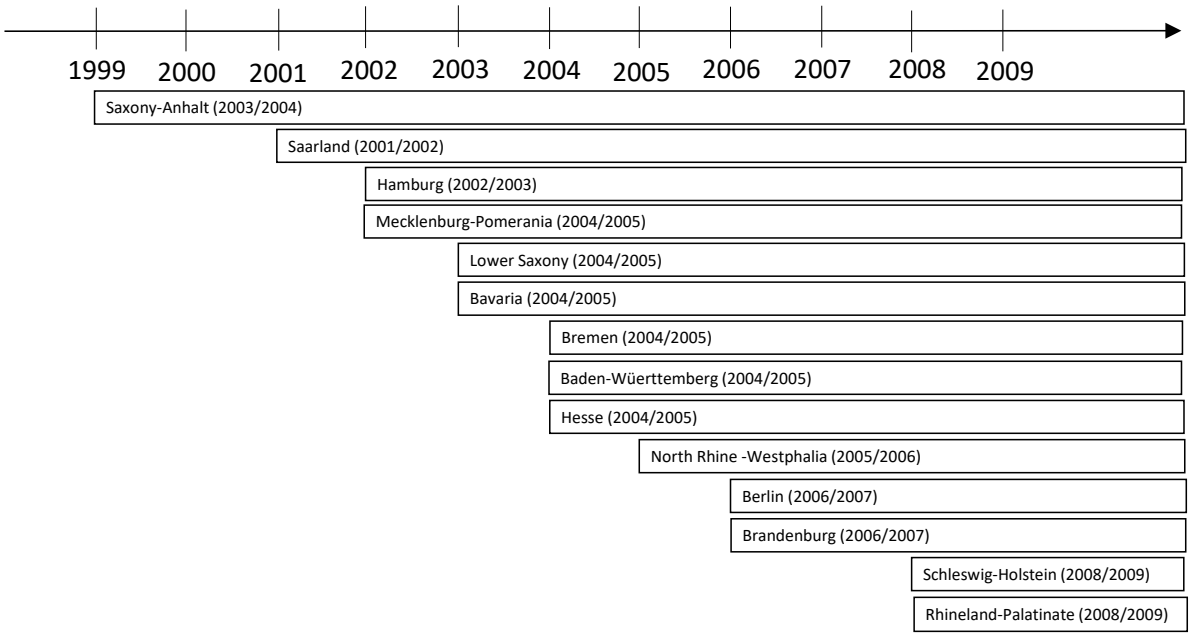


Figure 3.1: Timeline of introduction of G8 reform in the German federal states

Notes: The graph shows the timeline of school cohorts the G8 reform affected for all German federal states. It lists the year of reform introduction in parenthesis. Affected cohorts can pre-date the year of introduction as several federal states introduced the reform for more than just the first secondary school grade. Reform information is based on Ständige Konferenz der Kultusminister der Länder in der Bundesrepublik Deutschland (2018).

in 2001/2002. The first affected cohorts, however, started secondary school in 1999 with the introduction of the reform in Saxony-Anhalt in 2003/2004. Altogether, the reform was introduced in 14 federal states, the last being Rhineland-Palatinate, and Schleswig-Holstein in 2008/2009. Several federal states have announced the re-introduction of the old G9 system, starting with Baden-Wuerttemberg in 2013. These changes, however, do not, affect the dataset in this setting, as the last observed cohorts pre-date these changes. In line with previous G8 literature, we exclude Hesse, Thuringia, Rhineland-Palatinate, and Saxony from the analysis, as the reform was only partially introduced here or the federal states always had a shorter schooling system in place.[6] Given this stepwise introduction of G8 in federal states in Germany, the number of treated individuals increases from 1999 until there are only treated individuals after 2008.

[6]See, for example, Anger and Dahmann (2015) for an early reference.

Previous studies have shown that the G8 reform increased participation in voluntary service or staying abroad, and decreased university enrolment rates (Meyer et al., 2018; Marcus and Zambre, 2019; Büttner and Thomsen, 2015). There was no general increase in volunteering, however, as the increase in schooling intensity reduced leisure time and, hence, also pro-social behaviour at school (Huebner et al., 2017; Meyer and Thomsen, 2015; Krekel, 2017). This was also pointed out in Chapter 2 of this dissertation. Repetition rates have increased due to the reform (Huebener and Marcus, 2017), but graduates are younger (Marcus and Zambre, 2019) compared to untreated cohorts.

Our research confirms these results by providing evidence that the probability to engage in a gap year is substantially increased and that a large share of individuals who take time off after graduation engage in a voluntary year. We further add to this research by showing that the reform had an unintended positive effect on trust in European institutions.

3.2 Data

The empirical analysis of this paper is based on two main sources. In order to show that the reform affected trust in the European Union, we use the German General Social Survey (allbus). We measure the increase in gap year uptake based on data from the German Socio-Economic Panel Study (SOEP).

3.2.1 Definition of treatment

We define an individual as treated when she is part of a school cohort for which the reform was introduced or thereafter. All others are untreated and part of the old G9 system. There are two special cases of treatment. First, there are double graduate years, where both the old G9 cohort and the new G8 cohort graduated

during the same year. These cohorts may differ from others. Post-graduate competition, for example, for university was increased, which may have made these cohorts particularly likely to engage in a gap year. Second, several federal states introduced the reform for more than one grade, leading to partially treated cohorts who first experienced the old schooling system and were then treated. We routinely control for double graduate and partially treated individuals.

SOEP data allows very accurate treatment assignment, as we often have direct information on the year, federal state, and type of school individuals enrolled in. When information is missing, we extrapolate the federal state of secondary schooling from the current federal state of residence.[7] We extrapolate school starting years based on the year and month of birth taking individual states' deadlines for enrolment into account.[8] In the German school system it is generally the case that a child starts attending school when she turns six years before a certain deadline and waits one more year otherwise.[9]

Allbus provides information on the federal state where an individual grew up beginning with surveys in 2004. When this information is missing, we use the current federal state of residence as in SOEP. The survey further provides information on which type of school degree was achieved, hence, we can clearly identify academic-track high school students where treatment occurred. In allbus we fully rely on extrapolated treatment assignment based on the year and month of birth.[10]

[7]Over 90 percent of individuals still live in the federal state where they graduated high school.

[8]We account for changes in deadline regulations across all federal states and across time. The deadline for school enrolment varies between June and December and was changed at several points in time for most federal states.

[9]The extrapolated data shows that 50 percent of individuals started primary school by the age of six in the SOEP data. The Statistical Office lists 64% of all six year old children as enrolled in school in 2018 (Hoffmann and Malecki, 2018). Our number of treated individuals may be increased as having more seven year old children impacts school cohorts when the reform was introduced. These cohorts, however, are also part of the double graduate years when the last untreated and first treated cohorts graduated together, which we routinely control for.

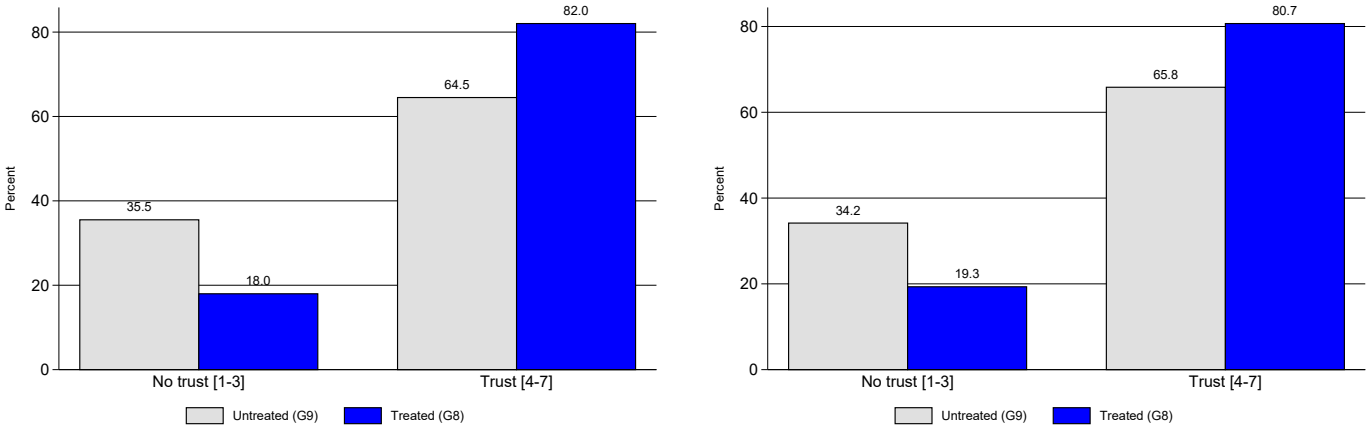
[10]Treatment assignment is, thus, noisier in allbus than in SOEP. When we compare treatment assignment in SOEP based on the "true" year of school enrolment and fully extrapolated data we see that only 1 out of 900 individuals is re-assigned from the control to the treatment group. We, therefore, consider extrapolated treatment assignment reliable.

SOEP data is more extensive and includes younger respondents than allbus, thus, our sample of treated individuals is larger here. Limited to academic-track students, where the the reform was introduced, we have about 40 percent treated in SOEP and a little below 30 percent treated in allbus. Table C.1 and Table C.2 provide information on the distribution of treated and untreated individuals in both datasets.

3.2.2 Trust in the European Union

Our source of data on trust in the European Union is the German General Social Survey (allbus) of the Leibniz Institute for the Social Sciences (gesis). The allbus survey provides rich data on attitudes and political opinions in Germany, and is conducted every two years as a repeated cross-section amongst a representative sample of on average 3,000 individuals. We focus our sample to individuals born after 1980 in order to ensure comparability of cohorts. We have information on trust in European institutions from survey years 2000, 2008, and 2018. We obtain a sample with about 330 individuals with an university entry school degree. Given the small sample size, we additionally include students with other secondary degrees as untreated individuals. This increases our sample size to 861 individuals. This has the advantage of allowing for more statistical power, but it only increases the number of untreated individuals in our sample. Table C.3 provides summary statistics for the sample. The number of observations is balanced on basic controls.

For the main outcomes of interest, individuals are asked to rate how much they trust institutions of the European Union on a scale from one (no trust at all) to seven (trust very much). For the main analysis, we define each variable of trust as a binary variable that turns one if the individual states that she trusts EU Parliament or Commission at least on a level of four, and zero if trust is below this. Figure 3.2 provides a comparison of the share of individuals in treated and untreated cohorts for these binary variables. In our academic-track high school graduate sample, about 69 percent trust EU Parliament (65 percent in the overall sample) and 70 percent



(a) Trust in EU Parliament

(b) Trust in EU Commission

Figure 3.2: Mean distribution for trust in EU Parliament (a) and trust in EU Commission (b) for treated and untreated cohorts

Notes: The graph shows means of trust. We define trust as one if an individual states she trusts EU Parliament / Commission at least on a level of four on a scale from one (no trust at all) to seven (high trust). Treated individuals (in blue) are G8 and untreated individuals (in grey) are G9. The sample is reduced to academic-track high school graduates.

trust EU Commission (66 percent in the overall sample) at least on a level of four. Both graphs show an increase in the probability of trusting either EU institution for treated relative to untreated individuals. In additional robustness checks we test the reform effect on trust measured as discreet variables. Figure C.1 in the Appendix provides the same graph distinguished at the seven categories of trust levels instead of the binary variables.

3.2.3 Gap Year

We propose that a main contributor for the increase in trust in EU institutions is increasing gap year uptake in treated cohorts. We base this analysis on SOEP long format information from 2018 which provides a wide array of household and individual based information.[11] Every year over 25,000 households are surveyed. The SOEP includes readily usable education and occupation information. Based on this information we can construct a timeline of the career path for about 2,000

[11]This paper is based on the 34th wave, encompassing survey data from 1984 to 2017.

individuals which allows us to identify delays in entering university, a job, or an apprenticeship after graduating from high school.

We focus the analysis on individuals born after 1980 as above. We limit the analyses to individuals from academic-track high school for the main analyses, as these were unambiguously affected by the reform, and SOEP data is large enough to still identify a meaningful effect in this reduced sample.[12]. In 2000, the pool of participants in SOEP was enlarged beyond the adult age and includes adolescents at the age of 17. This survey additionally allows identification of childhood background information, as well as linking individuals to parents' backgrounds. We focus the analysis on survey years 2000 to 2017 when this additional information is also available. Our analysis is based on a cross-section of first observations when individuals are no longer at school and for whom we could identify the next step in life after graduation. The average age in our sample is 20.

Participation in a gap year is the main outcome of interest here. Gap year is a binary variable that turns one if an individual is at least one year older between achieving the high school degree and the next step. Figure 3.3 shows the mean uptake of a gap year in comparison for treated and untreated cohorts. In the cross-section based on observations for whom we observe all control variables, 40 percent of individuals engages in a gap year after graduation.[13] On average, treated individuals are more likely to participate in a sabbatical after graduation compared to untreated individuals. Table C.4 provides descriptive statistics for our SOEP data. Gap year

[12]Comprehensive schools are, thus, excluded, as well as basic- and middle-track schools of the three-tiered German high school system

[13]In the unbalanced cross section 30 percent show a gap between graduation and the next step. We are aware that we measure a large percentage of gap year takers. Gap year, may, however, also be generic in the sense that the next phase in life is simply reported after having turned one year older the same year. Measurement error is possible, but only of concern if it were correlated with treatment and systematically different for treated and untreated cohorts. We use the same sources of information for all individuals and only include individuals where we have listed information on their next phase in life after graduation. Furthermore, the implied increase in gap year participation relative to the mean in the main analyses of section 3.4 compares well to the increase of voluntary service participation, which is more precisely measured.

results are also confirmed at the intensive margin, measuring the number of years between career phases.[14]

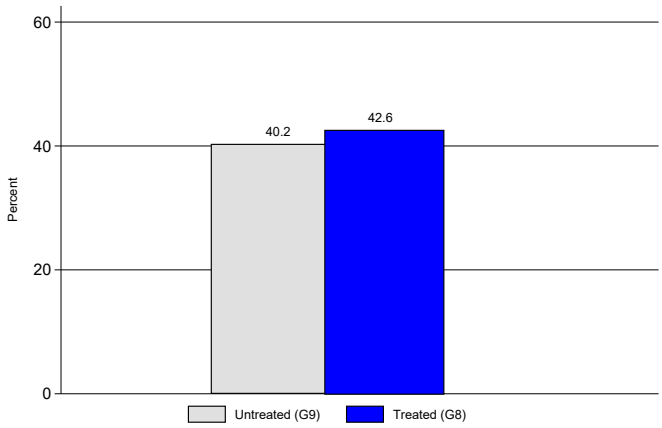


Figure 3.3: Mean gap year participation for treated (G8) and untreated (G9) individuals

Notes: The graph shows the share of individuals who take a gap year after graduation for treated individuals (in blue) and untreated individuals (in grey) for the cross-section of first observations in the SOEP sample.

3.2.4 Further Outcomes

Half of the individuals in a gap year take part in voluntary services after graduation in our sample. We measure volunteering as a dummy variable that turns one if an individual states that she is engaged in a voluntary service based on the youth questionnaire or her occupation information. Volunteering can, for example, be a civic, environmental, or military year. The official state-organised voluntary year was introduced in 2011 after the abolishment of compulsory military service in all federal states. Before that, there were already vast options via private but state-sanctioned organisations, such as, through the church or welfare organisations. The Ministry

[14]Figure C.2 shows a comparison of the age gap between graduation and the next career step for treated ("G8") versus untreated ("G9") cohorts. The figure shows the mean distribution of individuals who are the same age when graduating school and when continuing with university, an apprenticeship, or employment, individuals who are one year older, two years older, or three years older. Almost 80 percent of gap year takers are one year older at their next phase in life. Voluntary services, for example, are often for one year up to 24 months.

of Family Affairs provides a list of organisations that offer civic and environmental voluntary year services (BMFSFJ, 2020).

Volunteering, and in particular volunteering abroad, has substantially grown in demand over the past decade. Since its founding in 2012 state-organised volunteering grew by about 20 percent in 2017 to about 42,000 participants (BAFZA, 2012, 2017). There are ten central offices organising regional agencies. Seven of these organisations also have specific listings for volunteering abroad. An evaluation of volunteering abroad lists over 7,000 individuals volunteering abroad in 2017.[15] A majority of activity is Europe-based (AKLHUE, 2011, 2018).

In addition to these results we provide further analyses. These are mainly based on SOEP data. We show that the G8 reform did not affect trust levels in general. We measure trust as binary variable that turns one if individuals state that they trust people in general at least on level four out of seven, and zero otherwise. Our sample consists of 1,338 individuals of whom more than 50 percent show general trust. We further show that the reform did not increase political interest in general. Political interest is provided on a scale from one (no interest) to four (very high interest). We measure political interest as a dummy variable for 2,359 individuals that turns one if an individual states at least being interested (level two), and zero otherwise. About 32 percent if individuals are interested in politics in general in this sample. Based on allbus we show that trust in political parties is also not affected by the reform based on 1,517 individuals. Finally we estimate whether the G8 reform impacted the probability of individuals going abroad during their school time in order to show that we do not simply observe a displacement effect of spending time in a foreign country later in life after the reform. Thirteen percent of our sample of 2,218 individuals spent time abroad during high school.

[15]Information is based on on a survey amongst international volunteering organisations from 2017 in cooperation with the Ministry of Family Affairs. More than 90 percent of volunteers abroad use state-organised programs. Figure C.3 in the Appendix shows the development of international volunteering from 2005 to 2017.

3.2.5 Covariates

We control for a rich set of fixed effects at state, cohort, and survey level. In addition, we include a variety of potentially confounding factors that may be correlated with both the reform and our outcomes of interest. These include individual level controls for age when answering the survey, age squared, gender, migration background / German nationality, living in former East Germany, and being part of the double graduate cohort or partially treated.

Given the rich background information in SOEP, we can additionally include having lived in the countryside as a child. We further control for family background by adding parental controls for having a blue-collar-job working parent, a parent that is married versus single, having a parent with a tertiary degree, and having at least one sibling. In order to control for the financial background, we also include household income in additional robustness checks and occupational controls for holding a blue-collar job, and being employed. These are not part of our preferred regression design, however, as this may also be endogenously influenced by the G8 reform. In gap year and voluntary service analyses we additionally control for past cohort's participation in the compulsory military or civic service.

3.3 Econometric Setting

We conduct two separate main analyses. In both these analyses we rely on the sequential introduction of the G8 reform across federal states and use a difference-in-difference design.

We first show that that the reform is connected to higher trust levels towards European Parliament and European Commission:

$$Trust_i = \alpha_0 + \alpha_1 G8_{s,c} + X_i'\lambda + \mu_s + \theta_t + \gamma_c + \epsilon_{1,i},$$

with the main coefficient of interest α_1 measuring the impact of the G8 reform in state s and school cohort c on the probability to trust EU Parliament or Commission of individual i. We include state level, μ_i, and cohort, γ_c, fixed effects. This means we are taking out all differences in trust towards EU institutions that exist between cohorts, for example, because younger people in general have a more favourable view of the EU. By including state fixed effects we control for differences in trust between different states that are constant over time. For additional robustness we also include survey year, θ_t, fixed effects in order to account for factors that may have affected answers in a particular survey year. Individual level control variables, as described in the last section, are gathered in vector X_i.

We argue that a main contributor for this unintended side-effect of the reform is due to an increase in probability to take a gap year due to the reform:

$$GapYear_i = \beta_0 + \beta_1 G8_{s,c} + Z_i'\phi + \mu_s + \gamma_c + \psi_t + \eta_g + \epsilon_{2,i},$$

with the main coefficient of interest β_1 measuring the impact of the G8 reform in state s and school cohort c on the probability of participating in a gap year of individual i. The model includes state, μ_s, and cohort, γ_c, fixed effects. The main estimations again include survey year fixed effects, ψ_t. We also include survey sub-group fixed effects, η_g, in the main specifications as SOEP is conducted for different focus groups. Individual level control variables are gathered in vector Z_i. ϵ denotes the error term.

Standard errors are clustered at the state level. We account for the low number of clusters by additionally applying wild bootstrapping according to Cameron et al. (2008) and Roodman et al. (2019).

Several concerns arise in this analysis. First, the empirical approach relies on the comparison of cohorts prior and after the school reform based on students' school entry dates and on the states' introduction dates of the shorter schooling system relative to individuals in states with the previous system. Underlying this approach is the assumption that cohorts would not have developed differently in absence of the reform. Several additional school reforms were introduced between 2005 and 2014.[16] None of these are perfectly collinear with the introduction of the G8 reform. They impacted the schooling system, and may, hence, influence school duration and also post-graduation decisions, however. These include the introduction of central exit examinations in eight states instead of individual school exams. The tracking grade at which students first change from primary to secondary school was changed in three states.[17] The secondary schooling choices outside of academic-track schools were limited in five states through combination of lower and middle secondary schools into one comprehensive school. Most importantly, seven federal states first introduced and then retracted university tuition fees. We test robustness of our main results by including dummy variables that turn one if an individual was affected by these reforms.

Second, and equally important for causal inference, is the assumption that no sample selection occurred. It stands to reason that selection would have generated substantial costs as the G8 reform was introduced quickly for entire federal states and families would have had to move to different states in order to select in or out of the G8 treatment. Selection bias, therefore, seems unlikely. Furthermore, previous research has shown that graduation rates have not been affected by the G8 reform (Huebener and Marcus, 2015, 2017). The total number of grammar school students

[16] See, for example, Meyer et al. (2018) or Huebener and Marcus (2015).
[17] The tracking year in Germany varies between 5^{th} and 7^{th} grade.

was not affected by the reform and has remained high (Hoffmann and Malecki, 2018).[18]

Third, Goodman-Bacon (2018) amongst others recently stressed the importance of changing treatment effects through variations in treatment timing. We, therefore, also provide event study analyses to explore the treatment effect over time.[19]

Fourth, there naturally might be several channels explaining why the reform may influence attitudes towards Europe. We consider gap year participation, for example used for volunteering, a very likely and plausible causal channel. In section 3.6 we survey existing research for alternative reform effects and present an evaluation of the possibility that these may present alternative channels for the G8 reform impacting trust in European institutions.

3.4 Main Results

3.4.1 Trust in European institutions

Table 3.1 shows the first set of main results for the impact of the G8 reform on trust in EU Parliament in columns (1) to (4) and in EU Commission in columns (5) to (8). We see a positive effect of the reform on trust in both institutions.

Panel A includes all cohort fixed effects. We see a positive reform effect on trust in EU Parliament. The coefficient suggests an increase in the probability to trust EU Parliament of nearly 10 percentage points in column (1) when including only cohort and state fixed effects. Coefficient magnitude remains very similar when

[18] Anger and Dahmann (2015), Andrietti (2015), Huebener et al. (2017), or Meyer and Thomsen (2015), for example, have previously analysed the possibility of selection bias in this treatment and come to the same conclusion.

[19] It is important to note that the event study relies on the assumption that the treatment effect did not vary for the different federal states introducing the reform. The reform was introduced similarly throughout all federal states. All states experienced similar discussions after its introduction. Apart from the above discussed additional school system reforms, such as university fees, which we control for, we could not find evidence for differences in post-graduation decision processes across treated federal states.

including additional controls for survey years in column (2), and individual controls in column (3). Trust in EU Commission is similar, but the reform effect is smaller with a coefficient of about 6 percentage points increase.

The measured connection is close to the ten percent significance level in particular in columns (1) to (3), but weak. The small sample (of treated individuals) raises concerns of too little statistical power. We have about 300 individuals at academic-track high school, of whom 89 are treated. Adding all fixed effects implies we have over 30 dummy variables in the regression, thus, leaving few observations per independent variable. In Panels B and C we account for this problem in two different ways. First, in Panel B, we substitute the school cohort fixed effects by a linear trend in order to still account for changes across these cohorts but reduce the number of covariates in our analysis.[20] Panel B standard errors are slightly increased compared to Panels A and C. Second, in Panel C, we, again include cohort fixed effects, as we take this as the most accurate model specification. Here we account for potential over-fitting by omitting insignificant cohort fixed effects as shown in Figure C.4.[21] The results show that coefficients are increased, whereas standard errors remain mostly very similar compared to results of Panel A. In both Panels B and C we see positive coefficients and often close to significant reform effects.

Panel C shows that the reform led to significant increases in trust. We see that the probability to trust European Parliament is higher by between 12 to 14 percentage points. Relative to the sample mean of 0.65 this implies an increase of roughly 19 percent[22] when including individual level controls in column (3).[23] The robustness checks in the Appendix in Table C.6 show that these results also hold when applying a probit instead of a linear probability model and when including additional school reform controls.[24]

[20] We test an alternative quadratic trend and results are qualitatively the same.

[21] The authors thank Marco Caliendo for pointing this out.

[22] Calculated as $\frac{0.12}{0.65} = 0.185$

[23] Table C.5 shows the full regression results.

[24] The main reform effect for trust in Parliament seems to be at the extensive instead of the intensive margin.

Table 3.1: The effect of decreasing school duration on the probability to trust EU institutions

	Trust Parliament				Trust Commission			
	(1) FE	(2) Survey FE	(3) Individual Controls	(4) Academic track	(5) FE	(6) Survey FE	(7) Individual Controls	(8) Academic track
Panel A. All cohort FE								
Reform	0.096	0.100	0.095	0.143	0.058	0.063	0.057	0.098
	(0.056)	(0.058)	(0.065)	(0.153)	(0.052)	(0.055)	(0.060)	(0.160)
Observations	864	864	864	334	847	847	847	328
WB p-value	0.113	0.111	0.162	0.500	0.310	0.301	0.366	0.644
Panel B. Linear cohort trend								
Reform	0.105	0.112	0.112	0.166	0.080	0.088	0.091	0.124
	(0.066)	(0.069)	(0.071)	(0.110)	(0.059)	(0.062)	(0.064)	(0.110)
Observations	864	864	864	334	847	847	847	328
WB p-value	0.135	0.128	0.133	0.123	0.218	0.200	0.200	0.288
Panel C. Significant cohort FE								
Reform	0.121*	0.136**	0.118*	0.145	0.154**	0.179**	0.125*	0.160
	(0.059)	(0.062)	(0.063)	(0.116)	(0.064)	(0.061)	(0.065)	(0.101)
Observations	864	864	864	334	847	847	847	328
WB p-value	0.048	0.026	0.077	0.232	0.050	0.016	0.112	0.192
Mean	0.653	0.653	0.653	0.692	0.658	0.658	0.658	0.698
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓		✓	✓	✓
Basic controls			✓				✓	
Clustered SE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The dependent variable in columns (1) to (4) is a dummy variable that turns one if an individual trusts EU Parliament at least on a level of four on a scale up to seven (high trust), and zero otherwise. The dependent variable in columns (5) to (8) is a dummy variable that turns one if an individual trusts the EU Commission at least on a level of four out of a scale up to seven (high trust), and zero otherwise. The mean values of the dependent variables are provided at the bottom of the table as "Mean". Panel A shows the regression results when including all cohort fixed effects. Panel B alternatively includes a linear trend variable for school cohorts. Panel C shows the regression results when including only significant cohort fixed effects in order to avoid over-fitting in this small sample. We include cohort year FE for: 1997, 1998, 1999, 2000, 2002, 2005, 2007, 2008, 2009 which all affect the outcome at a level of 1 percent significance in columns (1) to (4). We include cohort year FE for: 2002 and 2009 which affect the outcome at a level of 1 percent significance in columns (5) to (8). The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school entry year. Control variables are as indicated. The number of observations in all regressions is balanced on basic controls. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table as "WB p-value". *** p<0.01, ** p<0.05, * p<0.1.

Trust in EU Commission shows a similar tendency. We see a significant increase in the probability to trust EU Commission in treated cohorts of about 13 to 18 percentage points in Panel C. This implies an increase by 20 percent relative to the sample mean of 66 percent in column (7). The bootstrapped p-value is just above the 10 percent level when including individual controls. The robustness checks in the Appendix show that the reform effect is significant at the intensive margin as well and when including additional reform controls.

Columns (4) and (8) show the effect limited to the sample of academic-track high school graduates where treatment effect is most accurately assigned. Again, we see positive coefficients. Coefficient sizes are larger in this sample. As sample size is even smaller here, the effect is imprecisely measured.

Thus, the results reveal a significant increase in trust in both EU institutions of about 20 percent amongst treated relative to untreated cohorts. Stability of these results vary due to our small sample of treated. The event-study analysis in section 3.4.3 adds further evidence to the here presented results.

As the reform was, clearly, never intended as a means to increase support of European institutions, the reform effect is obviously an indirect one, driven by a different channel. The following section shows that gap year participation is significantly increased amongst treated cohorts and often used for volunteering.

3.4.2 Gap year uptake

Our second set of results show that the G8 reform led to significantly higher uptake of gap year participation. Table 3.2, Panel A, presents the results when estimating the G8 reform on the binary variable indicating that an individual has a career path gap after graduation of at least one year. We first include cohort and state fixed effects in column (1), and subsequently add further controls. Column (2) includes survey year and survey sub-group fixed effects. Column (3) also includes individual

level controls as described in the data section above. Column (4) adds family background controls for parents' and siblings' information. Column (5) controls for (past cohorts') participation in compulsory military service or its substitution by civic services. This is our preferred setting. Column (6) adds linear time trend variables interacted with dummy variables for reform regions as additional controls.[25]

In all settings we see a significantly higher gap year uptake in treated relative to untreated cohorts. The coefficient suggests a sizeable increase of about 14.9 percentage points in column (5). Relative to the mean of gap year participation in this sample of 42 percent, this implies that the probability to take time off after graduation has increased due to the reform by about 35 percent.

The results are very robust. Table C.8 includes income and occupational controls, as well as additional school reform controls. The coefficient measuring the effect of the G8 reform remains significant and similar in magnitude throughout. Coefficient magnitude is reduced when controlling for compulsory military or civic service in column (5), which is natural as it implied a gap by law for a large part of male graduates before it was discontinued in 2011. The table further shows that the results also hold in the fully balanced sample, when applying a probit instead of the linear probability model, and at the intensive margin.

We also estimate the reform effect specifically on the probability to engage in voluntary services after graduation in Panel B of Table 3.2.[26] We see a significant increase in the probability to participate in a voluntary year of 5.6 percentage points.[27] Our preferred estimation setting again includes all fixed effects, individual level controls, family background controls, and controlling for compulsory military or civic year participation in column (5). Without the reform, about one out of five graduates

[25]Table C.7 provides the full regression results.

[26]Table C.9 in the Appendix provides the full regression results.

[27]Meyer et al. (2018), for example, find an increase of 10 percentage points in the probability to engage in a voluntary year comparing 2008 (pre reform) graduates to 2012 (post reform).

Table 3.2: The effect of decreasing school duration on the probability to take a gap year and voluntary year

	(1) FE	(2) Survey FE	(3) Basic controls	(4) Background controls	(5) Comp. service	(6) Linear trend
Panel A. Gap year (mean: 0.4)						
Reform	0.175***	0.161***	0.189**	0.194***	0.149**	0.166**
	(0.025)	(0.026)	(0.064)	(0.058)	(0.053)	(0.057)
Observations	2,196	2,196	2,196	1,930	1,930	1,930
WB p-value	0.000	0.000	0.044	0.031	0.039	0.026
Panel B. Voluntary year (mean: 0.19)						
Reform	0.156***	0.142***	0.138***	0.112***	0.056**	0.064**
	(0.023)	(0.021)	(0.043)	(0.036)	(0.023)	(0.025)
Observations	2,196	2,196	2,196	1,930	1,930	1,930
WB p-value	0.000	0.000	0.029	0.035	0.021	0.039
Cohort FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓
Basic controls			✓	✓	✓	✓
Family controls				✓	✓	✓
Compulsory service					✓	✓
Linear trend						✓
Clustered SE	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns one if an individual in a gap year as taking time off after graduation before going to university, starting an apprenticeship, or occupation in Panel A. Results are balanced on basic controls. The mean value of the dependent variable in Panel A is 0.415. Panel B shows the regression results in the cross section of first observations balanced on basic controls for the probability to engage in voluntary military or civic service after graduation. The mean value of the dependent variable is 0.19. The main independent variable, reform, equals one if the individual was affected by the G8 reform in his or her federal state given school starting year. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table as "WB p-value". *** p<0.01, ** p<0.05, * p<0.1.

volunteered. Due to the reform effect this increased to roughly one out of four graduates.[28]

3.4.3 Event study analysis of the reform effect

We add further evidence to our findings above in an event study analysis. We change the econometric model from measuring an aggregate reform effect to analysing the effect for the individual school cohorts in order to show the dynamic of gap year uptake and trust in EU Parliament responses regarding the introduction of the G8 reform. We expect to see a rise in trust and gap year participation after the reform is introduced and no trend leading up to the reform.

We introduce lead and lags to our reform variable and replace the aggregate G8 reform coefficient with a series of dummy variables for whether an individual is part of a school cohort before or after the reform was introduced.

$$Outcome_i = \delta_0 + \sum_y \delta_y SchoolEntry^y_{s,c} + \Psi_s + \Theta_t + \Gamma_c + \epsilon_{3,i},$$

where $SchoolEntry$ refers to a series of ten dummy variables that turn one if individual i started high school as part of school cohort c, before or after y years of the federal state's introduction of the reform. Thus, we have three lag cohort years when individuals are part of the first treated cohort: they start high school the year the reform is introduced, one year later, two years later, or three years later.[29] The series of dummy variables further includes leads for up to six years before the reform was introduced. Thus, these dummies turn one if an individual started secondary school six years before the reform was introduced, five years before the reform was introduced, etc. up to the last G9 cohort, one year before G8 introduction. The last G9 cohort is the omitted category. $Outcome$ is either a dummy variable indic-

[28]Relative to the sample mean of 0.19, a 5.6 percentage point increase implies a non-negligible increase of about 29 percent due to the decrease in school duration by one year.

[29]The number of observations decreases in later cohorts.

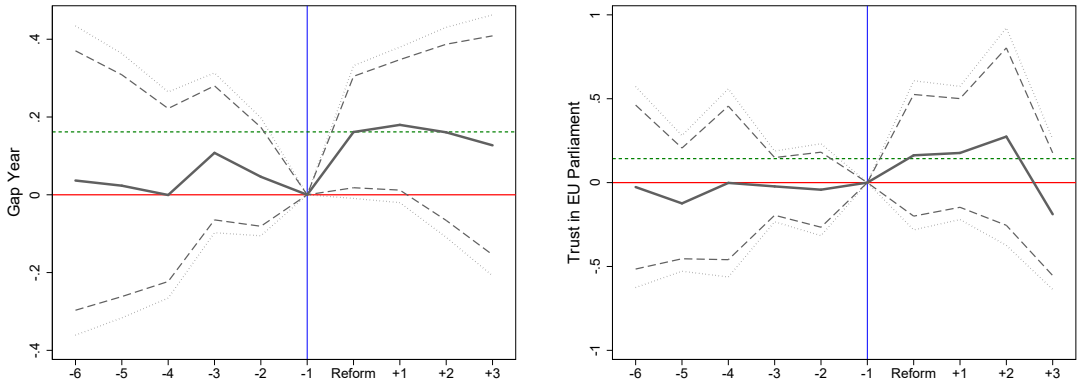
ating gap year participation or trusting EU Parliament.[30] Otherwise, the regression equations introduced in section 3.3 remain unchanged: we include state, cohort, and survey fixed effects.

The results are presented in Figure 3.4 and confirm the aggregate analyses from above. Panel (a) shows the results for the probability to engage in a gap year, Panel (b) for trust in EU Parliament. In Panel (a) we see mostly positive but small coefficients and no clear trend leading up to the reform. As coefficients are relative to the excluded year this implies that individuals in school cohorts before the reform may have been more likely to go on a sabbatical after graduation than the last untreated cohort. The last G9 year had more pressure continuing on with university as they were immediately followed by the first G8 cohorts. All coefficients for lead dummies are insignificant, however.[31] After the reform is introduced there is a significant upwards-movement in the probability to engage in a gap year.

A similar picture is presented in Panel (b) for trust in EU Parliament. Leading up to the reform there is clearly no trend. In fact coefficients are very close to zero. After the reform is introduced we see an upward trend for the first treated cohorts indicating higher trust. Non-significance here is most likely due to the low number of observations. When we account for over-fitting as in the empirical analysis above, we see the same pattern, but stronger reform effects. These results are presented in Figure C.5 in the Appendix.

[30] In the analysis for gap year participation we have at least well over 100 observations per year. The number of observations for trust in EU Parliament is lower as we focus the analysis on academic-track high school graduates that are clearly assigned to treatment and control group, but total number of observations is only about 300 here. For the last year after the reform the number of observation drops to 29. In order to increase the number of observations in this last cohort, we also test combining responses for individuals who started three and four years after the reform was introduced into the category starting three years post-reform introduction. This increases the number of observations in the last cohort to 53. The presented conclusions remains unchanged by this. Results are available upon request.

[31] To alleviate concerns of mean reversion, we additionally test using the cohort three years before the reform is introduced as the omitted category and results remain unchanged. Results are available upon request.



(a) Gap year participation

(b) Trust in EU Parliament

Figure 3.4: Event study and fixed-effects estimates of the G8 treatment on gap year and trust in EU Parliament

Notes: The graph shows regression coefficients and confidence intervals (90% as dashed line and 95% as dotted line) for estimating the development of gap year participation in (a) and trust in EU Parliament at least on level four on a scale from one (no trust) to seven (high trust) in (b) for the sample restricted to upper secondary school graduates. The last school cohort before the reform is the excluded category. The graph further shows the aggregated effect through difference-in-difference estimates in short dashed horizontal lines in the given sample. Individuals were included when they started secondary school up to six years leading up to the reform, and up to three years after the reform. All regressions control for cohort fixed effects, survey year fixed effects, federal state fixed effects, individuals in the double graduate cohort, and partially treated individuals. Panel (b) additionally controls for individuals in the compulsory military or civic service. Standard errors are clustered at the federal state level.

The event study, thus, first of all confirms our aggregate findings. We see that treated cohorts show different gap year and trust behaviour than untreated cohorts. Both are increased. We also see, however, that the measured effects seem largely driven by the first treated cohorts and declining afterwards. We do not see a lasting reform effect. The first treated cohorts were obviously the most aware of the "additional" time they had gained as they had the direct comparison with untreated cohorts. It is, therefore, not surprising that they show the largest reaction in our setting.

3.5 The G8 Reform Did Not Increase Trust in General

We analyse the effect of the reform on several further outcomes regarding political interest and trust in general and see no comparable effect of the reform. The effect of the reform on trust in EU institutions seems quite singular. The results are presented in Table 3.3. We test the effect of the reform on the probability to trust political parties in general, show political interest (panel B), and trust people (panel C). The G8 reform has no significant positive effect on any of these outcomes.

In fact, we can even see a significant negative effect of the G8 reform on political interest in Panel B.[32] The coefficient suggests a reduction in the probability to show interest in politics of about 14 percentage points when including all controls in column (5). Relative to the mean of 0.32 this suggests a large reduction by 43 percent, which is a sizeable effect.

The coefficient measuring the probability to trust political parties in Panel A (based on allbus data) is not affected by the G8 reform.[33]. The probability to trust people at least on a level of four out of seven also reveals a connection to the G8 reform that is very close to zero in Panel C.

We, furthermore, analyse whether the increase in gap year uptake is due to G8 cohorts postponing going abroad during their school time until after graduation. Regression results in Panel D do not show a significant difference between treated and untreated cohorts due to the G8 reform in the probability to spend time abroad

[32]This is evident when controlling for the share of our sample who are attending high school while answering this survey question. Our result is in line with previous research, for example, by Krekel (2017).

[33]Table C.10 shows that this also holds in our alternative model specifications when alternatively using a linear trend instead of cohort fixed effects and when including only significant cohort fixed effects.

Table 3.3: The effect of decreasing school duration on trust in political parties, political interest, trust in people, and going abroad during school time

	(1) State and cohort FE	(2) Survey FE	(3) Basic controls	(4) Background controls	(5) Income controls
Panel A. Trust political parties (mean: 0.53)					
Reform	0.028	0.032	0.053		
	(0.108)	(0.107)	(0.108)		
Observations	1,517	1,517	1,448		
WB p-value	0.838	0.813	0.695		
Panel B. Political interest (mean: 0.32)					
Reform	-0.139**	-0.141**	-0.148**	-0.139**	-0.137**
	(0.050)	(0.054)	(0.059)	(0.059)	(0.057)
Observations	2,356	2,356	2,356	2,356	2,356
WB p-value	0.008	0.064	0.083	0.097	0.101
Panel C. Trust people (mean: 0.51)					
Reform	-0.052	-0.024	-0.026	-0.014	-0.013
	(0.054)	(0.056)	(0.056)	(0.055)	(0.055)
Observations	1,340	1,340	1,340	1,340	1,340
WB p-value	0.345	0.706	0.676	0.814	0.831
Panel D. School time abraod (mean: 0.13)					
Reform	0.050	0.077	0.043	0.056	0.057
	(0.065)	(0.057)	(0.054)	(0.053)	(0.053)
Observations	2,204	2,204	2,204	2,204	2,204
WB p-value	0.638	0.364	0.606	0.482	0.481
Cohort FE	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓
Basic controls			✓	✓	✓
Family controls				✓	✓
Income controls					✓
Clustered SE	✓	✓	✓	✓	✓

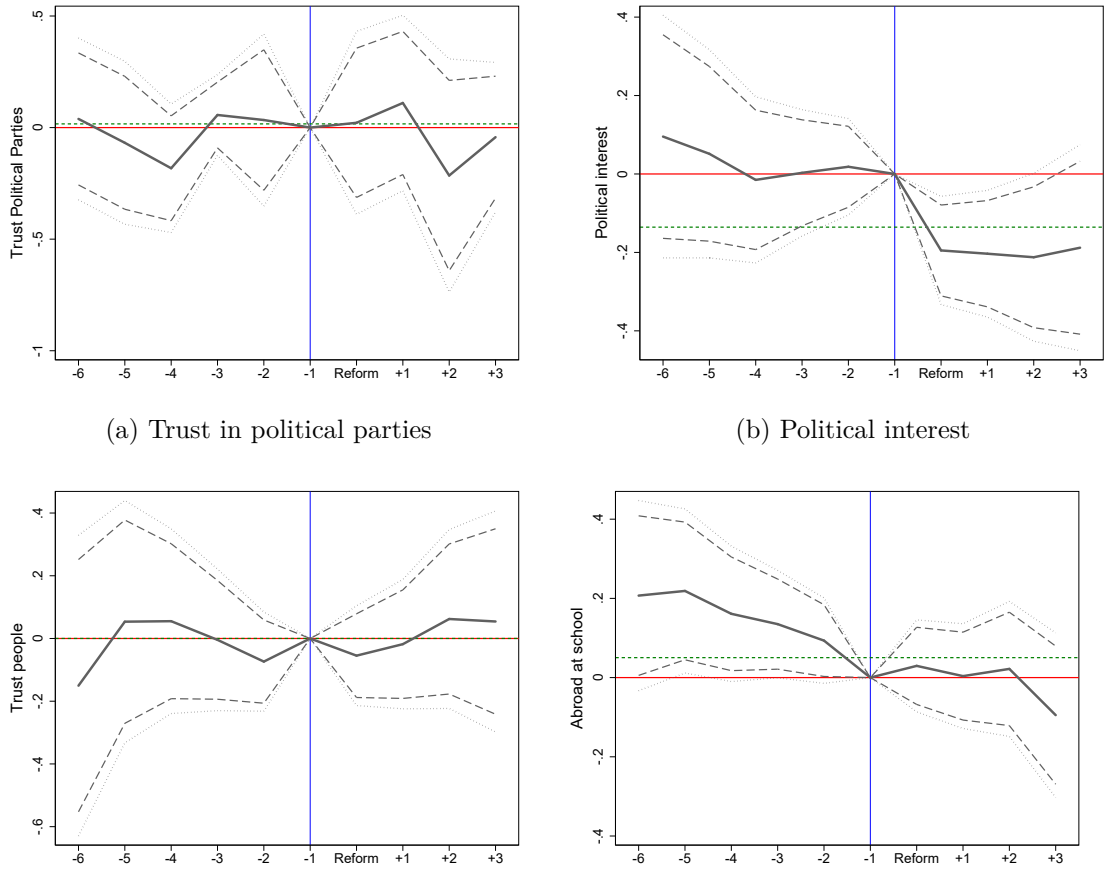
Notes: The dependent variable is trust in political parties measured as a dummy variable that turns one if an individual shows trust on a level of 4 out of a scale up to 7 (high trust), and zero otherwise in Panel A. These analyses are based on allbus data. The mean value of the dependent variable is 0.525. All other Panels are based on SOEP data. The dependent variable in Panel B is general political interest measured as a dummy variable that turns one if an individual is interested in politics at least on a level of two one a scale of one (no interest) to four (high interest). Panel C shows the results for the dummy variable that turns one if an individual trusts people at least on a level of four on a scale of one (no trust) to seven (high trust) in general, and Panel D shows the results for a dummy variable that turns one if a person spent some time abroad during high school, and zero otherwise. The mean value of the dependent variable is 0.275 in Panel B, 0.51 in Panel C, and 0.129 in Panel D. The main independent variable, reform, equals one if the individual was affected by the G8 reform in his or her federal state given school starting year. Control variables are as indicated. Individual level controls in Panels B to D additionally include being still at high school, as the shown questions are also answered by individuals who are still at school. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table as "WB p-value". *** p<0.01, ** p<0.05, * p<0.1.

while still at school.[34] We take this as evidence that the increase in sabbaticals after graduation is not due to a substitution effect.

As before, we additionally confirm our findings of this section in event study analyses. The results are presented in Figure 3.5. Panel (a) shows the development of trust in political parties for cohorts up to six years prior to the reform and three years after the reform. There is no clear trend either before or after the reform. The same holds for trust in people in general, in Panel (d). Panel (b) confirms the significant drop in political interest as a result of the reform. We see no trend leading up to the reform, but a sharp drop afterwards which is slow to recover in later treated cohorts. Panel (c) shows that going abroad during school time has been on a downward trend before the reform. This trend was momentarily stopped after the reform. There is no evidence that G8 students participate less in going abroad during their school time compared to previous cohorts.

Clearly, there is no overall increase in trust in general, or specifically in politics. The positive reform effect we observe for trust in European institutions is not reflected in any of our alternative trust measures.

[34] A study by weltweiser Verlag (2019) on student exchange programs, for example, also shows an increase in total number of pupils going abroad during high school between 2003 and 2010, the main years of early reform impact.



(a) Trust in political parties

(b) Political interest

(c) Trust people

(d) Abroad during school time

Figure 3.5: Event study and fixed-effects estimates of the G8 treatment on trust in parties, political interest, trust in people, and going abroad during school time

Notes: The graph shows regression coefficients and confidence intervals (90% as dashed line and 95% as dotted line) for estimating the development of trust in political parties (a) at least on level four on a scale from one (no trust) to seven (high trust), political interest (b), trust in people in general (c), and the probability to go abroad at school in (b) for the sample restricted to academic-track students and graduates. The last school cohort before the reform is the excluded category. The graph further shows the aggregated effect through difference-in-difference estimates in short dashed green lines in the given sample. Individuals were included when they started secondary school up to six years leading up to the reform, and up to three years after the reform. All regressions control for cohort fixed effects, survey year fixed effects, federal state fixed effects, double graduate cohorts and partially treated individuals. Panels (b) to (d) additionally control for individuals still being at school. Standard errors are clustered at the federal state level.

3.6 Further Potential Channels of Reform Impact on Trust in EU Institutions

Finally, the G8 reform naturally had a variety of effects. We believe that the positive link of the reform and trust in EU institutions is connected to the increase in gap year participation of treated cohorts, as this sabbatical is, for example used to volunteer (abroad) which has largely gained in popularity over the past decade.

Table 3.4 provides a list of reform effects that have been shown to be significantly connected to the G8 reform in previous literature. We show the outcome, the effect of the reform, the main source, and our assessment of whether the alternative outcomes are likely to affect trust in EU institutions. The main observed outcomes for effects of the reform focus on student performance, time availability, and well-being. Recently there has been a larger focus also on post-graduation reform effects.

Much of the previous research has focused on student performance. Overall, performance seems slightly reduced and increased for high-performing students. Altogether, the reform was successful in reducing the age of school graduates but increased repetition rates indicating that on average the reduction is not an entire year. Importantly for our research, however, students still benefit from extra time after graduation in comparison to untreated cohorts. Students' grades in several subjects appear decreased.[35] Reduced English skills and intelligence may lead to less trust as it reduces understanding, but hardly more.

The G8 reform implies increased pressure on students and, hence, activities outside of school may be reduced. Chapter 2 of this dissertation has shown evidence on this effect, as well as mid-term effects of the reform on volunteering after graduation. Students' personalities further indicate that treated cohorts are more extroverted.

[35]Better education in general is related to higher trust (Oreopoulos and Salvanes, 2011).

Table 3.4: G8 reform effects shown in previous literature

Outcome	**Effect of G8 reform**	**Source**	**Effect on trust**
Student performance	Lower performance at graduation in mathematics	Büttner and Thomsen (2015)	$\sim$
	Slightly reduced performance in English	Huebner et al. (2017)	$\downarrow$
	Lower final grade point averages	Huebener and Marcus (2017)	$\sim$
	Grade repetition increased (for boys)	Huebener and Marcus (2015, 2017)	$\sim$
	Graduation age reduced (stronger for girls)	Huebener and Marcus (2015)	$\uparrow$
	No effect on graduation rates	Huebener and Marcus (2015, 2017)	$\sim$
	PISA test scores for high-performing students improved	Huebener et al. (2017) Andrietti and Su (2019)	$\sim$
	Reduced performance on intelligence tests	Bergold et al. (2017)	$\downarrow$
Student activities	Less time for side-job	Meyer and Thomsen (2015)	$\sim$
	Less time for voluntary activity	Marcus et al. (2020); Krekel (2017)	$\downarrow$
	Reduced political interest	Krekel (2017)	$\downarrow$
Student personality	More extroverted	Anger and Dahmann (2015)	$\uparrow$
	Less emotionally stable	Anger and Dahmann (2015)	$\downarrow$
Student well-being	More stressed	Meyer and Thomsen (2015); Marcus et al. (2020)	$\sim$
Post graduation	Women less likely enrolled at university in year of graduation	Büttner and Thomsen (2015), Meyer et al. (2018)	$\downarrow$
	University enrolment lower up to three years after graduation	Marcus and Zambre (2019)	$\downarrow$
	Increased voluntary service participation	Meyer et al. (2018)	$\uparrow$
	More likely to stay abroad after graduation	Meyer et al. (2018)	$\uparrow$
	Higher university drop out probability	Meyer and Thomsen (2015)	$\downarrow$
	Higher probability to change majors	Marcus and Zambre (2019)	$\sim$

Notes: Collection of main significant G8 reform effects established by previous research and evaluation on potential effects on trust in EU institutions. $\sim$ indicates neutral effect, $\downarrow$ symbolizes a potentially negative effect, $\uparrow$ symbolizes a potentially positive effect.

We see this in favour of our proposed channel, as this may also increase the probability to seek inter-cultural exchanges.

Not going to university or dropping out may have a direct negative effect on trust (besides increasing gap year participation), as education is positively correlated with trust. Our proposed channel is, furthermore, indirectly supported by previous evidence that university enrolment is delayed and participation in voluntary services and going abroad are increased due to the reform.

The question naturally arises if volunteering itself may be connected to higher trust in EU institutions. It is possible, of course, that increased voluntary activity implies that individuals are more socially oriented and, thus, support the cooperative European project more. This may encourage higher gap year participation (and international voluntary service) in the first place. The research also suggests, however, that voluntary activity of students is reduced due to the reform by almost 20 percent. Thus, it does not appear to be the case that treated individuals are generally more civic minded.

3.7 Conclusion

Policy makers are asking how to increase trust in the European Union. Our research sheds light on an interesting unintended effect of a major German school reform which "gifted" students with an additional year after graduation. Compared to previous cohorts, students of the new G8 system received the same education but with one year less instructional time. We see that this reform increased trust in European institutions, in particular, European Parliament. This increase in trust in the EU is not due to a general increase in trust through the reform. We see no reform effect on trust in political parties in general or in people. In fact, we show

evidence that political interest seems to be decreased in treated relative to untreated cohorts.

We argue that a main contributor to this increase is the higher probability to engage in a gap year by treated cohorts after graduation, which many use to go abroad, for example, through voluntary services. We show that participation in a gap year is robustly increased due to the reform. This increase is not due to a substitution effect of postponing going abroad during school to after graduation.

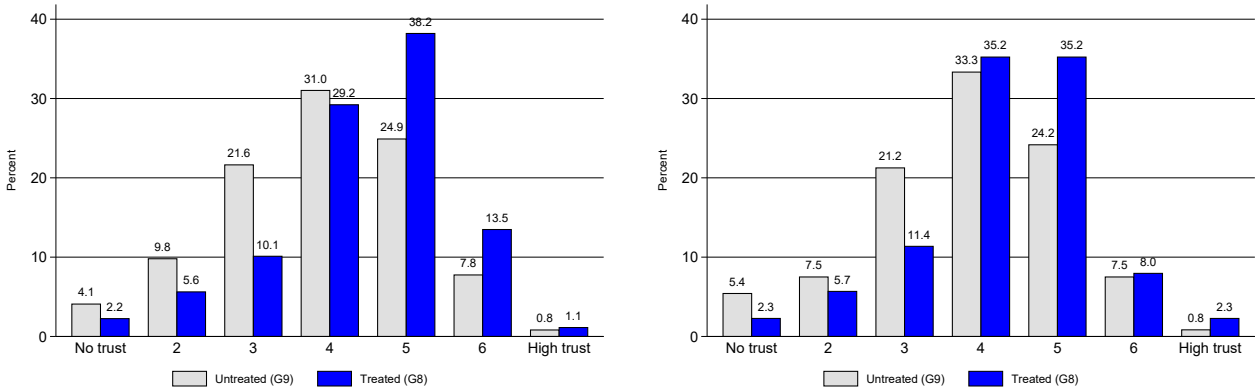
We, thus, show that increasing international cooperation through higher gap year uptake can lead to higher trust in EU institutions. Encouraging trust and participation in the European project is obviously relevant for the effective operation of the European Union. There are a variety of projects trying to increase international exchanges and cooperation towards this goal. As recently as 2016, for example, the "European Solidarity Corps" was announced as a platform for organising and financing volunteering across the European Union.[36] For the years 2018 to 2020 a substantial budget of 341.5 million is planned for this endeavour (European Commission, 2017). The initiative is one of many that enable young graduates to gain international experience.

Investments in international exchanges can be seen as fostering trust in EU institutions.

[36] "The European Solidarity Corps will create opportunities for young people willing to make a meaningful contribution to society and help show solidarity [...] And those who work as volunteers are living European values each and every day", European Commission (2016).

C Appendix to Chapter 3

C.1 FIGURES



(a) Trust in EU parliament

(b) Trust in EU commission

Figure C.1: Mean comparison for trust in EU Parliament (a) and trust in EU Commission (b) for treated and untreated cohorts measured at the intensive margin

Notes: The graph shows means of different levels of trust on a scale from 1 (no trust at all) to 7 (trust very much) on the x-axis for treated individuals (in blue) and untreated individuals (in grey) for the academic-track high school sample based on allbus.

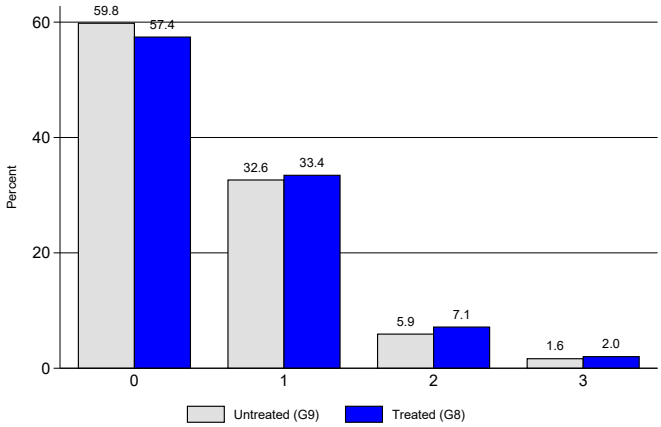


Figure C.2: Mean comparison of years between high school graduation and next phase in life for treated (G8) and untreated (G9)

Notes: The graph shows mean participation in gap years at the intensive margin measured as years between finishing high school and beginning an apprenticeship, university, or employment on the x-axis for treated individuals (in blue) and untreated individuals (in grey) for the cross-section of first observations based on SOEP.

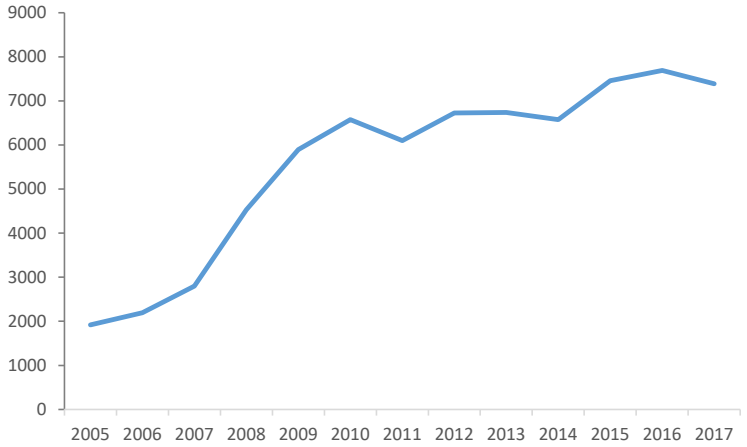


Figure C.3: Development of total number of volunteers in international programs 2005 to 2017

Notes: The graph shows the total number of German volunteers in international programs from 2005 to 2017. Own graph based on information in AKLHUE (2018).

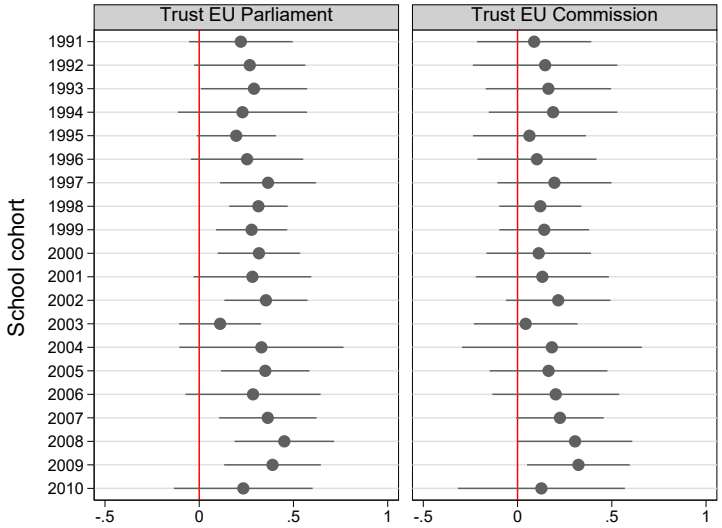
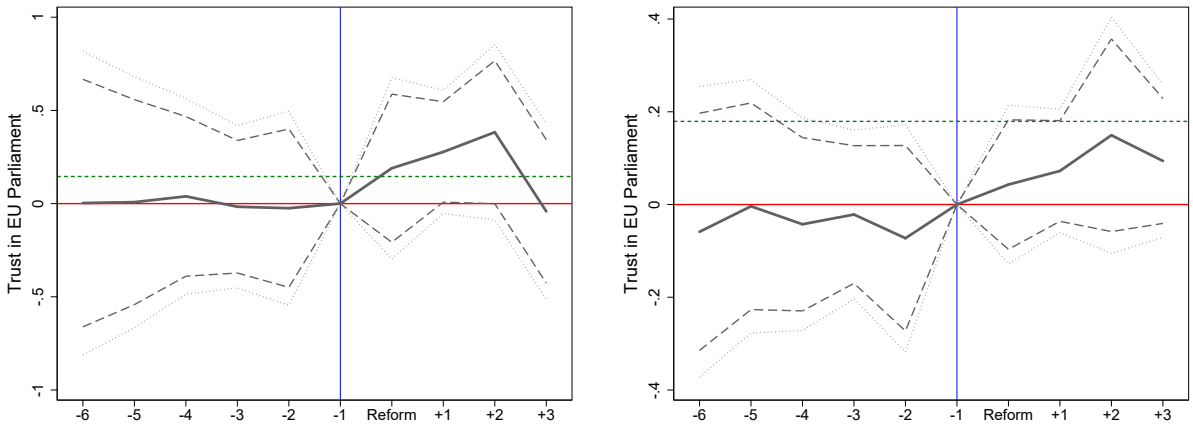


Figure C.4: Cohort Fixed Effects in allbus

Notes: Data from ALLBUS. The graph shows regression coefficients and confidence intervals for school cohort fixed effects in a regression of trust in EU Parliament and trust in EU Commission on state and cohort fixed effects, as well as an indicator whether a cohort in a certain state was exposed to G8 and basic controls as described in the data section of this paper. The omitted category is the school cohorts of 1990. All regressions use robust standard errors clustered at the federal state level.



(a) Trust in EU Parliament

(b) Trust in EU Commission

Figure C.5: Event study and fixed-effects estimates of the G8 treatment on trust in EU Parliament and Commission including only significant cohort fixed effects

Notes: The graph shows regression coefficients and confidence intervals (90% as dashed line and 95% as dotted line) for estimating the development of trust in EU Parliament (a) and trust in EU Commission (b) at least on level four on a scale from one (no trust) to seven (high trust) in for the sample restricted to upper secondary school graduates and including only significant cohort fixed effects in order to avoid over-fitting. We include cohort year FE for: 1997, 1998, 1999, 2000, 2002, 2005, 2007, 2008, 2009 which are all correlated with the outcome at a level of 1 percent significance in (a). We include cohort year FE for: 2002 and 2009 which are correlated with the outcome at a level of 1 percent significance in (b). The last year before the reform is the excluded category. The graph further shows the aggregated effect through difference-in-difference estimates in short dashed green lines in the given sample. Individuals were included when they started secondary school up to 6 years prior to the reform, and up to 3 years after the reform. All regressions control for cohort fixed effects, survey year fixed effects, and federal state fixed effects. Standard errors are clustered at the federal state level.

C.2 TABLES

Table C.1: Distribution of treated and untreated individuals in allbus

Part of G8	No	Yes	Total
1 Schleswig - Holstein	6	1	7
2 Hamburg	5	1	6
3 Lower Saxony	23	14	37
4 Bremen	3	1	4
5 North Rhine-Westphalia	72	18	90
6 Baden-Wuerttemberg	45	10	55
7 Bavaria	38	19	57
8 Saarland	3	2	5
9 Berlin	3	6	9
10 Brandenburg	22	5	27
11 Mecklenburg-Pomerania	11	2	13
12 Saxony-Anhalt	14	10	24
Total	245	89	334

Notes: Number of observations per treatment (Yes) and control (No) group in the considered federal states for academic-track high school graduates based on availability of information in trust in European Parliament in allbus.

Table C.2: Distribution of treated and untreated individuals in SOEP

Part of G8	No	Yes	Total
1 Schleswig - Holstein	75	13	88
2 Hamburg	19	18	37
3 Lower Saxony	118	133	251
4 Bremen	13	10	23
5 North Rhine-Westphalia	368	197	565
6 Baden-Wuerttemberg	215	130	345
7 Bavaria	140	143	283
8 Saarland	4	8	12
9 Berlin	69	26	95
10 Brandenburg	67	19	86
11 Mecklenburg-Pomerania	25	21	46
12 Saxony-Anhalt	50	49	99
Total	1,163	767	1,930

Notes: Number of observations per treatment (Yes) and control (No) group in the considered federal states in the cross section of first observations per individuals. The number of observations is balanced on all controls.

Table C.3: Descriptive statistics for balanced allbus data

	Mean	SD	Min	Max	Number
Reform	0.10	0.30	0.0	1.0	861
Trust EU Parliament	0.65	0.48	0.0	1.0	861
Trust EU Commission	0.66	0.47	0.0	1.0	841
Age	26.63	5.73	19.0	38.0	861
Age squared	741.85	321.11	361.0	1,444.0	861
Female	0.45	0.50	0.0	1.0	861
German nationality	0.96	0.19	0.0	1.0	861
Lives in East	0.24	0.43	0.0	1.0	861
German A-level	0.39	0.49	0.0	1.0	861
Double graduate cohort	0.09	0.29	0.0	1.0	861
Partially treated	0.04	0.20	0.0	1.0	861

Notes: Summary statistics based on the overall sample of individuals balanced on individual level controls for trust in EU parliament as outcome variable.

Table C.4: Descriptive statistics for the cross section of first observations in the overall sample for gap year balanced on main observables

	Mean	SD	Min	Max	Number
Reform	0.40	0.49	0.0	1.0	1,930
Years between graduation and next step	0.52	0.69	0.0	3.0	1,930
Gap year	0.42	0.49	0.0	1.0	1,930
Age	19.86	1.25	17.0	26.0	1,930
Age squared	396.08	50.16	289.0	676.0	1,930
Female	0.54	0.50	0.0	1.0	1,930
Migration background	0.24	0.43	0.0	1.0	1,930
Lived in countryside	0.27	0.45	0.0	1.0	1,930
Lives in East	0.14	0.35	0.0	1.0	1,930
Monthly HH income (net)	3,515.30	1,620.19	500.0	7,500.0	1,670
Comp. military/civic year	0.21	0.41	0.0	1.0	1,930
Double graduate cohort	0.13	0.34	0.0	1.0	1,930
Partially treated	0.04	0.18	0.0	1.0	1,930
Parent: Blue collar	0.30	0.46	0.0	1.0	1,930
Parent: Married	0.81	0.39	0.0	1.0	1,930
Parent: Tertiary	0.41	0.49	0.0	1.0	1,930
Dummy for siblings	0.88	0.32	0.0	1.0	1,930

Notes: Summary statistics based on the cross-section of the first answer in the overall sample of individuals balanced on individual level and parental background controls.

Table C.5: The effect of decreasing school duration on trust towards EU Parliament and Commission full regression results for individual controls

	Trust Parliament			Trust Commission		
	(1) All FE	(2) Linear Trend	(3) Sig. FE	(4) All FE	(5) Linear Trend	(6) Sig. FE
Reform	0.095	0.112	0.118*	0.057	0.091	0.125*
	(0.065)	(0.071)	(0.063)	(0.060)	(0.064)	(0.065)
Age	-0.038	-0.027	-0.028	0.063	0.056	0.013
	(0.053)	(0.042)	(0.020)	(0.045)	(0.038)	(0.018)
Age squared	0.001	0.000	0.000	-0.000	-0.000	-0.000
	(0.001)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Female	0.037	0.043	0.043	0.029	0.031	0.032
	(0.031)	(0.031)	(0.032)	(0.029)	(0.029)	(0.030)
German nationality	-0.017	-0.008	-0.006	-0.003	0.007	0.016
	(0.080)	(0.069)	(0.070)	(0.050)	(0.040)	(0.043)
Double graduate cohort	0.007	-0.040	-0.012	-0.019	-0.042	-0.036
	(0.061)	(0.055)	(0.063)	(0.059)	(0.055)	(0.057)
Partially treated	0.035	-0.030	-0.023	0.018	-0.035	-0.043
	(0.046)	(0.050)	(0.051)	(0.045)	(0.054)	(0.057)
Observations	864	864	864	847	847	847
WB p-value	0.162	0.133	0.077	0.366	0.200	0.112
Cohort FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Survey year FE	✓	✓	✓	✓	✓	✓
Basic controls	✓	✓	✓	✓	✓	✓
Clustered SE	✓	✓	✓	✓	✓	✓

Notes: In columns (1) to (3) the dependent variable is a dummy variable that turns one if an individual trusts EU Parliament at least on a level of 4 out of a scale up to 7 (high trust), and zero otherwise. Columns (4) to (6) show the results for the dependent variable measured as a dummy variable that turns one if an individual engages trusts EU Commission at least on a level of 4 out of a scale up to 7 (high trust), and zero otherwise. Columns (1) and (4) include all cohort fixed effects. Columns (2) and (5) include a linear cohort trend. Columns (3) and (6) only include significant cohort fixed effects in order to avoid over-fitting. We include cohort year FE for: 1997, 1998, 1999, 2000, 2002, 2005, 2007, 2008, 2009 which are all correlated with the outcome at a level of 1 percent significance in column (3). We include cohort year FE for: 1997, 1998, 1999, 2000, 2002, 2005, 2007, 2008, 2009 which are all correlated with the outcome at a level of 1 percent significance in column (6). The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school entry year. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table C.6: The effect of decreasing school duration on the probability to trust EU institutions in probit, at the intensive margin, and adding further controls

	Trust Parliament					Trust Commission				
	(1) FE	(2) Survey FE	(3) Individual controls	(4) Additional controls	(5) Academic track	(6) FE	(7) Survey FE	(8) Individual controls	(9) Additional controls	(10) Academic track
Panel A1. Probit margins - all FE										
Reform	0.115	0.119	0.114	0.103	0.158	0.068	0.072	0.069	0.061	0.115
	(0.072)	(0.073)	(0.082)	(0.081)	(0.145)	(0.064)	(0.067)	(0.072)	(0.072)	(0.153)
Panel A2. Probit margins - linear trend										
Reform	0.125	0.131	0.134	0.133*	0.177	0.093	0.100	0.106	0.088	0.130
	(0.081)	(0.084)	(0.088)	(0.079)	(0.108)	(0.074)	(0.076)	(0.078)	(0.069)	(0.110)
Panel A3. Probit margins - significant FE										
Reform	0.138*	0.154**	0.136*	0.134*	0.156	0.110	0.131*	0.098	0.100	0.178
	(0.075)	(0.077)	(0.082)	(0.079)	(0.116)	(0.070)	(0.070)	(0.072)	(0.071)	(0.115)
Panel B1. Intensive - all FE										
Reform	0.042	0.058	0.078	0.064	0.106	0.003	0.020	0.060	0.049	0.027
	(0.147)	(0.158)	(0.163)	(0.161)	(0.379)	(0.142)	(0.156)	(0.174)	(0.175)	(0.348)
WB p-value	0.799	0.747	0.662	0.723	0.811	0.983	0.909	0.755	0.803	0.948
Panel B2. Intensive - linear trend										
Reform	0.159	0.183	0.201	0.194	0.318	0.092	0.117	0.151	0.154	0.091
	(0.165)	(0.175)	(0.180)	(0.184)	(0.291)	(0.141)	(0.150)	(0.156)	(0.165)	(0.245)
WB p-value	0.366	0.315	0.274	0.331	0.279	0.566	0.488	0.367	0.399	0.745
Panel B3. Intensive - significant FE										
Reform	0.227	0.290	0.226	0.205	0.435	0.378**	0.465***	0.304*	0.314**	0.375
	(0.184)	(0.194)	(0.186)	(0.179)	(0.356)	(0.147)	(0.147)	(0.141)	(0.141)	(0.215)
WB p-value	0.241	0.134	0.246	0.266	0.241	0.028	0.004	0.053	0.035	0.149
Observations	864	864	864	864	334	847	847	847	847	328
Cohort FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓		✓	✓	✓	✓
Basic controls			✓	✓				✓	✓	
Reform controls				✓					✓	
Clustered SE	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The dependent variable in columns (1) to (5) is a dummy variable that turns one if an individual trusts EU Parliament at least on a level of four on a scale up to seven (high trust), and zero otherwise. The dependent variable in columns (6) to (10) is a dummy variable that turns one if an individual trusts the EU Commission at least on a level of four out of a scale up to seven (high trust), and zero otherwise. Columns (5) and (10) show regression results in the reduced sample limited to academic-track high school students. Panel A1 to A3 shows the regression results in a probit instead of a linear probability model. Panel B1 to B3 show the results measuring trust at the intensive instead of the extensive margin. In both sets of Panels, the first Panel includes all cohort fixed effects. The second Panel includes a linear school cohort trend. The third variable includes only significant cohort fixed effects. We include cohort year FE for: 1997, 1998, 1999, 2000, 2002, 2005, 2007, 2008, 2009 which are all correlated with the outcome at a level of 1 percent significance in columns (1) to (5). We include cohort year FE for: 2002 and 2009 which are correlated with the outcome at a level of 1 percent significance in columns (6) to (10). The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school entry year. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table C.7: The effect of decreasing school duration on the probability to take a gap year full results

	(1) FE	(2) Survey FE	(3) Basic controls	(4) Background controls	(5) Comp. service	(6) Linear trend
Reform	0.175***	0.161***	0.189**	0.194***	0.149**	0.166**
	(0.025)	(0.026)	(0.064)	(0.058)	(0.053)	(0.057)
Age			0.331**	0.313*	0.190	0.185
			(0.144)	(0.162)	(0.135)	(0.134)
Age squared			-0.008**	-0.008*	-0.005	-0.005
			(0.003)	(0.004)	(0.003)	(0.003)
Female			-0.151***	-0.157***	-0.020	-0.021
			(0.023)	(0.026)	(0.014)	(0.015)
Migration background			-0.038	-0.009	0.005	0.005
			(0.025)	(0.029)	(0.026)	(0.027)
Lives in East			0.059	0.049	-0.011	-0.006
			(0.087)	(0.104)	(0.065)	(0.066)
Double graduate cohort			-0.025	-0.014	0.018	0.013
			(0.036)	(0.036)	(0.030)	(0.030)
Partially treated			-0.032	-0.002	-0.053	-0.062
			(0.090)	(0.074)	(0.065)	(0.067)
Parent: Blue collar				-0.036	-0.033**	-0.034**
				(0.026)	(0.013)	(0.013)
Parent: Married				0.006	0.001	0.002
				(0.032)	(0.019)	(0.019)
Parent: Tertiary				0.001	-0.025	-0.025
				(0.028)	(0.016)	(0.017)
Dummy for siblings				0.047	0.036	0.035
				(0.033)	(0.024)	(0.024)
Comp. military/civic year					0.663***	0.661***
					(0.020)	(0.020)
Observations	2,196	2,196	2,196	1,930	1,930	1,930
WB p-value	0.000	0.000	0.044	0.031	0.039	0.026
Cohort FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓
Basic controls			✓	✓	✓	✓
Family controls				✓	✓	✓
Compulsory service					✓	✓
Linear trend						✓
Clustered SE	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns one if an individual engages in a gap year as taking time off after graduation before going to university, starting an apprenticeship, or occupation. Results are balanced on basic controls. The mean value of the dependent variable in Panel A is 0.415. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school entry year. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table C.8: The effect of decreasing school duration on gap year participation

	(1) State and cohort FE	(2) Survey FE	(3) Basic controls	(4) Background controls	(5) Comp. service	(6) Occupation controls	(7) Reform controls	(8) Linear trend
Panel A. Extensive margin								
Reform	0.175***	0.161***	0.189**	0.194***	0.149**	0.149**	0.220***	0.199**
	(0.025)	(0.026)	(0.064)	(0.058)	(0.053)	(0.057)	(0.064)	(0.066)
Observations	2,196	2,196	2,196	1,930	1,930	1,669	1,930	2,196
WB p-value	0.000	0.000	0.042	0.033	0.038	0.024	0.036	0.036
Panel B. Fully balanced sample								
Reform	0.175***	0.164***	0.165**	0.160**	0.118**	0.149**	0.178***	0.181**
	(0.030)	(0.033)	(0.054)	(0.055)	(0.052)	(0.057)	(0.053)	(0.059)
WB p-value	0.000	0.001	0.018	0.022	0.031	0.024	0.014	0.015
Panel C. Margins of probit								
Reform	0.178***	0.167***	0.167***	0.161***	0.107**	0.150***	0.161***	0.182***
	(0.031)	(0.033)	(0.052)	(0.053)	(0.049)	(0.056)	(0.053)	(0.058)
Panel D. Intensive margin								
Reform	0.228***	0.223***	0.262**	0.256**	0.208**	0.245**	0.280**	0.286**
	(0.053)	(0.053)	(0.095)	(0.095)	(0.090)	(0.099)	(0.094)	(0.103)
Observations	1,669	1,669	1,669	1,669	1,669	1,669	1,669	1,669
WB p-value	0.002	0.002	0.021	0.024	0.026	0.027	0.018	0.020
Cohort FE	✓	✓	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓	✓	✓
Basic controls			✓	✓	✓	✓	✓	✓
Family controls				✓	✓	✓	✓	✓
Compulsory service					✓			
Additional controls						✓		
School reform controls							✓	
Linear trend								✓
Clustered SE	✓	✓	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns one if an individual engages in a gap year as taking time off after graduation before going to university, starting an apprenticeship, or occupation. Panel A shows the regression results in the cross section of first observations balanced on basic controls. The mean value of the dependent variable in Panel A is 0.415. Panel B shows the same regression results in the cross section of observations balanced on all controls. The mean value of the dependent variable is 0.417. Panel C shows the fully balanced cross sectional regression results as margins based on a Probit instead of LPM model. Panel D shows the fully balanced intensive margin analysis, using the number of years between graduation and the next phase in life as dependent variable. The mean of the dependent variable here is 0.5. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school entry year. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table C.9: The effect of decreasing school duration on the probability to take a voluntary service full results

	(1) FE	(2) Survey FE	(3) Basic controls	(4) Background controls	(5) Comp. service	(6) Linear trend
Reform	0.156***	0.142***	0.138***	0.112***	0.056**	0.064**
	(0.023)	(0.021)	(0.043)	(0.036)	(0.023)	(0.025)
Age			0.128	0.083	-0.069	-0.070
			(0.108)	(0.107)	(0.087)	(0.090)
Age squared			-0.003	-0.001	0.002	0.002
			(0.003)	(0.002)	(0.002)	(0.002)
Female			-0.166***	-0.173***	-0.004	-0.004
			(0.015)	(0.019)	(0.005)	(0.005)
Migration background			-0.056***	-0.032	-0.015	-0.015
			(0.016)	(0.021)	(0.015)	(0.014)
Lives in East			0.085	0.082	0.007	0.003
			(0.060)	(0.077)	(0.019)	(0.019)
Double graduate cohort			-0.047*	-0.042*	-0.003	-0.002
			(0.024)	(0.021)	(0.010)	(0.010)
Partially treated			0.037	0.097	0.035	0.028
			(0.067)	(0.057)	(0.043)	(0.043)
Parent: Blue collar				-0.044	-0.039***	-0.040***
				(0.028)	(0.012)	(0.012)
Parent: Married				0.020	0.014	0.013
				(0.029)	(0.016)	(0.016)
Parent: Tertiary				0.047	0.015	0.015
				(0.032)	(0.012)	(0.012)
Dummy for siblings				0.023	0.009	0.009
				(0.030)	(0.010)	(0.010)
Comp. military/civic year					0.820***	0.821***
					(0.016)	(0.016)
Observations	2,196	2,196	2,196	1,930	1,930	1,930
WB p-value	0.000	0.000	0.029	0.035	0.021	0.039
Cohort FE	✓	✓	✓	✓	✓	✓
State FE	✓	✓	✓	✓	✓	✓
Survey year FE		✓	✓	✓	✓	✓
Sub-sample FE		✓	✓	✓	✓	✓
Basic controls			✓	✓	✓	✓
Family controls				✓	✓	✓
Compulsory service					✓	✓
Linear trend						✓
Clustered SE	✓	✓	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns one if an individual engages in in voluntary military or civic service after graduation. Results are balanced on basic controls. The mean value of the dependent variable in Panel A is 0.19. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school entry year. Control variables are as indicated. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

Table C.10: The effect of decreasing school duration on the probability to trust in political parties in general

	(1) FE	(2) Survey FE	(3) Individual controls	(4) Academic track
Panel A. All cohort FE				
Reform	0.028	0.032	0.053	0.012
	(0.108)	(0.107)	(0.108)	(0.112)
WB p-value	0.838	0.813	0.695	0.931
Panel B. Linear trend				
Reform	0.024	0.034	0.029	-0.027
	(0.094)	(0.091)	(0.087)	(0.093)
WB p-value	0.834	0.760	0.792	0.806
Panel C. Significant FE				
Reform	0.092	0.095	0.050	0.081
	(0.084)	(0.083)	(0.086)	(0.051)
WB p-value	0.348	0.310	0.644	0.150
Observations	1,448	1,448	1,448	544
Cohort FE	✓	✓	✓	✓
State FE	✓	✓	✓	✓
Survey year FE		✓	✓	✓
Basic controls			✓	
Clustered SE	✓	✓	✓	✓

Notes: The dependent variable is a dummy variable that turns one if an individual trusts political parties in general on a level of 4 out of a scale up to 7 (high trust), and zero otherwise. The mean value of the dependent variable is 0.547 in the small academic-track high school sample and 0.525 in the overall sample. Panel B shows the regression results for the probability to show trust when including a linear cohort trend. Panel C shows the results when only significant cohort fixed effects in order to avoid over-fitting in this small sample. We include cohort year FE for: 2008 and 2009 which affect the outcome at a level of 1 percent significance in Panel C. The main independent variable, "Reform", equals one if the individual was affected by the G8 reform in his or her federal state and school entry year. Control variables are as indicated. Individual level controls additionally include preference for right-wing parties. Standard errors in parentheses are clustered at federal state level. The p-value when correcting standard errors of the main coefficient of interest "Reform" according to wild-bootstrapping are provided at the bottom of the table. *** p<0.01, ** p<0.05, * p<0.1.

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Eidesstattliche Versicherung

Ich versichere hiermit eidesstattlich, dass ich die vorliegende Arbeit selbständig und ohne fremde Hilfe verfasst habe. Die aus fremden Quellen direkt oder indirekt übernommenen Gedanken sowie mir gegebene Anregungen sind als solche kenntlich gemacht. Die Arbeit wurde bisher keiner anderen Prüfungsbehörde vorgelegt und auch noch nicht veröffentlicht. Sofern ein Teil der Arbeit aus bereits veröffentlichten Papers besteht, habe ich dies ausdrücklich angegeben.

München, 16.03.2020

Daniela Miehling