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Abstract

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JEL Classification: G11, G24, G41, N20, Z19

Keywords: Behavioral finance, Home bias, Venture capital, Start-ups, Culture, Instability

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Does Regional Identity Guide Investments?
Evidence from German license plates *

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April 12, 2023

Abstract

In this paper, we present novel data from the German-speaking area on 13,422 venture capital investments between 1999 and 2019, and document a novel and yet unexplained contributor to investors' home bias. We propose a new measure of regional identity based on a recent vehicle license plate liberalization in Germany, and leverage on a unique dataset of historical borders to examine how regional identity is formed. We use an instrumental strategy to establish a causal link between historical political instability, regional identity, and the home bias. Our results indicate that a common regional identity is highly relevant for investment decisions. (100 words)

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"Home wasn't built in a day"
Jane Sherwood Ace (1897–1974)

What determines investment decisions? The traditional answer to this question has often been based on rational agents who are concerned with the future of their potential assets. But is an intangible regional identity, defined as the assumption of real or imagined shared characteristics with other people from the same region, responsible for our financial behavior? If so, then this regional identity could help us better understand why—and to what degree—the home bias, widely observed in a variety of economic and financial decisions, is caused by long-standing differences between the characteristics of places.[1]

If regional identity was relevant for financial decisions, we should find evidence for this even among the presumably most cosmopolitan financial actors: venture capitalists. We have therefore collected a new dataset of thousands of venture capitalist transactions in Germany, Austria, and Switzerland between 1999 and 2019 based on data from Thomson Reuters' EIKON database. We have also collected publicly available data on the fund managers' CVs to understand whether personal ties to the start-up location (place of study or residence, among others), drive their investment decisions. These German-speaking countries are a fascinating case study in their own right (they have the largest economy in Europe, a relevant financial market, and rich venture capital data), but their unique history also allows us to clearly identify the role of regional identity. While the area is relatively homogeneous in terms of language and legal framework, the heterogeneity of the historical states is well documented as a uniquely decentralized collection of territories of different sizes and institutional arrangements. As such, the German setting combines geographic proximity within a single nation with great diversity in terms of regional attachment.

This paper is the first to quantify the relationship between the degree to which investments are biased toward geographically closer opportunities on the one hand, and intangible regional identity on the other. We also provide a concrete mechanism by which regional identity is rooted in historical experience through past political instability.

[1] The home bias, also called the "local bias" or the "proximity bias" refers to the "tendency of investors to overrepresent assets and stocks closer to their home region."(Coeudacier and Rey 2013).

Note: The Unterscheidungskennzeichen (UZ) is the first part of any German license plate (here: M for Munich). Our novel measure of regional identity is based on the fact that some UZs were first abolished during administrative reforms, to then be re-introduced after a grass-roots movement. Source: Wiltron/Wikicommons.

Figure 1: A typical German license plate

A unique sequence of political decisions allows us to quantify regional identity using German car license plates. Standard German license plates consist of a *Unterscheidungszeichen (UZ)*, an abbreviation of a county name, followed by two letters and three to four numbers (see Figure 1). These UZs are so well known to Germans that guessing the county from the abbreviation is a common game for bored children on long car rides, and there is a lively culture of epithets for neighboring counties.[2] As such, UZs (and thus German license plates) have become a marker of group identity. When the license plate system was designed, the idea was that there was no choice of UZ, it was allocated based on set rules about the owner's place of residence. This was the case until 2012, when this mechanism was heavily criticized by the public. Grass-roots movements across the country criticized especially UZs of administrative regions that were created since the 1970s when ideas of rationalizing public administration led to aggressive mergers of existing counties (see Blesse and Roesel 2019). Their critique was that these "super-counties" were an anonymous brainchild of the bureaucracy, so they lobbied to give vehicle owners the choice between the merged counties and the old UZs that they instead deemed to reflect people's regional attachment. As such—at least on license plates—they wanted to undo the administrative reforms and hence restore a map of Germany they found a more adequate representation of the groups within German society. Their success led to the 2012 license plate liberalization, which allowed counties to reinstate the abolished UZs if the county parliament agrees. Since then, 170 counties have given vehicle owners the choice between their standard UZ and the UZ of one of the 355 abolished counties that once existed within their boundaries. The latter comes with a fee of 10 Euros, the same fee that applies to any

[2]For example, people from Hamburg would argue that the letters PI that vehicles from their more rural neighbors from Pinneberg drive around actually stands for "provincial idiot". A comprehensive database of these epithets can be found under `https://www.kennzeichen-direkt.de/kennzeichen-bedeutungen`. As one can see from the list, there are derogatory epithets for any UZ, so that this should not be a source of significant variation in the choice for the UZ itself.

desired license plate ("Wunschkennzeichen").[3] In a survey by Bochert (2014), the majority of participants responded that the abolished abbreviations are an important part of their identity.[4] We calculate the share of these UZ of abolished counties ("Altkreise") in each municipality to measure the regional identity of the inhabitants.

As a first result of our empirical investigation, we document a significant home bias in the investment decisions of venture capitalists. Already 14% of the investments are located in the same city as the investor. In German-speaking countries, as much as 40% of the investments are within a 100km radius. We find that geographic distance has a significant negative effect on investment decisions.

We estimate the relationship between a variable that captures the share of venture capital investments in a municipality that took place within 100km of the investor and a measure of regional identity. This is expressed by the choice of license plates at the municipality-level. We establish causality between regional identity and home bias by connecting historical roots of home bias with past levels of political instability. We use an instrumental variable based on changes in the borders of Germany's predecessor states resulting from the death of the territory's ruler without a male heir. Our 2SLS results imply a positive and economically significant causal effect of regional identity on home bias. They suggest that, on average, a 1% increase in the number of reintroduced license plates is associated with a 0.175% increase in the share of home bias investments. This confirms our result and indicates that the OLS coefficients are biased downward.

Our first contribution to the literature is a new measure of regional identity available at the municipal level. It is based on the revealed preferences of thousands of individuals faced with an economic decision: Which county abbreviation do I want on my license plate? Unlike existing research on the origins and consequences of regional identity, this approach does not rely on surveys (notably the World Values Survey, WVS) to measure attachment to a region (for example a county, state, or country, Kremer (e.g., 2021)). Respondents are not rewarded or punished for what they answer. Choosing a license plate is costly and consequential (the 10 Euro fee and the commitment to drive around with the

[3]It is relatively common for vehicle owners to choose their initials for the part after the UZ. Counties usually organize the choice of plates via a website that allows users to choose a plate from a pool of available combinations.

[4]This has also been noted by Germany's largest automobile association, the ADAC ("Allgemeiner Deutscher Automobil Club"). They also argue that license plates are a way to express identification with one's home region.(ADAC Executive Committee 2018).

plate for years) and therefore reveals preferences more accurately. It is also based on a much larger sample of the population (all German car owners) than any survey. Survey data is usually not available more gralunarly than a country (reasons include cost or privacy concerns), and if it is available, the sample size per municipality or country is tiny. Our measure overcomes this problem. Since there are usually thousands of cars registered per municipality, the German vehicle registration office was able to provide us with the number of registered vehicles per UZ for each municipality. These data are more granular and powerful than other datasets, and they come with yet another conceptual advantage: They do not depend on surveys. As we will explain in more detail in the data section, questionnaires are very sensitive to variations in wording and framing, surveys are not incentivised, and hence existing surveys on regional identity hardly correlate with each other.

Our second contribution is a descriptive analysis of venture capital investment in our region, aggregated to the municipality-level. This part presents evidence on the prevalence of home bias in investment decisions. We classify an investment as local using different categories based on whether the distance between the startup and the investors' headquarters is less than 100km, whether they are located in the same city, or whether they are located within the same state.

As a third contribution, we link financial decisions to concepts of economic groups and identity that go back to Akerlof and Kranton (2010) and test them in a well-defined empirical framework. Their research shows how the degree to which agents act "groupy," that is, preferring members of their own group over members of another group, affects their cooperation. Here we focus on the role of the spatial component of what distinguishes one group from another, regional identity, and propose that a sense of historical belonging contributes to agents' perceived common identity.[5]

Our final contribution is to show that regional identity is rooted in past experiences of political instability. This argument is inspired by the research of Giuliano and Nunn (2021). They hypothesize that the transmission of cultural norms and values across generations is hindered in the presence of an unstable environment. We argue that regional identity is similarly affected by political instability. Regions that have experienced higher lev-

[5]For more on the concept of social identity, the reader is referred to Tajfel (1974). Important qualitative contributions to understanding the spatial component of identity are Paasi (2002), Proshansky, Fabian, and Kaminoff (1983), and Sedlacek, Kurka, and Maier (2009).

els of political instability in the past are expected to have less shared regional identity, i.e., individuals expect to share fewer characteristics with other people from the same region.

Our empirical conclusions are robust to a number of checks, such as standard errors that account for spatial autocorrelation, the inclusion of additional control variables, and the application of alternative definitions of home bias. Our results highlight the role of behavior in financial decisions and call on investors and prospective investors to consider these parameters in their assessment of their position in the market.

The rest of the paper is organized as follows. Section 1 provides a comprehensive review of the relevant literature. We present the data in section 2, and the empirical analysis follows in section 3. The section 4 concludes.

1 Related Literature

Since the first systematic discussion of home bias in French and Poterba (1991), the literature has proposed numerous reasons for the fact that investors prefer to invest in assets with geographically closer headquarters. Van Nieuwerburgh and Veldkamp (2009) have famously highlighted the role of information in the sense of Akerlof (1970) as as central element of this bias.[6] It has also been noted that this pattern persists among venture capitalists (see Hoban Jr. 1976; Coval and Moskowitz 1999; Zacharakis and Shepherd 2001; Cumming and Dai 2010).[7] There are arguably dozens of reasons why geographic proximity makes it easier for investors to observe what is happening in the place they have invested in, but a corollary of geographic proximity and its influence on investment decisions is yet understudied: People who live close together have a shared feeling of belonging, a common identity based on a multitude of visible and invisible shared characteristics, such as common dialects, preferences, world views, and, not to forget, a shared regional history. We argue that these invisible characteristics are an important aspect of

[6] Important empirical contributions to the home bias are Bernartzi (2001), investigating that employees overinvest their retirement accounts in the firms where they are employed. Demarzo, Kaniel, and Kremer (2004) argue that in regions where there is one dominant firm or sector, an individual under-diversifies their portfolio. Hornuf, Schmitt, and Stenzhorn (2020) show that investors overinvest in proximate firms even after controlling for network effects such as friends and families.

[7] Some venture capitalists are quoted to have a "20-minute rule", which is the maximum door-to-door travel time to be considered as an investment (*New York Times 22 October 2006* 2006).

the investment decision, as they initiate trust in the relationship between those involved in the investment.[8]

It is established in the literature that investment decisions are made by individuals, and their individual characteristics shape their investment decisions as much as they shape their behavior in general.[9] A large literature dating back to Akerlof and Kranton (2010) has developed a theoretical framework that links individuals' behavior to their feeling of belonging to groups, from there conceptualizing how this affects cooperative decisions. They termed the concept of 'groupiness' as the degree to which an individual prefers members of their own group over nonmembers. Since investment decisions are cooperative decisions, this framework applies to our context. Groups are likely to be formed between individuals who share characteristics (the social homophily theory, Lazarsfeld and Merton 1954; McPherson, Smith-Lovin, and Cook 2001).[10] Cable and Shane (1997), Franke et al. (2006), and Murnieks et al. (2011) provide empirical support for our context and show that characteristics shared between individuals representing venture capitalists and individuals representing start-ups is relevant. The characteristics they are interested in are similar educational or work background, "way of thinking", demographic characteristics, work values, and perceived power equality. In this paper, we investigate how history has affected the degree to which regional identity shapes individuals' (perceived) shared characteristics and as such investments.

The argument that geographic regions—even regions as large as nations—depend on a sense of shared characteristics is as old as Anderson (1983). It is important to highlight that the formation of one's identity shares communalities with cultural transmission in general (Bisin and Verdier 2000), while an individuals regional identity may on the other hand also change according to life circumstances, such as migration.[11] Recent economic

[8] For a discussion of trust and its role for investments, see Gusio, Sapienza, and Zingales (2004) and Gusio, Sapienza, and Zingales (2008).

[9] Previous research has shown that the socioeconomic characteristics—such as gender, age, education, income and investment experience—influences the expectations of the individuals involved in investment decisions (Jianakoplos and Bernasek 1998; Barber and Odean 2001; Goetzmann and Kumar 2008; Kumar 2009; Sapienza, Zingales, and Maestripieri 2009).

[10] Important empirical contributions have highlighted the role of religious (Benjamin, Choi, and Fisher 2016), ethnic (Benjamin, Choi, and Strickland 2010; Desmet, Ortin-Ortuno, and Wacziarg 2017), political (Kranton et al. 2013) or language (Rustagi and Veronesi 2016) similarity between individuals to increase willingness to cooperate.

[11] We are thankful to Gérard Roland to encourage us to distinguish the two concepts, culture and identity, more clearly.

(Fritsch et al. 2021) and social psychological literature (Plaut et al. 2012; Rentfrow, Gosling, and Potter 2008; Rentfrow, Jokela, and Lamb 2015) have shown that psychological characteristics are clustered in space, suggesting a link between shared characteristics and regional identity. The reason for this clustering is predominantly seen in inter-generational (vertical) transmission (see Bisin and Verdier 2000; Tabellini 2008; Guiso, Sapienza, and Zingales 2016). Rustagi and Veronesi (2016) show how parents and grandparents pass on their sense of regional belonging. Migration is not found to dramatically affect this sense. First, because a strong sense of regional identity reduces emigration from these regions, as outlined in Kremer (2021). Second, Rentfrow, Gosling, and Potter (2008) show that if someone from regions with a strong identity migrates to another region, this second region is more likely to have a strong regional identity as well, because a strong regional identity is a characteristic itself, and an individual self-selects into this shared characteristic. It is also known that people who live in closer proximity to each other tend to be more similar and that there is a tendency for people to fit in and behave and think alike with the people they interact with each day. The literature suggests that people who migrate from a place with a weak regional identity to a place with a strong regional identity become part of these rituals and strengthen the regional identity of their chosen home in time (for example by participating in local festivals and traditions).[12]

The idea that history and individual events are important for understanding group formation, especially regional identity, is also established in the literature. To name some important contributions, Dehdari and Gehring (2022) show that the annexation of Alsace-Lorraine between 1870 and 1918 caused a measurable increase of regional identity, a decrease of national (French) identity, and an increase of European identity. The complementarity between regional and national identity in the German context is discussed in Mühler and Opp (2004) and Hanns-Seidel Stiftung (2009). Shared experiences have been shown to affect individuals and their sense of belonging to a group. Depetris-Chauvin, Durante, and Campante (2020) conducted surveys on national and ethnic identity, before and after the soccer games of the South African national team. Their results suggest that national identity increased and ethnic identity and interethnic violence decreased after victories of the national football team. Ochsner and Roesel (2019), using Austrian data,

[12] As shown by Rios and Moreno-Jimenez (2012). Those who migrate from a place with a weak regional identity to a place with a strong regional identity will form strong feelings of attachment to this region. Their study compares natives and migrants in Málaga (Spain) and finds that immigrants reach the same level of regional identity as natives after some years.

show how the relevance of past events for national identity could be reactivated by a political campaign.

Our instrumental variable strategy relies on the idea that a sequence of such events, culminating in a relatively stable political history of one place compared to a place that was part of many different historical states, is relevant for today's feeling of regional identity. The argument is that regional identity is less developed where historical events—here: the (unexpected) change of political borders—disturbed its establishment. The idea that stability is relevant for the transmission of personal traits (so-shared characteristics) has recently been proposed by Giuliano and Nunn (2021). They argue that the degree to which traits (a concept related to shared characteristics) are passed down to the next generation depends on the stability of the environment. In an absolutely stable environment, this transmission works very well, while more instability reduces the value of learning from the parent's generation. We focus on the instability of the environment induced by historical events that changed political borders, relying on a long-standing literature on the predecessor states of Europe and the German-speaking area, especially the Holy Roman Empire (see Acemoglu et al. 2011; Huning and Wahl 2021b). In this regard, the recent study by Abramson, Carter, and Ying (2022) is closely related to ours. They show that there is a negative relationship between historical border changes and individuals' political and social trust. They argue that this is because border changes prevent successful state-building efforts. Similarly, one can argue that if one lives in an area that belonged to many different states, rituals that are essential for the formation and persistence of regional identity may not develop in the first place (Leineweber and Seng 2023). Even if they do, they might not be passed down, as people do not place enough value on what they currently believe or identify with. Our instrument, ruler's death without a male heir, is also established in this literature on early statehood, (see Acharya and Lee 2019).

To conclude on our reading of the literature, it is established that investments are affected by the characteristics of the individuals involved in the decision-making process, this also applies in the context of venture capitalists, and that some of these shared characteristics are clustered in space and contribute to a sense of regional identity. The formation of such identity and the degree to which it affects the cooperation between individuals from more distant places depend on historical events. We can group similar historical events, in our case changes of political borders, to develop a valid historical instrumental variable, a measure of he portion of historical political instability that is based on rulers' death

without an heir.

2 Data

Data on venture capital transactions. We have retrieved transaction data on venture capital investments in Germany, Austria and Switzerland for the time period from 2.11.1999 to 5.8.2019 from Thomson Reuter's EIKON database. Augmenting these data with information on the location of the headquarters of venture capitalists and start-ups yields 13,422 observations in total, and 8,590 observations of which both the venture capitalist and the invested firm are headquartered in the German speaking area. We geocoded the headquarters to calculate the distance using `gpsvisualizer.com`. Table 1 provides a descriptive summary of the Thomson Reuters EIKON database for Austria, Germany, and Switzerland. Figure 2 shows the borders of Austria, Germany and Switzerland, the location and number of venture capitalists per municipality (Figure 2(a)). Figure 2(b) shows the same for start-ups. These maps are insightful on their own. First, the locations of start-ups are significantly more scattered in space compared to the venture capitalist. Second, but less surprisingly, venture capital firms cluster in the largest agglomeration zones (especially Berlin, Cologne, Frankfurt, Hamburg, Munich and Vienna), but there is a considerable spread of start-ups in the more rural areas.

Data on the individuals on the venture capitalist side. We collected data on central managing directors (such as CEO or COO) by matching venture capital firms in the EIKON database with information in the German commercial register, available online from `northdata.org`. We then performed a systematic search for publicly available data on these individuals, relying on their online curriculum vitae, LinkedIn, and Wikipedia. We were able to find information on places of birth, education, and current residence for 1,096 of the 6,365 managers, representing 282 firms.

Data on German vehicle license plates to measure regional identity. We purchased municipality-level data on the distribution of vehicles from the German Vehicle Registration Office (*Kraftfahrtbundesamt*). These data provide us with the number of vehicles registered in a municipality per UZ on the license plate, and represent the state of 01.01.2019, seven years after the reform.[13] Here, we are interested in data on UZs that were reintro-

[13]The term UZ is explained on page 3.

duced after the liberalization of the license plates in 2012. At that time, 170 counties had decided to reintroduce a total of 355 UZs. These counties consist of 6,059 municipalities, and the share of cars with reintroduced UZs on their license plates was on average 19.41%. A list of these reintroduced UZs can be found in the Online Appendix, Table A.1.

The information on the UZs is taken from an official list by the German vehicle registration office (Kraftfahrt-Bundesamt 2018), augmented with information on reintroduced UZs from Wikipedia.[14] We use these data to calculate the share of vehicles with license plates of re-introduced UZs as a measure of regional identity. Figure 3 shows this share of reintroduced license plates per municipality. The darker the municipality is shaded, the higher the share of vehicles with reintroduced UZs on their license plate. The borders depict contemporary counties.[15]

To validate license plates of reintroduced UZs as a measure of regional identity, we test whether it is significantly positively related with alternative measures of regional identity coming from survey questions asking people to what degree they feel attached to a particular spatial unit like a region or a country. We compare our license plate measure with the two surveys.

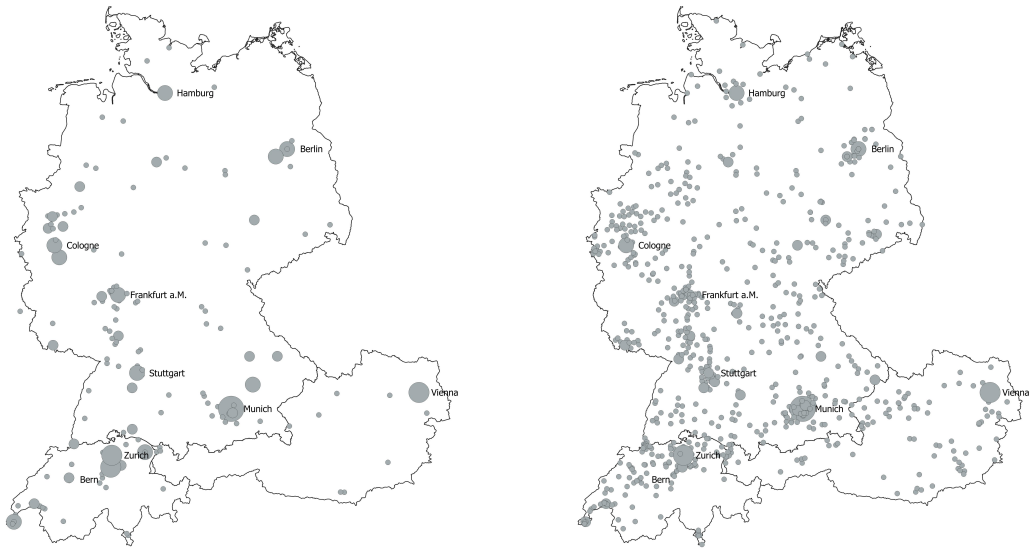
Table 1: Summary of Thomson Reuter's EIKON Database for the German-speaking area

	Austria	Germany	Switzerland	Rest	Total
No. of venture capitalists	69	478	147		694
No. of start-up	288	2,834	399	2,546	6,067
No. of venture capitalist locations	13	114	38		165
No. of start-up locations	95	542	132	770	1,539

These surveys are the European Values Survey (EVS) and the European Quality of Government (EQI) survey of the World Government Institute. By comparing the share of license plates from reintroduced UZs with the more standard survey questions on spatial identities on NUTS-2 level, we find a significant and positive correlation between these surveys and our measure based on license plates. For example, the correlation between

[14] `https://de.wikipedia.org/wiki/Kennzeichenliberalisierung` (Last accessed on 15th July, 2022).
[15] The county is the level that decides over the reintroduction of UZs.

the EVS survey question and our license plate-based measure is 0.22.[16] This is not significant, but is as high as the correlation between the EVS and the EQI survey question on local identity (identification with place of residence), which is 0.229 and is not significant. The correlation with the EVS question on regional identity (identification with NUTS-3 unit) is even lower with 0.06. The fact that there are only 38 NUTS-2 regions in Germany, and the sample size of these surveys is not very large, can partly explain the insignificance of the correlation.



(a) Location of Venture Capitalists **(b)** Location of Start-ups

Note: The gray dots show the location of Venture capitalists and start-ups, respectively. The size of the dots indicates the number of VC firms and start-ups per location.

Figure 2: Location of Venture Capitalists and Start-ups (Eikon data)

When comparing the correlation between the regional and European identity question of the EQI, the correlation is also negative, but lower (-0.169). We conclude that there is suggestive evidence for the validity of our measure.

Data on the political borders and ruler deaths. We have geocoded data for the position of historical borders for six periods: 1250, 1378, 1477, 1556, 1648, 1789. These data represent

[16] We refer the reader to the Online Appendix section A.2. for a detailed explanation of how we have constructed the EVS survey question on regional identity. There, we also provide maps showing the spatial distribution of regional identity in German NUTS-2 regions according to both the EVS and the EQI survey.

the states of the Holy Roman Empire. All data comes from Wolff (1877). His atlas which was digitized by Huning and Wahl (2021b), and a detailed explanation of the data is provided there.[17] To link the same territory over time, we consulted the historical literature, such as Köbler (1988).[18]

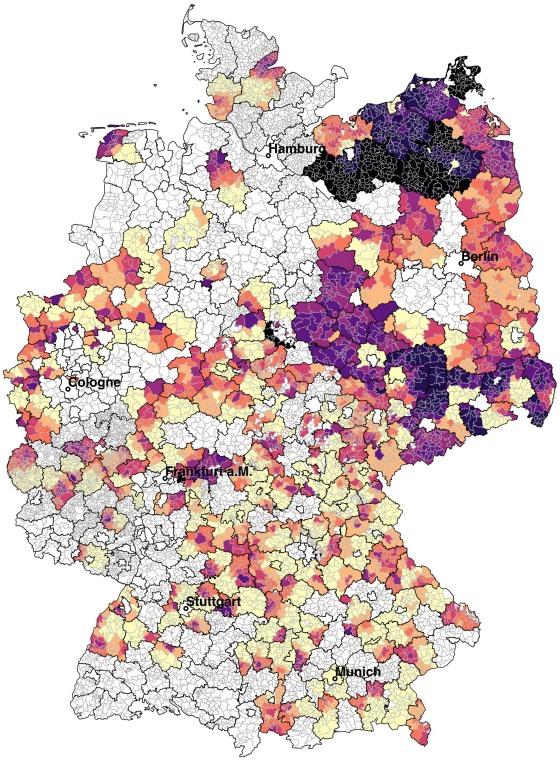
Our instrumental variable "Ruler Deaths without Heir" is constructed by focussing on—and including only—instances when a municipality changed its state because the ruler of the territory died of natural causes and without a male heir resulting in the territory being allocated/sold to another noble family, or being merged with another one.

Information on the cause of the disappearance of a state is taken from the historical literature, especially Köbler (1988), Sante (1964), and Keyser and Stoob (1939–1974). A total of 489 states ceased to exist between 1250 and 1789. We identified 15 different reasons for these disappearances, one of them being the extinction of the ruling dynasty because of a lack of a legitimate male heir. This yields a total of 146 historical accidents which help us to construct the maps that serve as our instrument.

The instrumental variable is an index based on the number of different states that a municipality belonged to historically, only counting states to which a municipality belonged because the previous ruler died without a male heir.

[17] The Data Appendix, section A.3. shows digitized versions of these maps (Figure A.8.). 1250 captures the effect of the collapse of the Staufer dynasty on state formation and city independence. 1378 depicts the HRE around the peak of its fragmentation after the passing of the Golden Bull in 1356. 1477 is the year in which Charles the Bold, Duke of Burgundy, died in the battle of Nancy. 1556 is the year after the peace of Augsburg settled the confessional division of Germany for the next decades and ended the first wave of religious wars in the HRE. 1648 is the year when the Thirty Years War ended with the peace treaties of Westphalia. Finally, 1789 is the year when the French Revolution began. A more detailed historical overview of these critical points of Central European history is given in section A.3.3 of the Online Appendix.

[18] We ignore changes in the title of the same state, i.e. do not differentiate between the Duchy of Württemberg and the Kingdom of Württemberg.



Note: The figure shows the share of vehicles with reintroduced UZ in each municipality. The darker a municipality is shaded the higher is its share. The bold black borders are those of contemporary counties. The gray borders indicate municipalities without vehicles with reintroduced UZs.

Figure 3: Share of Vehicles with Reintroduced UZs in German Municipalities

We also incorporate the rationale that more recent border changes should be of greater importance than older changes. Therefore, we discount any change with the number of years that have passed since then. This provides us with a weighted version of our index, formally defined as

$$Rulerdeath_i = \sum_{t=1250}^{1925} \sum_{i=1}^{i=N} \frac{1}{2022 - t} \cdot S_{it} \tag{1}$$

with

$$S_{it} = \begin{cases} 1, & \text{if state of municipality i changed in t because of ruler death without male heir.} \\ 0, & \text{otherwise.} \end{cases} \tag{2}$$

Control Variables. We employ a host of contemporary and historical control variables. These include a dummy variable equal to one for municipalities historically located in the Roman Empire, a dummy variable equal to one if a municipality was the location of at least one historical war-related battle between 1250 and 1789, a dummy variable reporting location of a municipality on a major medieval trade route, historical location on the of the Holy Roman Empire's external border, and an indicator variable for Neolithic settlement areas. These data originate from Huning and Wahl (2021b), Wahl (2017) and Fritsch et al. (2021) and are introduced there. We use fixed effect for the states of the Holy Roman Empire in 1150 from Huning and Wahl (2021b).[19] We also include several standard geographic control variables: Latitude and longitude of a municipality's centroid, the interaction of latitude and longitude, and elevation and terrain ruggedness.

The characteristics of contemporary municipalities averaged over the year 2002–2014 are taken from Asatryan, Havlik, and Streif (2017). Here, we consider population, income per capita, the share of industry buildings, and the migration balance per capita.[20] We coded a dummy for independent ("kreisfrei") municipalities, an attribute given to cities usually larger than 100,000 inhabitants that comes with more political autonomy. We take these data from the Federal Statistical Office. Information on uninhabited areas ("gemeindefreie Gebiete"), is taken from Asatryan, Havlik, and Streif (2017). From Reuter's EIKON database we take information on the number of venture capitalist funds which are locally bound. These include quasi-public, private, or mixed institutions that have a given and binding geographic area and are allowed to invest it (this will be a relevant factor to con-

[19]Figure A.9. in the Online Appendix shows which municipality belongs to which of the states of the HRE in 1150 and, for comparison, also shows the borders of the contemporary German federal states. Note also that the Holy Roman Empire in 1150 did not extend into the northeastern parts of today's Germany. Consequently, in the regression including 1150 states dummies, parts of Brandenburg and Mecklenburg-West Pomerania are excluded. Here, we only consider parts of Germany that have been in the hands of the Holy Roman Empire since the 12^{th} century.

[20]When we use these data, the number of observations decline because Asatryan, Havlik, and Streif (2017) do not have data for the federal state of Schleswig-Holstein, and most of their data are also missing for Hamburg, Berlin, and for some other municipalities and years.

trol for). We augment these data with the location of German universities in 2019 from the Federal Statistical Office.[21] Finally, we include the scaled version of Facebook's social connectedness index (SCI) as a proxy for the social ties a NUTS-3 region has with others as of August 2020.[22]

A descriptive overview of all variables and data sets used in the empirical analysis can be found in the Online Data Appendix, Tables A.2 and A.3.

3 Empirical Analysis and Results

In the following, we show a considerable home bias among venture capitalists. We continue by testing the relationship between regional identity and home bias, using our municipality-level data on Germany. Finally, we provide causal evidence by using our two-step 2SLS instrumental variables strategy to exploit the exogenously determined historical political instability.

3.1 Documenting the Home Bias in Venture Capital Investments

Descriptive results. Table 2 shows the shares of all venture capitalist investments in our data in Austria, Germany, and Switzerland, classified by the distance between the investor's headquarters and the invested company. This table suggests that around 25% of the start-ups' headquarters were within a 100km radius of their respective venture capitalist. If we restrict the sample to investments in these three German-speaking countries, this share increases to 40%. In about one out of four investments, investors and investment are headquartered in the same federal state and 15% in the same city. These descriptive figures provide a first impression of the size of an investor's home bias. A comparison of our three countries shows that Switzerland seems to be relatively immune to home bias, whereas it is strongest in Austria.

Figure 4 provides a map of the regional pattern of the investments. The lines represent the municipal borders. Municipalities in which we found a venture capitalist are rendered black. A darker shading in Figure 4a indicates a higher share of investments in start-ups

[21] This includes all certified universities, so also technical universities and universities of applied sciences.

[22] The publicly available version of the SCI can be downloaded for free here: `https://data.humdata.org/dataset/social-connectedness-index` (last accessed on 24th July 2022).

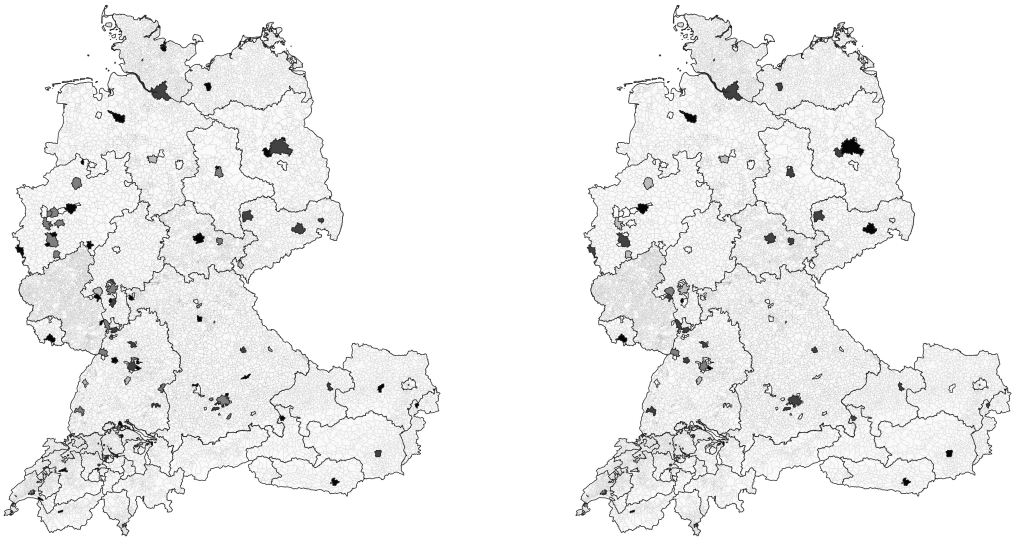
less than 100km from the headquarter. Figure 4b shows the share of investments in start-ups in the same city, respectively. A comparison of the two figures shows a similar spatial structure, and suggests similar bias, with some variation within the maps. As expected, investments in the same city are more likely in big cities (like Munich or Berlin), while the share of investments within 100km of the venture capitalist is more frequent in rural locations. Reassuring for our theory is that the share of investments in close proximity (as well as the share of the same city transactions) is higher in Northern Germany (which was historically relatively more politically stable), compared to its southern half.

Regression results. To test the significance of a home bias more thoroughly, we estimate regressions. We construct a matrix of all possible investments by by pairing all venture capitalists with all start-ups in our dataset, a total of around 2.5 million pairs. We then code a dummy variable that is equal to one if there is such investment, else zero. This dummy is then used as the explained variable of our probit regressions. Results, estimated for Germany only due to availability of our instrument, are reported in the Appendix (Table A.4).

The results show that venture capitalists are 40 and 64% more likely to invest in a start-up if it is not more than 100 km away from the location of the venture capitalist. From these regressions, we conclude that there is a significant home bias in our data.

Table 2: Geographic Proximity and the Investments of Venture Capitalists

	Austria	Germany	Switzerland	All
Share distance <100km (all investments)	0.4	0.277	0.2	0.266
Share distance <100km (investments within GER, AUT, or CH)	0.5	0.37	0.44	0.4
Share foreign investments	0.36	0.34	0.72	0.42
Share same state	0.32	0.28	0.08	0.24
Share same city	0.3	0.16	0.05	0.14



(a) Distance investor to start-up $<$ than 100km **(b)** Investors from the same city

Note: This figures shows the borders of all municipalities in the Austria, Germany, and Switzerland. The bold black lines are the borders of the municipalities with venture capitalists. A darker shading indicates a higher share of investments in start-ups less than 100km from the headquarter of the firm (sub-figure a) or the share of investments in start-ups in the same city (sub-figure (b)).

Figure 4: Visualizing Venture Capitalists' Home Bias

3.2 Regional Identity and Home Bias—Evidence from German Municipalities

We continue our empirical analysis by investigating the relationship between regional identity and the home bias. We first present and discuss the baseline OLS results, and then establish causality by running instrumental variable regressions. We focus on exogenous variation in historical instability that stems from ruler death without a male heir.

Estimation Approach. In a first step of our municipality-level analysis, we show a cross-sectional relationship between regional identity and venture capitalists' home bias. We estimate variants of the following regression equation with OLS and heteroskedasticity robust standard errors:

$$\begin{aligned} ln(HB)_{i,s} =& \alpha + \beta ln(Identity)_{i,s} + \gamma' \mathbf{G}_{i,s} + \delta' \mathbf{H}_{i,s} + \\ &+ \theta' \mathbf{X}_{i,s} + \eta RI_{i,s} + \pi_s + \epsilon_{i,s} \end{aligned} \tag{3}$$

$ln(HB)_{i,s}$ is our preferred measure of home bias. It is the natural logarithm of the share of investments by a venture capitalist headquartered in a municipality i in a state s that existed in 1150 and lies within a radius of 100km around the headquarters. We prefer log-log specifications since most measures are left-skewed, there are some minor concerns with outliers, and the interpretation of the coefficients is simpler.[23] $ln(Identity)_{i,s}$ is the natural logarithm of the share of vehicles with reintroduced UZs on their license plates per municipality.

$\mathbf{G}_{i,s}$ is a set of geographic control variables as explained in the data section. The coordinates of each municipality control for general geographic patterns in psychological and cultural attitudes. Elevation and terrain ruggedness account for the fact that mountain areas are characterized by a peculiar landscape and a different lifestyle. These may lead to peculiar traditions and rituals that may cause shared characteristics that are orthogonal to regional identity caused by political stability.

$\mathbf{H}_{i,s}$ is a set of historical control variables that consists of a dummy variable equal to one for municipalities that once were part of the Roman Empire, one equal to one if there is evidence for medieval trade roads, a dummy variable equal to one for municipalities in which a relevant battle took place between 1250 and 1789, a political fragmentation measure of the average number of states the area of a municipality belonged to for each year between 1250 and 1789, a municipality's Black Death mortality rate, a dummy variable equal to one for municipalities that were located on the border of the Holy Roman Empire, and a variable that reports the area of a recorded Neolithic settlement (in km^2). These variables capture the impact of several different potentially relevant historical fac-

[23] However, we present level-level regressions too, in order to ensure that our results are not sensitive to the use of of the level instead of the log of the variables

tors, which may be orthogonal to our story.[24]

$\mathbf{X}_{i,s}$ controls for contemporary determinants of home bias. This includes two dummy variables that indicate whether the managers of the venture capitalist have personal connections to the location of the start-up, including if they were born there, went to university there, or worked or lived there. Another variable reports the share of investments by all venture capitalists in a municipality made by public or private investors that are legally bound only into local start-ups. If this type of investor represents a large portion of the overall investment activities, it would be self-evident to find more investments into start-ups in close proximity. We also include a dummy variable equal to one if a municipality has a technical university. We report that the estimated coefficients of these variables are also explicitly reported in the regression tables to allow us a comparison with the effect of regional identity. This set of controls also includes a dummy equal to one for the largest six German cities (Berlin, Hamburg, Munich, Cologne, Frankfurt am Main, and Stuttgart) and for uninhabited municipalities. We include a "large city dummy" to rule out that our results are driven by outliers, a few peculiar large places, the most vibrant economic areas of Germany. This should rule out the possibility that both investors and start-ups are located in these cities because they are prosperous areas and attractive places to live in.

$RI_{i,s}$ is a dummy variable equal to one if a municipality lies within the historical bound-

[24]For example, Fritsch et al. (2021) show how a Roman presence in the past is correlated with today's entrepreneurship, innovation, and certain personality traits conducive to entrepreneurship. Similarly, being located on a major historical trade route could have contributed to a commercial tradition, less risk aversion, and in general more openness towards strangers and change. Proximity to the locations of major historical warfare as well as a high Black Death mortality similarly capture other aspects of instability of the political and social environment in a region determining, among other factors, how traditional people in those regions are. They also lead to significant migration movements, which might have resulted in a population with more diverse backgrounds and therefore also more diverse attitudes. Political fragmentation can be responsible for the scale of regional identities. It could also have affected the formation of identities in a significant way, as, for example, nation-building policy is difficult for a small state lacking the necessary capacity. High political fragmentation might also have contributed to strengthening regional identity, as the presence of many other states in close proximity could have increased the need to separate oneself from others. In the spirit of Bazzi, Fiszbein, and Gebresilasse (2020) location on the border of the Holy Roman Empire could have given rise to the emergence and persistence of a particular "frontier culture", which is, among other things, connected to higher levels of individualism and less attachment to other people, groups or regions (see also Iyigun 2008). The inclusion of the Neolithic settlement area is motivated by the hypothesis that areas with a long settlement history had a head start. From Huning and Wahl (2021a) we also know that early settlements are related to the emergence and persistence of the inheritance practice of equal partition, which in turn is significantly related to a higher degree of cooperation and social capital among the population.

aries of an abolished county whose UZ was reintroduced by any modern county.[25] This dummy variable acts as a fixed effect for these municipalities and accounts for all time-invariant unobserved factors common to all of them. These could, among other facts, be related to deep-rooted historical factors that influenced the decision to reintroduce the UZ.

pi_s is a set of dummy variables that indicate to which state of the Holy Roman Empire in 1150 a present-day municipality belongs. These act as region-fixed effects and have two main advantages over using current higher-order administrative units such as NUTS-2 regions or federal states. First, they were determined long ago, before we began to measure levels of political instability. Therefore, it is less likely that the borders of these states are endogenous to events that still matter for contemporary socioeconomic outcomes. Second, the borders of these states, e.g. of the Duchies of Franconia, Swabia, or Bavaria are still approximately reflecting relevant present-day differences like in spoken dialect or cultural traditions. People often refer to these territories when asked what group they identify with.[26] As such, they account for deep-rooted cultural and linguistic differences that can be closely related to regional identity.

Baseline Results. Table 3 presents the results. In column (1) we show the results of a regression including the UZ reintroduced dummy, uninhabited municipalities, and large cities. In the following columns, we iteratively add more controls. Column (5) is the full specification. In addition to different sets of control variables, we present a level-level specification (column 6). In column (7), we also show results based on different standard errors. These take into account spatial autocorrelation and follow Conley (1999).

[25]Some of the abolished counties were split and are now part of two or more modern counties. Not all modern counties have decided to reintroduce the UZ of the abolished county.

[26]For example people in Franconia (an area including Nuremberg), with is today part of four different German federal states, still identify as Franconian instead of Bavarian, Hessian, or Württembergian, and speak Franconian instead of Bavarian or Swabian dialects.

Table 3: Regional Identity and Venture Capitalists Home Bias

Dependent Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	ln(% Investment within 100km)			% Investments within 100km	ln(% Investment within 100km)		
ln(% Vehicles with Reintroduced UZs)	-0.0103***	-0.00891***	-0.0110***		-0.0139***	-0.0139***	-0.00549**
	(0.00233)	(0.0026)	(0.0027)		(0.0032)	[0.0036]	(0.0022)
% Vehicles with Reintroduced UZs				-0.00801***			
				(0.0022)			
Technical University							0.817***
							(0.273)
Venture Capitalist's Manager Studied at Start-Up Location							2.631***
							(0.862)
Other Connection of Venture Capitalist's Manager							3.187***
							(0.975)
% Locally Active Investors							4.617***
							(0.773)
UZ Reintroduced	✓	✓	✓	✓	✓	✓	✓
Uninhabited Dummy & Large Cities Dummy	✓	✓	✓	✓	✓	✓	✓
Geographic Controls	–	✓	✓	✓	✓	✓	✓
Historical Controls	–	–	✓	✓	✓	✓	✓
1150 State Dummies	–	–	–	–	✓	✓	✓
Observations	11,264	11,263	11,263	11,263	10,242	10,242	10,242
R^2	0.058	0.062	0.087	0.043	0.092	0.092	0.377

Notes. Standard errors in parentheses are robust to heteroscedasticity. In column (6), Conley standard errors that account for spatial autocorrelation are shown in brackets (cut-off point 15km). Coefficient is statistically different from zero at the ***1 %, **5 %, and *10 % level. The unit of observation are German municipalities in 2010. All regressions include a constant not reported. Geographic controls include latitude, longitude, latitude-longitude interaction, elevation, and terrain ruggedness. The UZ Reintroduced dummy is one if a municipality lies in the historical boundaries of an abolished county whose UZ was reintroduced by any modern county. Historical controls comprise of dummy variables equal to one for municipalities located in the historically Roman part of Germany, on medieval trade roads, a dummy variable equal to one for municipalities that had a battle taking place in their area between 1250 and 1789, a political fragmentation measure giving the average number of states, the territory of a municipality belonged to between 1250 and 1789, a municipality's Black Death mortality rate, a dummy variable equal to one for municipalities which historically were located on the border of the Holy Roman Empire, and a variable reporting the area of each municipality that is located in the Neolithic settlement area (in km^2).

Spatial autocorrelation in the data could lead to wrongly reported standard errors (see Kelly 2020, who studies this problem in the context of historical persistence studies), and hence can create the false impression of a significant effect. The established way to address this concern and adjust standard errors in the presence of spatial autocorrelation is the method of Conley (1999). Reassuringly, Conley standard errors are virtually identical to the others. The results show robust and highly statistically and economically significant effects of the considered determinants of home-biased investments. Personal connections between managers and the place they invest in, the presence of a technical university, or a large share of venture capitalists that are legally bound to invest only in local companies are all relevant for investment decisions.

We also find a significant effect of the share of vehicles with a reintroduced UZ on their license plates. As such, regional identity can explain a significant share of venture capitalists' home bias. Surprisingly, the sign of the coefficient implies a negative relationship between regional identity and home bias (which is contrary to our theory). The estimated elasticities imply that an increase in the share of vehicles with reintroduced UZs by 1% decreases the share of investments within 100km by approximately 0.01% in columns (1) to (6). This is a sizeable but not extraordinary effect, given that the average share of home bias investments in the overall sample is only 0.367. The level-level specification in column (4) indicates that a one standard deviation increase in the share of vehicles with reintroduced UZ (which is 1.52 log points) decreases the share of investments with home bias by around 0.012%.

Discussion of the Results. This counter-intuitive result is likely driven by a significant downward bias of OLS. This bias could come from unobserved factors that are positively correlated with regional identity but negatively with the home bias (such as a cultural characteristic related to remoteness or instability of the environment in general). This factor would then impact the willingness to cooperate negatively. For example, people from remote regions would be less trusting with strangers or less open to new ideas. But if regions with high regional identity had inhabitants with attitudes not conducive for entrepreneurship, start-ups would likely not locate in this area. This could explain our regression results, since these sensible caveats would create a negative correlation, but driven by the unavailability of investments rather than by a low level of regional identity. As such, the OLS regressions are not credible. Therefore, we proceed with our instrumental variable strategy that overcomes these issues. The reason why the instrumental

variable is able to extract variation that is not related to this type of bias is its specific nature. Here it is important to note that our inclusion restriction is that our instrument must not be correlated with venture capitalists' home bias other than via its effect of regional identity. We argue that this is the case for rulers who died without leaving a male heir, a variable that is connected to historical political instability but not directly to the decisions of venture capitalists. As such, our instrument can distinguish traditionalism, remoteness, openness towards new ideas from the regional identity we are after. It is however important to note that the elements that drive a negative sign in the naïve OLS regression seem to be relevant and definitely worth investigating in further research.

3.3 IV Results

To separate the effect of regional identity from other mechanisms that may drive the OLS results, we introduce our instrumental strategy.

The Instrumental Variable. Our instrument is connected to historical political instability. Inspired by Acharya and Lee (2019), it is based on the idea that only a small percentage of territorial changes are exogenous. The most central aspect of the survival of a European dynasty was the creation of a legitimate (usually male) heir before the death of the current ruler. Failure to do so would jeopardize all other efforts to stabilize one's reign. This could happen if an heir died in childhood, a fact of life that was ubiquitous in the Middle Ages (compared to the more rarely recorded events of heirs dying in a battle or falling off a horse). The death of a ruler without a male heir could lead to the death of many others if a dispute over the territory could not be solved peacefully. This could often be avoided if the territory could be legitimately transferred to another noble family (which was often related to the first), who then integrated the territory into their realms.[27] This variable is a reliable instrument for historical political instability, since the death of a ruler without an heir was a random event. It is reasonable to assume that it did not affect regional identity other than through its effect on political instability. This variable was determined a long time ago, and especially predates the Industrial Revolution which transformed societies

[27]One example of such a change in state is the County of Ziegenhain in the north of today's Hesse. The last count of Ziegenhain, John II., called "the strong" died in 1450 without a male heir. As a result, there was a limited military conflict between different potential legal successors, among them the Count of Hesse, who finally succeeded and integrated the county in his territory in 1495. The death of the ruler without a legitimate heir has often resulted in violence and conflict. In the case of the county of Niederslam, which is located in today's Belgium, count Henry VII. died in 1416 without an heir and just bequeathed the state to his nephew John V. of Reifferscheid, his closest living relative.

and economies. Catering to a large literature on plausible instruments, it is also a specific variable and captures well-defined historical events. To support this statement, we performed a placebo exercise and used our instrumental variable "Ruler Deaths Without Heir" to explain various economic and political outcomes related to entrepreneurship, industrialization levels, and investor location. We consider a variety of outcomes, such as the natural logarithm of the average share of votes for the liberal party (FDP) in the federal elections of 2002, 2005 and 2009, the natural logarithm of a municipality's business tax revenue per capita, the population, income per capita, and unemployment rate. All variables are averaged over the period 2002 to 2014 and originate from the data set of Asatryan, Havlik, and Streif (2017).[28] The included control variables are the same as in the baseline estimates.

Table 4: Ruler Deaths Without Heir and Alternative Socio-Economic Outcomes

	(1)	(2)	(3)	(4)	(5)
Dependent Variable	% ln(Votes Liberal Party)	ln(Business Tax Revenue p.c.)	ln(Population)	ln(Income p.c.)	ln(Unemployment Rate)
Weighted Ruler Deaths Without Heir	-0.151	-2.153	7.616	-3.214	-0.169
	(0.140)	(6.513)	(7.708)	(2.141)	(0.104)
UZ Reintroduced	✓	✓	✓	✓	✓
Uninhabited & Large Cities Dummy	✓	✓	✓	✓	✓
Geographic Controls	✓	✓	✓	✓	✓
Historical Controls	✓	✓	✓	✓	✓
1150 State Dummies	✓	✓	✓	✓	✓
Observations	9,756	9,576	9,790	9,706	9,761
R^2	0.349	0.179	0.426	0.383	0.531

Notes. Heteroskedasdicity robust standard errors in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 %, and *10 % level. The unit of observation are German municipalities in 2010. All regressions include a constant not reported. Geographic controls include a municipality's latitude, longitude, latitude-longitude interaction, elevation, and terrain ruggedness. The UZ Reintroduced dummy is one if a municipality lies in the historical boundaries of an abolished county whose UZ was reintroduced by any modern county Historical controls comprise of dummy variables equal to one for municipalities located in the historically Roman part of Germany, on medieval trade roads, a dummy variable equal to one for municipalities that had a war-related battle taking place in their area between 1250 and 1789, a political fragmentation measure giving the average number of states, the territory of a municipality belonged to between 1250 and 1789, a municipality's black death mortality rate, a dummy variable equal to one for municipalities which historically were located on the border of the Holy Roman Empire, and a variable reporting the area of each municipality that is located in Neolithic settlement area (in km^2).

Table 4 shows the results. The variable "Ruler Deaths without Heir" is not related to any of these variables in any common statistical sense. This supports the validity of the variable as an instrument.

IV Approach. To quantify the causal effect of regional identity on home bias, we estimate

[28] A descriptive overview of the variables can be found in Table A.2 in the Online Appendix.

variations of the following instrumental variable regressions using 2SLS:

$$\begin{aligned} ln(Identity)_{i,s} =& \alpha_1 + \beta_1 Rulerdeath_{i,s} + \gamma_1' \mathbf{G}_{i,s} + \delta_1' \mathbf{H}_{i,s} + \\ & \theta_1' \mathbf{X}_{i,s} + \eta_1 RI_{i,s} + \zeta_s + \eta i, s \end{aligned} \tag{4a}$$

$$\begin{aligned} ln(HB)_{i,s} =& \alpha_2 + \beta_2 ln(\widehat{Identity})_{i,s} + \gamma_2' \mathbf{G}_{i,s} + \delta_2' \mathbf{H}_{i,s} + \\ & \theta_2' \mathbf{X}_{i,s} + \eta_2 RI_{i,s} + \pi_s + \epsilon_{i,s} \end{aligned} \tag{4b}$$

Here, $Rulerdeath_{i,s}$ is the WHPI index as defined in the data section, but only considering territorial changes due to the death of a ruler without a male heir. $ln(RegionalIdentity)_{i,s}$, $ln(HB)_{i,s}$,$\mathbf{G}_{i,s}$, $\mathbf{H}_{i,s}$, $\mathbf{X}_{i,s}$, and $RI_{i,s}$ are defined identically to equation 3. With ζ_s and π_s we refer to 1150 states fixed effects. The error terms are $\eta_{i,s}$ and $\epsilon_{i,f}$.

Results. Table 5 reports the results of the 2SLS regressions. Any specification spans over three columns: The first column shows the reduced form, the second the first stage, and the third the second stage. Columns (1) to (3) report the results of our baseline IV regressions. Here, we include all control variables and report heteroscedasticity-robust standard errors. The reduced form shows a significant relationship between the logarithm of the share of investments within a 100km radius of the venture capitalists' headquarter. The F-statistic of the excluded instrument in the first stage is 17.29, above common thresholds, suggesting that the death of the ruler without an heir is a relevant and strong instrument. The results of the second stage reveal a significant and positive effect of the share of vehicles with reintroduced UZs (our measure of regional identity) on the share of investments with home bias. The estimated elasticity of 0.175 is statistically and economically significant. Unlike in our OLS specification, the sign of the coefficient—positive—supports our theory. The elasticity implies that a 1% increase in vehicles from reintroduced UZs increases the amount of biased investments by around 0.175%. In columns (4) to (6), we add contemporary predictors of home bias (as in Table 3). The logarithm of the share of vehicles with reintroduced UZs remains significant. The coefficient is 0.106 and is therefore sizable. The other determinants of home bias remain significant. In column (3), we report Conley-standard errors. The coefficient remains significant at the 10% level. Our results imply a significant and positive effect of regional identity on venture capitalists' home bias. The Instrumental variable regressions, our preferred specifications, overcome the downward bias of the OLS results.

In Tables 6 and 7, we present robustness checks for our IV results.

Level-level specification. We use the level of the share of vehicles with reintroduced UZs and investments within 100km of the headquarters of the venture capitalists. The results are reported in column (1) of Table 6. The coefficient remains positive and statistically significant.[29]

Intensive Margin Effect. To estimate the intensive margin effect and to avoid a potential bias from systematic selection into treatment, we estimate the baseline regression only for municipalities in abolished counties in which the old license plates were reintroduced (for which the "UZ Reintroduced" dummy is equal to one). Table 6, column (2) reports the results. The intensive margin effect (elasticity around 10%) is slightly smaller, but still statistically and economically significant.

Additional Control Variables. In columns (3) and (4), we assess the effect of additional control variables. In column (3), we divide counties into ordinary counties and independent cities ("kreisfreie Städte"). The latter have never reintroduced any UZs, predominantly because their geographic borders never included UZs other than the city's. We include a dummy variable equal to one for these counties in the regression. We also include a dummy as to whether the municipality is at the border to an abolished county whose UZ was reintroduced. This is motivated by a close inspection of the UZ data, which shows that the share of vehicles with reintroduced UZs is lowest in municipalities which are further away from the center of the abolished county, this reintroduced UZ abbreviates. We are interested in whether our results hold when we isolate these municipalities because we expect that the ability of a reintroduced UZ to represent a region is strongest in the areas closest to the political center of the abolished county it represents. Also economic development, population densities, infrastructure, etc. are likely to be different in areas that are at the boundary to other counties, hence away from the historical seat of the county government. Similarly, the border regions on the contemporary German border could be systematically different with respect to culture and attitude of people who live there (see Bazzi, Fiszbein, and Gebresilasse 2020). As such, we include the distance to the German border (in kilometers) among the additional control variables.

[29]The F-statistic of the excluded IV falls below 10, however common tests for under-identification and weak-instrument robust inference pass. As such, the instrument is strong. The Kleinbergen-Paap rk LM statistic, for example, rejects the null of under-identification on the 1% level. Tests of joint significance of the endogenous regressor in the main equation (Anderson-Rubin Wald test and Stock-Wright LM S statistic) reject the null hypothesis of a zero effect on the 1% significance level as well.

Table 5: Regional Identity, Historical Political Instability and Venture Capitalists Home Bias—IV Regressions

Dependent Variable	(1) ln(% Investments within 100km)	(2) ln(% Vehicles with Reintroduced UZs)	(3) ln(% Investments within 100km)	(4) ln(% Investments within 100km)	(5) ln(% Vehicles with Reintroduced UZs)	(6) ln(% Investments within 100km)
	Reduced-Form	1st stage	2nd stage	Reduced-Form	1st stage	2nd stage
ln(Vehicles with Reintroduced UZs)			0.175***			0.106**
			(0.0661)			(0.0465)
			[0.103]*			(0.0465)
Weighted Ruler Deaths Without Heir	-5.471***	-31.20***		-3.373***	-31.81***	
	(1.536)	(7.504)		(1.237)	(7.498)	
Technical University				0.820***	-0.248	0.846***
				(0.273)	(0.197)	(0.276)
Venture Capitalist's Manager Studied at Start-Up Location				2.631***	-0.665*	2.701***
				(0.862)	(0.364)	(0.865)
Other Connection of Venture Capitalist's Manager				3.188***	-1.000***	3.294***
				(0.975)	(0.344)	(0.984)
% Locally Active Investors				4.625***	-1.511**	4.785***
				(0.774)	(0.601)	(0.817)
UZ Reintroduced	✓	–	✓	✓	✓	✓
Uninhabited & Large Cities Dummy	✓	✓	✓	✓	✓	✓
Geographic Controls	✓	✓	✓	✓	✓	✓
Historical Controls	✓	✓	✓	✓	✓	✓
1150 State Dummies	✓	✓	✓	✓	✓	✓
F-value of excluded IV		17.29			18.00	
Observations	10,242	10,242	10,242	10,242	10,242	10,242
R^2	0.090	0.458	-0.270	0.377	0.460	0.252

Notes. Heteroskedasticity robust standard errors in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 %, and *10 % level. In column (3), Conley standard errors that account for the presence of spatial autocorrelation are shown in brackets (cutoff point 15km). The unit of observation are German municipalities in 2010. All regressions include a constant not reported. Geographic controls include a municipality's latitude, longitude, latitude-longitude interaction, elevation, and ruggedness of a municipality. The UZ Reintroduced dummy is one if a municipality lies in the historical boundaries of an abolished county whose UZ was reintroduced by any modern county. Historical controls comprise dummy variables equal to one for municipalities located in the historically Roman part of Germany, on medieval trade roads, a dummy variable equal to one for municipalities that had a war-related battle taking place in their area between 1250 and 1789, a political fragmentation measure giving the average number of states, the territory of a municipality belonged to between 1250 and 1789, a municipality's black death mortality rate, a dummy variable equal to one for municipalities which historically were located on the border of the Holy Roman Empire, and a variable reporting the area of each municipality that is located in Neolithic settlement area (in km^2).

Table 6: IV Regressions—Robustness Checks I

Dependent Variable	(1) % Investments within 100km	(2)	(3)	(4)
		ln(% Investments within 100km)		
Robustness Check	Level-Level Model	Intensive Margin	Additional Controls	
ln(% Vehicles with Reintroduced UZs)		0.0939**	0.0921*	0.0919*
		(0.0463)	(0.0550)	(0.0547)
% Vehicles with Reintroduced UZs	0.268**			
	(0.134)			
% of Population over 65	–	–	–	✓
Independent City Dummy	–	–	✓	✓
County Border Municipality	–	–	✓	✓
Distance to German Border (km)	–	–	✓	✓
Start-Ups within 100km	–	–	✓	✓
No. of Abolished Counties	–	–	✓	✓
Federal State Dummies	–	–	✓	✓
1150 State Dummies	✓	✓	✓	✓
UZ Reintroduced	✓	✓	✓	✓
Uninhabited & Large Cities Dummy	✓	✓	✓	✓
Geographic Controls	✓	✓	✓	✓
Historical Controls	✓	✓	✓	✓
F-value of Excluded IV	7.84	11.79	12.10	12.67
Observations	10,242	6,873	11,262	10,997

Notes. Heteroskedasticity robust standard errors in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 %, and *10 % level. The unit of observation are German municipalities in 2010. All regressions include a constant not reported. Geographic controls include the latitude, longitude, latitude-longitude interaction, elevation, and terrain ruggedness of a municipality. The UZ Reintroduced dummy is one if a municipality lies in the historical boundaries of an abolished county whose UZ was reintroduced by any modern county. Historical controls comprise of dummy variables equal to one for municipalities located in the historically Roman part of Germany, on medieval trade roads, a dummy variable equal to one for municipalities that had a war-related battle taking place in their area between 1250 and 1789, a political fragmentation measure giving the average number of states, the territory of a municipality belonged to between 1250 and 1789, a municipality's black death mortality rate, a dummy variable equal to one for municipalities which historically were located on the border of the Holy Roman Empire, and a dummy variable indicating whether a municipality is located in Neolithic settlement area.

Table 7: IV Regressions—Robustness Checks II

Dependent Variable	(1) % Investments within 50km	(2) % Investments within 30km	(3) % Investments within 20km	(4) ln(% Investments in Same 1970 County)
Robustness Check		Alternative Definition of Home Bias		
ln(% Vehicles with Reintroduced UZs)	0.156***	0.140***	0.129**	0.0767**
	(0.0595)	(0.0536)	(0.0514)	(0.0370)
UZ Reintroduced	✓	✓	✓	✓
Uninhabited & Large Cities Dummy	✓	✓	✓	✓
Geographic Controls	✓	✓	✓	✓
Historical Controls	✓	✓	✓	✓
1150 State Dummies	✓	✓	✓	✓
F-value of Excluded IV	17.29	17.29	17.29	17.29
Observations	10,242	10,242	10,242	10,242

Notes. Heteroskedasticity robust standard errors in parentheses. Coefficient is statistically different from zero at the ***1 %, **5 %, and *10 % level. The unit of observation are German municipalities in 2010. All regressions include a constant not reported. Geographic controls include the latitude, longitude, latitude-longitude interaction, elevation, and terrain ruggedness of a municipality. The UZ Reintroduced dummy is one if a municipality lies in the historical boundaries of an abolished county whose UZ was reintroduced by any modern county. Historical controls comprise of dummy variables equal to one for municipalities located in the historically Roman part of Germany, on medieval trade roads, a dummy variable equal to one for municipalities that had a war-related battle taking place in their area between 1250 and 1789, a political fragmentation measure giving the average number of states, the territory of a municipality belonged to between 1250 and 1789, a municipality's black death mortality rate, a dummy variable equal to one for municipalities which historically were located on the border of the Holy Roman Empire, and a dummy variable indicating whether a municipality is located in Neolithic settlement area.

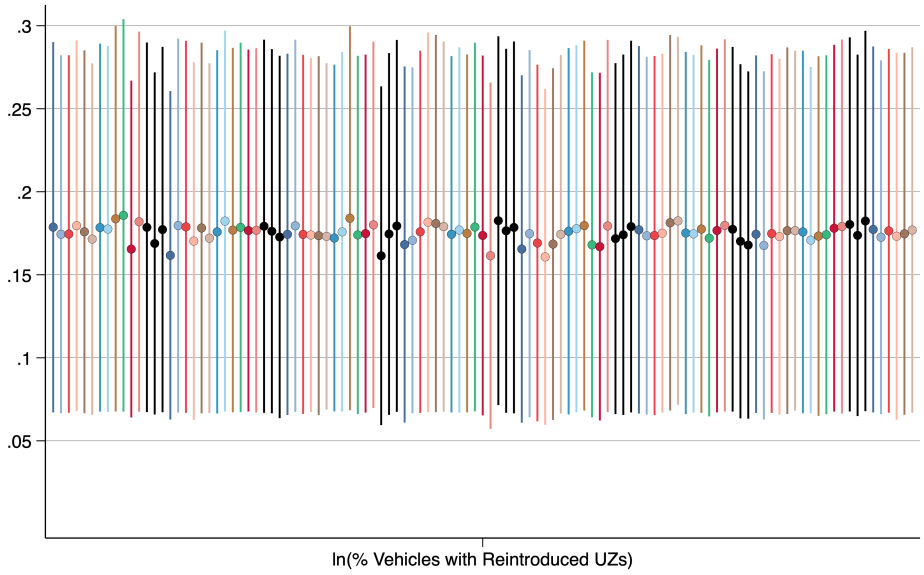
We also add the number of abolished counties to the enlarged specification. This proxies, for example, for the pre-merger level of population density. We also consider the number of start-up companies within 100km of a venture capitalists' headquarters. This ensures that our baseline estimates do not just pick up the fact that investors in a region with high regional identity could have more start-ups and, therefore, investment opportunities in their vicinity. We introduce federal state dummies. This is worthwhile to exploit variation within contemporary federal states (which are constitutionally responsible for the county mergers) the design of municipalities and other relevant policies. Furthermore, it ensures that our results hold when including the municipalities in the west of Brandenburg and the east of Mecklenburg-West Pomerania which are not included in the baseline specification as they were not part of the Holy Roman Empire in 1150. The estimated elasticity from this more demanding specification is around 0.1%, which is virtually the same as the intensive margin effect and economically and statistically significant (although only on 10% level).

Finally, in column (4) we add a control for the share of the population that is older than 65 years (around the usual age of retirement). The data come from Asatryan, Havlik, and Streif (2017), and are available for 10,997 municipalities. The share of over 65 year old is informative because the venture capitalist scene is demographically younger than the average. An older population may also be an indicator of a less dynamic regions (in terms of economics, but also socially), which can both affect regional identity and financial behavior. The results remain virtually identical.

Alternative Definitions of a "Home Bias Investment". We followed the literature with our 100km threshold for our main specification and repeat our baseline 2SLS regression with a 50, 30 and 20km radius around the headquarters for robustness. We also consider a variable that defines the home bias as the share of a venture capitalist's total investments into start-ups that, in 1970, would have had their headquarter in the same county. Table 7 shows the results. As expected, the narrower definition of the home bias causes a reduction in the coefficients, but they remain stable, positive, and significant across all our alternative measures for the home bias. In conclusion, our results are not driven by a particular definition of home bias.

Sensitivity to Violations of the Exclusion Restriction. To further test whether our instrument complies with the exclusion restriction, we follow the methodology outlined in

Conley, Hansen, and Rossi (2012), and use their union of confidence interval (uci) and the local to zero (ltz) approach. The results from the uci approach suggest that our IV results are credible if the direct effect of the instrument on the home bias variable is smaller than -2.7. This is around half of the total reduced-form effect of the instrumental variable on the home bias measure (see Table 5, column (1)). The lzt approach results in significant and positive coefficients for all estimated second-stage specifications. As such, both tests support the robustness of our results. [30]



Note: The figure shows the coefficients of the ln(% Vehicles with Reintroduced UZs) variable alongside the corresponding 90 % confidence intervals for 205 re-estimations of the baseline IV regression using Stata's crossfold package. Each run excludes 50 different municipalities.

Figure 5: Sensitivity of the Effect of Regional Identity When Removing Sub-Samples of the Data

Sensitivity to the Exclusion of Sub-Samples. We also test how sensitive the results are to the exclusion of certain randomly drawn subsamples of municipalities from the estimation sample. Particularly, we split the data set into 205 subsamples (as we have 10,242

[30]The local to zero approach assumes that the effect of the instrument on the home bias is normally distributed around the mean zero. We tested various plausible values of the variance of this direct effect of the instrument (between 0.1 and 1).

observations, this is around 50 municipalities) and then reestimate the IV regression from Table 6 columns (1) and (2), 205 times each time excluding one of the subsamples. Figure 5 shows the coefficient and 10% confidence interval of the ln(% Vehicles with Reintroduced UZs) variable in each of the 205 regressions. In all of these regressions, our regional identity measure remains statistically significant. The coefficient is always between 0.16 and 0.184. This means that our results are not decisively influenced by a particular group of observations (or a few influential municipalities).

4 Conclusion

This paper documents a significant home bias among venture capitalists in German-speaking countries, especially Germany. It investigates the role of regional identity for this bias and identifies (assumed) shared characteristics as an important factor for financial transactions. Our instrumental variables strategy suggests that differences in the degree to which individuals ascribe to their regions have historical roots that go back as far as the Middle Ages. Studying the historical roots of regional identity in general. In particular, the connection between historical political instability and identity formation is a promising avenue for future research.

The paper improves our knowledge on yet understudied deep roots of current financial behavior, and it highlights the contextual complexity of business transactions. The fact that a branch as seemingly cosmopolitan as the start-up and venture capitalist scene is affected by long forgotten historical events is a friendly reminder that we still know quite little about the determinants of behavior in financial transactions.

This paper is the first systematic quantitative study on the link between the historical origins and economic consequences of regional identity. We show how past experiences of political unstable environments translate into differences in regional identities which then explain financial behavior. Shared experience and a common regional identity are crucial for individuals and relevant for their decisions. These experiences shape their expectations about who they are similar to, who they can trust, and who will be a valuable keepsake for their investment.

This study suggests that other, yet unexplored, factors that influence individuals' decision-making via their identification with groups are economically and financially important.

These could include norms, attitudes, and other intangible aspects of everyday life. Meanwhile our results highlight the role of a long gone past, and hence immutable aspects of the environment.

This study is one of many to suggest that intangible and yet unexplored aspects of human life shape professional interactions. Lacking outcomes of investment success, we cannot answer the question if this form of home bias among investors is rational. Is regional identity a good indicator of shared characteristics? Does a strong regional identity foster investment due to increased trust? Or does it instead make investors predominantly more skeptical to a stranger's brilliant idea? Are German investors specifically 'groupy' or can we simply identify regional identity more conveniently? All these questions are worthwhile to investigate, also in the long-run.

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Appendix (For online publication only)

A.1 Overview of the Reintroduced UZs of Abolished Counties

A.1.1 Constructing the "% Vehicles with Reintroduced UZs" Variable

Table A.1 list all the reintroduced abolished county UZs (license plates) , the date they were available again, the contemporary county that reintroduced them and the federal state in which the county is located. The information depicted in the table comes from a list of all officially recognized UZs as of 12.09.2018 from the Federal Motor Transport Authority (Kraftfahrt-Bundesamt 2018), and a list of reintroducedUZs of abolished counties in the wikipedia entry about the German license plate liberalization ("Kennzeichenliberalisierung") `https://de.wikipedia.org/wiki/Kennzeichenliberalisierung` (accessed latest on 15th July, 2022). As already stated in the main text, 170 counties reintroduced 355 old UZs. To calculate the share of abolished county UZs in each municipality, we merge this list with the dataset of all registered UZs in each municipality that we bought from the KBA by both the UZ and the county name. In doing so, we ignore the UZ of abolished counties which are registered outside of the counties that decided to reintroduce them, because it is unclear what signal these UZs send. Then we calculate the sum of all UZs and of reintroduced UZs of abolished counties in each municipality, divide both figures by each other and collapse the data on municipality level.

Table A.1: The Reintroduction of Altkreis license plates in German counties as of 1st January 2019

Abolished County UZ	Date Reintroduced	County of Reintroduction	Federal State
ÖHR	10.02.2015	Hohenlohekreis	Baden-Württemberg
LEO	25.02.2013	Landkreis Böblingen	Baden-Württemberg
NT	10.11.2014	Landkreis Esslingen	Baden-Württemberg
HCH	19.02.2018	Landkreis Freudenstadt	Baden-Württemberg
HOR	02.12.2013	Landkreis Freudenstadt	Baden-Württemberg
WOL	19.02.2018	Landkreis Freudenstadt	Baden-Württemberg
VAI	14.07.2014	Landkreis Ludwigsburg	Baden-Württemberg
BH	09.12.2013	Landkreis Rastatt	Baden-Württemberg
BK	01.09.2018	Landkreis Schwäbisch Hall	Baden-Württemberg
CR	28.03.2014	Landkreis Schwäbisch Hall	Baden-Württemberg
SÄK	15.03.2021	Landkreis Waldshut	Baden-Württemberg
MGH	07.01.2014	Main-Tauber-Kreis	Baden-Württemberg
BCH	25.02.2013	Neckar-Odenwald-Kreis	Baden-Württemberg
BH	30.03.2015	Ortenaukreis	Baden-Württemberg
KEL	31.03.2014	Ortenaukreis	Baden-Württemberg
LR	31.03.2014	Ortenaukreis	Baden-Württemberg
WOL	31.03.2014	Ortenaukreis	Baden-Württemberg
GD	25.02.2013	Ostalbkreis	Baden-Württemberg
BK	02.12.2013	Rems-Murr-Kreis	Baden-Württemberg
HCH	25.02.2013	Zollernalbkreis	Baden-Württemberg
NEC	01.12.2014	Coburg	Bavaria
FDB	11.07.2013	Landkreis Aichach-Friedberg	Bavaria
LF	01.10.2016	Landkreis Altötting	Bavaria
BUL	12.07.2013	Landkreis Amberg-Sulzbach	Bavaria

Table A.1 – *Continued*

ESB	12.07.2013	Landkreis Amberg-Sulzbach	Bavaria
NAB	12.07.2013	Landkreis Amberg-Sulzbach	Bavaria
SUL	12.07.2013	Landkreis Amberg-Sulzbach	Bavaria
DKB	10.07.2013	Landkreis Ansbach	Bavaria
FEU	10.07.2013	Landkreis Ansbach	Bavaria
ROT	10.07.2013	Landkreis Ansbach	Bavaria
ALZ	11.07.2013	Landkreis Aschaffenburg	Bavaria
SMÜ	01.03.2017	Landkreis Augsburg	Bavaria
WER	01.03.2017	Landkreis Augsburg	Bavaria
BRK	10.07.2013	Landkreis Bad Kissingen	Bavaria
HAB	10.07.2013	Landkreis Bad Kissingen	Bavaria
WOR	10.07.2013	Landkreis Bad Tölz-Wolfratshausen	Bavaria
EBS	10.07.2013	Landkreis Bayreuth	Bavaria
ESB	10.07.2013	Landkreis Bayreuth	Bavaria
KEM	10.07.2013	Landkreis Bayreuth	Bavaria
MÜB	10.07.2013	Landkreis Bayreuth	Bavaria
PEG	10.07.2013	Landkreis Bayreuth	Bavaria
BGD	15.09.2016	Landkreis Berchtesgadener Land	Bavaria
LF	15.09.2016	Landkreis Berchtesgadener Land	Bavaria
REI	15.09.2016	Landkreis Berchtesgadener Land	Bavaria
KÖZ	10.07.2013	Landkreis Cham	Bavaria
ROD	10.07.2013	Landkreis Cham	Bavaria
WÜM	10.07.2013	Landkreis Cham	Bavaria
NEC	10.07.2013	Landkreis Coburg	Bavaria
WER	10.07.2013	Landkreis Dillingen a.d.Donau	Bavaria
LAN	01.03.2017	Landkreis Dingolfing-Landau	Bavaria
NÖ	10.07.2013	Landkreis Donau-Ries	Bavaria
HÖS	02.02.2015	Landkreis Erlangen-Höchstadt	Bavaria

Table A.1 – *Continued*

EBS	10.07.2013	Landkreis Forchheim	Bavaria
PEG	10.07.2013	Landkreis Forchheim	Bavaria
GRA	10.07.2013	Landkreis Freyung-Grafenau	Bavaria
WOS	10.07.2013	Landkreis Freyung-Grafenau	Bavaria
KRU	13.07.2013	Landkreis Günzburg	Bavaria
EBN	01.04.2014	Landkreis Haßberge	Bavaria
GEO	01.04.2014	Landkreis Haßberge	Bavaria
HOH	01.04.2014	Landkreis Haßberge	Bavaria
MÜB	04.08.2014	Landkreis Hof	Bavaria
NAI	04.08.2014	Landkreis Hof	Bavaria
REH	04.08.2014	Landkreis Hof	Bavaria
SAN	04.08.2014	Landkreis Hof	Bavaria
MAI	10.07.2013	Landkreis Kelheim	Bavaria
PAR	10.07.2013	Landkreis Kelheim	Bavaria
RID	10.07.2013	Landkreis Kelheim	Bavaria
ROL	10.07.2013	Landkreis Kelheim	Bavaria
SAN	10.07.2013	Landkreis Kronach	Bavaria
EBS	10.07.2013	Landkreis Kulmbach	Bavaria
SAN	10.07.2013	Landkreis Kulmbach	Bavaria
MAI	25.07.2014	Landkreis Landshut	Bavaria
MAL	25.07.2014	Landkreis Landshut	Bavaria
ROL	25.07.2014	Landkreis Landshut	Bavaria
VIB	25.07.2014	Landkreis Landshut	Bavaria
STE	16.07.2013	Landkreis Lichtenfels	Bavaria
OBB	15.01.2018	Landkreis Miltenberg	Bavaria
AIB	10.07.2013	Landkreis München	Bavaria
WOR	10.07.2013	Landkreis München	Bavaria
SOB	10.07.2013	Landkreis Neuburg-Schrobenhausen	Bavaria

Table A.1 – *Continued*

PAR	10.07.2013	Landkreis Neumarkt i.d.OPf.	Bavaria
SEF	10.07.2013	Landkreis Neustadt a.d.Aisch-Bad Windsheim	Bavaria
UFF	10.07.2013	Landkreis Neustadt a.d.Aisch-Bad Windsheim	Bavaria
ESB	10.07.2013	Landkreis Neustadt a.d.Waldnaab	Bavaria
VOH	10.07.2013	Landkreis Neustadt a.d.Waldnaab	Bavaria
ILL	10.07.2013	Landkreis Neu-Ulm	Bavaria
ESB	15.07.2013	Landkreis Nürnberger Land	Bavaria
HEB	15.07.2013	Landkreis Nürnberger Land	Bavaria
N	15.07.2013	Landkreis Nürnberger Land	Bavaria
PEG	15.07.2013	Landkreis Nürnberger Land	Bavaria
FÜS	10.07.2013	Landkreis Ostallgäu	Bavaria
MOD	10.07.2013	Landkreis Ostallgäu	Bavaria
VIT	01.03.2018	Landkreis Regen	Bavaria
KÖN	10.07.2013	Landkreis Rhön-Grabfeld	Bavaria
MET	10.07.2013	Landkreis Rhön-Grabfeld	Bavaria
AIB	10.07.2013	Landkreis Rosenheim	Bavaria
WS	10.07.2013	Landkreis Rosenheim	Bavaria
HIP	11.07.2013	Landkreis Roth	Bavaria
EG	10.07.2013	Landkreis Rottal-Inn	Bavaria
GRI	10.07.2013	Landkreis Rottal-Inn	Bavaria
VIB	10.07.2013	Landkreis Rottal-Inn	Bavaria
BUL	10.07.2013	Landkreis Schwandorf	Bavaria
NAB	10.07.2013	Landkreis Schwandorf	Bavaria
NEN	10.07.2013	Landkreis Schwandorf	Bavaria
OVI	10.07.2013	Landkreis Schwandorf	Bavaria
ROD	10.07.2013	Landkreis Schwandorf	Bavaria
GEO	10.07.2013	Landkreis Schweinfurt	Bavaria
WOR	10.07.2013	Landkreis Starnberg	Bavaria

Table A.1 – *Continued*

BOG	02.07.2018	Landkreis Straubing-Bogen	Bavaria
MAL	02.07.2018	Landkreis Straubing-Bogen	Bavaria
KEM	10.07.2013	Landkreis Tirschenreuth	Bavaria
LF	14.10.2016	Landkreis Traunstein	Bavaria
SOG	16.09.2013	Landkreis Weilheim-Schongau	Bavaria
GUN	10.07.2013	Landkreis Weißenburg-Gunzenhausen	Bavaria
MAK	10.07.2013	Landkreis Wunsiedel i.Fichtelgebirge	Bavaria
REH	10.07.2013	Landkreis Wunsiedel i.Fichtelgebirge	Bavaria
SEL	10.07.2013	Landkreis Wunsiedel i.Fichtelgebirge	Bavaria
OCH	10.07.2013	Landkreis Würzburg	Bavaria
BER	19.03.2013	Landkreis Barnim	Brandenburg
EW	19.03.2013	Landkreis Barnim	Brandenburg
KW	02.07.2015	Landkreis Dahme-Spreewald	Brandenburg
LC	02.07.2015	Landkreis Dahme-Spreewald	Brandenburg
LN	02.07.2015	Landkreis Dahme-Spreewald	Brandenburg
FI	02.04.2013	Landkreis Elbe-Elster	Brandenburg
LIB	29.05.2013	Landkreis Elbe-Elster	Brandenburg
NAU	04.01.2016	Landkreis Havelland	Brandenburg
RN	04.01.2016	Landkreis Havelland	Brandenburg
FRW	18.03.2013	Landkreis Märkisch-Oderland	Brandenburg
SEE	18.03.2013	Landkreis Märkisch-Oderland	Brandenburg
SRB	18.03.2013	Landkreis Märkisch-Oderland	Brandenburg
CA	15.03.2013	Landkreis Oberspreewald-Lausitz	Brandenburg
SFB	15.03.2013	Landkreis Oberspreewald-Lausitz	Brandenburg
BSK	01.09.2017	Landkreis Oder-Spree	Brandenburg
EH	01.09.2017	Landkreis Oder-Spree	Brandenburg
FW	01.09.2017	Landkreis Oder-Spree	Brandenburg
KY	18.03.2013	Landkreis Ostprignitz-Ruppin	Brandenburg

Table A.1 – *Continued*

NP	18.03.2013	Landkreis Ostprignitz-Ruppin	Brandenburg
WK	18.03.2013	Landkreis Ostprignitz-Ruppin	Brandenburg
FOR	19.03.2013	Landkreis Spree-Neiße	Brandenburg
GUB	19.03.2013	Landkreis Spree-Neiße	Brandenburg
SPB	19.03.2013	Landkreis Spree-Neiße	Brandenburg
ANG	03.04.2014	Landkreis Uckermark	Brandenburg
PZ	03.04.2014	Landkreis Uckermark	Brandenburg
SDT	03.04.2014	Landkreis Uckermark	Brandenburg
TP	03.04.2014	Landkreis Uckermark	Brandenburg
USI	02.01.2013	Hochtaunuskreis	Hesse
DIL	02.05.2014	Lahn-Dill-Kreis	Hesse
DI	02.01.2013	Landkreis Darmstadt-Dieburg	Hesse
ROF	01.08.2013	Landkreis Hersfeld-Rotenburg	Hesse
HOG	02.01.2013	Landkreis Kassel	Hesse
WOH	02.01.2013	Landkreis Kassel	Hesse
WEL	02.01.2013	Landkreis Limburg-Weilburg	Hesse
BID	02.01.2013	Landkreis Marburg-Biedenkopf	Hesse
FKB	04.11.2013	Landkreis Waldeck-Frankenberg	Hesse
WA	04.11.2013	Landkreis Waldeck-Frankenberg	Hesse
HU	15.06.2016	Main-Kinzig-Kreis	Hesse
GN	02.01.2013	Main-Kinzig-Kreis	Hesse
SLÜ	02.01.2013	Main-Kinzig-Kreis	Hesse
SWA	15.08.2013	Rheingau-Taunus-Kreis	Hesse
FZ	16.03.2015	Schwalm-Eder-Kreis	Hesse
MEG	16.03.2015	Schwalm-Eder-Kreis	Hesse
ZIG	16.03.2015	Schwalm-Eder-Kreis	Hesse
WIZ	16.09.2013	Werra-Meißner-Kreis	Hesse
BÜD	02.01.2013	Wetteraukreis	Hesse

Table A.1 – *Continued*

HGN	01.08.2013	Landkreis Ludwigslust-Parchim	Mecklenburg-West Pomerania
LBZ	01.08.2013	Landkreis Ludwigslust-Parchim	Mecklenburg-West Pomerania
LWL	01.08.2013	Landkreis Ludwigslust-Parchim	Mecklenburg-West Pomerania
PCH	01.08.2013	Landkreis Ludwigslust-Parchim	Mecklenburg-West Pomerania
STB	01.08.2013	Landkreis Ludwigslust-Parchim	Mecklenburg-West Pomerania
AT	18.03.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
DM	22.07.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
MC	18.03.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
MST	22.07.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
MÜR	22.07.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
NZ	18.03.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
RM	18.03.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
WRN	18.03.2013	Landkreis Mecklenburgische Seenplatte	Mecklenburg-West Pomerania
GDB	02.04.2013	Landkreis Nordwestmecklenburg	Mecklenburg-West Pomerania
GVM	02.04.2013	Landkreis Nordwestmecklenburg	Mecklenburg-West Pomerania
WIS	02.04.2013	Landkreis Nordwestmecklenburg	Mecklenburg-West Pomerania
BÜZ	18.03.2013	Landkreis Rostock	Mecklenburg-West Pomerania
DBR	18.03.2013	Landkreis Rostock	Mecklenburg-West Pomerania
GÜ	18.03.2013	Landkreis Rostock	Mecklenburg-West Pomerania
ROS	18.03.2013	Landkreis Rostock	Mecklenburg-West Pomerania
TET	18.03.2013	Landkreis Rostock	Mecklenburg-West Pomerania
ANK	14.03.2013	Landkreis Vorpommern-Greifswald	Mecklenburg-West Pomerania
GW	14.03.2013	Landkreis Vorpommern-Greifswald	Mecklenburg-West Pomerania
PW	14.03.2013	Landkreis Vorpommern-Greifswald	Mecklenburg-West Pomerania
SBG	10.07.2013	Landkreis Vorpommern-Greifswald	Mecklenburg-West Pomerania
UEM	14.03.2013	Landkreis Vorpommern-Greifswald	Mecklenburg-West Pomerania
WLG	14.03.2013	Landkreis Vorpommern-Greifswald	Mecklenburg-West Pomerania
GMN	15.03.2013	Landkreis Vorpommern-Rügen	Mecklenburg-West Pomerania

Table A.1 – *Continued*

NVP	15.03.2013	Landkreis Vorpommern-Rügen	Mecklenburg-West Pomerania
RDG	15.03.2013	Landkreis Vorpommern-Rügen	Mecklenburg-West Pomerania
RÜG	15.03.2013	Landkreis Vorpommern-Rügen	Mecklenburg-West Pomerania
NOR	15.11.2012	Landkreis Aurich	Lower Saxony
SY	23.04.2018	Landkreis Diepholz	Lower Saxony
BRL	15.11.2012	Landkreis Goslar	Lower Saxony
CLZ	15.11.2012	Landkreis Goslar	Lower Saxony
DUD	15.11.2012	Landkreis Göttingen	Lower Saxony
HMÜ	15.11.2012	Landkreis Göttingen	Lower Saxony
OHA	01.11.2016	Landkreis Göttingen	Lower Saxony
ALF	15.11.2012	Landkreis Hildesheim	Lower Saxony
EIN	15.11.2012	Landkreis Northeim	Lower Saxony
GAN	15.11.2012	Landkreis Northeim	Lower Saxony
BSB	11.06.2018	Landkreis Osnabrück	Lower Saxony
MEL	11.06.2018	Landkreis Osnabrück	Lower Saxony
WTL	11.06.2018	Landkreis Osnabrück	Lower Saxony
BRV	15.11.2012	Landkreis Rotenburg (Wümme)	Lower Saxony
RI	15.11.2012	Landkreis Schaumburg	Lower Saxony
WAT	14.11.2012	Bochum	North Rhine-Westphalia
WIT	14.11.2012	Ennepe-Ruhr-Kreis	North Rhine-Westphalia
WAN	12.12.2012	Herne	North Rhine-Westphalia
AH	01.02.2013	Kreis Borken	North Rhine-Westphalia
BOH	01.02.2013	Kreis Borken	North Rhine-Westphalia
LH	16.05.2014	Kreis Coesfeld	North Rhine-Westphalia
JÜL	17.11.2012	Kreis Düren	North Rhine-Westphalia
MON	15.07.2015	Kreis Düren	North Rhine-Westphalia
SLE	15.07.2015	Kreis Düren	North Rhine-Westphalia
SLE	20.02.2013	Kreis Euskirchen	North Rhine-Westphalia

Table A.1 – *Continued*

ERK	02.09.2013	Kreis Heinsberg	North Rhine-Westphalia
GK	02.09.2013	Kreis Heinsberg	North Rhine-Westphalia
GEL	10.06.2014	Kreis Kleve	North Rhine-Westphalia
BÜR	24.11.2014	Kreis Paderborn	North Rhine-Westphalia
CAS	13.11.2012	Kreis Recklinghausen	North Rhine-Westphalia
GLA	13.11.2012	Kreis Recklinghausen	North Rhine-Westphalia
BLB	13.11.2012	Kreis Siegen-Wittgenstein	North Rhine-Westphalia
LP	03.12.2012	Kreis Soest	North Rhine-Westphalia
BF	03.07.2013	Kreis Steinfurt	North Rhine-Westphalia
TE	03.07.2013	Kreis Steinfurt	North Rhine-Westphalia
LH	01.09.2015	Kreis Unna	North Rhine-Westphalia
LÜN	24.11.2012	Kreis Unna	North Rhine-Westphalia
KK	02.03.2015	Kreis Viersen	North Rhine-Westphalia
BE	22.04.2014	Kreis Warendorf	North Rhine-Westphalia
DIN	03.12.2012	Kreis Wesel	North Rhine-Westphalia
MO	03.12.2012	Kreis Wesel	North Rhine-Westphalia
OP	03.08.2015	Leverkusen	North Rhine-Westphalia
GV	19.08.2015	Rhein-Kreis Neuss	North Rhine-Westphalia
MON	02.07.2013	Städteregion Aachen	North Rhine-Westphalia
ROK	15.07.2013	Donnersbergkreis	Rhineland-Palatinate
PRÜ	14.11.2012	Eifelkreis Bitburg-Prüm	Rhineland-Palatinate
BKS	26.11.2012	Landkreis Bernkastel-Wittlich	Rhineland-Palatinate
ZEL	15.11.2012	Landkreis Cochem-Zell	Rhineland-Palatinate
BIN	15.11.2012	Landkreis Mainz-Bingen	Rhineland-Palatinate
MY	06.05.2013	Landkreis Mayen-Koblenz	Rhineland-Palatinate
ZW	02.02.2015	Landkreis Südwestpfalz	Rhineland-Palatinate
SAB	19.11.2012	Landkreis Trier-Saarburg	Rhineland-Palatinate
GOA	15.11.2012	Rhein-Hunsrück-Kreis	Rhineland-Palatinate

Table A.1 – *Continued*

DIZ	08.07.2013	Rhein-Lahn-Kreis	Rhineland-Palatinate
GOH	08.07.2013	Rhein-Lahn-Kreis	Rhineland-Palatinate
ANA	09.11.2012	Erzgebirgskreis	Saxony
ASZ	09.11.2012	Erzgebirgskreis	Saxony
AU	09.11.2012	Erzgebirgskreis	Saxony
MAB	09.11.2012	Erzgebirgskreis	Saxony
MEK	09.11.2012	Erzgebirgskreis	Saxony
STL	09.11.2012	Erzgebirgskreis	Saxony
SZB	09.11.2012	Erzgebirgskreis	Saxony
ZP	09.11.2012	Erzgebirgskreis	Saxony
BIW	09.11.2012	Landkreis Bautzen	Saxony
HY	09.11.2012	Landkreis Bautzen	Saxony
KM	09.11.2012	Landkreis Bautzen	Saxony
LÖB	09.11.2012	Landkreis Görlitz	Saxony
NOL	09.11.2012	Landkreis Görlitz	Saxony
NY	09.11.2012	Landkreis Görlitz	Saxony
WSW	09.11.2012	Landkreis Görlitz	Saxony
ZI	09.11.2012	Landkreis Görlitz	Saxony
BNA	09.11.2012	Landkreis Leipzig	Saxony
GHA	09.11.2012	Landkreis Leipzig	Saxony
GRM	09.11.2012	Landkreis Leipzig	Saxony
MTL	09.11.2012	Landkreis Leipzig	Saxony
WUR	09.11.2012	Landkreis Leipzig	Saxony
GRH	09.11.2012	Landkreis Meißen	Saxony
RG	09.11.2012	Landkreis Meißen	Saxony
RIE	09.11.2012	Landkreis Meißen	Saxony
BED	09.11.2012	Landkreis Mittelsachsen	Saxony
DL	09.11.2012	Landkreis Mittelsachsen	Saxony

Table A.1 – *Continued*

FLÖ	09.11.2012	Landkreis Mittelsachsen	Saxony
HC	09.11.2012	Landkreis Mittelsachsen	Saxony
MW	09.11.2012	Landkreis Mittelsachsen	Saxony
RL	09.11.2012	Landkreis Mittelsachsen	Saxony
DZ	09.11.2012	Landkreis Nordsachsen	Saxony
EB	09.11.2012	Landkreis Nordsachsen	Saxony
OZ	09.11.2012	Landkreis Nordsachsen	Saxony
TG	09.11.2012	Landkreis Nordsachsen	Saxony
TO	09.11.2012	Landkreis Nordsachsen	Saxony
DW	12.11.2012	Landkreis Sächsische Schweiz-Osterzgebirge	Saxony
FTL	12.11.2012	Landkreis Sächsische Schweiz-Osterzgebirge	Saxony
SEB	12.11.2012	Landkreis Sächsische Schweiz-Osterzgebirge	Saxony
GC	09.11.2012	Landkreis Zwickau	Saxony
HOT	09.11.2012	Landkreis Zwickau	Saxony
WDA	09.11.2012	Landkreis Zwickau	Saxony
AE	09.11.2012	Vogtlandkreis	Saxony
OVL	09.11.2012	Vogtlandkreis	Saxony
PL	09.11.2012	Vogtlandkreis	Saxony
RC	09.11.2012	Vogtlandkreis	Saxony
GA	27.11.2012	Altmarkkreis Salzwedel	Saxony-Anhalt
KLZ	27.11.2012	Altmarkkreis Salzwedel	Saxony-Anhalt
HHM	27.11.2012	Burgenlandkreis	Saxony-Anhalt
NEB	27.11.2012	Burgenlandkreis	Saxony-Anhalt
NMB	27.11.2012	Burgenlandkreis	Saxony-Anhalt
WSF	27.11.2012	Burgenlandkreis	Saxony-Anhalt
ZZ	27.11.2012	Burgenlandkreis	Saxony-Anhalt
RSL	27.11.2012	Dessau-Roßlau	Saxony-Anhalt
AZE	27.11.2012	Landkreis Anhalt-Bitterfeld	Saxony-Anhalt

Table A.1 – *Continued*

BTF	27.11.2012	Landkreis Anhalt-Bitterfeld	Saxony-Anhalt
KÖT	27.11.2012	Landkreis Anhalt-Bitterfeld	Saxony-Anhalt
ZE	27.11.2012	Landkreis Anhalt-Bitterfeld	Saxony-Anhalt
BÖ	27.11.2012	Landkreis Börde	Saxony-Anhalt
HDL	27.11.2012	Landkreis Börde	Saxony-Anhalt
OC	27.11.2012	Landkreis Börde	Saxony-Anhalt
OK	27.11.2012	Landkreis Börde	Saxony-Anhalt
WMS	27.11.2012	Landkreis Börde	Saxony-Anhalt
WZL	27.11.2012	Landkreis Börde	Saxony-Anhalt
HBS	27.11.2012	Landkreis Harz	Saxony-Anhalt
QLB	27.11.2012	Landkreis Harz	Saxony-Anhalt
WR	27.11.2012	Landkreis Harz	Saxony-Anhalt
BRG	27.11.2012	Landkreis Jerichower Land	Saxony-Anhalt
GNT	27.11.2012	Landkreis Jerichower Land	Saxony-Anhalt
EIL	27.11.2012	Landkreis Mansfeld-Südharz	Saxony-Anhalt
HET	27.11.2012	Landkreis Mansfeld-Südharz	Saxony-Anhalt
ML	27.11.2012	Landkreis Mansfeld-Südharz	Saxony-Anhalt
SGH	27.11.2012	Landkreis Mansfeld-Südharz	Saxony-Anhalt
HV	27.11.2012	Landkreis Stendal	Saxony-Anhalt
OBG	27.11.2012	Landkreis Stendal	Saxony-Anhalt
GHC	27.11.2012	Landkreis Wittenberg	Saxony-Anhalt
JE	27.11.2012	Landkreis Wittenberg	Saxony-Anhalt
MER	27.11.2012	Saalekreis	Saxony-Anhalt
MQ	27.11.2012	Saalekreis	Saxony-Anhalt
QFT	27.11.2012	Saalekreis	Saxony-Anhalt
ASL	27.11.2012	Salzlandkreis	Saxony-Anhalt
BBG	27.11.2012	Salzlandkreis	Saxony-Anhalt
SBK	27.11.2012	Salzlandkreis	Saxony-Anhalt

Table A.1 – *Continued*

SFT	27.11.2012	Salzlandkreis	Saxony-Anhalt
MED	20.04.2015	Kreis Dithmarschen	Schleswig-Holstein
ECK	15.11.2012	Kreis Rendsburg-Eckernförde	Schleswig-Holstein
ARN	29.11.2012	Ilm-Kreis	Thuringia
IL	29.11.2012	Ilm-Kreis	Thuringia
ART	29.11.2012	Kyffhäuserkreis	Thuringia
SDH	29.11.2012	Kyffhäuserkreis	Thuringia
SLN	29.11.2012	Landkreis Altenburger Land	Thuringia
HIG	29.11.2012	Landkreis Eichsfeld	Thuringia
WBS	29.11.2012	Landkreis Eichsfeld	Thuringia
ZR	29.11.2012	Landkreis Greiz	Thuringia
RU	29.11.2012	Landkreis Saalfeld-Rudolstadt	Thuringia
MGN	29.11.2012	Landkreis Schmalkalden-Meiningen	Thuringia
NH	29.11.2012	Landkreis Sonneberg	Thuringia
APD	29.11.2012	Landkreis Weimarer Land	Thuringia
EIS	29.11.2012	Saale-Holzland-Kreis	Thuringia
SRO	29.11.2012	Saale-Holzland-Kreis	Thuringia
LBS	29.11.2012	Saale-Orla-Kreis	Thuringia
PN	29.11.2012	Saale-Orla-Kreis	Thuringia
SCZ	29.11.2012	Saale-Orla-Kreis	Thuringia
LSZ	29.11.2012	Unstrut-Hainich-Kreis	Thuringia
MHL	29.11.2012	Unstrut-Hainich-Kreis	Thuringia
SLZ	29.11.2012	Wartburgkreis	Thuringia

A.2 Comparison of the License-plate based Measure with Survey Questions on Regional Identity

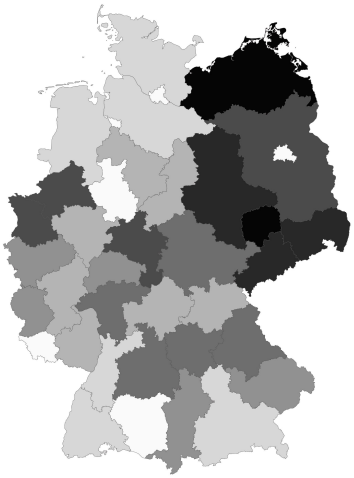
We compare our license plate-based measure of regional identity with standard survey questions from two established and widely cited survey data sets, the longitudinal (1981–2008) data file of the European Values Survey (EVS) (EVS 2020) and the most recent (2021) European Quality of Government Index Survey Data Set (EQI) (Charron et al. 2022). Both surveys would allow one to calculate a regional identity measure on NUTS-3 level (counties), however, the sample size within NUTS-3 regions is too low to allow for meaningful statistical analyses. For example, in the EVS, on average 13 people per NUTS-3 region were asked and in more than 50 % of the regions 11 or less people participated in the survey. Therefore, we aggregate the individual answers at the level of the 38 German NUTS-2 regions. From the EVS, we calculate the regional identity variable as follows: We start by considering the individual answers to the questions G001 ("Which of these geographical groups would you say you belong to first of all?") and G002 ("Which of these geographical groups would you say you belong to second of all?") which both can be answered with 1 ='Locality or town where you live', 2 ='Region or country where you live', 3'='Country as a whole', 4 = 'Europe' and 5 = 'The world as a whole'. We then define two intermediate variables, reprio_1 and reprio_2, where reprio_1=1 iff GOO1=2, otherwise 0, and reprio_2=1 iff G001=1, otherwise 0. From these, we construct our individual-level regional identity measure rescore which is defined as rescore=reprio_1+reprio_2 (and is missing if either G001 or G002 is missing). We then take the average of the rescore variable over a NUTS-2 region and all survey waves to arrive at our final NUTS-2 level regional identity measure. From the EQI survey, we take the variable q23_2 reporting the answers to the question "People might feel different levels of attachment to where they live and to Europe, on a scale of 1-10 with '1' being 'not at all' and '10' being 'very attached' how closely attached do you feel about your region in (COUNTRY)". We average the individual answers over a NUTS-2 region to obtain our final regional identity variable from this survey.

Figure A.6 visualizes the spatial patterns of regional identity according to both surveys (Panels (a) and (b)) and the share of vehicles with reintroduced UZs (averaged over NUTS-2 regions) in Panel (c). As discussed in the main text, similar patterns are visible in all three maps. There are, however, more visible similarities between the EVS measure and the license plate variable than between the license plate variable and the measure derived

from the EQI survey. It also becomes clear that there are significant differences between the EVS and the EQI measures. These differences are likely a result of the different scale and wording of the questions, a different pool of participants and survey period.

(a) EQI Survey

(b) EVS



(c) ln(% Vehicles with Reintroduced UZs)

Note: The graphic shows the borders of the 38 German NUTS-2 regions. The darker the shades, the higher the regional identity of the people. Regions in white are ones with missing data

Figure A.6: Comparison of Regional Identity Measures

A.3 Maps Used for the Calculation of the "Ruler Death without Heir" Variable

A.3.1 Maps of the Territories of the HRE by Wolff (1877)

The area of a state ("reichsunmittelbares Territorium") is calculated based on shapefiles created from maps of the non-Italian parts of the Holy Roman Empire printed in Wolff

(1877). One of those maps, "Deutschland beim Tode Karl des IV. im Jahre 1378" ("Germany at the death of Charles IV. in the year 1378") is shown below in Figure A.7. Note that this map incorrectly includes the state of the Teutonic Order, so when digitizing the map we excluded this area.[31] To cross-validate the map of we consulted several other historical atlases, including those of Darby and Fullard (1978), Stier et al. (1956), and Andree (1886), or Baldamus, Schwabe, and Koch (1914).

Note: This figure shows the original map of the HRE as printed in Wolff (1877). For our empirical analysis we digitized this map using GIS software.

Figure A.7: Germany at the Death of Charles IV. in the Year 1378 according to Wolff (1877)

A.3.2 Frequency and Type of Territories in the HRE

Overall, we identified 730 independent states, including 81 city states, 89 ecclesiastical territories (bishoprics, archbishoprics and monastic states), and 560 secular territorial states. The latter group consists of two kingdoms, Bohemia and Prussia, 48 duchies,

[31] The maps are available here: `http://gei-digital.gei.de/viewer/javax.faces.resource/pdf-icon32.png.xhtml?ln=images/` (accessed on January 22, 2016).

80 principalities[32], 16 republics (all of them in today's Switzerland), 217 counties[33] and 180 "Herrschaften" (territories ruled by "Freiherren" (barons)). Furthermore, there were seven Imperial territories (directly controlled by the Emperor), among them were six "Landvogteien" (Grand Bailiffs) and one territory, the Staufian lands, controlled by the Staufian Emperors during the 11th to 13th century. There are also four territories that were occupied by the Swedes after the Thirty Years' War. Finally, there are nine electorates (among them three archbishoprics already counted above), which are considered to be the most powerful states of the HRE and are treated as an own category.[34]

A.3.3 Historical Background to the Sampling Years

1. 1250 was the year of the death of Frederick II., the last Emperor of the Staufer dynasty. The Staufer dynasty had ruled the Empire as kings and emperors for more than 110 years. The whole dynasty (and with them central power) collapsed soon after, in 1254, when his sole male heir Konrad IV., who was King of Germany but never Emperor, died. Following the collapse of the Staufer dynasty, a 20 year period called the "Great Interregnum" began, in which there was no elected Emperor, but four elected kings. The kings were not universally accepted by the powerful princes, and so did not rule the Empire. In this period, known as an age of insecurity, violence, and anarchy, many of the numerous city state (free and imperial cities) emerged and

[32]Apart from principalities, we also classify the following states into this category: Nine "Landgrafschaften" (landgraviates), 17 "Markgrafschaften" (margraviates) and two Princely counties (the Princely county of Burgundy and the Princely County of Tyrol). The reason for this is that the rulers of those states (the margrave, the landgrave etc.) were considered to have the same rank as princes (although their names refer to their origins as counties).

[33]The 217 counties subsume the following territories with "county" in the name: Four "Pfalzgrafschaften" (county palatinates). In general, the rulers of those territories (the palatinates) were considered to be of a higher rank than ordinary counts (in the case of a "Pfalzgraf" (Palatinate)). One of these county palatinates, the "Pfalzgrafschaft bei Rhein" (County Palatinate of the Rhine) had the status of an electorate from the middle of the 13th century (and was thereafter called "Kurfürstentum Pfalz" (Electorate of the Palatinate)). Thus, it still was called a county palatinate but actually was one of the most influential and powerful states within the Empire. Then, there are also six burgraviates and 207 ordinary "counties". It is important to note that counties were fairly heterogeneous regarding their size, and political importance. The county of Württemberg, for example, for a long time the largest county of the Empire (before it became a duchy in 1495), was larger than some of the principalities or duchies of the time and also had higher tax revenues than some of those higher-ranked territories. Hence, one should not assume counties to be less important or smaller than duchies or principalities.

[34]The official title of those states differed. Some of them were called "Kurfürstentümer" (electoral principalities) some are margraviates or county palatinates and the Habsburg monarchy called itself "Archduchy of Austria".

political fragmentation increased further.[35]

2. 1378 was the year Emperor Charles IV died. This year marks the peak of the political fragmentation of the Empirea situation that was made permanent by the Golden Bull of 1356. Furthermore, while considered by some as one of the greatest and most influential medieval German Emperors, he failed to preserve the powerful position of his dynasty, the Luxembourgians, as he pledged away a lot of the territories under his control, in order to pay his large debts. This further weakened central authority and helped to increase the political fragmentation of the Empire.

3. 1477 was the year in which Charles the Bold, Duke of Burgundy died. With his death, the Duchy of Burgundy, one of the largest states in Europe, which could be considered an independent, middle-sized power (although de jure part of the HRE), collapsed and was split after violent hostilities. Some parts of the Duchy fell to France and the remainder was integrated into the HRE as smaller political entities (like the Duchy of Brabant). Furthermore, through marriage, the Habsburgs gained control over the remaining parts of Burgundy. Thus, the death of Charles the Bold was the decisive event in the ascent of the House of Habsburg to world power. A period with slowly declining political fragmentation began.

4. 1556, the year after the peace of Augsburg settled the confessional division of Germany for the next decades and ended the first wave of religious wars in the Holy Roman Empire. However, it also was the year when Charles V, probably the most powerful European monarch after the fall of Rome, abdicated from the throne due to his setback against the protestant princes and his lack of loyal vassals within the Empire. His reign marked the peak and turning point of the power of the House of Habsburg as his resignation from the throne and its defeat by the princes of the Empire commenced the slow decline of the Habsburg's power.

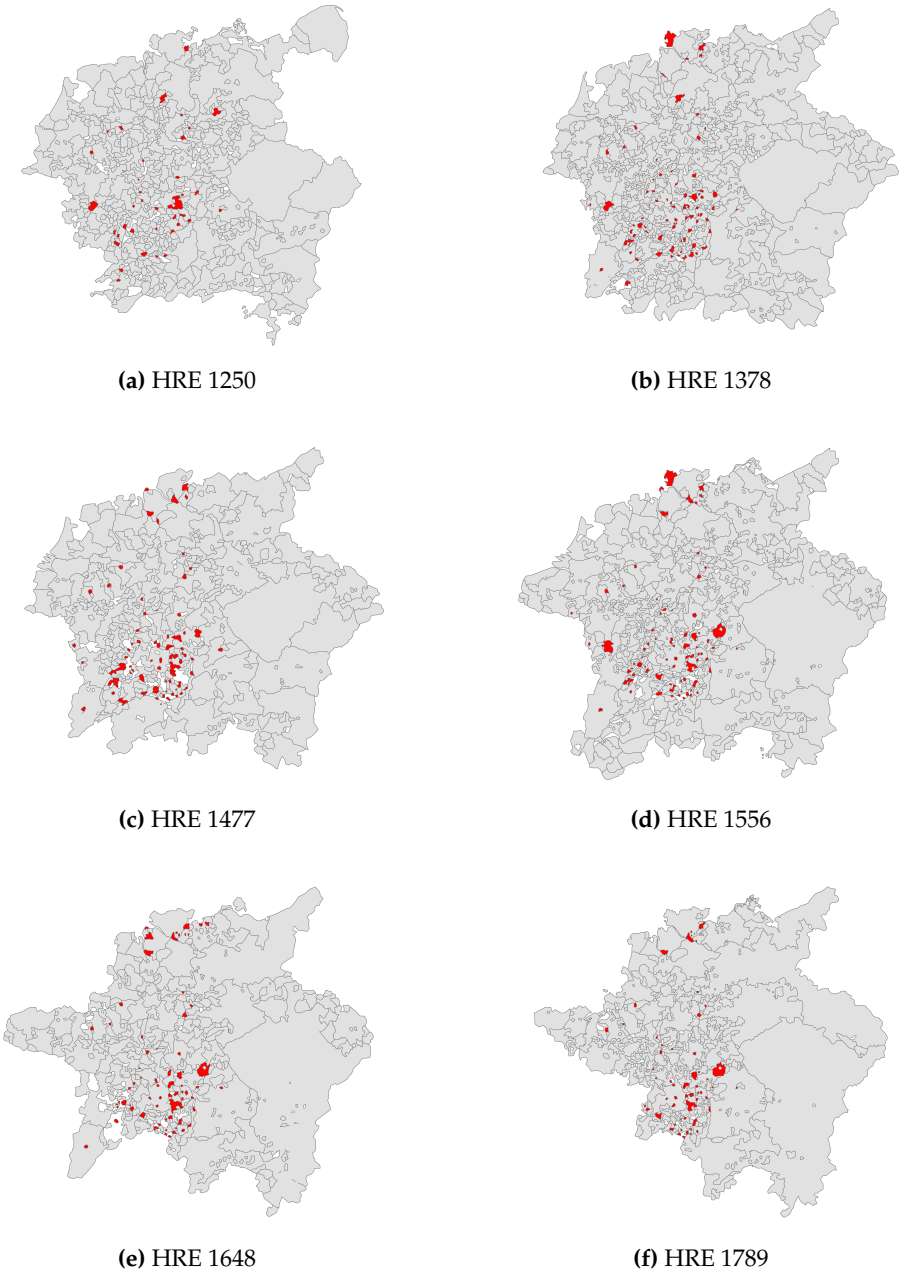
5. 1648, the year the Thirty Years War ended, with the Peace Treaties of Westphalia. This lead to notable territorial changes, as some large and powerful states like Branden-

[35] Political fragmentation in the 13th century was already much higher than during the 12th century. This was due to the fact that, as a consequence of the struggle between Henry the Lion, Duke of Saxony and Emperor Frederick I., the old and quite large stem duchies ("Stammesherzogtümer") were dissolved and partitioned into smaller (and even further divisible) territories. This should have weakened the position of dukes and princes towards the Emperor and hence strengthen central power, but in the long-run, had the opposite effect.

burg and Hesse integrated smaller territories into their states. Furthermore, several imperial cities disappeared, becoming part of France or of Switzerland (whose independence was officially acknowledged). Finally, it settled the confessional question within the Empire.

6. 1789, the year when the French Revolution began and triggered a series of events and wars, resulting in the demise of the HRE and the most significant reshaping of the landscape of states in Central Europe since the dissolution of the stem duchies in the 12^{th} century.

A.3.4 States in the Holy Roman Empire 1250–1789



(a) HRE 1250 **(b)** HRE 1378

(c) HRE 1477 **(d)** HRE 1556

(e) HRE 1648 **(f)** HRE 1789

Figure A.8: The Holy Roman Empire and its territorial states (gray) and city states (red) at our sampling years

A.3.5 Coding Challenges and Discussion of Difficult Cases

Typical difficulties in the coding of the data originate from errors as to name, type of state or omission of an existing state. Such problems mostly arose in the case of small

states on which information is limited even today (typically some "Herrschaften", states ruled by a baron or an imperial knight), when there were several territories with the same name (e.g. "Limburg") or for a few of Imperial cities in the Alsac-Lorrain region which Wolff forgot.[36] However, we were able to resolve almost all of these issues, sometimes by consulting additional sources such as books by local historians.

Another difficulty was determining the start and end point of a states' independence. The latte was problematic, when, for example, a states was split up between the sons of a ruler and three family lines ruled over three different parts of the former territory. Here, Wolff not always correctly recorded the division of the state, which we resolved. Sometimes, after a ruling dynasty died out due to a lack of a male heir (or after a war about its heritage) a territory was partitioned between several other rulers. In this case, we decided whether to assign the territory to the state that had the majority of rights or whether it remained an independent state (when there was no clearly dominant party).

This was the case, for example, for the county of Sponheimwhich consisted at the beginning of the 14th century, of two separated territories, the "Vordere" and "Hintere" Grafschaft of Sponhein. When the dynasty ruling the "Vordere Grafschaft" (the front county) died out, one fifth of the County went to the Electoral Palatinate and four fifth to the Count controlling the "Hintere Grafschaft" (the back county). After 1437, the Margrave of Baden and the Count of Veldenz inherited both parts of the County. Both rulers decided not to split the County but to rule it together as a condominium. Another change occurred in 1559, when the Princedom of Pfalz-Simmern (who had inherited the part of the County of Veldenz) bought the Electoral Palatinate's shares in the "Vordere Grafschaft". Simultaneously, it decided to give away the half of the "Hintere Grafschaft" to the Duchy of Pfalz-Zweibrücken. This resulted in the following situation: the "Vordere Grafschaft" belonged three fifths to Pfalz-Simmern (since 1559 Electoral Palatinate) and two fiftha to Baden. The "Hintere Grafschaft" belonged half to Baden and half to Zweibrücken. Finally, in 1707, the Margraviate of Baden-Baden and Electoral Palatinate split up the "Vordere Grafschaft" and in 1776, the "Hintere Grafschaft" was split in half by the Margrave of

[36] Another case was that of the Imperial city of Friedberg and the burgraviate of Friedberg, located around a castle next to the city. The latter was a very small county around the castle of Friedberg that was involved in various conflicts with the nearby Imperial city. Wolff does not include both territories before the 1789 map, where he drew a territory called Friedberg and marked it as an Imperial city. We split this territory between the Imperial city and the burgraviate from 1250 to 1378. In 1477 the Imperial city lost its independence (it was under the control of the burgraviate then for most of the time) and thus, we assigned the whole territory to the burgraviate in the later maps—the burgraviate existed until 1806.

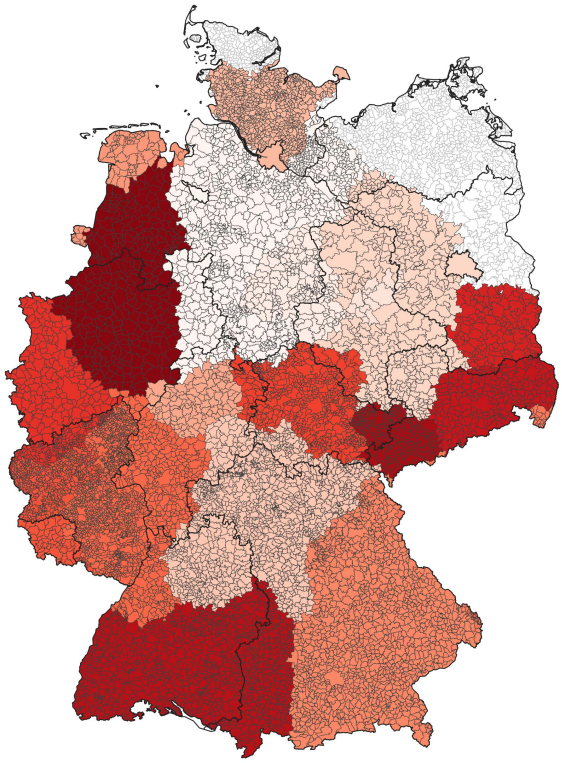
Baden and the duke of Pfalz-Zweibrücken. After 1815 the territory was integrated into Prussia and disappeared. In 1477 and 1555, i.e. during the condominium, we decided to consider the whole territory as county of Sponheim. Wolff, in his 1556 map has assigned the four separate territories of the county to either Pfalz-Simmern or Baden-Baden, Pfalz-Zweibrücken and the Electoral Palatinate. One cannot be sure whether he has assigned it to Pfalz-Simmern or Baden-Baden as both have the same color. In addition, this does not reflect the actual situation in 1556 (according to our sources), rather this is the situation in 1559 (when one assumes that he has assigned the "Vordere Grafschaft" to Baden and not to Pfalz-Simmern). For 1648 and 1789 we follow Wolff, who no longer included the county of Sponheim but assigned its territory to Pfalz-Zweibrücken, Electoral Palatinate and Baden-Baden (or Baden, respectively).

A lack of clarity about when a territory ceased to be an independent state typically arose also because Wolff (and other historians) followed a tradition of drawing important states (like e.g., the duchy of Berg) as independent ("reichsunmittelbare") states even when they were de facto ruled by other nobles, as was the case for the united duchy of Kleve-Jülich-Berg which was split up again after armed hostilities over the different parts, with one part (the duchy of Kleve and the counties of Mark and Ravensberg) falling in the hands of the margrave of Brandenburg and another part (the duchies of Berg and Jülich) coming under the control of the duchy of Pfalz-Neuburg. In these cases we diverge from the map and make these territories part of Brandenburg or Pfalz-Neuburg, respectively.

Finally, city states are often among those territories for which it was not absolutely clear what degree of independence they had, regardless of their de jure status. It is well known that some cities had gained certain independence from their rulers, while never being officially considered as imperial cities. By the same measure, there were imperial cities that were never truly independent of their former ruler although they were granted "Reichsunmittelbarkeit" by the Emperor. We consulted standard sources on the history of German cities such as Köbler (1988) or Keyser and Stoob (1939–1974) and other studies on imperial cities, including Cantoni (2012) and followed their judgment about whether a city was de facto, and not just de jure, an imperial city. This is also an issue for several territories that were ruled by the Emperor or another high-ranked noble (like an elector) but where never part of their core territory. Two of these territories were the magraviates of Ober- and Niederlausitz (Upper and Lower Lusatia). Hence, some historians argue that the power of those rulers over the territory was limited if non-existent. Therefore, we

decided to treat the Lausitz territories as independent states.

A.3.6 Map of 1150 States of the HRE and Municipalities



Note: This figure shows the borders of contemporary German municipalities and federal states (the bold black lines). The different red colors in which the municipalities are faded indicate to which state of the HRE in 1150 a municipality belongs. The white color municipalities are those outside of the HRE in 1150 borders and are thus not part of the sample in the regression using 1150 states dummies. The borders of the states of the HRE in 1150 are drawn according to a map printed in Wolff (1877)

Figure A.9: Assignment of German Municipalities to the States of the HRE in 1150 and Federal States

A.4 Descriptive Overview of the Data Sets

Table A.2: Descriptive Overview of the "Matrix Data Set"

Variable	Obs	Mean	Std. dev.	Min	Max
Distance to Start-Up	2,442,880	400.343	228.700	0.000	3148.671
Distance to Start-Up < 100km	2,442,880	0.097	0.296	0.000	1.000
Facebook Social Connectedness Index	1,348,479	35644.060	128153.500	1818.000	2410000.000
Income p.c. Quantile of Start-Up Location	1,381,060	3.014	1.169	1.000	5.000
Investment=1	2,442,880	0.002	0.049	0.000	1.000
Investor and Start-Up Location in Same Income Group	2,442,880	0.303	0.460	0.000	1.000
ln(Population of Start-Up Location)	1,381,754	11.864	1.831	6.136	14.118
Migration Balance p.c. of Start-Up Location	1,313,742	0.136	0.181	-0.343	1.350
Share Industry Buildings of Start-Up Location	1,381,754	0.035	0.022	0.000	0.161
Start-Up in Same Municipality	2,442,880	0.043	0.202	0.000	1.000
Technical University at Investor and Start-Up Location	2,442,880	0.339	0.473	0.000	1.000
Technical University at Start-Up Location	1,964,714	0.464	0.499	0.000	1.000
Technical University of Applied Science at Start-Up Location	1,964,714	0.383	0.486	0.000	1.000
University at Investor and Start-Up Location	2,442,880	0.392	0.488	0.000	1.000
University at Start-Up Location	1,964,714	0.681	0.466	0.000	1.000
University of Applied Science at Start-Up and Investor Location	2,442,880	0.400	0.490	0.000	1.000
University of Applied Science at Start-Up Location	1,964,714	0.694	0.461	0.000	1.000

Table A.3: Descriptive Overview of the Municipality Level Data Set

Variable	Obs	Mean	Std. dev.	Min	Max
% Altkreis License Plates	11,264	11.157	20.992	0.000	98.977
% Investments within 100km	11,264	0.367	5.270	0	100
% Investments within 30km	11,264	0.002	0.040	0.000	1.000
% Investments within 50km	11,264	0.003	0.043	0.000	1.000
% Investments within 20km	11,264	0.002	0.038	0.000	1.000
% Locally Active Funds	11,264	0.001	0.019	0.000	1.000
% Population over 65	10,998	0 .196	0.037	0 .000	0.45
Altkreis Border	11,264	0.153	0.360	0 .000	1.000
Black Death Mortality	11,264	33.130	4.188	7.677	56.020
Boundary of HRE	11,264	0.068	0.253	0.000	1.000
Distance to German Border (km)	11,264	64.684	49.811	0.012	209.949
Elevation	11,263	280.300	215.400	0.015	1435.000
East Germany	11,264	0.236	0.425	0	1
Gemeindefrei	11,264	0.0482	0.214	0.000	1.000
Historical Battles	11,264	0.006	0.075	0.000	1.000
Historical Political Fragmentation	11,264	1.417	0.569	0.000	5.667
Historical Political Instability	11,263	4.491	1.365	0.000	8.000
Kreisfrei	11,264	0 .009	0.097	0.000	1.000
Latitude	11,264	5635.959	215.752	5246.913	6097.555
Latitude×Longitude	11,264	3190614	840499.5	1607068	5226483
ln(% Altkreis License Plates)	11,264	1.258	1.520	0.000	4.605
ln(Business Taxes p.c.)	9,978	-2.013	1.090	-6.851	5.079
ln(Income p.c.)	10,115	0.699	0.403	-1.269	2.994
ln(% Investments in Same Altkreis)	11,264	0.0113	0.195	0.000	4.615
ln(% Investments within 100km)	11,264	.025	0.312	0.000	4.615
ln(% Investments within 20km)	11,264	0.017	0.251	0.000	4.615
ln(% Investments within 30km)	11,264	0.019	0.261	0.000	4.615
ln(% Investments within 50km)	11,264	0.021	0.276	0.000	4.615
ln(Historical Political Instability)	11,263	1.659	0.338	0.000	2.197
ln(Historical Political Instability Pre 1871)	11,263	1.593	0.334	0.000	1.946
ln(Population)	10,202	7.594	1.528	2.079	14.118
ln(Votes FDP)	10,168	0.095	0.028	0.000	0.383
ln(Unemployment Rate)	10,173	0.0444	0.0247	0.0000	0.1923
ln(Weighted Historical Political Instability)	11,263	0.015	0.005	0.000	0.033
Location on Historical Trade Route	11,264	0.320	1.681	0.000	40.320
Longitude	11,264	565.241	144.079	284.1033	917.626
Neolithic Settlement Area	11,264	0.374	3.390	0.000	123.000
No. of Abolished Counties	11,264	1.37	1.792	0	8
Other Personal Connection of VC Manager	11,264	0.001	0.024	0.000	1.000
Roman	11,264	0.568	2.232	0.000	44.810
Ruler Deaths Without Heir (Weighted)	11,263	0.001	0.002	0.000	0.009
Start-Ups within 100km	11,264	2.997	33.917	0	709
Technical University	11,264	0.001	0.037	0.000	1.000
Terrain Ruggedness	11,263	4.324	3.858	0.000	36.060
UZ Reintroduced	11,264	0.678	0.467	0.000	1.000
VC Manager Studied at Start-Up Location	11,264	0.001	0.024	0.000	1.000

A.5 Control Variables

Black Death Mortality. The variable provides an estimate for the Black Death mortality rate of each municipality. It is based on the city-level mortality rates calculated by Christakos et al. (2005). Data for all municipalities is obtained by interpolatiing the values for all of them from the existing city-level mortality rates using the inverse distance weighted (IDW) interpolation tool in QGIS.

Boundary of the HRE. Dummy variable equal to one if a municipality was located at the border of the Holy Roman Empire in at least one of the periods for which we have maps (1250, 1378, 1477, 1556, 1648, 1789). Variable is calculated using digitized versions of the maps of the HRE printed in Wolff (1877).

Elevation. Maximum elevation of each state in meters. Data is based on the Digital Elevation Model (DEM) of the U.S. Geological Survey's Center for Earth Resources Observation and Science (EROS), namely the GTOPO30 dataset, which can be downloaded here `https://lta.cr.usgs.gov/GTOPO30` (last accessed May, 30th 2016). The GTOPO30 has a spatial resolution of 30 arc seconds.

Historical Battles. Dummy variable equal to one if at least one historical battle has taken place in the area of the municipality in the period between two of our maps (e.g. between 800 and 1250 between 1250 and 1378, between 1378 and 1477 etc.). The considered period is from 1250 to 1789. Information of the date and location of the battles is taken from Bradbury (2004), Clodfelter (1992) and Darby and Fullard (1978).

Historical Political Fragmentation. Average number of historical states intersecting the municipality. Variable is calculated using digitized versions of the maps of the HRE printed in Wolff (1877).

Location on Historical Trade Road.Dummy variable equal to one if a municipality intersect a historical trade route. Data on the course of historical trade routes are obtained by digitizing a map on "Medieval Commerce" from Shepherd (1923). The map can be downloaded as pdf from here: `https://www.lib.utexas.edu/maps/historical/shepherd/europe_mediaeval_commerce.jpg` (last accessed July, 10th 2017).

Neolithic Settlement Area. We have computed the area within each state that was already settled in pre-historic times (in km^2). This information stems from Schlüter (1952).

Roman. Dummy variable equal to one if a grid cell is located in the historical Roman Empire as of 200 AD, when it had reached its largest extent. Assignment of grid cells to the Roman Empire is based on a shapefile of the Roman border from the "Digital Atlas of Roman and Medieval Civilizations" (McCormick et al. 2013). The shapefile is based on the map of Roman roads in the Barrington Atlas of the Greek and Roman World Talbert (2000). It can be accessed here: `https://harvard-cga.maps.arcgis.com/apps/View/index.html?appid=b38db47e08ca40f3a409c455ebb688db` (last accessed March, 3rd 2021)

Terrain Ruggedness. Following Riley, DeGloria, and Elliot (1999) average ruggedness of a states' territory is calculated as the negative value of the derivative of the ruggedness index of a digital elevation model. The calculations are based on the elevation raster of Nunn and Puga (2012) (see above). Terrain ruggedness was calculated using QGIS.

A.6 Further Results—Documenting the Home Bias in Venture Capital Investments

Regression results. To test the significance of a home bias, we estimate regressions. We here rely on the matrix of all possible investments, constructed by pairing all venture capitalists with all start-ups in our dataset, a total of around 2.5 mio pairs. We then code a dummy variable that is equal to one if there is such investment, else zero. This dummy is then used as the explained variable of our probit regressions. Here, we predict the actual investment decisions with various sets of factors which could be relevant for the investment decisions:

$$\begin{aligned} &\Pr(Invest_{i,s}|HomeBias_{i,s}, \mathbf{X}_s, \mathbf{C}_{i,s}, SCI_{i,s}) \\ &= \Phi(\alpha + \beta HomeBias_{i,s} + \gamma' \mathbf{X}_s + \delta' \mathbf{C}_{i,s} + \theta SCI_{i,s} + \epsilon_{i,s}) \end{aligned} \tag{5}$$

With $Invest_{i,s}$ representing a dummy variable equal to one if a venture capitalist i has invested in a start-up s and $HomeBias_{i,s}$ is one of our three proxy variables for a home biased investment, which are distance to the respective start-up in km, a dummy variable equal to one if the distance to the start-up is less than 100km, and lastly, a dummy variable equal to one if a start-up is in the same municipality as the investor. We cluster all

standard errors on the investor-level, given that they are the decision-making entity and their decisions may be correlated.

$\mathbf{X}_s$ represents a set of characteristics of the location of the start-up that could contribute to the investment decisions. Since larger, richer, and more attractive cities receive more investments, this is the natural logarithm (ln) of the population, the migration balance per capita, the share of industry buildings, the income per capita quantile, as well as dummy variables for the presence of a university.[37] Some of these controls proxy for the level of economic and industrial development of the start-ups' locations. Others reflect the fact that universities (especially technical universities) are well known for assisting their students and alumni to found start-ups.[38] This variable therefore measures also informal personal connections between start-ups and venture capitalists induced by a university.

$\mathbf{C}_{i,s}$ is a set of variables that captures the existence of common characteristics shared by the location of the start-up's and investor's headquarter. This is prudent since investors may be more inclined to invest in start-ups from similar places, for example places that both have each a university. As such, we create a dummy variables equal to one if universities, universities of applied science or technical universities, exist in both places. We also include a dummy variable that indicates whether the two locations are located in the same quantile of the income per capita distribution among German municipalities. If, for example, investors from more economically backward cities prefer to cooperate with individuals from similarly backward cities, this could be a shared similarity that affects their investment decisions, but this is not necessarily the shared regional identity we intend to measure.

$SCI_{i,s}$ is the Facebook social connectedness index. It measures how connected people from different regions are on this social network. This helps us to gain more conservative estimates of the home bias. Kuchler et al. (2020) shows that the intensity of social ties is a significant predictor of investments.

Table A.4 reports the results.[39] Because several relevant control variables are only avail-

[37] Throughout the paper and to keep the number of observations constant, we add one to all counts before taking the natural logarithm.

[38] This involves, for example, the provision of office space, incubators, as well as organizational support via networking associations.

[39] In the third regressions, we exclude the variables for the start-up locations.

able for Germany, the regressions from column two onwards consider only investments in which both headquarters are located here. The results from all regressions are highly statistically and economically significant and show the expected signs. For example, venture capitalists are 40 and 64% more likely to invest into a start-up if it is not further than 100km away from the location of the venture capitalist. The probability to invest into a start-up if it is located in the same municipality is between 27 and 62% higher. We conclude from these regressions that a sizable home bias exists in our data. On a side note, the results for the social connectedness index replicate the finding of Kuchler et al. (2020), as well as confirm the relevance of universities (given the magnitude of the effect especially technical universities).[40]

[40] A combination of these university dummies yields similar results.

Table A.4: Venture Capitalists' Home Bias in Investment Decisions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Dependent Variable					Investment=1				
Distance to Start-Up	-0.00139***	-0.00115***	-0.00109***						
	(0.0001)	(0.0002)	(0.0002)						
Distance to Start-Up $<$ 100km				0.638***	0.446***	0.409***			
				(0.0456)	(0.0567)	(0.0614)			
Start-Up in Same Municipality							0.622***	0.389***	0.270***
							(0.0603)	(0.0921)	(0.100)
ln(Population of Start-Up Location)		-0.00459	-0.00476		-0.00274	-0.0110		-0.0142	-0.0143
		(0.0154)	(0.00761)		(0.0157)	(0.00743)		(0.0151)	(0.00971)
Migration Balance p.c. of Start-Up Location		0.0409	0.0472		0.0631	0.0610		0.0724*	0.0798
		(0.0436)	(0.0542)		(0.0411)	(0.0512)		(0.0427)	(0.0522)
Share Industry Buildings of Start-Up Location		0.793	0.581		0.475	0.818*		0.853	0.835*
		(0.574)	(0.513)		(0.600)	(0.492)		(0.559)	(0.504)
University of Applied Science at Start-Up Location		-0.0212			-0.0249			0.00330	
		(0.0334)			(0.0354)			(0.0337)	
University at Start-Up Location		0.0331			0.0360			0.00399	
		(0.0345)			(0.0362)			(0.0362)	
Technical University at Start-Up Location		0.0161			-0.0160			-0.0344	
		(0.0403)			(0.0398)			(0.0458)	
Technical University of Applied Science at Start-Up Location		-0.0124			0.0181			-0.00476	
		(0.0240)			(0.0249)			(0.0235)	
Income p.c. Quantile of Start-Up Location		0.00140			-0.00823			0.0106	
		(0.0139)			(0.0144)			(0.0138)	
Facebook Social Connectedness Index		2.53e-07***	2.45e-07***		2.38e-07***	2.29e-07***		2.80e-07***	2.83e-07***
		(8.33e-08)	(8.16e-08)		(7.99e-08)	(7.82e-08)		(9.38e-08)	(9.49e-08)
University at Investor and Start-Up Location			-0.0200			-0.0199			-0.0464*
			(0.0224)			(0.0230)			(0.0256)
University of Applied Science at Start-Up and Investor Location			0.0595**			0.0476*			0.0436*
			(0.0242)			(0.0254)			(0.0251)
Technical University at Investor and Start-Up Location			0.0889**			0.115***			0.122**
			(0.0436)			(0.0426)			(0.0475)
Investor and Start-Up Location in Same Income Group			0.0119			0.0408			0.0948**
			(0.0446)			(0.0478)			(0.0429)
Observations	2,442,880	902,484	902,961	2,442,880	902,484	902,961	2,442,880	902,484	902,961

Notes. Standard errors in parentheses are clustered on investor level. Coefficient is statistically different from zero at the ***1 %, **5 %, and *10 % level. Reported are average marginal effects. The unit of observation are German municipalities in 2010 . All regressions include a constant not reported.

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