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# Social Capital and Financial Development

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**Doctor of Philosophy**

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## **Declaration Page**

This is to certify that the work contained within has been composed by the author and is entirely the author's work. No part of this thesis has been submitted for any other degree or professional qualification.

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## Abstract

What is the driving force of development? Cultural economics explains the discrepancy of development when taking social capital as a workhorse. Driven by cultural factors, social capital describes how individuals and institutions work cooperatively and enables them to produce efficient economic outcomes. From this perspective, the discussion of how culture nurtures social capital has become a topic of study in recent years. Where we are now is a result of what we have gone through in the past. Similarly, disparities in cross-regional development can also often be explained by traumatic shocks experienced in bygone history. This persistence effect from the distant past to present-day outcomes works through psychological and sociological processes and persists thanks to intergenerational transmission. This thesis adds to this strand of research and examines how variations in modern financial development can be explained by traumatic historical shocks that altered local social capital in a region. The first essay argues that the Cultural Revolution in China (1966-1976) shaped some of the key financial fundamentals in today's China. The Cultural Revolution accounts for a lingering mistrust among the Chinese population. This degradation of social capital is manifested in present-day households' obstacles in accessing finance, particularly of the informal credit-related type. Residents living in those regions that were severely affected by the Cultural Revolution are observed to have less trust in the financial system, lower participation in financial markets, and a lower willingness to provide private loans. The second essay analyses the cultural link between anti-Jewish pogroms in the historical "Pale of Settlement" and the present-day access of firms to finance. Firms located in regions with a higher historical intensity of pogroms tend to experience higher financial constraints, which manifest in a greater reliance on internal finance, reduced access to trade-credit finance, and reduced access to banking finance. The financial-antipathy mechanism explains these effects, which are seen to diminish with the distance from the site of historical pogrom activity. The third essay discusses how the "Collapsed Wall" - German separation that lingeringly contributes to the East-West discrepancy between present-day household financial decisions in Germany. This essay finds that present-day residents of East Germany report lower general trust, lower trust in financial matters, less access to financial markets, and feel less financial security. However, women in Eastern Germany make more financial decisions and show greater concern about economic and financial matters than in the West. Overall, this thesis provides a battery of insights concerning the cultural legacies, namely the social capitals, from the past and their significant and continuing implications for financial development. In this way, the thesis sheds light on the study of financial development, financial behaviour, corporate finance, and household finance.

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# Chapter 1 Introduction

The theme of taking cultural norms as a driving force of economic development has long been argued (i.e., Putnam et al., 1994; Fukuyama, 1995; La Porta et al.,1997). This strand of research could be traced back to Adam Smith, the author of “The Wealth of Nations,” who argued that a particular stream of social norms underpinned or hampered market economics and capitalism. Following this, a profusion of recent literature has demonstrated that traumatic historical shocks persistently alter the trajectory of local culture (i.e., Acemoglu et al., 2011; Nunn & Wantchekon, 2011). This manifests as a legacy of socio-economic outcomes and mirrors the disparity of cross-regional development (i.e., Alesina & Fuchs-Schündeln, 2007; Grosfeld et al, 2013; D’Acunto et al.,2019; Levine et al., 2020).

This thesis supplements and extends the seminal work discussed above with substantial empirical evidence and adds to the literature with novelty arguments. The thesis consists of five independent chapters. In addition to the introduction chapter, the second to fourth chapters study the role of social capital on financial development by utilizing three different regional settings, respectively. The last chapter summarises the argument of the whole thesis.

In Chapter 2, “the Cultural Revolution and present-day household finance,” I argue that the Cultural Revolution in China, which took place half a century ago (1967-1976), has a profound impact on the social trust of the people of China. Hence, through intergenerational transmission of this social capital, the Cultural Revolution still impacts household finance in China to the present-day. Over ten years, the Cultural Revolution caused a country-wide social turmoil that claimed 1.1 to 1.6 million fatalities (Walder, 2014) and accounted for a tumultuous economic impact (Chow, 1993; Bai, 2014). The consequences of this traumatic event for present-day China’s social capital (i.e., trust) have been discussed (He, 2020; Bai & Wu, 2020). However, notwithstanding this evidence, there remains a lack of research that validates the robustness of the Cultural Revolution’s lingering impact on financial development, especially with the perspective on present-day residents’ access to finance and financial-related preferences. Building upon the literature that discusses the socio-economic legacy of the Cultural Revolution through its persistent effect on social norms (Bai, 2014; Kong et al., 2021), we find that the variation of the Cultural Revolution severity predicts the disparity of financial development across different regions in China. This relationship works through the prolonged effect of contaminated trust.

In Chapter 3, “historical anti-Semitism and firm access to finance,” I analyze the territory of the historical norm of the “Pale of Settlement,” a western region of the Russian Empire (between the early 1800s and 1927) where Jews were forced to move in and live alongside non-Jewish majorities. Owing to the association of Jews with capitalism and the market economy of Eastern Europe in the 18th and 19th centuries, historical anti-Semitism developed into a persistent anti-market attitude. This cultural legacy nurtured mistrust in market intermediaries and financiers that persists to the present-day, even after any physical presence of a local Jewish community has long ceased to exist (Grosfeld et al., 2013; Grosfeld et al., 2020). Financial contracts are trust-intensive, and therefore a cultural legacy of financial antipathy can hinder financial development. In terms of the present-day financial development in Eastern European countries, I provide the first evaluation of the lingering effects of the historical anti-Jewish riots on the access to finance enjoyed by firms in that region. Meanwhile, I argue that the under-developed nature of financial markets in Eastern Europe can be explained by the cultural legacy of financial exclusion, nurtured by historical anti-Semitism. This lingering cultural norm underlies the current disparity in the financial development in Eastern European countries.

In Chapter 4, I utilize the exceptional historical setting of German separation and reunification as a natural experiment (Offe, 1992; Uhlig, 2006) to distinguish the role of culture on financial development, with a specific focus on household financial decisions. I discuss the extent to which the long-collapsed “Berlin Wall” may still influence present-day individuals’ financial decision-making in Germany. This effort tries to explain the East-West divergence of Germany regarding financial development through the individual’s value and preference regarding finance. The results indicate that East Germans report lower social trust, lower willingness to access financial markets, less financial security, and higher financial reliance on the state compared with West Germans. However, Eastern women hold higher within-household financial decision power than Western women, inherited from the equal-breadwinner cognition in the former communist regime of GDR. The East-West convergence seems sluggish when observing East and West Germany as two entities. The evidence argues that an over-optimistic estimation of previous literature predicts the East-West divergence in economic preferences would close in one to two generations (i.e., Alesina & Fuchs-Schündeln, 2007).

This thesis extensively contributes to multiple strands of literature. Firstly, it adds to the research of cultural economics. Historical shocks persistently alter the trajectory of local culture, which manifests as a legacy of socio-economic outcomes and mirrors the disparity of cross-regional development (Nunn, 2008; Klüppel et al., 2018). This thesis adds to a line of discussion regarding this deep-rooted cultural legacy, and in so doing, explains the variation of financial

development observed in China, Eastern Europe, and Germany to the present day. Social capital has long been argued as a catalyst that fuels economic transactions and maintains the market's stability beyond the formal regulation forces (Fukuyama, 1995; Guiso et al., 2004). Social capitals have amalgamated and been nurtured by the cultural norms, which were affected by historical events. This thesis sheds light on the origin and formation of social capitals based on discussions from different regional and historical settings.

Second, this thesis provides novelty arguments that contribute to discussing the working mechanisms that historical shocks persistently shape present-day financial development (Pierce & Snyder, 2017; D'Acunto et al., 2019). In China, half a century has passed since the social turmoil of the "Cultural Revolution (1966-1976)". This events still contaminate the social trust of China and negatively influence the present-day Chinese residents' trust in the financial system, willingness to participate in financial markets, and willingness to provide private loans. In Eastern Europe, I argue the historical "Pale of Settlement" nurtured anti-Semitism among the non-Jewish majority in this territory. This inter-ethnic hostility expanded into an anti-market culture, which explains the obstacle of present-day firms' access to finance in Eastern European countries. In Germany, I show how ingrained communist ideology manifests in East Germans' financial decision-making, resulting from the bygone separation of Germany.

Finally, this thesis contributes to the discussion of regional development. Financial development is a building block of economic development, while social capital plays an essential role that sustains the financial market (Dupont & Karpoff, 2019). This thesis supports prior research on the role of social capital in explaining the disproportionate financial development across regions. Also, this thesis uncovers the importance of possible antithetical roles of different dimensions of social capital, and their combined result when discussing the long-term effect of culture on financial development.

## **Chapter 2. The Cultural Revolution and Present-day**

### **Household Finance**

#### **Abstract**

The Cultural Revolution in China (1966-1976) was witness to a decade-long period of widespread social turmoil and violence. Focusing on the impact of this experience on cultural norms, we examine how this event shaped some of the key financial fundamentals in today's China. Our empirical results suggest that the Cultural Revolution accounts for a lingering mistrust among the Chinese population. The impact of this degraded social capital can be seen in obstacles in accessing finance, particularly of the informal credit-related type, as experienced by present-day households. Residents living in those regions that were severely affected by the Cultural Revolution are observed to have less trust in the financial system, lower participation in financial markets, and a reduced willingness to provide private loans.

## 2.1. Introduction

Trust, as a key building block of social capital, enables individuals and social institutions to attain efficient economic outcomes (Fukuyama, 1995; Guiso et al., 2006)<sup>1</sup>. Trust underpins much of finance, and finance plays a key role in economic development and in the economic well-being of families, e.g. in smoothing consumption, in providing resilience to adverse shocks such as the Covid-19 pandemic, and in human capital accumulation. A growing body of literature explores the historical origins of the differences in trust<sup>2</sup> and the impact of such differences on present-day household financial development. These historical events are as varied as the slave trade in Africa (Levine et al., 2020) and Anti-Jewish pogroms in Nazi Germany (D'Acunto et al., 2019). In the light of the above research, we provide the first evaluation of the impact of the Cultural Revolution in China (1967-1976) on present-day household finance, and, in so doing, offers new insights into the long-lasting impact of cultural norms on financial development.

Over ten years, the Cultural Revolution witnessed country-wide social turmoil that is estimated to have been responsible for between 1.1 and 1.6 million fatalities (Walder, 2014). This sociopolitical movement has been characterized as a “savage and cruel” period of denunciation, “unmitigated horror”, “killing and torturing”, leaving “deep, still-painful wounds” (Economist, 2021)<sup>3</sup>. There has been no shortage of literature describing the suffering of this tumultuous decade in terms of economic failure (Chow, 1993) and human capital loss (Huang et al., 2020). However, notwithstanding this evidence, there remains a lack of research that validates the robustness of the lingering impact of the Cultural Revolution on household usage of financial services.

Two streams of the literature address the financial implications of the Cultural Revolution. First, Vogel (1965) argues that this movement has changed interpersonal relationships and trust through fear of informer allegations and the severe sanctions that invariably followed. People were under pressure to supply information as a proof their political loyalty but, in so doing, all too often caused others to suffer. Beyond simple survival, the prospect of political and social advancement also served as an incentive for individuals to snitch on their family, friends and acquaintances. The prevailing wisdom was to trust no one. Although the revolution came to an end in 1976, the traumatic shocks it engendered changed the long-run trajectory of cultural norms (Klüppel et al.,

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<sup>1</sup> Evidence in support of this perspective has been provided in cross-country studies (e.g., La Porta et al., 1997; Guiso et al., 2009) as well as in within-country studies – examples being Italy (Putnam, 1993), Peru (Karlan, 2005), Vietnam (McMillan & Woodruff, 1999), and China (Ang et al., 2015; Wu et al., 2014).

<sup>2</sup> A well-developed literature argues that a singular historical event can have a persistent effect on social norms (Nunn, 2008; Klüppel et al., 2018) and people’s beliefs and values (Nunn & Wantchekon, 2011; Becker & Pascali, 2019).

<sup>3</sup> *A revealing account of the Cultural Revolution*, Economist, 7 Jan 2021.

2018) and left a marked imprint on individuals that persisted despite subsequent environmental changes (Marquis and Tilcsik, 2013). Bai and Wu (2020) confirm that the revolutionary intensity engendered by the Cultural Revolution had long-term corrosive effects on social trust that are visible more than three decades later.

The second stream of literature focuses on the observation that virtually every commercial transaction has within itself an element of trust (Arrow, 1972). Consequently, the mistrust developed by Cultural Revolution can hold back the willingness of affected individuals to engage in commercial interactions with financial intermediaries, capital markets or even friends and relatives. The literature confirms that mistrust is associated with lower participation of individuals in capital markets (Guiso et al., 2008), reduced usage of financial and fintech services, and a more modest usage of credit by households (D’Acunto et al., 2019; Levine et al., 2020). Building upon these studies, we explore the link between the variation in the severity of experience of the Cultural Revolution and the present-day disparity of financial development of families across the different regions of China.

To perform our analyses, we collect county-level data on the intensity of the Cultural Revolution from Walder (2014). Identifying the unnatural deaths in each county attributable to the Cultural Revolution, we divide this number by the contemporaneous population in that county to obtain the “Cultural Revolution mortality rate” (CR mortality rate) as our key independent variable. To capture present-day household behavior, we use the Chinese Household Income Project (CHIP), a nationally representative database with observations on trust and household finance.

The empirical evidence presented in this paper confirms the predictions sketched above. There is a negative relationship between the density of the historical Cultural Revolution and the engagement of present-day households with finance. Those households located in the more affected areas report facing higher obstacles in accessing finance, especially credit-based informal finance. We show that this can be attributed to the degradation of trust brought about by the events surrounding the Cultural Revolution. In addition, we find that present-day residents in the highly affected regions are less willing to provide credit, exhibit a stronger mistrust in the financial system, and are less willing to participate in financial markets.

In order to support a causal interpretation of the results, we address the endogeneity concerns that arise from the possible presence of measurement error and omitted variable bias by running a series of robustness checks. First, we incorporate a range of additional indicators of the intensity of the Cultural Revolution, including: the word count from the historical Cultural Revolution section of each County Gazetteer (as an alternative gauge of the intensity of the Cultural Revolution); a measure if the local intensity of the Great Famine (to eliminate any

confounding effect between the Cultural Revolution (1966-76) and the Great Famine (1959-61)); and a firm-level measure of access to finance for the relevant Chinese industrial enterprises (CIE). The results remain consistent.

Second, we establish that present-day demand for bank loans is lower in more severely affected regions - regardless of household income and education levels. This suggests that it is the demand-side channel that explains the baseline results. We also conduct a sub-sample analysis of the potential non-uniform impact of the Cultural Revolution on different income and education groups, and find that even the wealthiest and most educated quartiles of households, who can be assumed able to obtain bank loans or invest in stocks, are less likely to do so if they are from regions with higher Cultural Revolution mortality rates.

Meanwhile, we use a variety of econometric approaches to lend support to a causal interpretation of our results. A Difference in Differences (DiDs) estimation focuses on the cohort of individuals who were in the key trust-development age range, i.e., 9 to 22 years of age (Van Den Bos et al. 2010), during Cultural Revolution. Our findings are also subjected to Oster's unobservable-selection bias test (Oster, 2019).

Our research contributes to the literature in several important ways. First, our findings add to the body of evidence that traces present-day socio-economic outcomes back to historical origins (Klüppel et al., 2018; Nunn, 2020) and add to the growing literature on the lingering adverse effects on present-day household outcome of historical traumatic shocks (D'Acunto et al., 2019; Levine et al., 2020). We provide original evidence on how the Cultural Revolution, which took place some fifty years ago, continues to affect the financial behavior of present-day residents. Those residents living in counties that were more severely affected by the Cultural Revolution are observed to manifest a lower demand for and lower engagement in both formal and informal lending. At the same time, they exhibit a reduced willingness to provide private loans to others and a greater reluctance to participate in financial markets. These finding also sheds light on “stock-market participation puzzle” (Guiso and Jappelli, 2005) by providing a cultural explanation of the occurrence of unexpectedly low levels of stock market participation.

Second, we contribute to another line of the literature which uses historical events to establish a causal link between trust and economic development outcomes (e.g.; Nunn and Wantchekon, 2011; Pierce and Snyder, 2017; An et al., 2022). A major problem in many studies of the trust and economic development connection (e.g. La Porta et al., 1997; Guiso et al, 2004) is the absence of any time variation in their cross-sectional settings, making it impossible to control for the confounding effects of time-invariant factors. One approach is to construct the time varying measures of inherited trust and control for time invariant factors (Algan and Cahuc, 2010).

Another plausible strategy, as used here in our study, is to exploit variations in the historical variables across regions and use this variation to instrument contemporaneous trust. Our results uncover the causal effects of how culture persistently shapes the financial decisions of families.

Third, and finally, this study is related to the literature on socio-political movements (Bai and Wu, 2020). The Cultural Revolution, which was responsible for the most serious setbacks and losses since the founding of the People's Republic of China, has been increasingly studied in terms of its impact on the economy (Chow, 1993; Bai, 2014), educational attachment (Meng and Gregory, 2002; Huang et al., 2020) and firm innovation (Kong et al., 2021). Very little is known about the financial consequences. Our results provide new insights on how the Cultural Revolution can be seen to have affected the use of various financial instruments by Chinese families. Given the vital role of household finance in smoothing consumption, facilitating resilience to disasters and shocks, in enabling human capital accumulation, and in other aspects of well-being, our results inform policy strategies for China and beyond on that focus on developing financial systems through the restoration of social cohesion.

## **2.2. Literature review**

### **2.2.1. The deep roots of trust and its linkage to financial development**

Scholars have long recognized the importance of trust in the operation of markets, and hence its linkage to the economic performance of a region. Arrow (1972) argued that the explanation for economic backwardness could lie in a lack of mutual confidence. This thesis attracted further attention in the contributions of James (1990), Putnam et al. (1994), and Fukuyama (1995), who were each explored the theoretical underpinnings of trust. These authors demonstrated that trust, as an essential dimension and component of social capital, is critical in the performance of institutions in society. A subsequent body of literature examined the importance of trust to social-economic development in various regional and cultural settings (La Porta et al., 1997; Guiso et al., 2006 & 2009). From this literature, a culture-based explanation emerged whereby the mechanism of mutual trust affects the access of individuals or companies to economic exchange by impacting on aspects such as trading frequency, portfolio investment, and direct investment (Guiso et al., 2009). Through such mechanisms, trust is inextricably linked to the financial and economic development of a region.

An extensive body of country-specific studies underpins this view. The original paper by Arrow (1972) proposed that a lack of general social trust led to the underdevelopment of Southern Italy. Putnam (1994) argued that this general lack of trust in Southern Italy could be due to the region's strong Catholic tradition, which stresses the vertical relationship with the Church and

discounts horizontal relationships among citizens. More recently, Guiso et al., (2004) explained how the disparities in social capital between North and South Italy contributed to the differences in their relative financial development, with households in higher trust level areas having better access to financial instruments, better access to institutional finance and relatively less reliance on informal credit. This divergence persists, and the consequent deficiency in cooperative behavior brought about by a failure in trust is seen to have contributed to the relative underdevelopment of South Italy (Bigoni et al., 2016).

In the case of Vietnam, McMillan & Woodruff (1999) argue that trust compensates for the law when the law is absent or less than omnipresent. In this way, it facilitates contract formation, improves trade credit, and provides a network to sanction any defaulting customer or contractual counterparty. To test this theory, the methodology of experimental economics has been used to capture social capital. Using a "Trust Game" experiment in Peru, Karlan (2005) argues that trustworthiness is a significant measure of individual-level social capital. Trust-based network connections enforce informal contracting and, hence, facilitate informal financial transactions. The experimental economic evidence collected by Karlan et al. (2009) in Peru documents the correlation between trust and the success of group-lending programs in the context of a microcredit program. In China, Wu et al. (2014) document within-country variation of trust and argue that firms have greater access to trade credit if located in a higher social trust region. The regional trust level also alters the investment location (Ang et al., 2015) and the innovation performance of firms (Kong et al., 2021), and has a cumulative impact on regional industrialization (Bai, 2014).

### **2.2.2. The origins of trust**

Given this evidence of the persistent impact and importance of trust in financial and economic development, researchers have also examined the formation of trust. As a dimension of social capital or culture, trust is essentially a product of history. In this context, certain key historical events may play a catalytic role in shaping trust, resulting in a lingering effect on present-day financial development (Nunn & Wantchekon, 2011; D'Acunto et al., 2019; Bai & Wu, 2020). For example, it is possible to view the African slave trade as exerting a lingering negative effect on Africa's economic development (Nunn, 2008), with its continuing impact working through the mistrust engendered by the slave trade, with this cultural norm of mistrust persisting to the present-day. The magnitude of the recorded historical slave shipments is negatively related to the present-day level of trust as observed in each region (Nunn & Wantchekon, 2011).

Following a similar logic, researchers have also found that ethnic factionalism in Europe can explain regional economic variation (Becker & Pascali, 2019). Grosfeld et al. (2013) argue that the culture of antipathy towards finance as engendered by historical inter-ethnic hostility towards the Jewish minority has led to lower trust in finance and a reduced willingness to engage with financial markets. This anti-market culture continues to be observable, long after the extinction of the Jewish presence across most territories of the Middle and Eastern Europe, and continues to inhibit local financial development (D'Acunto et al., 2019). Such evidence suggests a causal relationship, whereby these historical events and conditions continue to exert an influence on present-day socio-economic outcomes through the associated cultural norms and values that they created.

In examining the impact of history on the level of trust, and through trust on present-day finance, Pierce & Snyder (2017) argue that the richness of "access to finance" as experienced by firms in each region of Africa reflects the aftermath of the extent of the historical slave trade in those same regions. In a similar setting, Levine et al. (2020) argue that the slave trade negatively impacts present-day household finance in Africa, due to the reduced trust in financial institutions found in regions historically more exposed to the slave trade. In line with this strand of research, attention has also been given to the intensity of the Cultural Revolution and present-day variation in trust formation and individual beliefs across the respective regions of China (Roland & Yang, 2017; Bai & Wu, 2020). However, the extent to which the lingering effects of the Cultural Revolution on trust can be seen to impact present-day financial development remains under-researched.

### **2.2.3. The Cultural Revolution and its lingering impact**

The "Great Proletarian Cultural Revolution," more usually referred to simply as the "Cultural Revolution," was a period of severe social turmoil occurring throughout China between the years 1966 to 1976. This period witnessed an unprecedented national collapse and paralysis of local government (Walder & Lu, 2017); massive intra-factional infighting followed by the imposition of military control (Walder, 2014); the suspension of college entrance exams and widespread rustication of students at all levels of education (Zhou & Hou, 1999; Zhang et al., 2007). Even more striking was the immense scale of the violence and political persecution that occurred during the period. The Cultural Revolution led to 1.1-1.6 million deaths (Walder, 2014), along with all-pervasive mutual-denunciation and physical confrontation (MacFarquhar, 1974).

A combination of international and domestic factors contributed to the outbreak of the Cultural Revolution, which was launched by Chairman Mao (MacFarquhar & Schoenhals, 2009).

On the 17<sup>th</sup> of May 1966, the Central Committee of the Chinese Communist Party (CCP) issued a directive in the “People’s Daily.” This formally announced the establishment of the Cultural Revolution Committee and emphasized that the primary mission of the CCP should henceforth be the denunciation of “Revisionists” inside the Party and the continuing struggle of the proletariat against the bourgeoisie<sup>4</sup>. Mao’s People’s Daily Editorial of 1<sup>st</sup> of June 1966 contained the commands: “Wipe out all the monsters and demons” and “Protect Chairman Mao and the red regime” (MacFarquhar, 1974). The response to these slogans led to widespread inter-personal denunciation and physical struggles. The escalation that followed was motivated by ever more zealous efforts of Mao’s followers attempting to prove their devotion by denouncing and beating the “Revisionists.” These actions took place primarily within local communities, and often within households - family members being best placed to provide the “evidence” needed to expose the “Revisionists” (MacFarquhar & Schoenhals, 2009). The downfall of Lin Biao in 1971 was seen as a turning point and the start of a gradual return to order in China. After this watershed event, the subsequent years are seen as a recovery period, although the so-called “Gang of Four,” led by Mao’s wife, Jiang Qing, continued to promote the Cultural Revolution. Finally, in September 1976, soon after Mao’s death, the Politburo of the CCP overthrew the “Gang of Four,” and the tumultuous decade finally came to an end.

The economic impact of the Cultural Revolution has been widely discussed. Earlier studies argued that the loss of capital in the production sectors had an aggregate negative effect on China's economy (Chow, 1993). More recently, Bai (2014) identified a negative relationship between the magnitude of the revolution in a region and its subsequent rate of industrialization, general educational attainment, and per-capita output. Bai (2014) argued that these negative were not only of a significant magnitude, but remained detectable more than three decades later, albeit starting to fade in some cases. However, from the perspective of personal incomes, the role of the Cultural Revolution is less clear. Some scholars argue that there had been a long-lasting impact on the economic well-being of the affected cohorts (e.g., Zhou & Hou, 1999). Others find that with a longer perspective, there is no significant adverse impact on individual economic wellbeing that can be attributed to the Cultural Revolution (e.g., Zhang et al., 2007).

More recently, a growing body of research has focused on the human impact rather than the direct economic consequences of the Cultural Revolution. The decade of the Cultural Revolution saw a whole generation grow up in violence and with a near absence of education. Scholars label this cohort the “Chinese Lost Generation” (e.g., Chen, 1999; Roland & Yang, 2017). There is clear evidence of a loss of social capital, especially in terms of the level of trust among the

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<sup>4</sup> Party History (1988) “wen hua da ge ming yan jiu zi liao”, p.4.

Cultural Revolution cohort (Roland & Yang, 2017; Bai and Wu, 2020; Kong et al., 2021). This elevated level of mistrust is identified in terms of mistrust regarding specific social groups (e.g., government, strangers, family members etc.) and in terms of trust that one's own efforts will pay off (Roland & Yang, 2017; He, 2018). More importantly, the observed reduction in trust is related to the revolutionary intensity that occurred in each individual's respective area. This revolutionary intensity has significant explanatory power in explaining trust-based financial transactions (Bai, 2014). Given the observed lingering effect of the Cultural Revolution on present-day social trust, the question arises as to whether this plays a role in explaining variations in financial development across the regions of China? Our study fills this research gap by shedding light on the link between present-day financial outcomes and the half-century-old social shocks initiated by the Cultural Revolution.

## 2.3. Data and sample

### 2.3.1. The Cultural Revolution (CR) Measure

We obtain the county-level measurements of the magnitude of the Cultural Revolution from Walder & Su (2003) whose data, covering 2,412 Chinese counties, have been used by other researchers in the field (Su, 2011; Bai, 2014; Bai & Wu, 2020). After coding information from the relevant historical county gazetteers, Walder & Su (2003) tabulate the magnitude of the Cultural Revolution both by the number of reported mortalities and by the number of words used to record the various Cultural Revolution related incidents in each county's respective gazetteer. For each level of local government, the gazetteers in question are the officially compiled record that chronicle the historical and geographical occurrences (Walder 2014; Walder & Lu, 2017).

Our main measurement of the local intensity of the Cultural Revolution is the *CR mortality rate* (subsequently, "CR" is used as an abbreviation for "Cultural Revolution" in all variable labels), which indicates the total number of the reported unnatural deaths in each county during the Cultural Revolution divided by the local population in 1964. However, we also utilize the *CR words count* as an alternative measurement. As indicated above, this records the total number of words used to capture Cultural Revolution events in each local county gazetteer. The *CR words count* variable serves as a robustness check on our main results. By way of comparison with the approach adopted by other authors, Levine et al. (2020) use as an impact indicator the natural logarithm of the total number of slaves taken from each country, while Kong et al. (2021) adopt the total death toll as the indicator of the Cultural Revolution but at the higher level of each region. By comparison, we believe our *CR mortality rate* has the advantage of scaling the effect by the local population in the county at the time, thereby capturing the density of the effect and revealing the

intensity of the Cultural Revolution in a more appropriate manner. The construction method and detailed statistics describing each of our variables are shown in Table 2.1 and Table 2.2.

[Insert Table 2.1 about here]

[Insert Table 2.2 about here]

### 2.3.2. Present-day household data

We utilize the latest wave (2014) of the *Chinese Household Income Project* (CHIP) for information regarding present-day trust and household finance. Run by the China Institute for Income Distribution at Beijing Normal University, with assistance from the National Bureau of Statistics (NBS) China, CHIP collects national representative household-level income and expenditure data and certain social value indicators. Due to the stratified sampling approach of CHIP, we are left with 115 counties after merging the data from Walder (2014) and the CHIP. However, the working county-level sample size is comparable with earlier studies (e.g., Bai & Wu, 2020). Table 2.1 and Table 2.2 provide details regarding the construction of the CHIP-derived variables and their descriptive statistics.

Present-day social capital is measured by collecting the CHIP indicators *trust family members* and *trust people outside of family*. These represent each respondent's self-reported level of trust regarding their family members and regarding people outside the family circle. We also construct *perceived ease of access to finance* to measure the respondent's self-reported level of access to external finance, which encompasses both informal borrowing and formal bank loans. The *trust family members* and *trust people outside of family* are scaled from 1 to 5, and the *perceived ease of access to finance* is scaled from 1 to 3. A higher value on each of these scales represents a more positive answer to the question.

Each household's access to bank loans and borrowing from friends or relatives is defined by a dummy value, with 1 representing a positive response and 0 representing a negative answer. The CHIP question *applied for a bank loan* asks whether the household applied for a bank loan in the previous year. This indicator provides a measure of the household's access to the formal financial system. The household's access to informal finance is gauged using the response to the CHIP question whether the household borrowed money from friends or relatives in the previous year. We also code the reasons why they did not borrow money in the previous year to construct: *did not perceive the need* or *felt that would be rejected*. These indicators measure whether the household does not utilize finance due to a lack of need versus lack of confidence that they would receive it.

As discussed earlier, we argue that the lingering effects of the Cultural Revolution operate through trust channels to affect financial preferences. To test this, we measure the relative

importance in each household's portfolio of total financial assets of the following components: *cash stored in home*, *current deposit*, *fixed-term deposit*, *money loaned-out*, *bonds*, *stocks*, and *funds*. Each of these indicators is a percentile value, ranging from 0 to 100. Compared with fixed-term deposits, a current deposit offers greater flexibility to withdraw at any time, albeit while having a relatively lower interest rate. Hence, a higher value of *current deposit/cash stored in home* accompanied by a lower value of fixed-term deposit indicates less trust in the financial system. The *money loaned-out* corresponds to the other indicators of access to finance and mirrors the trust measurements discussed above. The last three indicators *bonds*, *stocks*, and *funds* measure a household's willingness to participate in various aspects of the financial market.

### 2.3.3. Control variables and data in causality robustness checks

In an effort to capture the county-level characteristics both before and after the Cultural Revolution, we utilize data from Walder (2014) to include three pre-CR controls: *Han-race rate*, *urbanization rate*, and *distance to provincial capital*. These measures are derived from China's national census of 1964. The *Han-race rate* variable measures the percentage presence of China's main ethnic group, which varies considerably across the various counties of China. The *urbanization rate* and *distance to provincial capital* capture the pre-CR social-economic features for each county. The former is the proportion of urban residents among the total population, and the latter is the distance (in kilometers) from the county to the capital city of the province in which the respective county is located. We control the geographical location of each county's present-day center, using the respective *latitude* and *longitude*. We also include a fixed effect for city-type, allowing for five levels of urbanization of the county, as classified in 2009.

In terms of household-level indicators, we control the respondent's *age*, *age-squared*, *gender*, and *income (log)*. We include only those responses from respondents who are over 16 years of age, as 16 is the minimum permitted age for a person to enter the labor market in China. We also control the squared value age, to capture the potential non-linear relationship between age and the outcome variables (Mincer, 1974). All the respondents were classified as having *gender* of value 1 for male and 0 for female. The yearly household income is a natural logarithmic value. In addition, we include a set of fixed effects that categorize the respondents regarding: *education level*, *race*, *residence status*, *marriage status*, and *political status*. Detailed explanations of these variables can be found in Table 2.1.

## 2.4. Modelling Construction

Building on the models of Nunn & Wantchekon (2011) and Levine et al. (2020), we start by evaluating the relationship between the Cultural Revolution and trust. Each of the related variables has been discussed in Section 2.3.

$$trust_{i,c} = \alpha + \beta CR_c + F'_{i,c}\Gamma + H'_c\Omega + Z'_{i,c}\Theta + \varepsilon_{i,c} \quad (1)$$

In equation (1), *trust* represents the dependent variable, being either the self-reported level of *trust family members* or the *trust people outside of family*. These indicators are expressed by individual  $i$  in county  $c$ . The  $CR_c$  is an abbreviation for *Cultural Revolution mortality rate*, which is designed to capture the severity of the Cultural Revolution in each county  $c$ . Vector  $F'_{i,c}$  denotes the set of covariates of individual characteristics. Vector  $H'_c$  denotes the set of county-level covariates before and after the Cultural Revolution. The  $Z'_{i,c}$  denotes the fixed controls for both individual-level and county-level. In equation (1),  $\Gamma$ ,  $\Omega$ , and  $\Theta$  represent the coefficients for each control setting. The residual term is  $\varepsilon_{i,c}$ . As we may observe multiple respondents from each household, we cluster the standard errors by household.

After examining the presence of the trust channel, we next analyze the lingering effect of the Cultural Revolution on a household's financial performance. Applying a reduced form regression, we follow D'Acunto et al. (2019) and estimate equation (2).

$$finance_{i,c} = \alpha + \beta CR_c + F'_{i,c}\Gamma + H'_c\Omega + Z'_{i,c}\Theta + \varepsilon_{i,c} \quad (2)$$

Here, *finance* $_{i,c}$  indicates one of the several financial indicators available for each household, as discussed in Section 2.3.2. These include *perceived ease of access to finance*, which is an overall score indicator for a household's access to finance. We also analyze the formal channel of finance, which, in our case, is banking finance. This is represented by *applied for bank loan*, which asks whether the household applied for a bank loan last year. Along the same lines, we discuss the informal channel of finance through the variable *borrowed from friends or relatives*, which asks whether the household borrowed money from friends or relatives last year, along with the variables giving the reasons they did not borrow money: *did not perceive the need*, or *felt that would be rejected*. We also include variables that measure as a percentage of total value of financial assets held in the following forms: *cash*, *current deposit*, *fixed deposit*, *money loaned-out*, *bonds*, *stocks*, and *funds*. The weight of each class of asset in the household's portfolio of financial assets is taken to reflect their trust in the financial system. Each of these variables has been discussed in detail in Section 2.3.2.

## 2.5. Baseline results

This section reports the baseline results of our empirical analysis, which estimate the impact of the historical local intensity of the Cultural Revolution (1966-1976) on the observed

social capital and financial engagement of present-day households. The analysis is conducted at the household-county level. The present-day household-level variables are obtained from the CHIP, and the county-level Cultural Revolution variables are from Walder (2014). We merge these two data sources according to the county in which the household is located. The key explanatory variable is the Cultural Revolution mortality rate (*CR mortality rate*), a percentile value that ranges from 0% to 0.323% and has a standard deviation of 0.051. We analyze the lingering impact of the Cultural Revolution by linking the *CR mortality rate* to the: (i) trust, (ii) access to finance, and (iii) financial portfolio allocation of present-day residents. Detailed information regarding the construction and descriptive statistics of all these variables can be found in Tables 2.1 and 2.2.

### 2.5.1. Trust

Table 2.3 illustrates that the Cultural Revolution plays a significantly negative role in determining the trust of present-day residents. This is consistent with the mainstream literature on the historical legacy of the Cultural Revolution (e.g., Roland & Yang, 2017; Bai & Wu, 2020; Kong et al., 2021). The CR mortality rate shows a significant negative relationship with the trust of residents, both regarding their family members and regarding people outside of their family. As shown in columns (1) - (3) and (5) - (7) of Table 2.3, neither the significance nor the magnitude of this relationship attenuates with increasingly comprehensive control settings. Columns (4) and (8) of Table 2.3 also confirm that the effect remains when we make use of the full scale values (1-5) of the trust measures to apply an Ordered-Probit regression approach, as an alternative econometric specification.

[Insert Table 2.3 about here]

The economic interpretation or magnitude of the observed effects is significant. For example, in column (7) of Table 2.3, we observe that one standard deviation increase in the *CR mortality rate* would lead to a statistically significant reduction of 0.043 ( $0.845 \times 0.051$ ) in the expected score of *trust people outside of family*. This amounts to 5.0% ( $0.043/0.862$ ) of the sample standard deviation of this dependent variable. The extent of the impact is revealed in a more profound way when we compare the lowest affected counties with the highest affected counties. For example, comparing with the lowest *CR mortality rate* counties, residents in those counties with the highest *CR mortality rate* have an expected lower value of *trust people outside family* of some 0.314 ( $-0.972 \times 0.323$ ) and a lower value of *trust family members* of some 0.273 ( $-0.845 \times 0.323$ ), as can be seen from column (3) and column (7) of Table 2.3.

It is worth noticing that our results reveal that although of similar magnitude, the Cultural Revolution has a relatively larger impact on the trust among family members than on the trust of

people outside of the family. This seems plausible because, as discussed in literature review, the denunciations and struggles during the Cultural Revolution essentially (and tragically) happened between people who were familiar with each other, especially within families. Our results mirror this situation in the form of a deficit in present-day social capital - a legacy of the decade-long social turmoil that was unleashed half a century ago.

### 2.5.2. Access to finance

Given the importance of trust on the viability of financial transactions, we next examine how the decreased trust lingering from the events of the Cultural Revolution in a county may affect access to finance by present-day residents of that county. In terms of variables analyzed, it is worth highlighting that, except for the variable *perceived ease of access to finance*, which has a score value, all the other variables simply have dummy values for which 1 is a positive answer and 0 a negative answer. Making use of the richer scoring on the variable *perceived ease of access to finance*, we apply OLS regression in column (1) of Table 2.4 and Ordered-Probit regression in column (2). For the remaining columns, we apply probit regressions and report the coefficients as the marginal effect.

[Insert Table 2.4 about here]

As shown in columns (1) - (4) of Table 2.4, a higher CR mortality rate is associated with a significantly lower score for the self-reported ease of access to finance by present-day residents, and this negative impact is clear both in access to formal finance (applying for bank loan) and in access to informal finance (borrowing from acquaintances). Residents in high *CR mortality rate* counties lack the confidence to avail themselves of financial help from friends and relatives, an effect that reflects a reduced level of social trust.

The estimates in Table 2.4 reveal the significant negative empirical impact of the Cultural Revolution on the access to finance of present-day households. For example, in columns (3) and (4) of Table 2.4, we find that a one standard deviation increase of *CR mortality rate* predicts a 2.12% ( $-0.415 \times 0.051$ ) lower likelihood that a household will access banking finance and a 4.05% ( $-0.795 \times 0.051$ ) lower likelihood of accessing private credit. This need not mean that the households have sufficient funds hence do not need finance, as might be suggested by column (5), but rather that households with a highly negative historical experience of the CR simply lack the confidence to avail themselves of finance, as shown in column (6). It is noteworthy that the effect of CR mortality rate on borrowing is around twice the empirical size of its impact on bank loans, something that is consistent with this interpretation. The lower trust engendered within people may more profoundly affect the willingness of residents to provide finance to each other than it does their willingness to access banking finance.

### 2.5.3. Financial portfolio

As discussed in Section 2.2, the effects on social capital of social unrest such as the Cultural Revolution may persist and alter the willingness of affected individuals to engage with the financial market long after the original source of upheaval has passed. Here, we examine the validity of this hypothesis and the empirical magnitude of any lingering effect. The results are shown in Table 2.5. As all the dependent variables here are expressed in percentile values, we apply OLS regression in each specification in this table.

[Insert Table 2.5 about here]

From Table 2.5, we can see that in the regions that experienced greater severity of the Cultural Revolution, households tend to make less use of fixed-term deposits (column (3)), and allocate more of their financial assets as current deposits (columns (1) and (2)). The evidence here suggests that the preference of survey respondents in high CR mortality rate counties for current deposits (a low-interest but high-liquidity mode of portfolio allocation) indicates a local culture of mistrust in the financial system.

In column (4) of Table 2.5, it can be seen that these same residents are also less willing to provide money to others. This confirms our earlier finding in column (6) of Table 2.4: as private borrowing is a mutual procedure, the fewer people willing to provide it results in more people finding it harder to borrow. The remaining columns (5) - (7) of Table 2.5 reveal that a higher intensity of *CR mortality rate* predicts less extensive participation in financial market investment, although this evidence is not universally statistically significant. Notably, however, the effect is significant in terms of the stock market, the most commonly used means of investment in China, compared with bonds and funds (see Table 2.2 for detailed statistics).

All the above evidence points to a long-lasting mistrust in the financial system being a legacy of the Cultural Revolution. The economic interpretation of this effect is significant. For example, compared with the lowest affected counties, those residents living in counties that have the highest *CR mortality rate* statistically report 18.97% ( $58.719 \times 0.323$ ) more under *current deposit*, 12.42% ( $-38.454 \times 0.323$ ) less under *fixed-term deposit*, and 1.17% ( $-3.613 \times 0.323$ ) less money loaned-out. Considering the mean values of these indicators, these figures represent an empirically significant impact.

In summary, our baseline research argues that the decade-long social turmoil in China, known as the Cultural Revolution, which witnessed mass denunciations and persecutions, left a legacy of diminished social capital. This manifests in a lingering lack of trust, which, in turn, has

resulted in less access to finance and a more conservative portfolio allocation among present-day households, effects that linger to the present day.

## 2.6. Robustness checks

In order to examine the validity of the mechanisms uncovered in the baseline research, we conduct a battery of robustness checks. These include: (i) an alternative indicator of the local impact of the Cultural Revolution; (ii) applying an interaction term between the Cultural Revolution mortality and the severity of Chinese Great Famine to uncover any confounding effect of the latter; (iii) sub-sample analyses by the level of education and income to allow for potentially disproportionate effects on different social-economic groups; and (iv) a firm-level study, which includes a rich set of firm-level panel data that has a more extensive territorial coverage than household data.

### 2.6.1. Alternative CR indicator

We first utilize an alternative indicator of the severity of the Cultural Revolution: *CR words count*. As discussed in Section 2.3.3, *CR words count* represents the total number of words used to record the Cultural Revolution events in each county's local gazetteer. Walder (2014) argues that a higher number of words indicates a greater magnitude of the impact of the Cultural Revolution in the local area. We, therefore, replace the *CR mortality rate* with the *CR words count* and replicate each of the baseline regression specifications by way of a robustness check. The results obtained appear in Table 2.6.

[Insert Table 2.6 about here]

As we used the natural logarithm value of the Cultural Revolution words count, the resulting coefficients in Table 2.6 are of relatively small magnitude (as compared to the baseline coefficients in the respective Tables 2.3, 2.4, and 2.5). However, the CR word count variation does produce a statistically significant and similar pattern of results to those obtained in the baseline results with the *CR mortality rate*. Although we observe that the statistical significance of results decreases in some cases, it does not diminish the overall validity of this robustness check. This strengthens our original claim regarding the lingering impact of the Cultural Revolution manifesting through the mechanism of a reduced level of trust and impeding present-day financial development,

### 2.6.2. The confounding impact of Chinese Great Famine

The Chinese Great Famine (1959-1961) was one of the worst famines in China's history, with the estimated number of deaths ranging anywhere between 16.5 to 45 million individuals (Meng et al., 2015). Research indicates that the famine was caused by faults in the central planning system, aggravated by extreme weather events (Li & Yang, 2005). The disaster left behind it not only highly negative long-term health and socio-economic consequences (Chen & Zhou, 2007) but also a deep-rooted suspicion of politicians on the part of the general populace (Chen & Yang, 2019).

To allow for the impact of this disaster, we utilize data from Guo et al. (2020), who construct an intensity indicator for the Great Famine by measuring the shrink rate in birth cohort size that is obtained by comparing the Great Famine birth cohort with the equivalent three-year average both before and after the critical 1959-1961 period. These authors argue that this indicator reflects the increased mortality and reduced fertility that occurred during the Great Famine, thereby providing an inclusive measurement of the famine's intensity. Detailed explanations and statistics of *Great Famine intensity* are shown in Table 2.1 and Table 2.2. As these data capture the variation of the Great Famine's severity by county, we predict that a higher value of this indicator should jointly result in a lower trust value, lower access to finance, and lower trust in the financial system.

To investigate the possible confounding impact of the effects of the Chinese Great Famine and the Chinese Cultural Revolution, we follow the methodology of Balli & Sørensen (2013) and construct a formula that includes a demeaned interaction term, as shown in equation (3).

$$\begin{aligned} trust/finance_{i,c} = & \beta_0 + \beta_1 CR_c + \beta_2 GF_c + \beta_3 (CR_c - \widehat{CR}) (GF_c - \widehat{GF}) \\ & + F'_{i,c} \Gamma + H'_c \Omega + Z'_{i,c} \Theta + \varepsilon_{i,c} \end{aligned} \quad (3)$$

Where the *trust/finance*<sub>*i,c*</sub> represents the various outcome variables in our baseline results. The *CR*<sub>*c*</sub> and the *GF*<sub>*c*</sub> are our density indicators of the Cultural Revolution and the Great Famine, respectively. The  $(CR_c - \widehat{CR}) (GF_c - \widehat{GF})$  represents the demeaned interaction terms of these two key explanatory variables. Other control conditions remain the same as in our baseline OLS regressions. According to Balli & Sørensen (2013), this formula has the advantage of allowing a similar interpretation of the main-terms coefficients compared with the non-interacted regression, thereby facilitating direct comparison. As the availability of the Great Famine indicator as devised by Guo et al. (2020) only overlaps with half of the counties in our working sample of counties, we see a 50% reduction in the number of observations when comparing with our baseline results. For

convenience of interpretation and to facilitate comparison with our baseline results, we apply OLS regressions to all specifications.

[Insert Table 2.7 about here]

The first two columns of Table 2.7 (Panel A) report the regression results of equation (3). We find that the joint effect of the Cultural Revolution and the Great Famine is both statistically and empirically significant. For example, in column (3) of Panel A in Table 2.7, holding the *Great Famine intensity* constant, a one standard deviation increase of *CR mortality rate* leads to a 0.103 decrease of the score of *perceived ease of access to finance*. This is more than twice the magnitude of the impact compared with the baseline results, as shown in column (3) of Table 2.4. The results shown in Panel B in Table 7 suggest that the Great Famine effect magnifies the decreased generalized trust and trust in the financial system, resulting in less access to finance, more conservative portfolio allocation, and reduced participation in the financial market on the part of present-day households. Notably, the coefficients of the *CR mortality rate* across the specifications generally remain strongly significant even after considering the impact of the local *Great Famine intensity*.

Overall, the Great Famine shows a confounding negative impact on present-day financial development that acts jointly with the Cultural Revolution. This evidence confirms the cost to social capital that lingers on long after the original causal historical trauma. Notwithstanding the importance of the Great Famine, however, it is clear that our baseline results deriving from the effects of the Cultural Revolution remain significant.

### 2.6.3. The impact of education and income

In our baseline results, income and education are consistently significant factors affecting the trust, access to finance, and financial portfolio allocation observed among present-day residents of China. This section analyzes the possible differential impact of the Cultural Revolution on disparate economic and educational groups. In effect, we examine whether our baseline results are driven by a specific social-economic group rather than directly through general social norms of trust. We create two sets of sub-samples, wherein we divide the total sample of observations according to their education level (four categories) and quartile of income.

[Insert Table 2.8 about here]

The corresponding results can be found in Table 2.8, where each row represents one regression specification from our baseline research, and each column represents the key regression result for the corresponding sub-sample (the coefficient on CR mortality rate). Firstly, for education, we split the total sample into four groups: illiteracy, primary, secondary, and tertiary (or above). We find the higher education does not offset the deep-rooted distrust, as shown in the

first two rows. Notably, the adverse impact of the Cultural Revolution on trust is manifested more strongly in higher-educated groups. This is also true in terms of financial portfolio allocation, as can be seen in the row of *money loaned-out* and in investments in stocks and funds. Secondly, we find that all income quartile groups were negatively affected by the Cultural Revolution both regarding trust and access to finance. In some cases, the high-income groups reveal a more profound impact, such as *trust people outside of family* and *applied for bank loan*. For the financial portfolio management, we find the impact is uneven. The conservative behavior elicited by the traumas of the Cultural Revolution is most clearly observed in the 2nd quartile income group. However, the impact on security-market participation remains clear in higher-income groups. It is also worth bearing in mind that security-market investment for households in the bottom quartile is extremely rare, and there is a lack of observed activity on this dimension of financial behavior among the bottom quartile income group.

In summary, the evidence in this section indicates that the lingering impact of the Cultural Revolution is to be found across all social-economic groups, and our baseline results are not significantly driven by the performance of specific education or income groups. This result lends further support to our baseline argument, whereby the trauma of the Cultural Revolution continues to affect present-day financial development by shaping general social norms with regard to trust.

#### **2.6.4. Additional evidence: firm-level study**

We also conduct a firm-level study to examine our trust mechanism from an enterprise perspective. Researchers have presented evidence that local cultural norms alter the financial decisions of firms, and the channel through which this occurs is the managerial style of the relevant chief executive officers (Bigoni et al., 2016; Pierce & Snyder, 2017). We utilized the Chinese industrial enterprises (CIE) database to construct a set of firm-level trust-sensitive financial indicators. After merging with the Cultural Revolution data of Walder (2014), this firm-year panel data yields a rich set of observations covering the years from 2004 to 2013, enabling us to observe 2,048 present-day counties of China.

First, we construct *access to trade credits* as a dummy variable measuring the access to informal finance enjoyed by a firm. This is set equal to one if the firm makes use of trade credit with their trade partners and zero if not. Second, we construct *credit period*, which measures the proportion of a firm's total debt value that is in the form of long-term debt. A higher value of this index indicates a longer credit period that a firm can access. Then, we construct the variables *long-term investment ratio* and *short-term investment ratio*, which are percentile indicators that measure the

firm's investment as a proportion of its total assets. A higher value of these indicators suggests that this firm is more willing to engage with investment. A rich set of firm-level characteristics and fixed effects are included as control variables in this analysis: a dummy for each of state-ownership and foreign-ownership; firm-age, total assets (natural logarithm value), profitability (quick ratio and asset turnover); firm-size fixed effect; registration-type fixed effect; industry fixed effect; and firm-year fixed effect.

[Insert Table 2.9 about here]

Table 2.9 illustrates the regression results obtained at the firm level. We find the firm-level evidence to be consistent with our baseline household-level results. Firms in a high *CR mortality rate* county are less likely to have trade credits as financial support from their trading partners, and are making do with a shorter period of trade credit. They also have a more conservative operating strategy, which manifested as lower engagement with investment. The economic magnitude of some of these effects is also noticeable. For example, as shown in column (2), the firms located in the highest Cultural Revolution affected counties report a 2.05 ( $6.344 \times 0.323$ ) lower credit period index as compared with the lowest affected counties. This evidence further supports the mechanism that underpins our baseline research. The lingering impact of the Cultural Revolution works through negatively affected cultural norms, manifest as a decrease in social capital (trust) and more conservative financial behavior.

## 2.7. Causal Interpretation

In order to confirm a causal interpretation to the relationships established in our baseline research (Schneider, 2020), we adopt a Difference in Differences (DiD) approach (Bai & Wu, 2020; Kong et al., 2021) and apply the unobservable-selection bias test (Oster, 2019) upon the baseline results. The evidence supports our claim of a causal relationship between the historical trauma of the Cultural Revolution and present-day financial development in China.

### 2.7.1. Difference in Differences: Cohort study

It has been argued that the Cultural Revolution created a cross-cohort variation of trust formation which opens the way to conduct a Difference in Differences (DiD) test for persistent outcomes arising from the Cultural Revolution (Bai & Wu, 2020; Kong et al., 2021). Drawing on this stream of literature, we construct a Cultural Revolution cohort variable (CR cohort) for those within our study sample by using an individual's year of birth.

Van Den Bos et al. (2010) define adolescence, being from 9 to 22 years of age, as a "trust-development period". After this stage, the individual's value of trust and reciprocity becomes stable.

Adopting this perspective, our *CR cohort* should be those individuals born between 1944 and 1968. This range would include the persons who were less than 22 years old when the Cultural Revolution was launched, and at least 9 years old before the termination of the Cultural Revolution. For the control group, we limit the birth year of those included in the test to those born in the years 1936-1943 and 1969-1978, which is 10 years before and after the Cultural Revolution's zone of influence. Considering the present-day old age of the 1934-1944 birth cohort, it is clear that the comparison group will have a right-skewed distribution. We use the formulation in equation (3), as discussed in Section 2.6.2, to construct the DiD interaction term.

[Insert Table 2.10 about here]

We show the DiD results in Panel A of Table 2.10 and append the statistics of the balance tests (Goodman-Bacon, 2021) in Panel B. As we can see in Panel A, the CR cohort manifests a more profound trauma and reports less trust and less access to finance than the control cohorts. It is worth discussing that because of this natural right-skewed distribution, the *CR cohort* is on average 6.6 years older and has one year less education when comparing with the control group. In non-reported results, we find the *CR cohort* does not report a significant difference concerning financial portfolio management. One potential reason for this result might be the unbalanced nature of the distribution of observations. However, the DiD approach does provide a further dimension of support for the persistent impact of the Cultural Revolution, and the results further strengthen the claim for a causal interpretation of the mechanism.

### 2.7.2. Unobservable selection bias test

Omitted-variable bias has been a frequent concern in non-experimental empirical estimation, and it raises questions concerning any causal interpretation. Since Altonji et al. (2005), the coefficient stability test, which assesses the presence of omitted variables bias, has been widely adopted in socio-economic research (e.g., Bellows & Miguel, 2009; McKenzie, 2012) as a way of testing for such possible bias. Recently, Oster (2019) has developed this into a new test that utilizes the coefficient changes and the corresponding R-square movement when evaluating the omitted variables bias. This approach argues that the impact of the inclusion of observable factors is informative in terms of the unobservables, and we can assess the unobservable-selection bias in proportion to coefficient movements when scaled by the corresponding movement in the R-squared.

Oster (2019) proposes two alternative indices to measure the unobservable selection bias,  $\delta$  and  $\beta$ . The  $\delta$  index indicates the weight on unobservables required to make an equivalent impact as observables. Oster (2019) argues 1 is the proper criteria for  $\delta$ , and a  $\delta$  value higher than 1

indicates that observable variables dominates the regression results. The  $\beta$  index examines the treatment effect under the assumption of both no informative relationship ( $\delta=0$ ) and equal selection ( $\delta=1$ ) between observables and unobservables in the regression. If the  $\beta$  index does not change its sign of value across the assumption of  $\delta=0$  and  $\delta=1$ , the corresponding specification is not seen as being driven by unobservables. We utilize both  $\delta$  and  $\beta$  to examine the robustness of our baseline arguments.

Table 2.11 shows the statistical results when applying Oster's (2019) method. Each row illustrates the value of  $\delta$  and  $\beta$  for each regression specification corresponding to our baseline research. We concentrate on those specifications that produced significant results in our baseline analysis to test whether the significant results are unreliable owing to the presence of unobservable factors. Column (1) of Table 2.11 reports the estimated value of Oster's  $\delta$  for the corresponding specification. Our results universally reject the hypothesis of unobservable selection bias. For example, as we can see in row (1) of column (1), the value of 5.03085 indicates that the selection on unobservables would need to be weighted more than five times relative to observables to make the treatment effect of CR mortality rate equal to zero. Columns (2) and (3) report Oster's (2019)  $\beta$  index when setting  $\delta$  equal to 0 and 1, respectively. We find that the value of the  $\beta$  index never changes the sign across specifications. This indicates that the significant results in our baseline research are not driven by unobservable selection bias, no matter whether or not the unobservables are informative to observables in our regressions.

Overall, the evidence in this section supports a causal interpretation of the relationship between the Cultural Revolution and present-day financial development

## **2.8. Discussion and Conclusion**

The Cultural Revolution brought about a decade of social turmoil and extensive violence across the whole of China, its effects being more pronounced in some areas than others (Dikötter, 2017). While the persistence of the effects of these "bitter ten years" on individuals has been identified (Bai & Wu; 2020; Roland & Yang, 2017), very few papers examine the extent to which this event has shaped the present-day disparity of regional socio-economic outcomes.

We establish consistent results that indicate the Cultural Revolution, and the ten years of social turmoil and massive persecution that it represented, decreased the population's trust in a way that persists long after the end of that movement and continues to impede financial development to the present-day. We first establish a robust relationship between the historical intensity of the Cultural Revolution and the level of trust found among the local population in present-day China. We show that the mistrust generated by the Cultural Revolution can be traced

to present-day difficulties that confront households when raising money or, equally, when considering providing finance to others. At the same time, this mistrust found in present-day households undermines trust in the financial system and the willingness to participate in financial markets. This is reflected by the choice of higher flexibility of wealth deposits and by more conservative financial portfolio allocation.

We conduct a series of robustness checks on the claim for a causal interpretation of our argument. First, we show the results continue to hold when we replace the key explanatory variable *CR mortality rate* with *CR words count*, an alternative intensity indicator of the Cultural Revolution. Second, we show that the impact of the Cultural Revolution is not confounded by the Great Famine of China, another catastrophic event in China's history. Third, the negative influences from the Cultural Revolution to present-day household finance are not weakened by higher education or higher household income. We also find comparable results when utilizing firm-level data to examine the disparity of financial behaviors across regions. Finally, the statistical procedures of Difference in Differences (DiD), and various unobservable-selection bias tests all confirm that the relationship between the intensity of the historical Cultural Revolution and present-day financial development can sustain a causal interpretation.

Our research has extensive implications. First, our evidence supplements the argument that the present-day cultural norm of trust can be viewed as being influenced by and reflecting historical experience (Levine et al., 2020; Nunn, 2020). The Cultural Revolution, which happened decades ago, continues to exert a lingering influence that can be seen empirically in the level of trust among present-day individuals. This finding helps us to better understand the formation and disparity of social capital across regions.

Second, this paper views present-day finance through the theoretical lens of history and finance (D'Acunto, 2017; Klüppel et al., 2018). In so doing, it highlights the importance of social capital as the mechanism that links the historical social shocks to the variation of present-day financial development across regions. Our findings suggest that such cultural legacies of historical social shocks and their subsequent persistent financial costs merit further investigation.

Third, our study adds to the discussion of development. Development is an outcome that originates from multiple factors. Financial development has played a central role in fueling economic expansion (Calderon et al., 2002). By understanding the cultural traits that hinder present-day financial outcomes, we shed light on where and how to tackle inequality in development.

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**Table 2.1 Variable definitions**

<b>Variable</b>	<b>Definition</b>
<i>Variables during and after the Cultural Revolution</i>	
CR mortality rate (%)	The total number of the reported unnatural deaths in each county during the Cultural Revolution divided by county population in 1964. Original data source: Walder (2014) data, variable name: deaths.
Han-race rate	The proportion of Han race among the county's total population in 1964. Original data source: Walder (2014) data, variable name: hanpop and totalpopu.
Urbanization rate	The proportion of urban population among total population in the county in 1964. Original data source: Walder (2014) data, variable name: urbanpop and totalpopu.
Distance to provincial capital	The distance from the county to the provincial capital city (kilometer). Original data source: Original data source: Walder (2014) data, variable name: distance.
<i>Contemporary social capital and household finance</i>	
Trust family members	The respondents' self-reported trust level regarding their family members. Original data source: CHIP, variable p03_1.
Trust people outside of family	The respondents' self-reported trust level regarding people except for their family members. Original data source: CHIP, variable p03_2.
Perceived ease of access to finance	The respondents' self-reported level of access to external finance, considering both channels, including borrowings from friends/relatives and bank loans. Original data source: CHIP, variable n02_1 and n03_1.
Applied for bank loan	Whether the household applied for a bank loan last year. Original data source: CHIP, variable n02.
Borrowed from friends/relatives	Whether the household asked a borrowing from relatives or friends last year. Original data source: CHIP, variable n03.
Reason why did not try to borrow: did not perceive the need	If the respondent did not ask for a loan from relatives or friends last year, what reason: did not need a borrowing. Original data source: CHIP, variable n03_2.
Reason why did not try to borrow: felt that would be rejected	If the respondent did not ask for a loan from relatives or friends last year, what reason: self-estimate that the borrowing would be rejected. Original data source: CHIP, variable n03_2.
Pct in financial assets: cash stored in home	The percentage of cash and equivalent value on total financial assets in each household. Original data source: CHIP, variable f03 and f03_1.
Pct in financial assets: current deposit	The percentage of current deposit value on total financial assets in each household. The current deposit can be withdrawn anytime while has a relatively lower interest rate. Original data source: CHIP, variable f03 and f03_2.
Pct in financial assets: fixed-term deposit	The percentage of fixed-term deposit value on total financial assets in each household. The fixed-term deposit can only be withdrawn after a certain period, typically one to three years. It has a relatively higher interest rate. Original data source: CHIP, variable f03 and f03_3.
Pct in financial assets: money loaned out	The percentage of loaned-out money value on total financial assets in each household. This indicator

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Pct in financial assets: bond	measures the willingness for household to financially support to relatives or friends. Original data source: CHIP, variable f03 and f03_11.
Pct in financial assets: stock	The percentage of bond value on total financial assets in each household. The term of bond here includes state bonds and commercial bonds. Original data source: CHIP, variable f03, f03_5 and f03_6.
Pct in financial assets: fund	The percentage of stock value on total financial assets in each household. The term of stock here is the securities trading in the stock exchange. Original data source: CHIP, variable f03 and f03_7.
<i>Variables in robustness checks</i>	
CR words count (log)	The percentage of fund value on total financial assets in each household. The term of fund here is commercial funds provided by banks and financial institutions. Original data source: CHIP, variable f03 and f03_8.
Great Famine intensity	The word number that counts for the Cultural Revolution events in local county gazetteers. We compile the words count in all sections in local gazetteers. Original data source: Walder (2014) data, variable name: words1, words2 and words3.
Access to trade credits	The intensity indicator of the Great Famine (1959-1961) in China. Measured by the shrink rate of birth cohort size when comparing the Great Famine birth cohort with the three-year average before and after 1959-1961. It reflects both the increased mortality, reduced fertility, and unnatural deaths during the Great Famine. Original data source: Guo, Gao, and Liang (2020).
Credit period	A dummy variable that equals to one when the firms claim to endow trade credits from their trade partners in the last fiscal year. Original data source: Chinese industrial enterprises (CIE).
Long-term investment	The percentage of long-term debt value by total debt value. A higher value indicates a longer credit period. Original data source: Chinese industrial enterprises (CIE).
Short-term investment	The percentage of long-term investment value by total asset. A higher value indicates a higher willingness to invest in long-term projects. Original data source: Chinese industrial enterprises (CIE).
	The percentage of short-term investment value by total asset. A higher value indicates a higher willingness to invest in short-term projects. Original data source: Chinese industrial enterprises (CIE).

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**Table 2.2 Summary of statistics**

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>P25</b>	<b>P75</b>	<b>Min</b>	<b>Max</b>
<i>Variables during and after the Cultural Revolution</i>							
CR mortality rate (%)	115	0.0250	0.0510	0	0.0230	0	0.323
Han-race rate	114	0.935	0.154	0.964	1	0.145	1
Urbanization rate	115	0.0980	0.160	0.0330	0.0970	0.00900	1
Distance to provincial capital (km)	115	56.85	38.41	30.77	86.35	0	177.0
longitude	114	112.6	6.168	107.3	116.8	98.43	124.2
latitude	114	32.47	5.083	29.47	36.62	22.40	41.84
<i>Contemporary social capital and household finance</i>							
Trust family members	32790	3.795	0.859	3	4	1	5
Trust people outside of family	32797	3.181	0.799	3	4	1	5
Perceived ease of access to finance	33313	1.308	0.559	1	2	1	3
Applied for bank loan	32592	0.129	0.336	0	0	0	1
Borrowed from friends/relatives	32537	0.298	0.457	0	1	0	1
Reason why did not try to borrow: did not perceive the need	22746	0.878	0.327	1	1	0	1
Reason why did not try to borrow: felt that would be rejected	22746	0.0310	0.174	0	0	0	1
Pct in financial assets: cash stored in home	30128	32.89	36.66	5.660	50	0.204	100
Pct in financial assets: current deposit	25331	37.87	34.30	5.745	71.43	0	100
Pct in financial assets: fixed-term deposit	21549	44.74	36.64	0	78.95	0	98.52
Pct in financial assets: money loaned out	16183	2.839	10.20	0	0	0	75
Pct in financial assets: bond	15221	0.007	0.205	0	0	0	7.519
Pct in financial assets: stock	15385	0.218	2.053	0	0	0	29.20
Pct in financial assets: fund	15345	0.125	1.237	0	0	0	18.75
<i>Variables in robustness checks</i>							
CR words count (log)	115	8.281	0.658	7.863	8.726	5.429	9.742
Great Famine intensity	64	0.0940	0.860	-0.544	0.409	-0.817	3.364
Access to trade credits	2273386	0.784	0.411	0	1	1	1
<b>Credit period</b>	1883246	11.91	24.59	0	0	8.724	100
<b>Long-term investment</b>	759402	0.267	1.424	0	0	0	15.80
<b>Short-term investment</b>	758335	0.012	0.147	0	0	0	3.205

**Table 2.3. Trust**

This table reports the baseline regression results of the Cultural Revolution density on the present-day trust among residents. All specifications have the identical explanatory variable: *CR mortality rate*, which is the reported unnatural deaths in each county during the Cultural Revolution divided by county population in 1964. The *trust family members* represents the respondents' self-reported trust level regarding their family members (scale value 1-5), while the *trust people outside of family* represents the respondents' self-reported trust level regarding people except their family members (scale value 1-5). The *individual characteristics* include the respondents' age, age-squared, gender, income (natural logarithm value) and education level. The *historical controls* include the Han-race rate, urbanization rate, and distance to the provincial capital for the county in 1964. The *individual fixed effects* are a set of individual-level fixed effects that include race category, residence status, marriage status, political status. The *county-specific controls* are a set of county-level specific covariates, including the longitude and latitude of each county and the city-type fixed effect. The parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Trust family members				Trust people outside of family			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
CR mortality rate (%)	-0.800*** (0.000)	-0.984*** (0.000)	-0.972*** (0.000)	-1.319*** (0.000)	-0.784*** (0.000)	-0.759*** (0.000)	-0.845*** (0.000)	-1.157*** (0.000)
Age		0.106 (0.611)	0.086 (0.681)	0.145 (0.584)		-0.077 (0.688)	0.024 (0.900)	0.040 (0.877)
Age2		-0.045 (0.834)	-0.007 (0.976)	-0.032 (0.906)		0.146 (0.455)	0.070 (0.720)	0.090 (0.738)
Gender		-0.021*** (0.000)	-0.020*** (0.000)	-0.028*** (0.000)		-0.015*** (0.001)	-0.017*** (0.000)	-0.023*** (0.000)
Income (log)		0.036*** (0.002)	0.039*** (0.002)	0.049*** (0.002)		-0.035*** (0.002)	-0.033*** (0.004)	-0.045*** (0.004)
Education level		0.057*** (0.000)	0.057*** (0.000)	0.080*** (0.000)		0.008 (0.375)	0.018* (0.062)	0.025* (0.053)
Individual characteristics	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Historical controls	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Individual fixed effects	No	No	Yes	Yes	No	No	Yes	Yes
County-specific controls	No	No	Yes	Yes	No	No	Yes	Yes
Specification	OLS	OLS	OLS	O-Probit	OLS	OLS	OLS	O-Probit
Observations	32790	32339	31690	31690	32797	32346	31695	31695

**Table 2.4. Access to finance**

This table reports the baseline regression results of the Cultural Revolution density on the present-day residents' access to finance. All specifications have the identical explanatory variable: *CR mortality rate*, which is the reported unnatural deaths in each county during the Cultural Revolution divided by county population in 1964. The *perceived ease of access to finance* represents respondents' self-reported level of access to external finance, from both formal banking channel and informal credit channel (scale value 1-3). The *applied for bank loan* represents whether the household applied for a bank loan last year (dummy value 0-1). The *borrowed from friends/relatives* represents whether the household asked a borrowing from relatives or friends last year (dummy value 0-1). For the *reason why did not try to borrow*, we analysis what reason the residents did not ask for a loan from relatives or friends last year, with two perspectives: *did not perceive the need* or *felt that would be rejected*. The *individual characteristics* include the respondents' age, age-squared, gender, income (natural logarithm value) and education level. The *historical controls* include the Han-race rate, urbanization rate and distance to the provincial capital for the county in 1964. The *individual fixed effects* are a set of individual-level fixed effects that include race category, residence status, marriage status, political status. The *county-specific controls* are a set of county-level specific covariates, including the longitude and latitude of each county and the city-type fixed effect. The parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Perceived ease of access to finance		Applied for bank loan	Borrowed from friends/relatives	Reason why did not try to borrow:	
	(1)	(2)	(3)	(4)	Did not perceive the need (5)	Felt that would be rejected (6)
CR mortality rate (%)	-0.930*** (0.000)	-2.816*** (0.000)	-0.415*** (0.000)	-0.795*** (0.000)	-0.333*** (0.000)	0.074* (0.059)
Age	-0.088 (0.491)	0.184 (0.572)	0.047 (0.554)	0.012 (0.914)	0.183** (0.047)	-0.013 (0.789)
Age <sup>2</sup>	-0.243* (0.054)	-1.062*** (0.002)	-0.203** (0.015)	-0.382*** (0.001)	-0.111 (0.237)	-0.012 (0.788)
Gender	-0.004 (0.174)	-0.009 (0.265)	-0.003 (0.147)	0.005* (0.064)	-0.001 (0.606)	0.002 (0.221)
Income (log)	0.008 (0.344)	0.018 (0.383)	0.035*** (0.000)	-0.024*** (0.000)	0.032*** (0.000)	-0.005* (0.072)
Education level	0.013** (0.049)	0.029* (0.066)	0.020*** (0.000)	-0.014*** (0.009)	0.005 (0.283)	-0.004* (0.085)
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
County-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Specification	32177	32177	31524	31505	22096	22040
Observations	OLS	O-Probit	Probit	Probit	Probit	Probit

**Table 2.5. Financial portfolio**

This table reports the baseline regression results of the Cultural Revolution density on the present-day residents' financial portfolio allocation. All specifications have the identical explanatory variable: *CR mortality rate*, which is the reported unnatural deaths in each county during the Cultural Revolution divided by county population in 1964. Each column in this table represents a different regression specification based on different dependent variables. The dependent variables are percentile values of the corresponding portfolio by the total financial assets for each household. The *individual characteristics* include the respondents' age, age-squared, gender, income (natural logarithm value), and education level. The *historical controls* include the Han-race rate, urbanization rate, and distance to the provincial capital for the county in 1964. The *individual fixed effects* are a set of individual-level fixed effects that include race category, residence status, marriage status, political status. The *county-specific controls* are a set of county-level specific covariates, including the longitude and latitude of each county and the city-type fixed effect. The parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	The percentage of each portfolio's value by financial asset						
	Cash stored in home (1)	Current deposit (2)	Fixed-term deposit (3)	Money loaned out (4)	In bonds (5)	In stocks (6)	In funds (7)
CR mortality rate (%)	1.708 (0.751)	58.719*** (0.000)	-38.454*** (0.001)	-3.613** (0.027)	-0.295* (0.092)	-1.119*** (0.002)	-0.128 (0.322)
Age	-14.938** (0.017)	-10.068 (0.412)	23.927* (0.081)	0.774 (0.761)	0.299 (0.346)	0.572 (0.249)	0.561** (0.017)
Age <sup>2</sup>	10.273 (0.103)	1.181 (0.925)	-9.615 (0.495)	-1.828 (0.506)	-0.248 (0.409)	-0.702 (0.143)	-0.528** (0.036)
Gender	0.025 (0.877)	0.443 (0.139)	-0.106 (0.751)	0.035 (0.551)	-0.008 (0.253)	-0.018 (0.229)	-0.022** (0.015)
Income (log)	-2.444*** (0.000)	-2.939*** (0.001)	3.742*** (0.000)	0.955*** (0.000)	0.021** (0.010)	0.077*** (0.007)	0.017 (0.134)
Education level	-0.623** (0.046)	-1.626*** (0.004)	1.184* (0.067)	-0.211* (0.099)	0.015 (0.278)	0.066** (0.015)	0.042** (0.022)
Individual characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Individual fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
County-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Specification	12608	12489	12426	12474	12432	12475	12453
R <sup>2</sup>	0.050	0.109	0.099	0.035	0.020	0.038	0.031

**Table 2.6. Robustness: words count as alternative Cultural Revolution (CR) indicator**

This table reports the robustness regression results when utilizing the *CR words count* as the alternative indicator of the Cultural Revolution density. Each column in this table represents a different regression specification based on different dependent variables. All the dependent variables are parallel to the variables that has been adopted in our baseline results as shown in Table 3, 4 and 5. Panel A and Panel B differ in the type of regression and characteristics of dependent variables. The *full control settings* represent all the controls adopted in the baseline regressions, including individual characteristics, historical controls, individual fixed effects, and *county-specific controls*. The parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

Panel A	Trust family members (1)	Trust people outside of family (2)	Perceived ease of access to finance (3)	Applied for a bank loan (4)	Borrowed from friends/relatives (5)
CR words count (log)	-0.090*** (0.000)	-0.055*** (0.004)	-0.138*** (0.000)	-0.019*** (0.000)	-0.036*** (0.000)
Full control settings	Yes	Yes	Yes	Yes	Yes
Specification	Ordered-Probit	Ordered-Probit	Ordered-Probit	Probit	Probit
Observations	31690	31695	32177	31524	31505

Panel B	The percentage of each portfolio's value on total financial asset						
	Cash stored in home (1)	Current deposit (2)	Fixed deposit (3)	Money loaned-out (4)	In bonds (6)	In stocks (7)	In funds (8)
CR words count (log)	-0.556 (0.284)	3.783*** (0.000)	-1.607 (0.181)	-0.681*** (0.004)	-0.013 (0.643)	0.016 (0.509)	-0.556 (0.284)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Specification	OLS	OLS	OLS	OLS	OLS	OLS	OLS
Observations	12608	12489	12426	12474	12432	12475	12453

**Table 2.7. Robustness: confounding impact of the Chinese Great Famine**

This table reports the robustness regression results when considering the *Great Famine intensity* as a confounding factor along with the Cultural Revolution density. The *Great Famine intensity* is collected from Guo et al. (2020), which measures the shrink rate of birth cohort size when comparing the Great Famine birth cohort with the three-year average before and after 1959-1961. The  $c\_CR*c\_Famine$  represents the demeaned interaction terms of these two key explanatory variables (Balli & Sørensen, 2013). All the dependent variables are parallel to the variables that has been adopted in our baseline results as shown in Table 3, 4 and 5. Panel A and Panel B differ in the type of regression and characteristics of dependent variables. The *full control settings* represent all the controls adopted in the baseline regressions, including individual characteristics, historical controls, individual fixed effects, and *county-specific controls*. The parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

Panel A	Trust family members (1)	Trust people outside of family (2)	Perceived ease of access to finance (3)	Applied for a bank loan (4)	Borrowed from friends/relatives (5)
CR mortality rate (%)	-0.508** (0.036)	-0.355 (0.145)	-0.568*** (0.000)	-0.249*** (0.000)	-0.453*** (0.000)
Great Famine intensity	0.012 (0.373)	-0.023* (0.088)	0.015* (0.095)	-0.001 (0.790)	0.012 (0.137)
$c\_CR*c\_Famine$	-2.383*** (0.000)	-1.948*** (0.000)	-1.355*** (0.000)	-0.322*** (0.009)	-1.107*** (0.000)
Full control settings	Yes	Yes	Yes	Yes	Yes
Observations	18248	18251	18520	18166	18138

Panel B	The percentage of each portfolio's value on total financial asset						
	Cash stored in home (1)	Current deposit (2)	Fixed deposit (3)	Money loaned-out (4)	In bonds (6)	In stocks (7)	In funds (8)
CR mortality rate (%)	-5.804 (0.350)	78.451*** (0.000)	-63.750*** (0.000)	-2.548 (0.124)	-0.383*** (0.008)	-0.260 (0.258)	-0.100 (0.380)
Great Famine intensity	0.287 (0.680)	-1.016 (0.412)	-0.613 (0.634)	-0.502** (0.015)	-0.028** (0.017)	-0.014 (0.653)	-0.024 (0.298)
$c\_CR*c\_Famine$	-15.045 (0.275)	47.666* (0.072)	-25.014 (0.398)	-15.412*** (0.000)	-0.875** (0.014)	-0.085 (0.916)	-0.583 (0.166)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7616	7545	7520	7555	7548	7562	7557

**Table 2.8. Robustness: the impact of education and income**

This table reports the robustness regression results when doing sub-sample analysis. We consider the respondents' education level and income level and analyze the Cultural Revolution density on the different groups. All the dependent variables are parallel to the variables that have been adopted in our baseline results. Each row represents the results from one specification, and each column shows the results of the specification using the corresponding sub-sample as observations. The *full control settings* represent all the controls adopted in the baseline regressions, including individual characteristics, historical controls, individual fixed effects, and *county-specific controls*. The parentheses contain p-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Education level				Income level			
	Illiteracy (1)	Primary (2)	Secondary (3)	Tertiary (4)	Bottom quartile (5)	2nd quartile (6)	3rd quartile (7)	Top quartile (8)
<b>The key explanatory variable is CR mortality rate (%)</b>								
Trust family members	-0.436 (0.588)	-1.252*** (0.000)	-1.449*** (0.000)	-1.478*** (0.001)	-1.142** (0.021)	-0.304 (0.560)	-2.051*** (0.000)	-1.653*** (0.001)
Trust people outside of family	-0.361 (0.659)	-0.910*** (0.002)	-1.913*** (0.000)	-1.098** (0.018)	-0.771 (0.161)	-0.943* (0.066)	-1.005* (0.053)	-1.767*** (0.001)
Perceived ease of access to finance	-2.913*** (0.004)	-2.391*** (0.000)	-4.109*** (0.000)	-2.946*** (0.000)	-3.033*** (0.000)	-1.974*** (0.003)	-3.809*** (0.000)	-3.246*** (0.000)
Applied for a bank loan	-0.808 (0.534)	-1.749*** (0.000)	-3.480*** (0.000)	-2.286*** (0.002)	-0.984 (0.306)	-1.968** (0.046)	-2.853*** (0.001)	-2.958*** (0.000)
Borrowed from friends/relatives	-3.062*** (0.004)	-1.974*** (0.000)	-3.574*** (0.000)	-2.862*** (0.000)	-2.580*** (0.000)	-1.667** (0.012)	-3.370*** (0.000)	-2.872*** (0.000)
Pct in financial assets: cash and equivalent	32.619* (0.081)	2.330 (0.718)	-2.637 (0.742)	-3.894 (0.704)	11.079 (0.359)	-1.747 (0.873)	5.479 (0.596)	-1.601 (0.871)
Pct in financial assets: current deposit	-1.047 (0.972)	69.304*** (0.000)	33.369** (0.020)	68.397*** (0.000)	40.266* (0.072)	132.555*** (0.000)	17.586 (0.347)	44.169** (0.015)
Pct in financial assets: fixed-term deposit	-36.297 (0.276)	-56.577*** (0.000)	-7.086 (0.688)	-10.870 (0.616)	-22.142 (0.405)	-104.440*** (0.000)	-4.161 (0.845)	-26.281 (0.232)
Pct in financial assets: money loaned-out	8.145 (0.227)	-2.784* (0.082)	-5.295** (0.027)	-9.483** (0.014)	0.133 (0.939)	-5.621** (0.017)	-6.476* (0.075)	-4.525 (0.194)
Pct in financial assets: bonds	-0.442 (0.315)	-0.234 (0.106)	-0.314 (0.445)	-0.029 (0.894)	.	-0.546 (0.321)	-0.094 (0.318)	-0.022 (0.917)
Pct in financial assets: stocks	-0.212 (0.619)	-0.241** (0.038)	-2.018** (0.038)	-3.525** (0.017)	.	0.337 (0.152)	-1.694* (0.092)	-2.063* (0.073)
Pct in financial assets: funds	-0.443 (0.203)	-0.150* (0.087)	0.271 (0.401)	-1.039** (0.020)	.	-0.175 (0.169)	-0.317 (0.268)	0.155 (0.652)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

**Table 2.9. Robustness: firm access to finance**

This table reports the robustness regression results when replacing the dependent variables with firm-level variables collected from Chinese industrial enterprises (CIE) database. Each column represents a different regression specification based on different dependent variables. The *access to trade credit* represents whether the firm has trade credits from their trade partners in the last fiscal year (dummy value 0-1). The *credit period* represents the percentile value of long-term debt value by total debt value, where a higher value indicates longer credit period. The *long-term investment* and the *short-term investment* represent the percentage of long-term investment and short-term investment value by total asset value, individually. The *firm-specific controls* include a dummy of state-ownership and foreign-ownership, firm age, total asset (natural logarithm value), and profitability (quick ratio and asset turnover). The *firm size/type fixed effects* represent firm-size fixed effect (3 categories) and registration-type fixed effect (25 categories). The *firm-year fixed effect* includes 10 dummies representing the firm-year between 2004 and 2013, while the industry fixed effect represents the 68 industrial categories. The parentheses contain p-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Access to trade credit (1)	Credit period (2)	Long-term investment (4)	Short-term investment (5)
CR mortality rate (%)	-0.106*** (0.000)	-6.344*** (0.000)	-0.039 (0.521)	-0.022*** (0.000)
State ownership	0.011*** (0.000)	0.870*** (0.000)	0.023 (0.253)	-0.002 (0.138)
Foreign ownership	-0.001 (0.645)	-0.671*** (0.000)	0.078*** (0.000)	-0.002* (0.075)
Firm age	0.001*** (0.000)	-0.010*** (0.005)	0.011*** (0.000)	0.000** (0.029)
Total asset (log)	0.003*** (0.000)	2.081*** (0.000)	0.134*** (0.000)	0.001*** (0.000)
Quick ratio	0.001*** (0.000)	1.599*** (0.000)	-0.003*** (0.000)	0.001*** (0.000)
Current asset turnover	-0.001*** (0.000)	0.238*** (0.000)	-0.000 (0.787)	0.000*** (0.000)
Firm-specific controls	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes
Firm size/type fixed effects	Yes	Yes	Yes	Yes
Firm-year fixed effect	Yes	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes	Yes
Observations	1,734,498	1,732,918	709,866	708,698
Specification	Probit	OLS	OLS	OLS

**Table 2.10. Difference in Differences: cohort study**

This table reports the causal interpretation results from the Difference in Differences (DiDs) regressions. For concision, we show the replication results of five key regression identifications about trust and access to finance. The *CR cohort* is the Cultural Revolution cohort individuals who were born between the years 1944 and 1968. The *c\_CR\*c\_cohort* is the demeaned interaction term of *CR mortality rate* and *CR cohort* according to the methodology of Balli & Sørensen (2013). Panel A reports the regression results, and Panel B reports the balance test of this DiDs approach. The *full control settings* represent all the controls adopted in the baseline regressions, including individual characteristics, historical controls, individual fixed effects, and *county-specific controls*. The parentheses contain p-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Panel A: difference in differences**

	Trust family members (1)	Trust people outside of family (2)	Perceived ease of access to finance (3)	Applied for a bank loan (4)	Borrowed from friends/relatives (5)
CR mortality rate (%)	-0.888*** (0.000)	-0.890*** (0.000)	-0.922*** (0.000)	-0.305*** (0.000)	-0.758*** (0.000)
CR cohort	0.003 (0.899)	0.006 (0.794)	0.029* (0.087)	0.016 (0.129)	0.021 (0.117)
c_CR*c_cohort	-0.536** (0.035)	-0.192 (0.437)	-0.459*** (0.005)	-0.166 (0.101)	-0.275** (0.031)
Full control settings	Yes	Yes	Yes	Yes	Yes
Observations	21535	21538	21893	21418	21403

**Panel B: Balance test**

	CR cohort =0		CR cohort =1		Difference	Overall sample	
	Obs.	Mean	Obs.	Mean		Obs.	Mean
Age	8301	47.07	14250	54.66	7.591***	22551	51.87
Education years	7982	8.058	13679	7.177	-0.881***	21661	7.501
Income (log)	8255	10.62	14170	10.62	-0.002	22425	10.62
Gender	8301	0.510	14250	0.502	-0.008	22551	0.505

**Table 2.11. Unobservable-selection bias test**

This table reports the causal interpretation results from the unobservable-selection bias test according to the methodology of Oster (2019). We replicate all the regression specifications in the baseline analysis. The  $\delta$  index indicates the weight of selection on unobservables to make an even impact as the observables. The  $\beta$  indicates the treatment effect under the assumption of no informative relationship ( $\delta=0$ ) and equal selection ( $\delta=1$ ) between observables and unobservables. The *full control settings* represent all the controls adopted in the baseline regressions, including individual characteristics, historical controls, individual fixed effects, and *county-specific controls*. The parentheses contain p-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Independent variable: CR mortality rate (%)		
	Oster's (2019) $\delta$ value	Oster's (2019) $\beta$ value when:	
	(1)	Setting $\delta = 0$ (2)	Setting $\delta = 1$ (3)
Trust family members	5.03085	-0.97216	-1.07577
Trust people outside of family	3.70622	-0.84526	-0.86256
Perceived ease of access to finance	-18.75478	-0.92961	-1.17608
Applied for a bank loan	-5.96539	-0.30244	-0.42155
Borrowed from friends/relatives	5.80907	-0.74266	-0.81601
Pct in financial assets: cash	-0.37298	1.70832	7.77831
Pct in financial assets: current deposit	-5.10602	58.71889	82.43910
Pct in financial assets: fixed-term deposit	-5.33666	-38.45372	-55.52677
Pct in financial assets: money loaned-out	4.51118	-3.61292	-3.62771
Pct in financial assets: bonds	-1.32265	-0.29497	-0.55176
Pct in financial assets: stocks	-1.45590	-1.11886	-2.01786
Pct in financial assets: funds	-0.70484	-0.12827	-0.36954
Full control settings	Yes	Yes	Yes

## 2.10. Appendix A. The context of the Cultural Revolution

Both international and domestic factors may have contributed to the origins of the Cultural Revolution (MacFarquhar & Schoenhals, 2009). Internationally, following the death of Stalin, his successor Khrushchev launched a propaganda campaign that was redolent with denunciations of the personality cult of Stalin. Mao feared a similar treatment. Meanwhile, the relationship between China and the USSR was cooling down. In the mid-1960s, a series of anti-Soviet polemics were issued in China denouncing the “phony communism” and “revisionism” under the Khrushchev regime. Chairman Mao and his allies portrayed the USSR as having forsaken Marxism-Leninism. They proclaimed a determination to prevent the same "capitalist restoration" that may have been emerging in China (Bai, 2014). Military tensions in the Taiwanese Strait created another trigger of the Cultural Revolution. Although defeated in the Chinese Civil War of 1946-1949 and expelled to Taiwan Island, the Nationalist Party (Guomindang) was still harboring the hope of retaking mainland China. Believing that considerable forces of the Nationalist Party remained in mainland China, Mao Zedong concluded that it was necessary to conduct a purge, thereby “Cleansing the bad classes.”

Domestically, the Great Leap Forward (1958) in conjunction with the subsequent Great Famine (1959-1961) represented a disastrous period for both the national economy and the Chinese populace. Partially due to the abnormal weather, but mainly caused by mistakes in central planning, this period claimed tens of millions lives (Cao, 2005; Li & Yang, 2005). Subsequently, Mao adopted a relatively low profile and spent much of his time outside of Beijing. During Mao’s absence, attempting to ameliorate the trauma created by the Great Leap Famine<sup>5</sup>, Shaoqi Liu and Xiaoping Deng and other party leadership members endorsed conservative policies aimed at repairing the national economy, especially the agricultural sector. However, some of these initiatives turned out to be ineffective, compounding the mistakes made in the Great Leap Forward and were undoubtedly viewed as objectionable by Mao (Bai, 2014). These pressures raised Mao’s concerns regarding his authority and legacy in the Chinese Communist Party (CCP). He worried that he might experience the same fate as Stalin in the Soviet Union. Moreover, Chairman Mao was also concerned that the members of CCP were becoming too bureaucratic, and were seeking personal gain rather than carrying out the ideology of communism. Mao saw the CCP as being threatened by “revisionism” (MacFarquhar & Schoenhals, 2009).

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<sup>5</sup> Sociologists have widely argued that the Great Leap Forward was a primary cause of the Great Famine. Consequently, scholars see these two historical events as one continuing event and name it the Great Leap Famine (Gooch, 2018).

A combination of these concerns led Mao to launch the Cultural Revolution. On the 17th of May 1966, the Central Committee of the CCP issued a directive in the "People's Daily." This formally announced the establishment of the Cultural Revolution Committee and emphasized that the primary mission of the CCP should be denouncing the revisionists inside of the Party and continuing the struggle of the proletariat against the bourgeoisie<sup>6</sup>. This article was seen as the bugle call that launched the Cultural Revolution national wide.

Mao's People's Daily Editorial of 1<sup>st</sup> of June contained the commands: "Wipe-out all the monsters and demons (sao chu yi qie niu gui she shen)" (MacFarquhar, 1974) and "protect Chairman Mao and the red regime". Summoned by this call, the initial wave of the movement was headed by Chinese youth, especially by college and university students. China's youth had always been identified as the successor revolutionaries. "Red Guard" organizations sprang up, starting in Beijing and soon established across the whole of China. These Red Guards conducted a series of nation-wide "Revolutionary Tours (da chuan lian)"<sup>7</sup>, which were supported by Mao and by all levels of government. However, it was soon to realize that any return to order would be difficult, the workers and peasants having joined the Red Guard movement in their masses. Additionally, violent means were rapidly becoming popular as a means of "Cleansing the bad classes". All levels of education in urban districts were closed down for two to three years from the beginning of the Cultural Revolution (Zhang et al., 2007). Students were instructed to learn 'Mao Zedong Thought', to denounce and struggle with the "class enemies" around them, and to fight against "the action of the counter-revolutionaries" in their own community (Walder, 2009). Following the instructions of Mao, the Red Guards launched the "Destroy the Four Olds (chu si jiu)"<sup>8</sup> campaign. Widespread "Criticize and Struggle Sessions (pi dou hui)" witnessed countless persecutions of people with a "bad class" element. Meanwhile, teachers and scholars frequently became a struggling target, as they were seen as the "reactionary bourgeois academic authorities." Moreover, the community and even family members of the Red Guards themselves were not exempt, as they were seen to stand for the "Old World" and the possible holding of conservative ideas regarding the revolution. (Walder & Su, 2003; Bai, 2014).

In early 1967, a wave of forced seizures of power (duo quan) was recorded across China. This popular insurgency against local authorities was encouraged by the state media. The Rebel Groups were allowed to travel freely throughout the railway system and permitted to publish their

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<sup>6</sup> Wen hua da ge ming yan jiu zi liao, 1988, p.4.

<sup>7</sup> Red Guards took public transportation (without payment) and crossed the country in order to exchange revolutionary ideas.

<sup>8</sup> These were Old Customs, Old Culture, Old Habits, and Old Ideas respectively. They were seen as elements incompatible with communism.

own newspapers. In the first quarter of 1967, local governments and party committees were mostly overthrown, ushering in universal civil strife and factional conflict among Rebel Groups, who fought to dominate the new local power system. The summer of 1967 was described as a situation of the civil war because armed battles between different factions had turned the streets and squares of several major cities into battlegrounds (MacFarquhar & Schoenhals, 2009). The unrest spread from the metropolis to outlying cities until the military started to interfere in 1967 and 1968, which resulted in even worse casualty figures than during the original repression (Walder, 2014; Walder & Lu, 2017). In an attempt to subdue the unrest and to reduce unemployment in the cities, Mao called upon the movement “go up to the mountains and down to the villages”, as “it is very necessary for the urban ‘educated youth’ to go to the countryside to be re-educated by the poor farmers!” (Zhang, Liu & Yung, 2007). This is well known as Mao’s ‘send-down’ movement, and was actually a large-scale rural rustication. Officially announced to start in 1968, it was estimated that by the end of 1978, this policy had moved a total of 17 million urban youths to rural areas (Zhou & Hou, 1999; He, 2018). Although most of them returned to city life after a few years of living and working in rural areas, roughly five percent of this cohort remained permanently in the countryside (Bai, 2014).

By 1968, the turmoil in the urban areas seemed to be under control. This followed the establishment of “Revolutionary Committees” that under martial law replaced the government system. This was when the campaign of “Cleansing the Class Ranks” got underway. This was the period of the most extensive and intensive cases of killing and persecution in the whole decade of the Cultural Revolution. In the highest ranks of the CCP, purges had already been implemented, with the Liu Shaoqi being the most prominent victim. As the president of China, Liu was denounced as the “biggest lackey of capitalism”, “China’s Khrushchev”. He was arrested in the spring of 1968 and died in November of 1969 (*Wen hua da ge ming yan jiu zi liao*, 1988, p. 625). The struggle within the highest echelons of power led to capricious directives emanating from the central party. MacFarquhar & Schoenhals (2009) argue that because of the impenetrable instructions issued by the central leadership during this period, this left ample space for local interpretation.

Consequently, in some places, this “Cleansing the Class Ranks” campaign became a massive persecution directed at those seen as being from or even potentially being from “bad class”. In some places, it was reduced to retributive torture and murder against factional rivals. In still others, it morphed into a widespread killing exercise aimed at imaginary mass conspiracies. According to Walder & Lu (2017), more than three-fourths of all unnatural deaths and more than

90 percent of all political persecutions in the decade took place between early 1968 and 1971. The year 1968 saw the worst period for victims. By early 1970, the situation had gradually moderated.

The downfall of Lin Biao is seen as the threshold of the return to order for the country. As one of the major protagonists in carrying out the Cultural Revolution, Lin intensified and fueled the propaganda boosting the personality cult of Mao. In 1969, he was officially appointed as Mao's successor. By this time, Lin Biao has already become the head of People's Liberation Army and the only vice-president of the nation. However, Lin Biao's right of succession was challenged following his attempt to forestall Mao's intent to abolish the post of national president in 1971. In September of 1971, there was an assassination attempt against Mao Zedong. This failed, and Lin and his supporters attempted to flee to the USSR. Lin died when the plane in which he was traveling crashed<sup>9</sup> (MacFarquhar & Schoenhals, 2009). Bai (2014) believes this event undoubtedly served to discredit the earlier propaganda that had proclaimed Lin as the "true Marxist Revolutionary" and "the closest comrade of Mao Zedong"<sup>10</sup>. " After this watershed event, the subsequent years are seen as a recovery period, although the so-called "Gang of Four," led by Mao's wife, Jiang Qing, continued to promote the Cultural Revolution. In the September of 1976, soon after Mao's death, the Politburo of the CCP overthrew the "Gang of Four," and this tumultuous decade finally ended.

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<sup>9</sup> This version of the story appears in the current official textbooks in China.

<sup>10</sup> These claims were written in the constitution of the Communist Party of China and published by People's Daily (Wen hua da ge ming yan jiu zi liao, 1988).

## Chapter 3 Historical anti-Semitism and firm access to finance

### Abstract

This paper analyzes the cultural link between anti-Jewish pogroms in the historical “Pale of Settlement” and the present-day access of firms to finance. Firms located in regions with a higher historical intensity of pogroms tend to experience higher financial constraints, which manifest in a higher reliance on internal finance, reduced access to trade-credit finance, and reduced access to banking finance. These effects diminish with distance from the site of historical pogrom activity. We argue that a financial-antipathy mechanism explains these effects. Our results are robust and consistent when utilizing alternative measurements of historical anti-Semitism, an alternative firm-level database, and allowing for the effects of communism and wars. A causal interpretation of our results is supported by the application of an instrumental variable approach, regression discontinuity design, an unobservables-selection test, and a spatial autocorrelation test.

### 3.1. Introduction

Ethnic discrimination has persistent socioeconomic effects. A report from McKinsey estimates that a racial wealth gap constrains the US economy, its dampening effect costing between \$1 trillion and \$1.5 trillion between 2019 and 2028, equivalent to 4 to 6 percent of the projected GDP in 2028<sup>11</sup>. The literature documents the financial costs that are associated with discrimination and are imposed on ethnic minorities, including tighter debt limits (Duca and Rosenthal, 1993), more expensive mortgage loans (Bayer et al., 2018), and higher underwriting costs when issuing bonds (Dougal, et al., 2019). The cost to financial development in general, however, is less well understood. As a case in point,<sup>12</sup> a persistent cultural trait, is found to reduce social capital (Grosfeld et al., 2013). Recognizing the importance of culture in explaining variations in financial development (Stulz and Williamson, 2003; Guiso et al., 2004), this study sets out to explain the external financing of present-day firms in terms of persistent cultural norms rooted in an antipathy to finance that developed alongside the anti-Semitism manifested in historical anti-Jewish pogroms.

Variations in financial and economic development can be explained by traumatic historical shocks that alter the trajectory of a country's institutions and cultures, such as colonization (Beck et al., 2003), slavery (Pierce and Snyder, 2018; Levine et al., 2020), or endemic disease (An et al., 2021). However, this strand of research mostly focuses on Africa and other former colonies, leaving European countries largely unexplored. Eastern Europe has long been argued as a “super-periphery” for its disappointing growth trajectory (Sokol, 2001). According to the World Inequality Lab (Blanchet et al., 2019), relative poverty in Europe is mainly manifested in the Eastern part, which is mirrored in a low growth rate, a situation that does not show any sign of convergence. Given the importance of finance in economic development, we provide the first evaluation, in terms of the present-day financial development in Eastern European countries, of the lingering effects of the historical anti-Jewish riots on the access to finance enjoyed by firms in that region.

Prior studies mainly discuss the economic backwardness of Eastern Europe as being a consequence of the fall of state-socialism (Alesina and Fuchs-Schündeln, 2007) and of the pain of the associated transition (Duch, 1995). However, a recent study by D'Acunto et al. (2019) opens up possibility that it is historical anti-Semitism, which pre-dates the communist regime, that explains the variation in financial development as manifested in the now re-united Germany. In a similar vein, we argue here that the under-developed nature of financial markets in Eastern Europe

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<sup>11</sup> See: <https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-economic-impact-of-closing-the-racial-wealth-gap>

<sup>12</sup> A growing body of the literature provides evidence for the cultural (Voigtländer and Voth, 2012) and the political determinants of historical anti-Semitism (Anderson et al., 2016; Finley and Koyama, 2018), as well as the economic incentives that shaped the geography of this ethnic hostility (Becker and Pascali, 2019).

can be explained by the cultural legacy of financial exclusion as nurtured by historical anti-Semitism, and it is this that underlies the current disparity in the financial development in Eastern European countries.

We analyze the territory of the historical norm of the “Pale of Settlement”, a western region of the Russian Empire, when between the early 1800s and 1927<sup>13</sup> Jews were forced to relocate alongside a non-Jewish majority. In the Pale, Jews specialized in financial services, as they were legally prohibited from owning land. This geographical locus was the scene of inter-ethnic tension, with the Jewish minority being the victims of discrimination, particularly when economic shocks coincided with political unrest, resulting in persecution (Grosfeld et al., 2020). Owing to the association of Jews with capitalism and the market economy of Eastern Europe in the 18<sup>th</sup> and 19<sup>th</sup> centuries, historical anti-Semitism developed into a persistent anti-market attitude, leaving a legacy of mistrust in market intermediaries and financiers that persists to this day - even after any physical presence of a local Jewish community has long ceased to exist<sup>14</sup> (Grosfeld et al., 2013; Grosfeld et al., 2020). Financial contracts are trust-intensive, and therefore, such a cultural legacy of financial antipathy can hinder financial development.

The historical presence of Jews in Eastern Europe is also found to have enhanced the within-group identification of the local non-Jewish majority, manifesting as “bonding trust” (Grosfeld et al., 2013). This strengthened trust enhanced the social capital of the non-Jewish majority (Putnam, 1994; Fukuyama, 1995), a persistent effect that survived the Holocaust-related extermination of the local Jewish community. However, Guiso et al. (2004) argue that only generalized trust across different social groups benefits the functioning of markets and the development of finance, suggesting that within-group “bonding trust” may play a limited role in mitigating the adverse effects of financial antipathy.

In this context, we analyze evidence from eight Eastern European countries regarding the effects of historical anti-Semitism on present-day external financing. To conduct this analysis, we use historical data on anti-Jewish pogroms obtained from Grosfeld et al. (2020) to generate indicators of pogrom occurrence across the territory of the Pale. Social capital data that describe present-day residents within the Pale are taken from the Life in Transition Survey (LITS). This household-level study is used to test the validity of the two mechanisms discussed above, namely the social capital legacies from historical anti-Semitism in the form of “anti-market sentiment” and

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<sup>13</sup> Our pogrom data are based on Grosfeld et al. (2020), whose study covers the period between 1800 and 1927. They argue that the Pale of Settlement remained in effect until the Soviet Collectivization in 1927.

<sup>14</sup> Any physical proximity ceased to be an issue following World War II, during which the Nazi Holocaust resulted in the systematic murder of the Jewish population within the Pale, resulting in a scarce presence of Jews in this territory today.

“bonding trust.” We also conduct a firm-level study to examine the net effect of these two mechanisms, adding to a growing literature that recognizes that social capital plays an essential role in determining a firm's access to finance (Pierce and Snyder, 2017; An, 2020). We follow this strand of theory and focus on the lingering effect of historical anti-Semitism on the financial constraints perceived by present-day firms in terms of access to internal finance, access to credit-based external finance, and access to banking finance. We collect firm-level indicators from the World Enterprise Survey (WES) as the primary data source, and utilize the Bureau van Dijk (BvD) database to check the consistency of our results.

We first show that residents from the regions that recorded a higher level of historical anti-Jewish pogroms within the Pale currently exhibit higher generalized social trust (a *bonding trust mechanism*), lower trust in the financial sector (a *financial antipathy mechanism*), a deprecation of minority rights, and lower entrepreneurial activity. We then analyze the net effects in terms of the link between financial development and historical anti-Semitism. We find that firms located in those regions with more historical pogroms experience more severe financial constraints, greater reliance on internal finance, and most importantly, lower access to external finance in both formal and informal channels. The results are robust to a rich set of controls for contemporary firm characteristics, local historical features, firm-size fixed effects, industry fixed effects, and year fixed effects. We argue that the *financial antipathy mechanism* hinders present-day financial development in those regions that witnessed a higher intensity of historical anti-Semitism, while the *bonding trust mechanism* is not sufficiently strong to counter this effect.

To support a causal interpretation of the findings in our baseline regressions, we employ an instrumental variable (IV) approach as an identification strategy. This utilizes three IVs, namely the “annual deviation of spring temperatures,” the “share of Jews among grain traders,” and the “literacy gap between Jews and non-Jews” during the historical period of the Pale. The first IV represents the economic trigger of anti-Jewish pogroms, while the other two IVs represent the source of ethnic tensions. This approach follows Grosfeld et al. (2020), who argue that these factors are associated with the outbreak of local anti-Jewish pogroms in the Pale. The subsequent results are in line with a causal interpretation of the effect of historical anti-Semitism on present-day access to finance.

We also conduct a battery of robustness checks. First, we replicate our baseline regression by replacing the key explanatory variable with a “pogrom dummy” and find parallel results compared with our baseline research, indicating both the magnitude and presence of anti-Jewish persecution matter. Second, we construct a “distance to pogrom” measure and establish the effect of the *financial antipathy mechanism* fades the greater the distance to the nearest recorded pogrom.

Third, using a regression discontinuity design (RDD) approach, we find a statistically significant structural break in access to finance across the historical border of Pale. We also establish that our baseline results are not driven by the military battles or communist ideology to which the territory of the Pale was exposed before, during and after the Second World War. In addition, we find significant and consistent results when replacing our firm-level database (WES) with a comparable alternative database (BvD). We also show that our results are not driven by unobservable factors (Oster, 2019) or spatial heteroscedasticity and autocorrelation (Hsiang, 2010). All these pieces of evidence support the validity of our baseline argument that the lingering effects of historical anti-Semitism adversely affect access to finance by present-day firms, an effect that works through the *financial antipathy mechanism*, which overwhelms the more positive *bonding trust mechanism*.

This paper contributes to the literature in several ways. First, we add to the research on the role of social capital in explaining the geographical variation of financial development (Putnam et al., 1994; La Porta et al., 1997). Trust, as an important dimension of social capital, plays a central role in economic and financial transactions (Guiso et al., 2009). Firms and households located in high trust regions are more willing to access financial markets (Ang et al., 2015; Bottazzi et al., 2016). Meanwhile, distrust in finance hinders local financial development by inhibiting access to financial services (Levine et al., 2020), limiting access to informal finance such as trade credit (Pierce and Snyder, 2017), and reducing willingness to invest in financial markets (D'Acunto et al., 2019). This paper examines the financial implications of a unique scenario wherein both general trust and trust in finance are linked to historical anti-Semitism but in different ways. Notably, the distrust in finance as a culture of financial antipathy is nurtured by historical anti-Semitism and overwhelms the related effect of increased general trust. The net effect is a persistent reduced access to trust-related finance as experienced by the firms and residents of the present-day territory of the Pale.

Second, our study also contributes to the literature on discrimination and the financial consequences of such actions. Stereotyping and unequal treatment regarding ethnic minorities incur financial costs in terms of tighter debt limits than non-minority families (Duca and Rosenthal, 1993) and higher-cost mortgage loans (Bayer et al., 2018). We add that the costs of discrimination are not limited to minorities. Our results show that historical animosity towards the Jewish minority spills over into a culture of antipathy to finance. This has been shown to impede household wealth accumulation (D'Acunto et al., 2019). We provide new evidence that such a cultural legacy holds back enterprises from fully engaging with finance.

Third, our research supplements a growing body of literature that utilizes historical events to establish causal relationships between deep-rooted cultural norms and present-day outcomes.

This stream of literature argues that traumatic shocks in history shape present-day institutions (Acemoglu et al., 2011; Klüppel et al., 2018), culture (Guiso et al., 2004; Nunn and Wantchekon, 2011), and personal preferences (Bernile, et al., 2017). These effects can persist for hundreds of years. Our research adds to a line of discussion regarding this deep-rooted cultural legacy, and in so doing, offers an explanation of the sluggish financial development observed in this area of Eastern Europe to the present day. Researchers have argued that social shocks such as colonial activity (Natividad, 2019; Levine et al., 2020), endemic diseases (An et al., 2021), and ethnic conflict (D'Acunto et al., 2019) create an embedded distrust in finance. By examining historical anti-Semitic pogroms in the Pale of Settlement, we offer new insights into the heterogeneity of financial development as observed among the under-researched countries of Eastern Europe.

## **3.2. Institutional Background and Related Literature**

### **3.2.1. The Pale of Settlement and trust**

The turn of the 19th century witnessed an expansion of the Russian Empire when it annexed a vast amount of territory in Eastern Europe, an area where Jews had settled since the 14th century (Pipes, 1975). In an effort to keep Jews away from Central Russia, Catherine the Great drew the border of the Pale Settlement within these newly conquered territories. Jews were forcibly relocated into this area. There, Jews tended to reside in townships, as they were denied permission to own land. The border (between Russia and the Pale) was finalized by the Congress of Vienna in 1815 and was recognized by law in 1835 (Grosfeld et al., 2013). These arrangements persisted until Soviet collectivization officially outlawed the Pale of Settlement in 1927.

The concentration of Jews in the fields of commerce and finance had already begun by the first century BCE, owing in part to the high level of education associated with adherence to Judaism (Botticini and Eckstein, 2005). By the end of the seventh century CE, Jews had a significant comparative advantage in skilled urban employment as compared with the relatively illiterate majority non-Jewish population (Baron, 1952; Ben-Sasson, 1976). Nonetheless, this economic and educational advantage of the Jews did not bring them a stable life, as anti-Jewish discrimination and persecution were common throughout history (Ben-Sasson, 1976; Becker and Pascali, 2019). The outbreak of the Black Death served only to aggravate anti-Jewish violence, and events such as the Crusades and the Alhambra Decree (1492) resulted in an involuntary movement of Jewish communities to the eastern part of Europe. It is here that the anti-Jewish pogroms that are the subject of this paper took place (D'Acunto, 2019; Grosfeld et al., 2020).

The historical Pale of Settlement overlapped the whole territory of contemporary Moldova, Belarus, and part of present Latvia, Lithuania, Poland, Romania, Russia, and Ukraine. According

to the 1897 census of the Russian Empire, 4.8 million Jews were living inside the Pale of Settlement, amounting to around 11% of the total within-border population. They were present in every district inside the Pale (Grosfeld et al., 2020). For over one hundred years, Jews lived alongside non-Jews. However, this geographical nexus was associated with ethnic tensions and discrimination against the Jews. The two groups had different traditions, languages, beliefs, and prohibitions. According to Aster and Potichnyj (1983), the Jews and non-Jews who lived within the Pale feared and despised each other and continued to live as “two solitudes,” having barely any interaction beyond market-based activities.

Taken in this historical context, the presence of Jews can be seen as consolidating the non-Jewish population, as the latter found themselves united in facing a perceived rival group. This led to an increased within-group identification among the local non-Jewish majority, which manifested as “bonding trust” (Tabellini, 2008). Following the devastating impact of the Holocaust in essentially eliminating the presence of Jews in the region of what had been the Pale, this increased trust continued as general social trust. Fukuyama (1995) argues that general social trust is an essential form of social capital and should theoretically facilitate financial transactions and promote economic development. We label this cultural consequence of historical anti-Semitism as a *bonding trust mechanism*.

However, unity in discriminating against an ethnic group can also spill into antipathy towards the activities associated with that persecuted group. Since Jews were characterized as being engaged in market- and finance-based activities (to the perceived detriment of the majority non-Jews), inter-ethnic hostility contributed to the growth of an anti-market culture and a distrust in finance – which we will label financial antipathy. These social values (summarized respectively here as the *bonding trust mechanism* and the *financial antipathy mechanism*) persisted across generations, and evidence of their presence is still detectable in contemporary society, long after the Holocaust had erased the presence of Jews in Eastern Europe (Grosfeld et al., 2013; D'Acunto, 2019).

### **3.2.2. Anti-Semitic pogroms and social capital legacies**

A large body of literature has discussed the causes that contributed to the outbreak of pogroms against the Jews (D'Acunto et al., 2019; Becker and Pascali, 2019; Grosfeld et al., 2020). The traditional “scapegoat theory” portrays Jews as being blamed for any and all disasters that befall the majority. This has been especially applicable since the period of the Black Death (mid-fourteenth century). According to this theory, Jews were targeted as a minority ethnic group, regardless of the length of their presence or the professions they occupied in the locality. This association led to deep-rooted and long-lasting cultural and ethnic discrimination. Voigtländer and

Voth (2012) show that the localized pogroms in Germany during the Black Death can explain the density of the human devastation wrought by the Holocaust in those same areas during the later Nazi period. Developing from this stream of theory, D'Acunto et al. (2019) show that the earlier presence of Jews in a local community in Germany is related to a higher local occurrence of anti-Semitism in the first half of the 20th century. Over time, this inter-group hostility led to a form of antipathy towards the type of economic activities that had been pursued by the Jewish minority, and this antipathy persisted even after the extinction of the local Jewish community (Grosfeld et al., 2013).

Developing this idea, Grosfeld et al. (2020) analyze the historical data within the Pale of Settlement and argue that the majority of anti-Jewish pogroms happened when local economic shocks resulted in political turmoil. The evidence here suggests that anti-Jewish pogroms occurred when economic crises ignited a breakdown in the social order, resulting in mob violence against Jewish commercial intermediaries and the ethnic community to which they belonged. This argument supports Anderson et al. (2016), who detect a link between adverse weather shocks and the outbreak of Jewish persecution. Weather shocks in history were associated with crop failures; hence, weather shocks created localized economic shocks. When this happened, the minority Jews who served as intermediaries in the market for agricultural produce became the target of persecution. This sparked off anti-Jewish ethnic conflict.

A related strand of research finds that the Protestant Reformation represented a watershed in terms of the relationship between Jews, who had long been merchants or lenders, and the vast majority of non-Jews, who had previously been Catholics and consequently prohibited from accessing the financial and commercial sector. Glaeser's (2005) demand and supply of hatred theory holds that the dominant position of Jews in those financial and commercial niches led to anti-Semitism on the part of the non-Jewish majority - many of whom had previously aspired to but had been prohibited from participating in these key market sectors. The Protestant Reformation compounded the pre-existing tension by releasing the Catholic majority from the earlier prohibition against engaging with the financial sector. This dramatic change increased the economic competition between the Christian majority and the Jewish minority, and triggered ethnic conflict between these two groups (Becker and Pascali, 2019). This perspective essentially supports both "scapegoat theory" and the "politico-economic mechanism," as economic incentives are seen as fueling ethnic animosity, and resulting in the violent persecution of the Jewish minority.

We integrate these theoretical contributions through the channel of culture as a social norm to analyze the long-term effects of historical anti-Semitism on present-day financial development.

Following the work of D'Acunto et al. (2019), we predict the validity of the *financial antipathy mechanism*. That is, a higher occurrence of historical anti-Semitic pogroms is linked to greater distrust in finance and a stronger anti-market culture across the present-day territory of the Pale. Our study is distinct from prior research in that it also examines the competing role of the *bonding trust mechanism* (as discussed in section 3.2.1), which also has its roots in the historical presence of a Jewish population within the Pale (Grosfeld et al., 2013). We analyze the net effect of these two mechanisms on the access to finance of present-day firms.

### 3.3. Data and Sample

This section introduces the data sources used and the variables constructed in evaluating the effects of historical anti-Jewish pogroms on present-day financial development. Table 3.1 lists the statistical summary of the variables utilized in the analysis, and Appendix Table A1 provides the corresponding detailed definitions, the original source, and the method of derivation for each variable, including control variables.

[Insert Table 3.1 about here]

#### 3.3.1. Pogroms and other historical data

While historical pogroms against the Jews have been analyzed in various ways, the occurrence of such pogroms has been widely accepted as an indicator of anti-Semitism (Becker and Pascali, 2019; Grosfeld et al., 2020). Our raw data on historical pogroms originates in Grosfeld et al. (2020), who assemble detailed panel data for each year between 1800 and 1927, the Pale of Settlement period. These data are compiled at a grid-cell level, each cell being  $0.5 \times 0.5$  degrees of latitude and longitude.

We accumulate the total number of pogroms recorded in each grid-cell throughout the period of the Pale (1800-1927) and generate cross-sectional indicators of pogrom occurrence for each grid-cell the *number of pogroms*. As shown in the first panel of Table 3.1, the *number of pogroms* ranges from 0 to 29, with a mean value of 2.983. The standard deviation (3.786) reveals a relatively large variation in pogrom occurrence across the cells. Figure 1 shows that the magnitude of historical anti-Semitic pogroms varies considerably across regions. The dots represent the occurrence of pogroms in the local area (grid-cell), and a larger dot indicates a higher number of pogroms recorded during the period of the Pale. The blank areas within the Pale indicate an absence of historical anti-Semitic pogroms.

A potential issue here is that the population of local Jews within each cell may affect the number of pogroms, as pogroms against Jews clearly could not happen in locations lacking Jewish

residents. To mitigate this concern, we control for a range of historical descriptors of the Jewish population in each grid-cell using census data for 1897, the year when the Russian Empire launched a census to report on this demographic (Grosfeld et al., 2013). First, the *share of Jews*, is the percentage of Jews in each cell's total population. Second, the *occupational segregation index*, measures for each cell how Jews and non-Jews tend to engage in different occupations in a particular area. Third, we also use the *urbanization rate* to control for the percentage of the total population in each cell living in an urban setting in 1897, as Jews predominately lived in urbanized areas within the Pale.

### 3.3.2. Household-level data on social capital

We collect indicators of social capital from the Life in Transition Survey (LITS), which provides household-level data on the current living conditions and social values of European households. Using the town names recorded in the LITS, we identify the geographic coordinate of each town (represented by the coordinate of each town-center) where survey households are located. This allows us to merge the LITS data with our historical pogrom data.

To identify the validity of the *bonding trust mechanism* and the *financial antipathy mechanism*, we utilize *trust people* and *trust finance*, from the LITS database. Both of these variables are recorded on a scale from 1 (completely distrust) to 5 (completely trust) to indicate each respondent's self-reported level of trust. The *trust people* variable asks residents: “generally speaking, how much do you trust people”, while the *trust finance* variable asks: “how much do you trust banks and the financial sector.”

We construct five variables from the LITS that allow us to examine the net effect of the two trust mechanisms on the access to finance of present-day households. These variables have a dummy value that equals 1 for a positive answer and 0 for a negative response. The first of these, *minority rights* (do you think minority rights are important), captures present-day attitudes that may echo anti-Semitism of the past. The other four variables indicate aspects of anti-market/financial-antipathy culture that could be linked to historical anti-Semitism. The second and third variables, *bank account* (do you have a bank account) and *investment income* (do you have income from investments, savings, and rentals), measure the access to finance of households (D'Acunto et al., 2019; Levine et al., 2020). The fourth and fifth variables are *self-employed* (if you are self-employed) and *self-employment income* (do you have income from self-employment), respectively. Each of these captures one aspect of anti-market culture that could be nurtured by anti-Semitism (Grosfeld et al., 2013). All the related descriptive statistics can be found in Appendix Table A1.

To eliminate the possibility of alternative explanations, we include a battery of control variables. First, we control for the individual characteristics of each respondent by including their age, age squared, gender, income level, decile of consumption, education level, religion, as well as a dummy variable capturing middle-class status. Second, we include district controls in the form of the elevation of a local district and its rural/urban/metropolitan categorization. We also use country-fixed effects, a set of country dummies covering the Pale of Settlement's historical borders. Following Levine et al. (2020), we further check the robustness of our results by limiting the sample of respondents to the top 60% income-group to eliminate the concern of income-group impact. For similar reasons, we also check our results by limiting the age of respondents to being over 18 years and under 60 years.

### **3.3.3. Firm-level data on access to finance**

Using the World Enterprise Survey (WES) database, we construct indicators of present-day firm access to finance, in terms of financial constraints, access to informal finance (trade credits), and access to formal finance (banking finance). The detailed descriptive statistics for the adopted variables can be found in the third section of Table 3.1, and the construction method of these variables is illustrated in Appendix Table A1. We merge these firm-level indicators with our historical anti-Jewish pogrom data by using the detailed geo-location of each firm's headquarters.

First, we construct the *financial constraints index* following the methodology of Kuntchev et al. (2014). This subjective index has three values: 1 for “this firm is financially unconstrained,” 2 for “this firm is partially financially constrained,” and 3 for “this firm is financially constrained.” We also utilize the *self-reported finance is an obstacle* as an assessment of the firm’s perceived financial constraints. This is a dummy variable which equals one if the firm's representative indicates their firm finds finance is an obstacle and equals zero if otherwise.

We then utilize six percentage-value indicators capturing each firm's source of finance. First, the *percentage of working capital from internal finance*, has a higher value when the firm's operation relies more on internal finance (self-funding). We also collect three credit-based indicators: *percentage of inputs purchased with trade credit*, *percentage of accepted supply chain credit*, and *percentage of offered sales credit*. A higher value of each of these indicators represents the firm's higher access to trade credits, i.e., informal external finance. Trade credit measures have been utilized by others as a measure of firm access to informal external finance, and have been found to be highly affected by social capital constructs such as trust (Pierce and Snyder, 2017; An, 2020). The final two indicators, *percentage of fixed asset from banking finance* and *percentage of working capital from bank credit*, measure the firm's access to banking finance (formal external finance).

For another perspective on access to banking finance by firms, we construct a set of dummy indicators. First, *whether has bank overdraft facility* - represents whether this firm had a bank overdraft facility in the prior fiscal year. Second, *whether has line of credit from a financial institution* - represents whether this firm had a line of credit from a financial institution in the previous fiscal year. In addition, we collect six self-reported reasons as to why a particular firm did not apply for a bank loan in the prior fiscal year. A value of one indicates a positive answer for this set of variables, and a zero value indicates a negative answer. These variables allow tests of whether and through which channel historical anti-Semitism continues to have predictive power regarding a firm's self-reported perception of access to banking finance.

We include a battery of control variables in an effort to eliminate the possibility of alternative explanations. For firm-level characteristics, we control for the firm age, the number of staff in the firm, the percentage of domestic ownership, whether the firm belongs to a business group, and whether the firm has a female CEO. We control for firm-size using fixed effects, as the WES provides firm-size information using a four-scale category. We also control for the firm-year fixed effect, which ranged from 2012 to 2019. Finally, we control for industry-fixed effects, using the 41 industry sector indicators in our sample.

#### **3.3.4. Identification strategy – instrumental variables**

To provide further support for a causal interpretation of our baseline estimates, we make use of an instrumental variables approach to address any endogeneity issues stemming from omitted variables bias. Although we incorporate a range of control variables and fixed effects, the baseline estimates could still be driven by unobservable factors that are also correlated with the existence of historical pogroms in the vicinity. To address this concern, we utilize three instrumental variables: *deviation of spring temperature*, *share of Jews among grain traders in 1897*, and *literacy gap between Jews and non-Jews in 1897*. This approach owes to the work of Grosfeld et al. (2020). The *deviation of spring temperature* represents an economic connection to the outbreak of anti-Jewish pogroms, while the *share of Jews among grain traders in 1897* and the *literacy gap between Jews and non-Jews in 1897* capture ethnic triggers of pogrom occurrences.

The *deviation of spring temperature* is the sum between 1800 and 1927 of the absolute deviation from the historical mean of each year's spring temperature for each grid-cell. As discussed in Section 3.2.2, Grosfeld et al. (2020) argue that an extreme spring temperature is a strong indicator of crop failure in a given year, leading to economic shocks. Although Jewish market intermediaries might provide credit to smooth the frictions in a mild shock period, these agents became targets of violence during the type of severe market-wide economic shocks associated with a breakdown

in the social order. During any ensuing social unrest, without legal restraints and with incentives to erase outstanding credits and to benefit from robbery, mob violence against Jewish commercial intermediaries and their ethnic community were recorded (Anderson et al., 2016). Hence, we utilize the *deviation of spring temperature* as an indicator of the economic trigger of pogroms. We hypothesize that a higher spring temperature deviation would lead to a higher occurrence of anti-Jewish pogroms. Meanwhile, it is unlikely that the extreme historical weather shocks a hundred years ago could directly influence present-day financial development.

Our second instrumental variable, the *share of Jews among grain traders in 1897*, is the proportion of the Jewish population among the total number of grain traders in an area, as recorded in the Russian Empire 1897 census. This variable has a mean of 90.3% and ranges from 17.6% to 100%, indicating that the Jewish population dominated the commercial and financial sector within the Pale, albeit with substantial variation. The third instrument is the *literacy gap between Jews and non-Jews in 1897*, representing the gulf of educational attainment between the Jewish minority and non-Jewish majority within each area across the Pale. This indicator has a mean of 18.6% and ranges from -14.2% to 44.1%, which indicates that the Jewish community generally outperforms the non-Jewish majority, again with considerable variation across the areas.

As discussed in Section 3.2.2, the historical presence of Jews as the dominant market intermediaries could lead to animosity against the Jewish community by the local Christian majority, owing to an association between finance and usury. Also, a higher literacy gap between the Jewish minority and non-Jewish majority indicates a greater cultural difference and ethnic estrangement within the local area. The historical data reveal a spatial variation of these two indicators across the Pale. Based on the theoretical discussion above, we expect these two instrumental indicators would be positively related to the outbreak of local pogroms for both ethnic and political-economic reasons. Also, given the almost non-existent presence of a Jewish community within the current territory of the Pale, we assume that the two instruments we are utilizing could not directly affect the financial indicators of present-day firms.

### 3.4. Pogroms and Social Capital

To test the validity of the two cultural mechanisms discussed in section 3.2, we estimate the association between historical anti-Semitism and present-day social capital in the following regression model:

$$SC_{ic} = \beta_0 + \beta_1 \text{pogrom}_c + I'_i \delta + H'_c \gamma + C'_k \lambda + \varepsilon_{ic} \quad (1)$$

Where  $i$  indexes individual respondents for each household,  $c$  indexes the geographical grid-cell of the household location, and  $k$  indexes the country to which the corresponding

household belongs.  $SC_{ic}$  represents any of a range of social capital indicators collected from the LITS. First, it captures two dimensions of trust: *trust people* and *trust finance*, which respectively capture our *bonding trust mechanism* and *financial antipathy mechanism*. The range of  $SC_{ic}$  dependent variables also includes a series of dummy variables discussed in detail in Section 3.3.2, namely *minority rights*, *bank account*, *investment income*, *self-employed* and *self-employment income*. The  $pogrom_c$  variable captures the number of pogroms in the region (grid-cell)  $c$ .  $I_i$  is a vector of variables controlling for individual characteristics: age, age-squared, gender, income level, decile of consumption, education level, religion, and social class.  $H_c$  is an array of cell-level historical control variables, which include the share of Jews and the urbanization rate of the cell in 1897; district controls, which include local district's elevation (log) and rural/urban/metropolitan classification.  $C_k$  represents the country fixed effect. The LITS database is sufficiently rich as to provide approximately 1,000 observations for each country in the sample. We apply a bootstrap approach for each regression specification.

[Insert Table 3.2 about here]

As shown in Panel A of Table 3.2, the density of historical pogroms within the Pale is positively related to *trust people*, but negatively related to *trust finance*. The estimated coefficients are significant and economically large. Column (1) indicates that a one standard deviation increase in the *number of pogroms* is associated with a 2.74% ( $3.786 \cdot 0.02 / 2.759$ ) increase of the mean value of a respondent's self-reported score on trusting other people. In comparison, column (4) indicates a corresponding 2.14% decrease ( $3.786 \cdot -0.018 / 3.187$ ) in the mean value of self-reported score on trust in banks and the financial sector. We then restrict the respondent's age to be between 18 and 60 years old to exclude any possible retired or minor respondents. As shown in columns (2) and (5), the results obtained are consistent with our full-sample results. Following Levine et al.'s (2020) method for eliminating any income-group effect, we also check the robustness of our results by limiting the sample to the top 60% income group and list the results in columns (3) and (6). We again find the same pattern of results as compared with full-sample results, albeit these coefficients are of greater magnitude.

Overall, we find that people in a region where a higher occurrence of pogroms is recorded are more likely to trust each other. However, they are less willing to trust in finance. These results suggest the existence and validity of both a *bonding trust mechanism* and a *financial antipathy mechanism*.

We next utilize as dependent variables the other five social capital indicators from the LITS to examine the net effect of the two mechanisms on present-day households. First, *minority rights* captures attitudes of present-day residents that may echo the anti-Semitic sentiments of years past. Next, *bank account* and *investment income* measure each household's willingness to engage with finance,

while *self-employed* and *self-employment income* capture the extent of the household's market-oriented entrepreneurship. Each dummy variable equals one for a positive answer and zero otherwise. Given the binary outcome of the dependent variables, we apply Probit estimation for this analysis and list the average marginal effect results in Panel B of Table 3.2.

As can be seen in column (1) of Table 3.2 Panel B, a standard deviation increase in the *number of pogroms* would decrease by 4.54% ( $3.786 \times -0.012$ ) the likelihood of a resident reporting positively that “minority’s rights are important.” For the indicators of household access to finance, as shown in columns (2) and (3), a standard deviation increase of the pogrom occurrence is associated with a 2.27% decrease in the likelihood ( $3.786 \times -0.006$ ) of a resident holding a bank account and a 3.03% decrease in likelihood ( $3.786 \times -0.008$ ) of a resident having income from investments, bank saving or rents. Similarly, anti-Jewish pogroms are negatively related to the entrepreneurial activities of respondents, see columns (4) and (5). These results point to the present-day social cost that correlate with historical anti-Semitism within the Pale – social costs that are not remedied by any associated increase in local trust.

### 3.5. Pogroms and Firm Access to Finance

We now introduce a firm-level focus by using the following baseline regression model to assess the net effect of historical anti-Semitism on access to finance by present-day firms:

$$AF_{ftc} = \beta_0 + \beta_1 \text{pogrom}_c + F'_{ft} \Gamma + H'_c \Omega + Z'_{ft} \Theta + \varepsilon_{ft} \quad (2)$$

Where  $f$  indexes the identity of each firm,  $t$  is the operating year, and  $c$  is the geographical grid-cell. The dependent variable  $AF_{ftc}$  represents any one of three sets of available indicators of firm-year level access to finance that are available in the WES databases (as discussed in Section 3.3.3): first, objective and subjective financial constraint indicators, as measured by *financial constraints index* and *self-reported finance is an obstacle* respectively; second, a set of percentile indicators that capture each firm’s access to internal finance, access to informal finance (trade credit), and access to formal finance (bank); third, two dummy indicators describing a firm’s access to banking finance, and a set of self-reported reasons why a firm did for not apply for a bank loan in the prior fiscal year. As before, the *pogrom<sub>c</sub>* variable denotes the number of pogroms in region (grid-cell)  $c$ .

We include a battery of control variables to reduce concerns regarding alternative influences (Pierce and Snyder, 2017). In equation 2,  $F_{ft}$  is a vector of variables capturing firm-year level characteristics: firm age, firm staff number, the percentage of domestic ownership, whether the firm belongs to a business group, and whether the firm has a female CEO.  $H_c$  is a vector of cell-level historical control variables: share of Jews, urbanization rate in 1897, and occupation segregation index.  $Z_{ftk}$  represents a battery of dummy-control variables: firm-size fixed effects,

industry fixed effects, and year fixed effects. We apply an IV approach to all our baseline regressions to confirm causality.

### 3.5.1. Financial constraints

[Insert Table 3.3 about here]

We first use the historical occurrence of anti-Semitic pogroms to explain the present-day financial constraints as experienced by firms. The results of a series of such regressions are summarized in Table 3.3. The leftmost column lists the dependent variable used in each regression specification, with each row representing a different dependent variable. The detailed information of each of these variables was discussed above in Section 3.3.3. Each row-cell reports on a different specification, where the columns (1) to (5) provide coefficient estimates using an increasingly comprehensive set of control variables. For each specification, column (6) represents the second stage results of the IV approach when adopting all three instrumental variables simultaneously. Each cell, therefore, reports the key regression coefficient (*number of pogroms*) relevant to the row-dependent variable and column-control settings. All the specifications use the identical key explanatory variable: the *number of pogroms* - and it is the coefficient estimate on this variable that is reported.

The coefficient results in Table 3.3 show that the occurrence of historical anti-Semitic pogroms has significant positive predictive power for both the objective indicator *financial constraints index* and the subjective financial constraint indicator *self-reported finance is an obstacle*. For example, using column (1) of the first row, one standard deviation increase in the number of pogroms, predicts a 9.6% ( $3.786 \times 0.039 / 1.538$ ) increase in the mean value of the financial constraints index score for present-day firms. The results are robust over different control settings. We find that including additional control variables does not diminish the magnitude or significance of the estimated coefficients, as shown in columns (2)-(5). Column (6) reports the second stage results of the 2SLS regressions. Here we find a strong significance and an increased coefficient magnitude compared with the OLS regression results, which supports the causal interpretation of this relationship.

The *financial constraints index* for each firm is a score-value, which variously equals 1, 2, or 3. Hence, we utilize an Ordered-Probit model to check the consistency of the OLS regression result. As shown in the second row, this is consistent. In the next three rows, we generate three dummy variables according to this index's three score values for each firm. We apply Probit estimation for each variable for this set of specifications and report the marginal effect results. The results obtained indicate that historical anti-Semitism significantly decreases the likelihood that local firms

are “Financially unconstrained” while increasing the likelihood of a firm being “Financially part-constrained” and “Financially constrained.” Correspondingly, we observe a similar pattern of results for the *self-reported finance is an obstacle*, as shown in the final row of coefficient estimates.

Overall, we find results that argue the historical anti-Semitic pogroms positively predict a present-day firm’s financial constraints. This evidence is robust across subjective and objective measurements, alternative econometric methods, and the instrumental variables approach.

### 3.5.2. Access to different sources of finance

Table 3.4 lists the OLS results obtained utilizing as outcome variables each of the six indicators of a firm’s source of finance (as discussed in Section 3.3.3), and replicates Table 3.3 in its format for reporting regression coefficients. As we can see in the first row of Table 3.4, the higher the occurrence of historical anti-Jewish pogroms, the higher is the reliance on internal finance. In other words, a higher density of pogroms predicts a lower willingness among present-day firms to use finance. This evidence has a sizeable economic interpretation after considering all control settings. For example, column (5) of row (1) indicates a standard deviation increase in pogrom occurrence is related to a 2.03% ( $3.786 \times 0.5353$ ) increase of working capital financed from internal channels.

[Insert Table 3.4 about here]

The results reported in rows (2)-(4) analyze the impact of historical pogrom density on the present-day use of external finance. We find that the density of pogroms is negatively related to a firm’s access to trade credits, a source of informal external finance. As shown in column (5) of row (2), a standard deviation increase in pogrom occurrence is related to a 2.28% ( $3.786 \times -0.603$ ) decrease in the level of a firm’s inputs purchased with trade credits. Similarly, a one standard deviation increase in pogrom occurrence is associated with a 1.86% ( $3.786 \times -0.490$ ) decrease in the supply chain credit that a firm receives, and a 1.71% ( $3.786 \times -0.451$ ) decrease in the sales credit that a firm provides (see column (5) of row (3) and row (4)). From the perspective of banking finance, which is arguably the major formal finance channel, we find parallel results to those obtained for credit finance. As we can see in row (5) and row (6), pogrom density is negatively related to a present-day firm’s access to banking finance, measured either by their fixed asset financed from banks or by their working capital financed from banks.

After applying the IV approach, we find significant and consistent results compared with the OLS regressions. Specifically, the coefficients for the second stage 2SLS are generally two times higher than those in the OLS regression specifications, which enforces our economic interpretation. For example, in column (6) of Table 3.4, one standard deviation increase in pogrom

occurrence results in a 6.92% ( $3.786 \times 1.829$ ) increase in a firm's reliance on internal finance, which is sizeable, considering the mean value for this indicator is 79.4%. Correspondingly, we find the decreases in access to external finance, both formal and informal channels, are larger in economic magnitude. As can be seen in rows (2) through (6) of column (6), the negative impact of a one standard deviation increase in pogrom occurrence produces a decrease on the indicators ranging from 1.46% ( $3.786 \times -0.385$ ) to 7.13% ( $3.786 \times -1.882$ ). Compared with the mean values of these indicators, which range from 6.73% to 34.75%, this causal effect is substantial in magnitude.

These results suggest that historical anti-Semitism still plays a significant role in altering the reliance of present-day firms on internal and external finance. This evidence supports the view that the *financial antipathy mechanism* hinders lenders from providing external finance, leaving a legacy of financial constraints experienced by local firms. This effect overwhelms the impact of the *bonding trust mechanism*, which should theoretically ease access to external credit.

### 3.5.3. Access to banking finance

We now analyze the channels through which the use of banking finance by present-day firms is affected by their proximity to historical pogroms. The results, presented in Table 3.5, use an increasingly comprehensive range of control variables and echo the layout adopted in Table 3.3 and Table 3.4. Finally, in column (6) of Table 3.5, we show that the second stage results of the IV regressions support a causal interpretation of our findings. Given the binary value of these sets of variables, we utilize Probit estimation for each specification and report the average marginal effects.

[Insert Table 3.5 about here]

In the first two rows of Table 3.5, we find that the higher density of historical pogroms predicts that a present-day firm has lower access to bank overdraft facilities and a lower possibility of obtaining a bank loan. While the estimated coefficients are not uniformly statistically significant, they are consistently negative and correspond with the results of the banking finance discussion in Section 5.2. In the third and subsequent rows of Table 3.5, we analyze the self-reported reasons provided by firms for not applying for a bank loan. As shown in column (1), a one standard deviation increase of the pogrom number is related to a 10.53% ( $3.786 \times -0.0278$ ) decrease in the likelihood that a firm reports they did “not need a loan.” The same change leads to an increase in the probability that a firm did not apply for a loan because of “too high interest rates” by 7.53% ( $3.786 \times -0.0199$ ). Reports of a firm not applying for a loan due to “too complex application procedures,” or that an “insufficient size of loan would available” are also arguably manifestations of a reluctance to access to banking finance. However, these effects make comparatively lower contributions (means of 4.3% and 0.7%).

Notably, the coefficients for all regression specifications in Table 3.5 show no loss of empirical significance over increasingly comprehensive control settings, as is shown in columns (1) to (5). And while the second stage results of our IV-regressions, shown in column (6), do not predict a decrease in the resort to finance by present-day firms owing to proximity to historical anti-Semitic pogroms, they do suggest that such firms are constrained by their skeptical attitudes towards banking finance.

The results in this section lead to the economic interpretation that contemporary firms lack access to banking finance because of their perception of the high interest rate requirements by banks. This evidence is consistent with our *financial antipathy mechanism* and a lack of trust in the financial sector inhibiting local firms from accessing formal finance, owing to the antipathy towards the banking sector and perceptions of a high cost of banking finance. This evidence is also consistent with results in Section 3.5.1 and Section 3.5.2, where a higher density of local historical anti-Jewish pogrom occurrence predicts a higher reliance on internal finance rather than external finance. The results in Table 3.5 suggest that this financial constraint also applies to banking finance.

#### **3.5.4. Detail statistics of IV approach**

Tables 3.3, 3.4, and 3.5 provide comprehensive results from our baseline regressions while also reporting the second-stage results of our IV regressions. To underpin the robustness of our IV approach, Table 6 provides detail on both first and second stage IV results and reports detailed statistics on the validity of the instrumental variables.

[Insert Table 3.6 about here]

Each column in Table 3.6 illustrates a different specification. We show the second stage results in the first part of the table - these are, of course, identical to the regression results found in column (6) of Tables 3.3 and 3.4. The results we are interested in are the first stage statistics and IV validation statistics, as shown in the middle and lower part of Table 3.6. We find that all three IVs positively predict the density of historical anti-Semitic pogroms, which meet our predictions as discussed in Section 3.3.4. The results are highly statistically significant, and the coefficients are consistent across different specifications. There are also interesting economic interpretations to be found in these coefficient results. For example, one standard deviation increase of the *deviation of spring temperature* predicts recorded anti-Jewish pogroms will be approximately 0.4 cases higher. Similarly, a one standard deviation increase in *share of Jews among grain traders* and *literacy gap between Jews and non-Jews* indicate 1.3 to 1.6 more cases respectively of anti-Jewish pogroms throughout the history of the Pale.

We confirm the validity of our IV approach using a range of identification statistics. First, we apply the Anderson LM under-identification test. This test is based on the Anderson (1951) canonical correlations test and has a null hypothesis of an under-identified equation. Second, we use the Cragg-Donald Wald weak-identification test. This test checks whether the excluded instruments are only weakly correlated with the endogenous regressors (Cragg and Donald, 1993). We also test for any over-identification of our equation by calculating Sargan-Hansen test statistic (Stock and Yogo, 2005). This involves testing whether our instruments are uncorrelated with the error term and whether they are correctly excluded from the estimated equation. We report the p-values for each of the above statistics under the respective specification. As listed in the lower part of Table 3.6, our results generally pass all three tests across the different regression specifications.

In summary, we find almost uniformly convincing evidence to support our IV approach. The estimated coefficients in both the first and second-stage regressions are significant, both in a statistical and economic sense. All three identification tests show that the instrumental variables have satisfactory validity across the different regression specifications. Hence, we again state the causal interpretation that emerges from our baseline results: the historical occurrence of anti-Jewish pogroms continues to inhibit the access to finance of present-day firms. We see this effect working through a *financial antipathy mechanism*. This mechanism overwhelms the *bonding trust mechanism* (also attributable to the occurrence of historical pogroms) and predicts a higher reliance on internal finance and lower access to external finance among present-day firms based in areas affected by historical pogroms.

### **3.6. Robustness Checks**

We conduct a battery of robustness checks to further confirm our causal interpretation of the baseline results discussed above. These checks cover a range of methods: adopting alternative key explanatory variables (pogrom dummy); checking the dissipation of the financial antipathy mechanism as the distance from pogrom locations increases; using a Regression Discontinuity Design (RDD) as an alternative econometric approach; considering the rival impact due to the communist regime that dominated this territory after the abolition of the Pale, and the impact of wars that beset the area; and utilizing an alternative firm-level database (BvD database) to check the consistency of our results. The detailed statistics for the related variables are listed in the lowest part of Table 3.1, and detail of the construction of the variables can be found in Appendix Table A1.

### 3.6.1. Pogrom dummy

In this section, we replicate our firm-level baseline regressions (equation 2) by replacing the key explanatory variable with *pogrom dummy*, a dummy variable equal to one if any pogrom occurred within a grid cell during 1800-1927 and equal to zero if no pogrom occurred. We utilize this indicator to check whether both the magnitude and presence of anti-Jewish persecution matter and support our baseline results.

[Insert Table 3.7 about here]

We show the replicated regression results using *pogrom dummy* in Table 3.7, where Panel A, B, and C corresponding to our three focused perspectives in our baseline research, found in Tables 3, 4, and 5, respectively. Each column of Table 3.7 represents the results from a different dependent variable. We find the results are mostly parallel with our baseline regressions, and they are also economically significant. For example, as we can see in column (1) of Panel A, the historical occurrence of anti-Semitism predicts a 10.12% increase of the mean value of a firm's financial constraints index comparing the regions without the presence of historical anti-Semitic pogroms. This implied impact is of considerable economic significance. In Panel B of Table 3.7, we find the *pogrom dummy* relates positively to a firm's reliance on internal finance and negatively to a firm's access to external finance, which aligns with our baseline results. The respective economic interpretations are also notable, as firms located in regions with recorded historical pogroms report 3.97% higher reliance on internal finance in their working capital, and 6.01% lower ability to purchase inputs with trade credits.

In terms of banking finance, while the coefficients are consistently negative across all regression specifications, as shown in columns (5)-(6) of Panel B and columns (1)-(2) of Panel C in Table 3.7, we find the relationships are not always statistically significant. It is worth noting that we also find a comparatively weak significance for banking finance in the baseline research, e.g., row (1) and row (2) of Table 3.6. We do find supporting evidence in columns (3)-(5) of Panel C in Table 3.7, as *pogrom dummy* predicts the same results as *number of pogroms* in terms of the reasons firms give for not actively accessing banking finance.

Overall, we find parallel results when replicating the baseline regressions when replacing the key explanatory variable as *pogrom dummy*. This evidence supports our earlier discussion of the net effect of historical anti-Semitism on present-day corporate financial development. Both the magnitude and the presence of anti-Jewish persecution matter for predicting the lingering culture of financial antipathy, which itself impedes present-day firms from accessing finance.

### 3.6.2. Distance to pogroms

To further test the robustness of the argument that the difficulty in accessing finance results from the cultural legacy of historical anti-Jewish pogroms, we construct *distance to pogrom*, the distance (km) from each firm's location to the closest recorded pogrom in the Pale of Settlement. The detailed statistics of this variable are shown in Table 3.1. This variable is not the occurrence of past anti-Jewish pogroms, but an indicator of the likelihood that the local region may have been affected by the cultural channels we proposed above. Suppose the lingering effect on the access to finance of present-day firms is due to the effects of historical anti-Semitism operating through the modern-day cultural trait of the financial antipathy mechanism. In that case, such an effect should gradually diminish proportional to the distance to the nearest place where such anti-Jewish pogroms happened in history. The larger the value of *distance to pogrom*, the lower the influence. In other words, we hypothesize that the coefficient results in this table have opposite signs in each regression specification as compared with our baseline results.

[Insert Table 3.8 about here]

Table 3.8 reports the results when using *distance to pogrom* as the alternative key explanatory variable to replicate our baseline model, equation (2). We can observe that a higher distance to the nearest historical anti-Jewish pogrom location is significantly related to a lower financial constraints index, lower reliance on internal finance, and higher access to external finance. In other words, the further the distance of a present-day firm location to the nearest historical anti-Semitic pogrom, the higher the trust in banks and finance as recorded by the firm. The economic import of these coefficient results is also considerable. For example, as shown in column (1) of Panel A, a one standard deviation increase of the distance value relates to a 4.8% decrease of the mean value of the firm's *financial constraints index* ( $-0.003 \times 24.63 / 1.527$ ).

In summary, the findings of this section suggest a causal effect of historical anti-Jewish pogroms on the severity of the perceived obstacles in accessing finance that confront present-day firms in the region. This evidence corresponds to our hypothesis: historical anti-Semitism points to an embedded anti-market culture that persistently impedes the access to finance of present-day firms. This notwithstanding the fact that such history also enhances generalized social trust in the area (see Table 3.2).

### 3.6.3. The Pale Border and Regression Discontinuity

The historical Pale of Settlement spans eight present-day countries. While countries such as Belarus and Moldova are fully included in the border of the Pale, the other six nations are only partially included. These six allow us to address one concern regarding our baseline research:

whether geographical and institutional considerations may influence our results on access to finance by present-day firms. To do this, we adopt a non-parametric Regression Discontinuity Design (RDD) using the now-vanished border of the Pale to provide a non-linear test for a statistical break. If we observed significant statistical jumps at the historical Pale border for our focused variables, we would argue our *financial antipathy mechanism* is not driven by geographical and institutional characteristics.

We examine all firms located within 343km on either side of the Pale's historical border, as 343km is the maximum distance within our sample of present-day firms of their respective currents to the historical border of Pale. As indicated above, we exclude Belarus and Moldova, as these two countries' territory lies entirely within the Pale. As the Pale's historical border goes across the remaining six countries, this provides the experimental background to test for any statistically significant jump at the historical border. Table 3.9 shows the coefficient results under the RDD approach when using the same indicators we applied in the OLS regressions of our baseline research. Appendix Figure A1 shows some examples of the graphical representation of the RDD results - illustrating the jump along the Pale border.

[Insert Table 3.9 about here]

A general concern for the validity of RDD is the bandwidth (Lee and Lemieux, 2010). According to Imbens and Kalyanaraman (2012), a narrower bandwidth tends to yield lower bias but increases the variance. The highest latitude in our sample is 57.25 N, where the one-longitude difference is 60km. Hence, we adopt 120km as our principal observing bandwidth. This range equals the minimum length value for measuring the two-degree longitude difference (one degree inside and one degree outside of the Pale) in our sample. To check the consistency of our results over various bandwidths, we also apply 180km and 240km as alternative bandwidths, which is 150% and 200% of our principal range.

As shown in Table 3.9, we observe statistically significant jumps in our results across the historical border of the Pale, and this finding is consistent over a different range of bandwidths. Compared with the firms located outside of the Pale, the firms located inside the Pale have a significantly higher financial constraints index, higher reliance on internal funding, and less access to informal and formal external finance. The border of the Pale vanished almost one hundred years ago (in 1927). Yet the cultural legacy of financial antipathy that was engendered by historical anti-Semitism towards the then presence of the Jewish community within this territory is so deeply embedded that it lingers to the present-day, long after the physical disappearance of Jews (a consequence of The Holocaust).

Importantly, these results confirm that our baseline results are not significantly driven by the geographical and institutional settings of the Pale. There are no within-country level institutional differences that would significantly impact access to finance by firms. In other words, the effect of *financial antipathy mechanism* overwhelms the effect of *bonding trust mechanism* in the case of the Pale of Settlement. The net effect is a reduced level of access to finance.

#### **3.6.4. Compounding Effects of Communism**

A potential concern regarding the mechanism linking historical anti-Semitism to present-day financial development is the impact of communism. Following the Russian revolution of 1917 and the subsequent establishment of the USSR in 1922, the practices of the Pale of Settlement were outlawed, and its Jewish community dispersed into collective farms during the Soviet collectivization movement in 1927. This disrupted the dominance of Jews in finance (Grosfeld et al., 2020). Of course, the communist ideology and the USSR's collectivization of production were themselves hostile to free-market practices, and did much to enforce an anti-market culture (Alesina and Fuchs-Schündeln, 2007). The variation in the impact of communism enables us to distinguish the joint effect of these two cultural drivers (anti-Semitic pogroms and communism) and to test to what extent the legacy of historical anti-market culture was driven by the communist ideology, which impacted the area after the Pale of Settlement regulations were abandoned.

We construct the two indicators to capture the variation of the impact of the communist ideology throughout the territory of the Pale: *prefer planned economy*, which measures the preference of local residents for a planned economy over a market economy; and *prefer democracy*, which measures the preference of local residents for democracy over an autocratic regime. The former indicator measures the impact of communism on economic preferences, and the latter measures the impact on political preferences. We collect these indicators from the Life in Transition Survey (LITS) database and construct the indicators as the mean value for the dummy observations within each grid-cell (0.5\*0.5 latitude and longitude) – designed to match our pogrom density indicator. As the communism indicators that we collected from LITS only covering about 50% of our observed regions and match half of our firm-level observations (as shown in Table 3.1), we simply utilize these indicators as a robustness check for the impact of communism rather than including them in our baseline research.

[Insert Table 3.10 about here]

Table 3.10 shows our results when including *prefer planned economy* and *prefer democracy* as additional controls. We replicate the Probit specifications in our baseline research and summarize the key coefficient results in Panel A, while showing results from replicating OLS regression

specifications in Panel B. We find that the *prefer democracy* does not significantly impact firms' access to finance while *prefer planned economy* shows a significant negative impact on a firm's access to finance that is in the same direction as our focal *number of pogroms* measure. This indicates the impact of communism on financial development works through the economic preferences of the local residents rather than through their political preferences. Notably, the impact of communism is economically significant while parallel with the historical anti-Semitism effect. For example, as shown in column (1) of Panel B in Table 3.10, one standard deviation increases in *prefer planned economy* would predict a 7.19% ( $0.0031 \times 35.41 / 1.527$ ) increase of the mean value of a firm's financial constraints index. This magnitude is comparable with *number of pogroms*, from which the one standard deviation increase would result in an 8.65% ( $3.786 \times 0.0349 / 1.527$ ) increase of the mean value of the financial constraint index.

Overall, the evidence in this section argues that the *financial antipathy mechanism* was not significantly affected by the later communist regime that ruled this territory; on the contrary, this mechanism is enhanced by exposure to communist ideology. Therefore, we conclude that the adverse effects of anti-Semitism on present-day firm financial development are not diluted by exposure to communist ideology.

### 3.6.5. The impact of war

Another possible confounding influence on our results is the impact of war. An extensive body of research has argued that exposure to violent conflicts, especially war, can alter an individual's saving and investment decisions (Voors et al., 2012; Callen et al., 2014). This impact has a continuing influence, working through reshaping an individual's perception of risk (Gilligan et al., 2014). It has also been argued that the experience of military and other fatal disasters could affect the CEOs and directors, hence affecting their firm's financial behavior (Bernile et al., 2017; An et al., 2020). The territory of the Pale coincided with the Eastern Front of WWII, which suggests that war is a potential driving factor for the cultural mechanisms under study in this paper.

To address this concern, we utilize Battle Location Dataset from Yuri (2010), which contains the geographical information of the worldwide military battles in the 20th Century. The original database records 382 battles in the period 1904-1984. We focus on the battles that took place after 1927, when the practice of the Pale was formally outlawed by Soviet collectivization. Applying this time restriction and merging the geo-location of battles with the territory of the Pale, we observe 15 battles fitting into 13 grid-cells of our geographical data of the Pale. All these battles happened during WWII. Therefore, we construct *battle* as the indicator of local experience of wars,

which is a dummy variable equal to one if a military battle took place in the local area after the Pale period and equals zero if not.

The within-cell detail of battles allows us to follow Balli and Sørensen (2013) by constructing a demeaned interaction term, as shown in the following formula:

$$AF_{ftc} = \beta_0 + \beta_1 pogram_c + \beta_2 battle_c + F'_{ft}\Gamma + X'_c\Omega + Z'_{ft}\Theta + \varepsilon_{ft} \quad (3)$$

$$AF_{ftc} = \beta_0 + \beta_1 pogram_c + \beta_2 battle_c + \beta_3 (pogram_c - \widehat{pogram})(battle_c - \widehat{battle}) + F'_{ft}\Gamma + H'_c\Omega + Z'_{ft}\Theta + \varepsilon_{ftc} \quad (4)$$

Where the *pogram* indicates *number of pogroms*. The  $(pogram_c - \widehat{pogram})(battle_c - \widehat{battle})$  is the demeaned interaction term of the *military battle* and the *number of pogroms*. Other control conditions remain the same as in our baseline OLS regressions. According to Balli and Sørensen (2013), this demeaned interaction term has the advantage of allowing a similar interpretation of the main-terms coefficients compared with the non-interacted regression.

[Insert Table 3.11 about here]

Table 3.11 reports the regression results of equation (3) in columns (1), (3), (5), and (7), followed by the results of equation (4) in column (2), (4), (6), and (8). Here we report results using indicators from four perspectives: financial constraints, internal finance, informal external finance, and banking external finance. The results indicate that the local experience of battles may not significantly affect the “financial antipathy mechanism.”

### 3.6.6. Alternative firm-level database

We also collect firm-level access to finance data from the Bureau van Dijk (BvD) database. This affords us the opportunity to check our results for consistency by using a different data source. To replicate our baseline results, we construct a range of firm-year indicators of the access to external finance by present-day firms. The first, the *pct trade payables to costs*, measures the percentage value of trade payables relative to the total cost of goods sold. The second, the *pct trade receivables to sales*, measures the percentage value of trade receivables relative to total revenue. The former of these two indicators represents the trade credit a firm received from its trading partners, and the latter represents the trade credit a firm is willing to provide. The third measure, *credit period*, represents the average credit period in days a firm provides. The fourth measure, *pct inventory prepayment*, represents the value a firm pre-pays to their trade partners for their inventory. These third and fourth indicators respectively capture the trade credit a company receives from or is willing to provide to their trade partners. We also construct *pct bank loan to total liability*, which measures a firm’s access to banking finance. Finally, we construct *pct income from interest*, which

measures interest as a percentage of the firm's non-operating income, and indicates a firm's willingness to provide loans. As in our baseline research, we merge this firm-level database with our historical pogrom data based on the headquarter location of each firm. The detailed descriptive statistics for these variables can be found in the lower sections of Table 3.1 and Appendix Table A1.

We replicate the regressions in our baseline research using the alternative firm-level BvD database, and include control variables that are comparable to those used in the baseline WES analysis. Specifically, we control for firm age, firm size, the board size, profitability ratio (ROA), industry fixed effects, and year fixed effects. Other non-firm level controls are the same as in our baseline regressions. As the BvD database does not include Belarus, a country whose present-day border overlaps a large area of the historical Pale, we utilize a bootstrap approach for each regression specification to remedy any distribution problem. We also apply the IV approach to each specification as an identification strategy, to check the robustness of the causal interpretation for these results.

[Insert Table 3.12 about here]

Panel A of Table 3.12 reports the OLS results obtained using this alternative database. Each column represents the results from a different specification. We list the results from 2SLS regressions in Panel B, aligning them with their corresponding OLS results in the same column. We find that all coefficient results show a negative sign and are statistically significant. This evidence is in line with our baseline research that a higher density of historical anti-Semitic pogroms predicts less access to finance among present-day firms. The economic interpretation of these results is also significant. For example, as shown in columns (1)-(2) of Panel A in Table 3.12, a one standard deviation increase in the *number of pogroms* is related to 4.11%  $(-0.168 \times 3.876 / 15.86)$  decrease of the mean value of the present of trade payable to costs, and 7.93%  $(-0.403 \times 3.876 / 19.70)$  decrease of the mean value of the percent of trade receivables to sales.

We find that the magnitude of the coefficients generally increased in the second stage of our 2SLS regression results while maintaining their statistical significance. We also find the first stage coefficient results for all the three instrumental variables. Each shows the statistical significance and the expected sign consistent with our hypotheses and comparable with our baseline research when using the WES database. In addition, the statistics from the three tests for the validity of instruments all indicate acceptance as valid instruments. This indicates a significant and causal relationship between the historical anti-Semitic pogroms and present-day financial development, especially for the access to finance of modern-day firms, which confirms our baseline research.

### 3.7. Unobservables and Spatial Autocorrelation

Here we address two concerns regarding non-experimental and spatial-related socio-economic studies.

#### 3.7.1. Unobservable selection

The omitted variables bias is a common concern in non-experimental empirical studies in socioeconomics. Since Altonji et al. (2005), the coefficient stability approach has been widely adopted as a means of assessing the presence of omitted variables bias, and scholars have provided multiple methods in line with this approach (e.g., Bellows & Miguel, 2009; McKenzie, 2012; Oster, 2019). We utilize the method recently developed by Oster (2019), which considers coefficient movement and R-square movement in evaluating the omitted variables bias.

Oster (2019) argues that the common method of remedying potential omitted variables bias is to add a set of controls to capture as rich as possible of a set of related factors and then take coefficient stability as evidence of the validity of the results. However, coefficient movements alone are not a sufficient statistic to calculate bias. Oster's (2019) method assumes that the selection on observables is informative about selection on unobservables, and researchers should assess omitted variables bias in proportion to coefficient movements only when scaled by the corresponding R-square movement. This method has attracted growing attention (e.g., Gonzalez & Miguel, 2015; Friche & Pannenberg, 2020).

[Insert Table 3.13 about here]

Table 3.13 shows the results after we apply Oster's (2019) method. Each row illustrates the results from a different regression specification. The column (1) reports the index of Oster's  $\delta$ , and the column (2) and (3) reports Oster's  $\beta$  value when we set the  $\delta$  value equals 0 and 1, respectively. We find that all the evidence supports the robustness of our results against omitted variables bias. For example, in the first row of column (1) of Table 3.13, the value of 6.186 indicates the selection on unobservables should weigh 6.186 times relative with observables to make the *number of pogroms* treatment effect equal zero. In another example, the second row of column (1) in Table 3.13, the value of -50.566 indicates the selection on unobservables should be negative and 50.566 times weighed to offset the treatment effect. Meanwhile, in columns (2) and (3), we find a consistent sign of  $\beta$  value across all specifications, which aligns with our expectations and again suggests robustness of our results against omitted variables bias.

#### 3.7.2. Spatial heteroscedasticity and autocorrelation

Our study argues that present-day outcomes in a geographical region reflect features of the same region as experienced in the distant past. One objection that has been raised concerning this type of geo-based economic research concerns spatial autocorrelation in residuals, especially when using panel data (e.g., Conley, 1999; Greene, 2003; Kelly, 2019). To address this issue, we adopt a method developed by Hsiang (2010), who recently updated their method in 2018. This method enables us to account for potential spatial autocorrelation as well as heteroscedasticity in residuals. This proceeds by calculating the non-parametric (GMM) spatial and autocorrelation structure, where the spatial correlation is estimated for all observations within the data period, and the autocorrelation is estimated for a given individual over multiple periods up to a given length of lag.

According to Hsiang (2010), the key setting we need to determine in applying this method is the distance cut-off of the spatial kernel (Conley, 2010) and lag cut-off of the temporal periods (Greene, 2003). The former setting is the distance at which spatial correlation is expected to vanish, while the later setting is the period window at which serial correlation is expected to vanish. We first set the lower bound and higher bound of the distance cut-off as 60km and 240 km, respectively. The 60km and 240km are the minimum and maximum geo-unit dimensions we observe across the 0.5\*0.5 (latitude and longitude) grid cells, as discussed above in Section 3.6.3. For the lag cut-off, we refer to Greene (2003), who recommends the period lags to be at least  $T^{0.25}$ . In our case, this is between 3.84 (since the establishment of the Pale in 1800) and 3.08 (since the outlawing of the Pale in 1927). Hence, we set the lower bound and higher bound as 3 and 4 periods as the most conservative and most extensive assumptions.

[Insert Table 3.14 about here]

As Hsiang's (2010) method applies for OLS regressions, we replicate all the OLS regression specifications in our baseline study. The results are shown in Table 3.14, where we apply the lower bound of distance cut-off and lag cut-off in Panel A and higher bound of these cut-offs in Panel B. Generally, we find that the significance of our results unchanged across specifications after applying this method, although the higher bound, as expected, indicates a weaker significance in some cases. It is worth noting that the R-square statistics reported in Table 3.14 differ from our baseline R-square statistics, as Hsiang's (2010) function omits the constant. Overall, the evidence in this section argues that our results are robust to spatial heteroscedasticity and autocorrelation.

### **3.8. Conclusion**

This paper provides evidence that historical inter-ethnic discrimination can result in antipathy towards those economic activities specialized in by the discriminated minority. This culture of discrimination towards those activities can persist long after the physical disappearance

of the minority group and, in the case considered here, can continue to hinder present-day financial development in terms of access to finance by firms in the region. We argue that this outcome explains the under-developed financial markets in Eastern Europe, an underdevelopment which is seen in the disparity in economic development between Western and Eastern European countries.

We first find that, when the local intensity of historical anti-Semitism is higher, current residents of the Pale area exhibit a lower trust in finance, paralleled by higher general social trust. Furthermore, current households in the present-day area of the Pale are less engaged with banks, financial markets, and self-employment when located in regions that recorded a higher incidence of historical anti-Jewish pogroms. This evidence suggests that the *financial antipathy mechanism* (Grosfeld et al., 2013; D'Acunto et al., 2019) is dominant in impeding access to finance among present-day households, overwhelming any offsetting tendency owing to the *bonding trust mechanism* (Grosfeld et al., 2013).

In the firm-level study, we find that those present-day firms that are located in regions with a history of more virulent anti-Semitism report (a) higher financial constraints, (b) less access to external credit, and (c) lower access to banking finance. These results are robust across different control settings and show consistency across comparable variables between different data sources (WES and BVD). This evidence from observing the access to finance of firms within the Pale supports the view that the *financial antipathy mechanism* dominates the increased local trust mechanism. This outcome helps explain the spatial variation in financial development within the territory of the former Pale of Settlement. While development results from numerous factors, anti-market culture plays a critical role in that it inhibits access to finance. We show that these outcomes have links to historical anti-Semitism.

We conduct a battery of checks to support the robustness and a causal interpretation of this relationship. First, we implement an IV approach for each of our baseline regressions and find consistent results along with statistics supporting the validity of the instruments. An RDD approach finds a significant statistical jump at the historical border of Pale, which supports the view that our results are not driven by present-day geographical detail or within-country institutional differences across the territory of the Pale. We also obtain parallel results to our baseline regressions when we replace the key explanatory variable with *pogrom dummy*. This points to the importance of both the density and occurrence of historical anti-Semitism pogroms. We also find that the anti-market culture effect fades with the distance from the places that experienced historical anti-Jewish pogroms, which suggests a cultural link to local historical inter-ethnic hostility. However, neither living under a communist ideology nor past local experience of military battles

drives our baseline results. Finally, our results pass both the unobservables bias test (Oster, 2019) and the spatial heteroscedasticity and autocorrelation test (Hsiang, 2010, updated in 2018).

This study has broader implications. First, inter-ethnic animosity produces a within-group identity, hence boosting a bonding-trust. However, it may also result in an aversion to the type of economic activity pursued by those discriminated against. In the case of the territory of the Pale of Settlement, historical anti-Semitism creates a long-lasting cultural norm of bias against finance, which hinders local residents and firms from accessing finance to the present day. These findings suggest that the cultural legacies of tensions between ethnicities and their subsequent enduring net economic effects merit further investigation.

Second, historical inter-ethnic discrimination can clearly persist through generations, becoming established in cultural norms that linger on affecting present-day financial and economic development. We find present-day residents within the Pale report less trust in finance accompanied by a lower valuation of minority rights (as shown in Table 3.2 Panel B). These effects can be seen as an enduring shadow of historical anti-Semitism. This paper joins the stream of research that discusses the persistence of inter-ethnic discrimination (Voigtländer and Voth, 2012) and its social and economic consequences (Blackaby and Frank, 2000; Burgess and Greaves, 2013; Jha, 2013). Our results highlight the need for efforts to remedy the legacies of historical inter-ethnic discrimination that continue to impede present-day economic development.

Third, literature that analyzes the origins of financial development (Guiso et al., 2004; Nunn and Wantchekon, 2011; Levine et al., 2020) highlights trust as an indicator of the social capital that facilitates regional development. This paper uncovers the importance of possible antithetical roles of different dimensions of trust, and their joint effect when discussing the long-term effect of culture on financial development.

Finally, our research adds to the literature on development. The deep-rooted anti-market culture that was nurtured by historical anti-Semitism persists in impeding the financial and economic development of Eastern Europe. This cultural trait is distinct from the legacy of communist ideology, and the related economic costs remain visible in those present-day transition countries located in the historical area of The Pale. This paper argues that evidence from their pre-communist past sheds light on present-day regional development.

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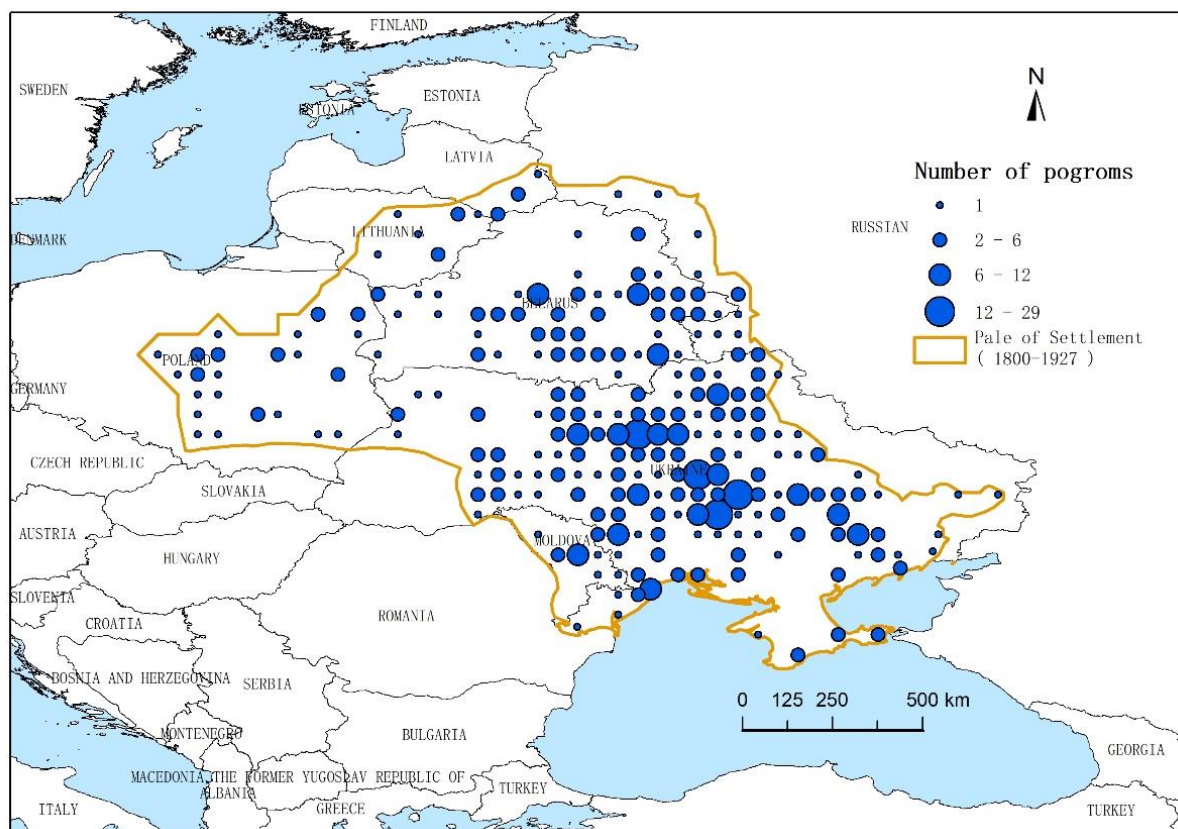
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**Figure 3.1 The area of the Pale of Settlement and distribution of pogroms**



**Table 3.1 Summary of statistics**

Variable	N	Mean	SD	Min	Max
<i>Grid-cell level variables related with the history of Pale</i>					
Number of pogroms (1800-1927)	571	2.983	3.786	0	29
Share of Jews in 1897	571	0.124	0.056	0.009	0.249
Urbanization rate in 1897	571	0.211	0.170	0.021	0.954
Occupational segregation index in 1897	571	0.524	0.139	0.179	0.758
Deviation of spring temperature (1800-1927)	571	52.82	1.596	47.72	56.02
Share of Jews among grain traders in 1897	571	0.903	0.131	0.176	1
Literacy gap between Jews and non-Jews in 1897	571	0.186	0.129	-0.142	0.441
<i>Contemporary social capitals and household finance (LITS database)</i>					
Trust people	4240	2.759	1.126	1	5
Trust finance	3860	3.187	1.302	1	5
Minority rights important	4020	0.950	0.217	0	1
Whether have bank account	4320	0.329	0.470	0	1
Whether have investment income	4320	0.032	0.177	0	1
Whether self-employed	4140	0.077	0.267	0	1
Whether have self-employment income	4320	0.144	0.351	0	1
<i>Contemporary corporate finance variables (WES database)</i>					
Firm financial constraints index	2671	1.527	0.779	1	3
Self-reported finance is an obstacle	5078	0.622	0.485	0	1
Pct working capital from internal finance	4633	79.40	28.02	0	100
Pct inputs purchased with trade credit	4586	34.57	33.89	0	100
Pct accepted supply chain credit	4633	9.026	19.50	0	100
Pct offered sales credit	4600	33.70	34.15	0	100
Pct fixed asset from banking finance	1586	12.50	25.36	0	100
Pct working capital from bank credit	4502	6.731	13.03	0	50
Has bank overdraft facility	4978	0.339	0.473	0	1
Has line of credit from a financial institution	5030	0.318	0.466	0	1
Didn't apply a loan: Did not need a loan	2374	0.606	0.489	0	1
Didn't apply a loan: Application procedures	2374	0.043	0.203	0	1
Didn't apply a loan: Interest rates	2374	0.218	0.413	0	1
Didn't apply a loan: Collateral requirement	2374	0.045	0.207	0	1
Didn't apply a loan: Insufficient size	2374	0.007	0.084	0	1
Didn't apply a loan: Would not be approved	2374	0.013	0.114	0	1
<i>Variables in robustness checks</i>					
Pogrom dummy	571	0.411	0.493	0	1
Distance to pogrom (km)	5150	31.57	24.63	0.666	219.9
Prefer planned economy	2824	61.19	35.41	0	100
Prefer democracy	2824	48.30	39.02	0	100
Military battle	5150	0.082	0.275	0	1
Pct trade payables to costs	6887	15.86	14.32	0	81.38
Pct trade receivables to sales	6076	19.70	17.59	0	88.31
Credit period (days)	6794	65.60	89.14	0	644

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Pct inventory prepayment	1300	10.73	20.09	0	95.70
Pct bank loan to total liability	5737	16.17	18.26	0	79.44
Pct income from interest	5624	0.722	1.577	0	11.43

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**Table 3.2 Historical anti-Semitism pogrom and contemporary social capitals**

This table reports Probit and OLS regression results of the historical pogroms within the Pale of Settlement on contemporary social capital. Panel A shows the effect of pogroms on generalized social trust and trust in finance. Panel B shows the heterogeneous effects of pogroms on other indicators of social capital. All specifications have the identical explanatory variable: *number of pogroms*, which is the accumulated number of the recorded pogrom of each grid-cell during 1800-1927. The *trust people* represents residents' generalized trust regarding other people. The *trust finance* represents residents' self-reported trust regarding banks and the financial sector. The *importance of minority's rights* represents residents' attitudes regarding the importance of protecting the rights of minority people. The *self-employed* represents whether the respondent is self-employed. The *self-employment income* represents whether the respondent's household has any means of income from self-employment. *Individual controls* represent a set of control variables for respondents' identity: age, age squared, gender, income level, consumption (log), decile of consumption, education level, religion, and a dummy for middle-class. *Historical controls* represent the share of Jews in the population and the urbanization rate in 1897. *District controls* represent the local district's elevation (log) and rural/urban/metropolitan category. *Country fixed effect* controls seven present-day countries within the historical border of the Pale of Settlement. *Age limit* represents an enforced limitation to the respondent's age to be over 18 years old and under 60 years old. *Income limit* represents a limit to the sample of respondents to be in the top 60 % income group. Standard errors are bootstrapped and clustered at the grid-cell level. Parentheses contain p-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Panel A: generalized trust and trust in finance (OLS)**

	(1)	Trust people (Mean 2.759) (2)	(3)	(4)	Trust finance (Mean 3.187) (5)	(6)
Number of pogroms	0.020*** (0.000)	0.012*** (0.002)	0.066*** (0.000)	-0.018*** (0.001)	-0.016*** (0.004)	-0.032*** (0.000)
Individual controls	Yes	Yes	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes	Yes
Age limit	No	Yes	No	No	Yes	No
Income limit	No	No	Yes	No	No	Yes
Observations	4240	2840	2940	3860	2740	2760
R <sup>2</sup>	0.130	0.176	0.115	0.264	0.363	0.324

**Panel B: other social capitals (Probit models-average marginal effect)**

	Minority rights (Mean 0.950) (1)	Bank account (Mean 0.329) (2)	Investment income (Mean 0.032) (3)	Self-employed (Mean 0.077) (4)	Self-employment income (Mean 0.144) (5)
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Number of pogroms	-0.012*** (0.000)	-0.006*** (0.000)	-0.008*** (0.000)	-0.015*** (0.000)	-0.004*** (0.000)
Individual controls	Yes	Yes	Yes	Yes	Yes
Historical controls	Yes	Yes	Yes	Yes	Yes
District controls	Yes	Yes	Yes	Yes	Yes
Country fixed effect	Yes	Yes	Yes	Yes	Yes
Observations	3680	4320	3900	4280	3840
Pseudo-R <sup>2</sup>	0.269	0.392	0.257	0.129	0.373

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**Table 3.3 Historical anti-Semitism pogrom and firm financial constraints**

This table reports the impact of historical anti-Semitism pogrom on present-day firms' financial constraints. The leftmost column lists the dependent variables, and each row shows the results from each corresponding regression specification. Each cell represents the coefficient of the *number of pogroms* from a different regression model, while each column in (1) to (5) represents results with an increasingly comprehensive set of control variables as captured at the foot of each column. Column (6) represents the second stage results of the 2SLS regression for each specification when adopting all three IVs: *deviation of spring temperature*, *share of Jews among grain traders*, and *literacy gap between Jews and non-Jews*. All specifications have an identical key independent variable: *number of pogroms*, which is the accumulated number of each grid-cell's recorded pogrom during 1800-1927. The *financial constraints index* is constructed following the methodology of Kuntchev et al. (2014). This index has three values: 1 for financially unconstrained, 2 for partially constrained, and 3 for financially constrained. In row (2) and row (3), we list the coefficient results when conducting the OLS regression and the Ordered-Probit model for the *financial constraints index* individually. According to this index's three scores, we generate three dummy variables and list the Probit-model results when using these three dummies individually in the last three rows. The *self-reported finance is an obstacle* is a dummy variable that equals one if the firm representative self-reported that finance is an obstacle for their firm, and equals zero for no self-reported financial impediments. Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Independent variable: Number of pogroms					
	(1)	(2)	(3)	(4)	(5)	(6)
Financial constraints index (Mean 1.538, OLS)	0.0390*** (0.002)	0.0385*** (0.000)	0.0384*** (0.000)	0.0372*** (0.000)	0.0349*** (0.000)	0.1122*** (0.000)
Financial constraints index (Ordered-Probit)	0.0596*** (0.001)	0.0593*** (0.000)	0.0594*** (0.000)	0.0590*** (0.000)	0.0554*** (0.000)	0.0678*** (0.000)
Finance unconstrained (Probit)	-0.0231*** (0.001)	-0.0227*** (0.000)	-0.0225*** (0.000)	-0.0230*** (0.000)	-0.0214*** (0.000)	-0.1936*** (0.000)
Finance part-constrained (Probit)	0.0088** (0.038)	0.0087** (0.019)	0.0086** (0.024)	0.0100** (0.013)	0.0097** (0.011)	0.1272*** (0.000)
Finance constrained (Probit)	0.0130*** (0.001)	0.0126*** (0.000)	0.0127*** (0.000)	0.0114*** (0.001)	0.0106*** (0.002)	0.1622*** (0.000)
Self-reported finance is an obstacle (Mean 0.606, Probit)	0.0038 (0.452)	0.0037 (0.298)	0.0037 (0.285)	0.0065** (0.046)	0.0057* (0.077)	0.0485*** (0.000)
Historical controls	No	Yes	Yes	Yes	Yes	Yes
Firm characteristic controls	No	No	Yes	Yes	Yes	Yes
Year & size fixed effects	No	No	No	Yes	Yes	Yes
Industry fixed effect	No	No	No	No	Yes	Yes
Specification						IV

**Table 3.4 Access to different sources of finance**

This table reports the impact of historical anti-Semitism pogrom on present-day firms' access to different sources of finance. Each cell represents the coefficient of the *number of pogroms* from a different regression model. Dependent variables are percentile values as listed in the leftmost column. We show the results from each regression specification by rows: in the row (1), we show the historical anti-Semitism on present-day firms' access to internal finance; in the row (2)-(4), we show the impact on credit-based external finance; in the row (5)-(6), we show the impact on banking finance, which is formal external finance. The remaining settings of this table hold the same as Table 3.

	Independent variable: Number of pogroms					
	(1)	(2)	(3)	(4)	(5)	(6)
Pct working capital from internal finance (Mean 79.40%)	0.4593 (0.102)	0.5277* (0.054)	0.5710** (0.029)	0.5353** (0.035)	0.5353** (0.035)	1.8291*** (0.000)
Pct inputs purchased with trade credit (Mean 34.57%)	-0.6274* (0.052)	-0.5348** (0.036)	-0.5314** (0.038)	-0.6577*** (0.007)	-0.6033*** (0.006)	-1.8821*** (0.000)
Pct accepted supply chain credit (Mean 9.026%)	-0.4030* (0.051)	-0.4853*** (0.009)	-0.5086*** (0.007)	-0.5069*** (0.007)	-0.4904*** (0.008)	-1.5906*** (0.000)
Pct offered sales credit (Mean 33.70%)	-0.3892 (0.227)	-0.3221 (0.179)	-0.3175 (0.189)	-0.4234** (0.023)	-0.4507** (0.011)	-1.5073*** (0.000)
Pct fixed asset purchased with banking finance (Mean 12.50%)	-0.5180*** (0.000)	-0.5106*** (0.001)	-0.5516*** (0.000)	-0.5538*** (0.000)	-0.4599*** (0.002)	-1.5082*** (0.000)
Pct working capital from bank credit (Mean 6.731%)	-0.1705** (0.022)	-0.1674** (0.016)	-0.1743*** (0.010)	-0.1794*** (0.009)	-0.1603** (0.015)	-0.3849*** (0.001)
Historical controls	No	Yes	Yes	Yes	Yes	Yes
Firm characteristic controls	No	No	Yes	Yes	Yes	Yes
Year & size fixed effects	No	No	No	Yes	Yes	Yes
Industry fixed effect	No	No	No	No	Yes	Yes
Specification	OLS	OLS	OLS	OLS	OLS	IV

**Table 3.5 Historical anti-Semitism pogrom and firm access to banking finance**

This table reports the impact of historical anti-Semitism pogrom on present-day firms' access to banking finance. The leftmost column lists the dependent variables, and each row shows the results from each corresponding regression specification. The row (1)-(2) represent the regression results when using dependent variables that ask whether the firm has bank overdraft facility or has line of credit from any financial institution, individually. The remaining rows represent results from a set of self-reported dummy answers for the reason this firm did not apply for a bank loan last fiscal year. The remaining settings of this table hold the same as Table 3.

	Independent variable: Total number of recorded pogroms					
	(1)	(2)	(3)	(4)	(5)	(6)
Whether has bank overdraft facility (Mean 0.339)	-0.0085*** (0.007)	-0.0101*** (0.003)	-0.0108*** (0.001)	-0.0095*** (0.001)	-0.0100*** (0.000)	-0.0086 (0.460)
Whether has line of credit from any financial institution (Mean 0.318)	-0.0033 (0.273)	-0.0024 (0.394)	-0.0025 (0.348)	-0.0032 (0.251)	-0.0021 (0.423)	-0.0321*** (0.005)
Reason didn't apply: Did not need a bank loan (Mean 0.606)	-0.0278*** (0.000)	-0.0287*** (0.000)	-0.0288*** (0.000)	-0.0271*** (0.000)	-0.0255*** (0.000)	-0.1729*** (0.000)
Reason didn't apply: Application procedures (Mean 0.043)	-0.0007 (0.517)	-0.0005 (0.673)	-0.0001 (0.919)	0.0000 (0.978)	-0.0003 (0.763)	0.0955*** (0.003)
Reason didn't apply: Interest rates (Mean 0.218)	0.0199*** (0.001)	0.0191*** (0.000)	0.0185*** (0.000)	0.0195*** (0.000)	0.0185*** (0.000)	0.1915*** (0.000)
Reason didn't apply: Collateral requirement (Mean 0.045)	0.0026 (0.188)	0.0025 (0.164)	0.0027 (0.128)	0.0023 (0.144)	0.0021 (0.159)	0.0527 (0.105)
Reason didn't apply: Insufficient size of loan available (Mean 0.007)	0.0012*** (0.003)	0.0015*** (0.001)	0.0014*** (0.001)	0.0014*** (0.001)	0.0019*** (0.000)	0.2304*** (0.003)
Reason didn't apply: Would not be approved (Mean 0.013)	-0.0004 (0.540)	-0.0003 (0.664)	-0.0003 (0.605)	-0.0005 (0.520)	-0.0006 (0.408)	-0.0021 (0.967)
Historical controls	No	Yes	Yes	Yes	Yes	Yes
Firm characteristic controls	No	No	Yes	Yes	Yes	Yes
Year & size fixed effects	No	No	No	Yes	Yes	Yes
Industry fixed effect	No	No	No	No	Yes	Yes
Specification	Probit	Probit	Probit	Probit	Probit	IV-Probit

**Table 3.6 Detail statistics of 2SLS regression specifications**

This table reports the detailed statistics of the 2SLS regression results for our baseline study where utilizing OLS regression. Each column represents the results for different regression specifications using an identical key independent variable: the *number of pogroms*. In the upper part and middle part of the table, we show the coefficient results for the instrumented key explanatory variable and for each of the three instrumental variables. We apply three instrumental variables for each specification. First, *the deviation of spring temperature* is the sum of each year's deviation of spring temperature during 1800-1927 from the historical mean. Second, the *share of Jews among grain traders* is the proportion of local grain traders that occupied by Jews population within a grid cell in 1897. Third, the *literacy gap between Jews and non-Jews*, which represents the gap of education level between the Jews minority and non-Jews majority within each area across the Pale in 1897. In the lower part of the table, we show the statistics for testing the validity of instruments. The *Anderson LM under-id statistics* represents the p-value of the Anderson L.M. under-identification test, which has a null hypothesis that the equation is under-identified. The *Cragg-Donald Wald weak-id statistics* represents the p-value of the Cragg-Donald Wald weak-identification test, which tests whether the excluded instruments are only weakly correlated with the endogenous regressors. The *Sargan-Hansen over-id statistics* represents the p-value of the Sargan-Hansen over-identification test, which tests whether the instruments are over-identified. The *full control sets* indicate the most comprehensive control settings in our baseline regressions: historical controls, Firm characteristic controls, year & size fixed effects, and industry fixed effect. Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Financial constraints index (1)	Pct working capital from internal finance (2)	Pct inputs purchased with trade credit (3)	Pct accepted supply chain credit (4)	Pct offered sales credit (5)	Pct of fixed asset purchased with banking finance (6)	Pct working capital from bank credit (7)
<b>Second stage</b>							
Number of pogroms	0.1122*** (0.000)	1.8291*** (0.000)	-1.8821*** (0.000)	-1.5906*** (0.000)	-1.5073*** (0.000)	-1.5082*** (0.000)	-0.3849*** (0.001)
<b>First stage</b>							
Deviation of spring temperature	0.2498*** (0.000)	0.4638*** (0.000)	0.4790*** (0.000)	0.4652*** (0.000)	0.4803*** (0.000)	0.2888*** (0.000)	0.4729*** (0.000)
Share of Jews among grain traders	9.600*** (0.000)	10.814*** (0.000)	10.712*** (0.000)	10.795*** (0.000)	10.598*** (0.000)	10.496*** (0.000)	10.602*** (0.000)
Literacy gap between Jews and non-Jews	11.053*** (0.000)	11.744*** (0.000)	11.765*** (0.000)	11.740*** (0.000)	11.662*** (0.000)	12.893*** (0.000)	11.671*** (0.000)
Anderson LM under-id test (P-val)	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Cragg-Donald Wald weak-id test (F-stat)	442.847	870.415	355.086	356.879	348.294	126.454	342.969
Sargan-Hansen over-id stat (J-stat)	5.036	1.496	12.870	2.808	5.098	2.409	12.468
Full control sets	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2627	4506	4458	4508	4472	1549	4381

**Table 3.7 Robustness: pogrom dummy as historical anti-Semitism indicator**

This table reports the regression results of our robustness check: replicating all baseline regressions using *pogrom dummy* as the key explanatory variable. The *pogrom dummy* represents the dummy variable that equals one if pogrom occurred within a grid cell during 1800-1927 and equals zero if no pogrom occurred. All the control settings hold the same as our baseline research. Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

**Panel A financial constraint**

	Financial constraints index (1)	Financial constraints index (2)	Finance unconstrained (3)	Finance part- constrained (4)	Finance constrained (5)	Finance obstacle (6)
Pogrom dummy	0.1546** (0.012)	0.2720** (0.011)	-0.1165*** (0.001)	0.0816*** (0.000)	0.0357 (0.223)	0.1279 (0.111)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes
R2/Pseudo-R2	0.0903	0.0535	0.0590	0.0505	0.0495	0.0631
Observations	2627	2627	2590	2609	2512	4873
Specification	OLS	Ordered-Probit	Probit	Probit	Probit	Probit

**Panel B source of finance**

	Pct working capital from internal finance (1)	Pct inputs purchased with trade credit (2)	Pct accepted supply chain credit (3)	Pct offered sales credit (4)	Pct fixed asset purchased with banking finance (5)	Pct working capital from bank credit (6)
Pogrom dummy	3.9709** (0.011)	-6.0116*** (0.006)	-4.5572*** (0.001)	-3.0712* (0.098)	-1.3819 (0.362)	-0.3959 (0.470)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0487	0.0730	0.0555	0.1116	0.0591	0.0428
Observations	4506	4458	4508	4472	1549	4381
Specification	OLS	OLS	OLS	OLS	OLS	OLS

**Panel C banking finance**

	Whether has bank overdraft facility (1)	Pct working capital from bank credit (2)	The reason why did not apply for a bank loan last fiscal year		
			No need (3)	Interest rate (4)	Insufficient size (5)
Pogrom dummy	-0.0117 (0.665)	-0.0004 (0.985)	-0.1324*** (0.001)	0.1078*** (0.001)	0.0232*** (0.005)
Full control settings	Yes	Yes	Yes	Yes	Yes
Pseudo-R2	0.0470	0.0595	0.0526	0.0777	0.1597
Observations	4790	4841	2298	2298	1795
Specification	Probit	Probit	Probit	Probit	Probit

**Table 3.8 Robustness: distance to pogrom**

This table reports the regression results of our robustness check: replicating all baseline regressions using *distance to pogrom* as the key explanatory variable. The *distance to pogrom* is the distance value (kilometer) from the location of each firm to the closest place that has historical anti-Semitism pogrom recorded. All the control settings hold the same as our baseline research. Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

**Panel A financial constraint**

	Financial constraints index (1)	Financial constraints index (2)	Finance unconstrained (3)	Finance part- constrained (4)	Finance constrained (5)	Finance obstacle (6)
Distance to pogrom	-0.0030*** (0.000)	-0.0060*** (0.000)	0.0022*** (0.000)	-0.0010*** (0.005)	-0.0013*** (0.008)	-0.0038*** (0.001)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes
R2/Pseudo-R2	0.0910	0.0543	0.0579	0.0441	0.0532	0.0651
Specification	OLS	Ordered-Probit	Probit	Probit	Probit	Probit

**Panel B source of finance**

	Pct working capital from internal credit (1)	Pct inputs purchased with trade credit (2)	Pct accepted supply chain credit (3)	Pct offered sales credit (4)	Pct fixed asset purchased with banking finance (5)	Pct working capital from bank credit (6)
Distance to pogrom	-0.0818** (0.043)	0.1860*** (0.000)	0.0900*** (0.002)	0.1095*** (0.000)	0.0040 (0.909)	0.0143 (0.278)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.0489	0.0822	0.0553	0.1154	0.0586	0.0432
Specification	OLS	OLS	OLS	OLS	OLS	OLS

**Panel C banking finance**

Whether has bank overdraft facility	Pct working capital from bank credit	The reason why did not for a bank loan last fiscal year No need      Interest rate      Insufficient size
----------------------------------------	-----------------------------------------	--------------------------------------------------------------------------------------------------------------

	(1)	(2)	(3)	(4)	(5)
Distance to pogrom	-0.0005 (0.385)	0.0001 (0.823)	0.0024*** (0.000)	-0.0023*** (0.000)	-0.0001 (0.198)
Full control settings	Yes	Yes	Yes	Yes	Yes
R2	0.0475	0.0595	0.0502	0.0772	0.1060
Specification	Probit	Probit	Probit	Probit	Probit

**Table 3.9 Robustness: regression discontinuity design**

This table reports the results of our robustness check: regression discontinuity design (RDD). The *statistical jump at the historical Pale border* indicates the RDD estimate the statistical difference of estimated results of dependent variables at the Pale of Settlement's historic border. We apply the RDD approach using 120km, 180km, and 240km as bandwidth individually to check the consistency and robustness of our RDD approach results. The Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Financial constraints index	Finance unconstrained	Finance part- constrained	Finance constrained	Pct working capital from internal credit	Pct inputs purchased with trade credit	Pct accepted supply chain credit	Pct offered sales credit	Pct working capital from bank credit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
<b>Statistical jump at the historical Pale border</b>									
Bandwidth 120km	5.031*** (0.000)	-2.439*** (0.000)	-0.153*** (0.000)	2.592*** (0.000)	36.888*** (0.000)	-31.549*** (0.000)	-26.982*** (0.000)	-28.842*** (0.000)	-5.344** (0.023)
Bandwidth 180km	3.871*** (0.000)	-1.863*** (0.000)	-0.144*** (0.000)	2.008*** (0.000)	37.202*** (0.000)	-48.092*** (0.000)	-22.428*** (0.000)	-25.760*** (0.000)	-5.344** (0.023)
Bandwidth 240km	3.708*** (0.000)	-1.785*** (0.000)	-0.138*** (0.000)	1.923*** (0.000)	36.597*** (0.000)	-49.820*** (0.000)	-20.870*** (0.000)	-24.967*** (0.000)	-5.344** (0.023)

**Table 3.10 Robustness: impact of communism**

This table reports the regression results of our robustness check: the impact of communist ideology. We implement the regression by including two additional control variables: *prefer market intervention*, which measures the local residents' preference on the planned economy over the market economy; *prefer democracy*, which measures the local residents' preference of democracy over the autocratic regime. All the other control settings hold the same as our baseline research. Parentheses contain p-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Panel A: Probit estimation**

	Finance obstacle (1)	Finance unconstrained (2)	Finance part-constrained (3)	Finance constrained (4)	Why not apply bank loan: No need (5)	Why not apply bank loan: Interest rate (6)
Number of pogroms	0.0098** (0.035)	-0.0202*** (0.000)	0.0080** (0.012)	0.0117*** (0.007)	-0.0203*** (0.000)	0.0152*** (0.000)
Prefer planned economy	0.0012* (0.063)	-0.0023*** (0.000)	0.0015*** (0.000)	0.0008** (0.041)	-0.0019*** (0.001)	0.0013*** (0.003)
Prefer democracy	-0.0000 (0.970)	-0.0006 (0.232)	0.0006* (0.065)	0.0002 (0.658)	-0.0007 (0.238)	0.0002 (0.750)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2714	1386	1395	1368	1195	1195

**Panel B: OLS regression specifications**

	Finance constraints (1)	Internal finance (2)	Trade credit (3)	Supply credit (4)	Offer credit (5)	Banking fixed asset (6)	Banking working capital (7)
Number of pogroms	0.0349*** (0.001)	0.4094 (0.166)	-0.6596*** (0.007)	-0.3698* (0.065)	-0.4295** (0.047)	-0.3212 (0.119)	-0.1787** (0.044)
Prefer planned economy	0.0031*** (0.001)	-0.0047 (0.879)	-0.0926** (0.017)	0.0197 (0.371)	-0.0614* (0.074)	-0.0622** (0.023)	-0.0132 (0.260)
Prefer democracy	0.0006 (0.517)	-0.0264 (0.427)	-0.0558 (0.101)	0.0403** (0.032)	-0.0652* (0.066)	-0.0473* (0.085)	-0.0049 (0.660)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1412	2521	2491	2525	2501	887	2452

**Table 3.11 Impact of war**

This table reports the regression results of our robustness check: impact of war. The *military battle* is a dummy variable that equals one if there were military battles recorded in a grid cell after the outlaw of Pale (1927-1984) and equals zero if no military battle recorded. The *c\_pogrom\*c\_battle* is the demeaned interaction term of *number of pogrom* and *military battle*, according to the methodology of Balli & Sørensen (2013). All the control settings hold the same as our baseline research. Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Financial constraints index		Pct working capital from internal credit		Pct inputs purchased with trade credit		Pct working capital from bank credit	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Number of pogroms	0.0362*** (0.000)	0.0353*** (0.000)	0.5301** (0.043)	0.5117** (0.046)	-0.6113*** (0.005)	-0.6366*** (0.005)	-0.1737** (0.014)	-0.1702** (0.014)
Military battle	-0.1001 (0.157)	-0.1443* (0.070)	0.9406 (0.715)	-0.5111 (0.886)	0.8121 (0.730)	-1.1018 (0.711)	1.2179 (0.181)	1.4918 (0.312)
c_pogrom*c_battle		0.0278 (0.179)		0.7628 (0.374)		1.0527 (0.190)		-0.1444 (0.692)
Observations	2627	2627	4506	4506	4458	4458	4381	4381
R2	0.1047	0.1052	0.0494	0.0498	0.0708	0.0713	0.0451	0.0451

**Table 3.12 Robustness: data from BVD database**

This table represents the robustness check when we utilize data from the Bureau van Dijk (BvD) database. We replicate the baseline regression specifications using comparable variables from BVD and show the OLS results in Panel A and 2SLS statistics in Panel B. Each column represents the results by using a different explanatory variable from six indicators of firm access to finance: *pct trade payables to costs*, which measures the percentage value of trade payable relative to the total cost of goods sold; *pct trade receivables to sales*, which measures the percentage value of trade receivable relative to the total revenue; *credit period*, records the average credit period in days this firm would be provided; *pct inventory prepayment*, the value this firm pre-paid to their trade partners for their inventory; *pct bank loan to total liability*, the percentage value of bank loan to the firm's total liability; *pct income from interest*, the percentage value of income from interest to the firm's total income. The *full control settings* represent all the control settings we utilized in our baseline regressions while replacing the firm characteristic indicators from the BvD database, which are: firm age, firm size, board size, and profitability ratio (ROA). The other control settings include historical controls, industry fixed effect, and year fixed effect. In the lower part of Panel B, we show the statistics for the three IV validity tests, which corresponding to the Table 6. Standard errors are bootstrapped and clustered at the grid-cell level. Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Pct trade payables to costs	Pct trade receivables to sales	Credit Period (days)	Pct inventory prepayment	Pct bank loan to total liability	Pct income from interest
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	(1)	(2)	(3)	(4)	(5)	(6)
<b>Panel A OLS results</b>						
Number of pogroms	-0.1679*** (0.005)	-0.4030*** (0.000)	-2.4311*** (0.000)	-0.7190*** (0.000)	-0.5118*** (0.000)	-0.0270*** (0.001)
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6259	5554	6153	1196	5230	5132
R2	0.1993	0.2134	0.1671	0.3595	0.2254	0.1838
<b>Panel B 2SLS results</b>						
<b>Second stage</b>						
Number of pogroms	-0.4100*** (0.009)	-0.4656** (0.023)	-4.3625*** (0.000)	-1.0147 (0.145)	-0.5395** (0.012)	-0.0459** (0.013)
<b>First stage</b>						
Deviation of spring temperature	0.3552*** (0.000)	0.4058*** (0.000)	0.4273*** (0.000)	0.4070*** (0.000)	0.3885*** (0.000)	0.3728*** (0.000)
Share of Jews among grain traders	12.193*** (0.000)	11.672*** (0.000)	11.813*** (0.000)	13.315*** (0.000)	11.813*** (0.000)	12.045*** (0.000)
Literacy gap between Jews and non-Jews	6.502*** (0.000)	6.921*** (0.000)	6.941*** (0.000)	3.985*** (0.000)	7.062*** (0.000)	6.329*** (0.000)
Anderson LM under-id stat	0.000	0.000	0.000	0.000	0.000	0.000
Cragg-Donald Wald weak-id stat	0.094	0.096	0.001	0.092	0.000	0.000
Sargan-Hansen over-id stat	0.000	0.000	0.000	0.000	0.000	0.000
Full control settings	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6244	5538	6136	1196	5215	5117
R2	0.1978	0.2137	0.1659	0.3590	0.2265	0.1830

**Table 3.13 Unobservable - observable selection**

This table reports the unobservables selection test when applying Oster's (2019) approach to our baseline OLS regressions, where each row represents a different regression specification. The assumption is that the selection on observables is informative about selection on unobservables, and  $R_{max}=1.3 \tilde{R}$ . The  $\delta$  measures the proportional degree between unobservables and observables, estimated by setting the  $\beta = 0$  when the unobservables equally offset the observables. The  $\beta$  measures the treatment effect of explanatory variable to match a proportional degree of selection  $\delta$ , estimated by setting  $\delta = 0$  and 1, respectively. According to Oster's (2019), a typical unbiased argument would observe the absolute value of  $\delta$  larger than 1, and the bounding set of  $\beta$  does not include 0. All the control settings hold the same as our baseline research.

	Independent variable: Number of pogroms		
	Oster's (2019) $\delta$ value	Oster's (2019) $\beta$ value when:	
	(1)	Setting $\delta = 0$ (2)	Setting $\delta = 1$ (3)
Financial constraints index	6.18616	0.03491	0.03317
Pct working capital from internal finance	-50.56601	0.54031	0.56974
Pct inputs purchased with trade credit	18.29925	-0.60325	-0.59616
Pct accepted supply chain credit	-22.89604	-0.49042	-0.52478
Pct offered sales credit	-681.61973	-0.45065	-0.46736
Pct of fixed asset purchased with banking finance	8.15559	-0.45992	-0.43326
Pct working capital from bank credit	14.68472	-0.16031	-0.15647
Historical controls	Yes	Yes	Yes
Firm characteristic controls	Yes	Yes	Yes
Year & size fixed effects	Yes	Yes	Yes
Industry fixed effect	Yes	Yes	Yes

**Table 3.14 Spatial heteroscedasticity and autocorrelation in residuals**

This table reports the regression results when implementing Hsiang's (2010) approach, which enables us to account for potential spatial autocorrelation as well as heteroscedasticity in residuals. For applying this approach, we need to set the distance cut-off of spatial kernel (the distance at which spatial correlation is expected to vanish), and lag cut-off of temporal periods (the period window at which serial correlation is expected to vanish). As discussed in section 7.2, we set the lower bound of this estimation as (60km, 3lags) and the higher bound of this estimation as (240km, 4lags). The results for the lower bound and upper bound are shown in Panel A and Panel B, respectively. The R-square statistics is different from analogous R-square statistics as this function omits the constant. Parentheses contain p-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Financial constraints index	Pct working capital from internal finance	Pct inputs purchased with trade credit	Pct accepted supply chain credit	Pct offered sales credit	Pct of fixed asset purchased with banking finance	Pct working capital from bank credit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
<b>Panel A</b>							
<b>60km as distance cut-off and 3 as lag cut-off</b>							
Number of pogroms	0.0388*** (0.000)	0.5801** (0.040)	-0.5495** (0.020)	-0.5117*** (0.002)	-0.3310 (0.217)	-0.5646*** (0.002)	-0.1796*** (0.009)
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year & size fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2627	4506	4458	4508	4472	1549	4381
R2 (excluding constant)	0.8089	0.8920	0.5287	0.1957	0.5218	0.2140	0.2349
<b>Panel B</b>							
<b>240km as distance cut-off and 4 as lag cut-off</b>							
Number of pogroms	0.0388*** (0.001)	0.5801* (0.077)	-0.5495** (0.047)	-0.5117** (0.019)	-0.3310 (0.309)	-0.5646*** (0.005)	-0.1796** (0.033)
Historical controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm characteristic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year & size fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2627	4506	4458	4508	4472	1549	4381
R2 (excluding constant)	0.8089	0.8920	0.5287	0.1957	0.5218	0.2140	0.2349

Figure 3.1: Figures for RRD test



Appendix Table A1 : Variable explanation

Variable name	Source and explanation
<i>Historical anti-Semitism pogrom variables (grid-cell level)</i>	
Cell-identifiers	Unique identification number for each grid-cell among the territory of the Pale of Settlement. Grosfeld et al. (2020) original code: “cell_id”.
Number of pogroms	The accumulated number of the recorded pogrom of each grid-cell during 1800-1927. Grosfeld et al. (2020) original code: “count”.
Share of Jews in 1897	The proportion of Jews among the total population within a cell according to the 1897 census of the Russian Empire. Grosfeld et al. (2020) original code: “sh_jews”.
Urbanization rate in 1897	The proportion of urban population among the total population within a cell according to the Russian Empire 1897 census. Grosfeld et al. (2020) original code: “urban”.
Occupational segregation index in 1897	Measures to what extent the Jews and non-Jews tend to engage in different occupations in a particular area. Grosfeld et al. (2020) original code: “segreg”.
Deviation of spring temperature	The sum of each year’s deviation of spring temperature during 1800-1927 from the historical mean. Grosfeld et al. (2020) original code: “sdev_temp_sp_rm75”.
Share of Jews among grain traders in 1897	The proportion of Jews among the grain traders within a cell according to the Russian Empire 1897 census. Grosfeld et al. (2020) original code: “sh_jews_agr_int_pr”.
Literacy gap between Jews and non-Jews in 1897	The gap of education level between the Jews minority and non-Jews majority within each area across the Pale in 1897. Grosfeld et al. (2020) original code: “sh_lit_diff”.

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Contemporary social capitals and household finance (LITS database)

Trust people	Generally speaking, how much this interviewee trusts in people today. Score-scale from 1, complete distrust to 5, complete trust. LITS original code: “q302_1”.
Trust finance	Trust in banks and the financial system. Score-scale from 1, complete distrust to 5, complete trust. LITS original code: “q303_8”.
Minority rights important	It is important to protect minority’s rights. LITS original code: “q312_9”.
Whether have bank account	Does the respondent holding a bank account. LITS original code: “q209_3”.
Whether have investment income	Does the respondent has income from investments, savings or rental of property. LITS original code: “q210a7”.
Whether self-employed	Whether the interviewee is self-employed. LITS original code: “selfemp_hh”.
Whether have self-employment income	Whether the interviewee’s household has income from self-employment. LITS original code: “q210a3”.

Contemporary corporate finance variables (WES database)

Firm financial constraints index	A constructed indicator of the WES firms’ level of financial constraints. Methodology follows Kuntchev et al., 2014.
Self-reported finance is an obstacle	Self-reported finance is an obstacle. Dummy value. Original score-scale from no obstacle (0) to very severe obstacle (4). Constructed by the replacing score 1-4 into 1, representing answers with a financial obstacle while keep score 0 to represent answers without financial obstacle. WES original code: “k30”.
Pct working capital from internal credit	Percentage of working capital financed from internal funds/retained earnings. WES original code: “k3a”.
Pct inputs purchased with trade credit	Percentage of material inputs/services paid for after delivery in the last fiscal year. Percentage value. WES original code: “k1e”.
Pct accepted supply chain credit	Percentage of working capital purchased on credit/advances from suppliers /customers. Percentage value. WES original code: “k3f”.
Pct offered sales credit	Percentage of total annual sales paid for after delivery. Percentage value. WES original code: “k2c”.
Pct fixed asset from banking finance	Percentage of fixed assets funded by bank borrowing. WES original code: “k5bc”.
Pct working capital from bank credit	Percentage of working capital financed from bank credit. WES original code: “k3bc”.
Has bank overdraft facility	Does this firm have a bank overdraft in the last fiscal year. WES original code: “k7”. K8
Has line of credit from a financial institution	Does this firm have a line of credit or a loan from a financial institution. WES original code: “k8”.
Reasons didn't apply for a loan	Reasons that this firm did not apply for a bank loan in the last fiscal year. Categorical variable. WES original code: “k17”.

Variables in robustness checks

Pogrom dummy	Whether there was pogrom recorded within a grid-cell during 1800-1927. Grosfeld et al. (2020) original code: “occurrence”.
Distance to pogrom (km)	The natural logarithm of the distance (km) from the location of each firm to the closest location that records pogrom occurrence during the existence of the Pale of Settlement. Constructed by the coordinates of firm location (town center) to the closest recorded pogrom place (center of grid-cell in Grosfeld et al., 2020).
Military battle	Whether military battles recorded in a grid cell after the outlaw of Pale (1927-1984). Geographical data were collected from Yuri Zhukov (2010).
Prefer planned economy	The local residents’ preference on the planned economy over the market economy. Constructed by getting the mean value of all respondents’ dummy answers in each grid-cell.
Prefer democracy	The local residents’ preference of democracy over the autocratic regime. Constructed by getting the mean value of all respondents’ dummy answer in each grid-cell.
Pct trade payables to costs	Trade payable / Cost of goods sold. Constructed by the total trade credit (“data13052”) divided by the gross cost of goods that sold last fiscal year (“data22199”).
Pct trade receivables to sales	Trade receivable / Net sales. Constructed by the total trade credit (“data21020”) divided by the total revenue last fiscal year (“data13004”).
Credit period (days)	The average days of credit period for a given firm year. BvD database original code: “data31125”.
Pct inventory prepayment	Inventory prepayment / Total revenue. Constructed by inventory prepayments (“data20030”) on the total revenue (“data20010”).
Pct bank loan to total liability	Bank loan / Total liability. Constructed by the value of bank loan (“data21070”) divided by the total liability (“data14022”).
Pct income from interest	Interest income / Total revenue. Constructed by the income from interest (“data13025”) divided by the total revenue (“data13004”).

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## **Chapter 4 The long shadow of the wall: household financial decision-making as a legacy of German Separation**

### **Abstract**

This paper discusses the lingering effect of cultural norms on household financial decision-making when taking the German Separation and later Reunification as a natural experiment. We find that three decades after the Reunification, the ingrained cultural norm of the former communist regime still alters the financial decision-making in East Germans. Compared with the West, residents in East Germany report less social trust, less trust in the financial market, and less confidence in economics. These contaminated social capitals have profound implications in financial preferences and behaviors for residents of East Germany. Compared to West Germans, they invest less in the financial market, perceive less financial security, and report higher financial reliance on the state. Notably, Eastern females report higher within-household financial negotiation power than Western females. The results' robustness and causal interpretation are underpinned by the Unobservable Selection Bias Test and Dual Difference-in-Differences approach.

## 4.1 Introduction

The root of a person's financial behaviors may encompass a sophisticated composition, such as the individual's education (Cole et al., 2014; Fernandes et al., 2014), religion (Guiso et al., 2003; Stulz & Williamson, 2003), and early experience (Callen et al., 2014; Bernile et al., 2017; Brown et al., 2019). Simultaneously, the surrounding society's cultural norms (Guiso et al., 2003), social cohesions (Gilligan et al., 2014), and quality of the local financial system (Pascali, 2016) alter the resident's financial preferences. A growing literature argues that traumatic historical shocks affect present-day residents' financial decision-making, and this mechanism works through the lingering effect on an individual's internal social norms (D'Acunto et al., 2019; Levine et al., 2020). However, as historical shocks may have multiple dimensions of impact on the society, such as institution (Lippmann et al., 2020) and social structure (Acemoglu et al., 2011), it has been a Gordian Knot for scholars to separately argue that the culture as a legacy of historical trauma which explains the contemporary socio-economic outcomes.

In this paper, we utilize the exceptional historical setting of German Separation and Reunification (1945-1990) as an attempt to distinguish the role of culture on financial development, with a specific focus on household financial decisions. Exogenously separated into two countries, the communist regime of the German Democratic Republic (GDR) and the capitalist regime of the Federal Republic of Germany (FRG), the forty-year division still contributes to the contemporary disparity between East and West Germany, despite the decades that have passed since Reunification (Simpser et al., 2018; Lippmann et al., 2020; Lichter et al., 2021). Literature has widely taken this event as a natural experiment to understand the drivers of economic development (Offe, 1992; Uhlig, 2006; Fuchs-Schundeln, 2008). Considering the post-reunification cohort has maintained a foothold among present-day Germany. The institutional division among East and West Germany has vanished for three decades. An emerging strand of the literature has adopted this platform as a natural experiment to analyze the persistence and legacy of cultural norms such as preference (Friche & Pannenberg, 2020), financial attitudes (Laudenbach et al., 2020), and gender issues (Zoch, 2021).

We discuss how and to what extent the previous Berlin Wall may still affect present-day individuals' financial decision-making in Germany. This effort tries to explain the East-West divergence of financial development through the individual's value and preference regarding finance. We collect survey measurements from the German Socio-Economic Panel (SOEP), which provides national representative observations spanning from 1984 to 2018. In the empirical analysis, we utilize comprehensive robustness tests including cohort study, restricted-sample and sub-sample analyses, an unobservable selection bias test, a regional effect test (interaction with an

East-state dummy), and a persistency test (demeaned interaction with education level). Specifically, we construct a Dual Difference-in-Differences (Dual-DiDs) approach to uncover the embedded cultural impact of former GDR, which works through intergenerational transmission while fading with long-term influence from surrounding circumstances.

We find that the present-day East Germans reveal the cultural legacy from the former communist regime, and these lingering cultural norms manifest in East Germans' financial preferences and behaviors. Compared with West Germans, East Germans report lower social trust, lower willingness to access financial markets, perceive less financial security, and perceive higher financial reliance on the state. However, East German women hold higher within-household financial decision power than West German women, inherited from the equal-breadwinner cognition in the former communist regime of GDR. These results persist across econometric approaches, and the East-West convergence is slow when observing East and West Germany as two entities. Meanwhile, we find younger German generations (post-reunification cohorts) reveal less East-West divergence in cultural norms and financial decision-making.

This paper makes extensive contributions to the literature. First, our paper is in line with the cultural economics literature that discusses how historical shocks persistently alter the trajectory of local culture, manifesting as a legacy of socio-economic outcomes (Nunn & Wantchekon, 2011) and mirrors the disparity of cross-regional development (Pierce & Snyder, 2017; D'Acunto et al., 2019). Germany provides an exceptional setting to analyze the persistency of cultural norms and the related financial and economic outcomes. Our study joins the discussion of how the "collapse of the Berlin Wall" still demonstrates the disparity between East and West Germany. We shed light on the cultural norm as the legacy of the former communist regime. Through this channel, the bygone ideological impact of GDR still alters East Germans' social capital, access to finance, financial cognitions, and financial decisions.

Secondly, this research contributes to the study of household finance and gender equality in finance. The classic research on household finance treats each household as a unitary entity and overlooks household members' bargaining power (i.e., Campbell, 2006). However, a growing number of researchers have argued for the heterogeneous negotiation power within households depending upon cultural backgrounds (Holst & Wieber, 2014). This strand of study primarily focuses on gender roles in household economic issues (Lippmann et al., 2020; Barth et al., 2020). Our study extends the discussion with the aspect of household financial decisions. We argue that although the former communist regime of GDR hinders the financial development of East Germany from the overview, it provides a cultural legacy of gender equality, and this lingering cultural norm is manifested in present-day household financial decision-making.

Thirdly, our study adds to the literature on financial decision-making. Early-life exposure to finance (Brown et al., 2019) and local social capital (Fukuyama, 1995) predict one person's financial decision-making. These factors extensively indicate one person's financial cognitions, financial preferences, and financial decisions within household financial negotiation power. This mechanism works through the intergenerational transmission of cultural norms (Dohmen, 2012). We provide evidence that the three-decade Reunification does not witness a conspicuous convergence between East and West Germany regarding the cultural norms and the implications in household financial decision-making. Meanwhile, we are calling for researchers' attention when interpreting the financial implications of one specific cultural norm. We argue that the former communist regime of GDR hindered the overall financial development of East Germany. However, the cultural legacy of this bygone regime has positive implications on present-day gender equality in the labor market, financial market participation, and within-household negotiation power.

This paper also sheds light on the study of Germany and its economic development. Previous research generally provides over-optimistic expectations for the East-West convergence of Germany after Reunification. For example, Duch (1995) argues that East Germany would unshakably manifest a democratic transition after the Reunification. Correspondingly, Alesina & Fuchs-Schündeln (2007) predict the East-West divergence in economic preferences would close in one to two generations (twenty to forty years). However, the three-decade unified development did not cause an apparent convergence of East-West discrepancy. Recent evidence indicates a profound and persistent socio-economic legacy of the former communist regime of GDR (i.e., Simpser et al., 2018; Friehe & Pannenberg, 2020; Zoch, 2021). Our study supplements and extends this work from the perspective of the ingrained cultural legacy, and its implications on present-day household finance in Germany.

Finally, this research joins the discussion of regional development and the discussion of communism. It has been argued that finance is a building block of economic development, and social capital fosters the development of the financial market (Dupont & Karpoff, 2019). Our study argues the diverse impact of communism on long-term outcomes of household financial behaviors. Also, this paper highlights the distinct impact of communist ideology on society as an entirety, the household as an economic unit, and individual residents when considering within-household heterogeneity.

## **4.2 Theoretical development**

### **4.2.1 Cultural economics and German separation**

A society's cultural norms such as beliefs, preferences, and values have long been argued as a determiner and driver that explains the divergence of development across regions (Putnam et al., 1994; Fukuyama, 1995). This strand of research of cultural economics can be traced back to Adam Smith, the author of "The Wealth of Nations," who argued that a particular set of social norms underpinned or hampered market economics and capitalism. Following this, a profusion of literature has demonstrated how traumatic historical shocks persistently alter the trajectory of local culture, which manifests as a legacy of socio-economic outcomes and mirrors the disparity of cross-regional development. For example, the historical slave trade in Africa has been negatively affecting Africa's economic development (Nunn, 2008). This causal relationship works through the mistrust, and ethnic fractionalization nurtured by the slave trade (Nunn & Wantchekon, 2011), and has implications on financial development (Pierce & Snyder, 2017; Levine et al., 2020).

In parallel, a separate body of research argues that culture may not be a sufficient channel through which historical events lingeringly affect present-day development. The literature argues that the contemporary economic outcomes assemble a sophisticated group of elements that originate from historical shocks, such as the political system (Acemoglu et al., 2001), institutions (Lippmann et al., 2020; Lichter et al., 2021), social structure (Acemoglu et al., 2011) or even randomness (Acemoglu & Robinson, 2019). In another strand of the research, Beck et al. (2003) show that colonization exerted exogenous shocks to colonies' legal traditions, combined with the local endowment condition, persistently altering former colonies' financial development.

Substantial evidence has claimed the persistent effect from the distant past to present-day outcomes and argued that culture provides an explanatory power that works through individuals' internal channels and is conveyed by intergenerational transmission (Dohmen et al., 2012). Indeed, scholars argue that a single historical event may create divergent impacts that are persistently observable, which is always a combined discussion of culture and other mechanisms (Becker & Woessmann, 2009; Pierce & Snyder, 2017). However, an inadequate effort can focus the discussion on the cultural mechanism while minimizing the confounding effects from other mechanisms.

From this perspective, Germany provides an exceptional setting to analyze the persistency of cultural norms and the related financial or economic outcomes. Firstly, the Separation was unrelated to the German people's desire or decision. As a result of political unification, Germany as a country was formalized in 1860 and remained a single country until the end of the Second World War (Bucher-Koenen & Lamla, 2014). Germany was exogenously separated into two parts, and the boundary line was arbitrarily set according to the end-of-war frontline between the Soviets and the Allies within Germany. Secondly, dramatic divergent ideologies were exerted into the two exogenous separated territories for 45 years. Under the sphere of influence of the Soviets, the

eastern part of Germany, known as the former German Democratic Republic (GDR), was developed as a rigid communist regime. In the meantime, the Federal Republic of Germany (FRG), the western part of Germany, was occupied by the Allies and developed as a capitalist regime to the present day. Thirdly, there was no institutional discrepancy between East and West Germany before and after the Separation. The fall of the Berlin Wall in November 1989 marked the start of the German Reunification, culminating on 31 August 1990 when the Unification Treaty was officially signed, and GDR was merged with FRG. Since then, no political or institutional East-West division has existed in Germany.

Researchers have long viewed the German separation and later reunification as a natural experiment (e.g., Offe, 1992; Fuchs-Schündeln & Schündeln, 2005). A substantial amount of literature has contributed to how this historical event still lingeringly affects the present-day residents and how the long-collapsed “Berlin Wall” still explains the disparity between East and West Germany (e.g., Alesina & Fuch, 2007; Fuchs-Schundeln, 2008). Our study is in line with this theoretical background and adopts German Separation as a natural experiment to analyze the cultural determiners of financial development from the perspective of household financial decision-making.

#### **4.2.2 Household financial decisions as a legacy of shocks**

Building on cultural economics, seminal literature argues that bygone history still explains present-day household financial behaviors (Fuchs-Schundeln, 2008; D’Acunto et al., 2019; Levine et al., 2020). Numerous historical settings have been discussed from different perspectives. Scholars find the legacy of shocks works by altering the local cultural norms and affecting individuals’ early life exposure to finance.

Corresponding to Nunn & Wantchekon (2011), Levine et al. (2020) argue that the magnitude of historical slave export negatively predicts present-day African households’ trust in financial institutions, resulting in less access to financial services, financial credits, and mobile finance. When analyzing the historical anti-Semitism within Germany, D’Acunto et al. (2019) find that the historical presence of the Jewish community, along with the inter-ethnic hostility it nurtured between Jews and the non-Jewish majority, explains the variation of present-day German households’ distrust in the financial system and residents’ participation in the financial market. This research builds on the theoretical framework that the historical specialization of Jews in the financial sector left a culture of financial antipathy, which was rooted in the anti-minority sentiment that expanded into the economic specialization that the ethnic minority engaged with. This cultural trail is visible even after the dramatic decrease in physical presence of the Jewish community

(Grosfeld et al., 2013). Similarly, the Habsburg Empire, as a long-gone institution, persistently affects the cultural norms of the residents who live within the historical border of this empire (Becker et al., 2016). Fernandes et al. (2014) examine finance education on improving financial literacy and financial behaviors. They find the educational interventions on financial behaviors reveal low magnitude, and the effects decay to negligible after 20 months, and controlling psychological traits diminish the educational effect dramatically. The profound impact of culture is demonstrated in its persistency and intergenerational transitivity (Dohmen et al., 2012).

We use the persistent cultural trail and the early life exposure to finance to dissect the case of German Separation and later Reunification on household financial decisions. Early-life exposure to finance has a long-term implication for household financial decision-making (Brown et al., 2019). Under a planned economy, GDR residents lived without capital market and access to very limited savings and credit options for more than four decades. The long-term lack of finance in East Germany created a significant East-West financial literacy gap among residents, leading to a division of their financial decisions (Stolper & Walter, 2017). However, the convergence in economic and demographic characteristics after the Reunification does not seem to close the gap in financial literacy and financial behaviors between Germans from the East and West. Researchers have started to argue the cultural norms explaining this persistency (Bucher-Koenen & Lamla, 2014; Friehe & Pannenberg, 2020).

#### **4.2.3 Persistent divergence and the financial legacy**

The initial concern of the persistent East-West division in Germany is the gap in economic outcomes. For example, one decade after Reunification, residents in the East held twice the amount of precautionary wealth (Fuchs-Schündeln & Schündeln, 2005), had a higher saving rate (Fuchs-Schündeln, 2008), and had higher job satisfaction from being self-employed (Fuchs-Schündeln, 2009) compared with Western residents in Germany. Meanwhile, researchers argue significant East-West divergence of cultural norms in post-reunification studies. Empirical work that uses surveys to analyze the East-West difference in values finds mixed conclusions. Rainer & Siedler (2009) find East Germans have lower social trust than West Germans, and there was no clear sign of convergence. However, does a lower trust level always indicate lower social capital and hence always hinder economic development? Van Hoorn & Maseland (2010) show that East Germans appear to entertain values more conducive to economic growth, which refutes the belief that communist culture brought about West-East economic differences. Nonetheless, the 45 years of exogenous division and development under different ideologies certainly nurtured profound

cultural differences between GDR and FRG residents, such as social values and economic or political preferences.

In an important contribution, Alesina & Fuchs-Schündeln (2007) estimate that it will take two to four decades to see the convergence of East and West Germans' preferences. However, the persistence of the East-West divergence in cultural norms was underestimated. Living under a communist regime persistently affects the East Germans' cultural norms, such as trust (Dohmen et al., 2012), risk preference (Heineck & Süßmuth, 2013), and political preference (Fuchs-Schündeln & Schündeln, 2015). Examining the individual's internal channel and intergenerational transition, Germany's division is still significantly observable after 30 years of Reunification. Recent literature argues that this divergence manifests in financial perspectives. Fricke & Pannenberg (2020) find GDR residents entertain less present bias, which indicates the lasting echoes of the regime's influence and predicts GDR residents' financial decisions such as saving and credit. Similarly, Laudenbach et al. (2020) find that present-day East Germans invest less in the financial market than West Germans. This phenomenon is explained by the long-lasting effect of the previous communist ideology that fuels anti-capitalist doctrine. The bygone communist regime persistently shapes East Germans' values and attitudes, which are transmissible across generations and impact the present-day East residents' social capital (Lichter et al., 2021). Evidence of how this lingering cultural norm impacts household finance has been provided. However, the within-household implication is under-researched.

Classic household finance literature predominantly discusses a household's financial behaviors when treating a household as a unitary entity (e.g., Campbell, 2006), rather than considering the composition structure of the household and within-household bargaining power between members. German Separation provides a perspective of analyzing the driving force of household financial decisions.

Encouraged by the communist ideology and state socialization, GDR females are likely to work with almost equal probability to males, although life expectancy and income were much lower in the East. By contrast, FRG actively supported the marriage-based male breadwinner family under a conservative welfare regime with policies such as marriage-related benefits and tax allowances (Zoch, 2021). In the GDR, full-time employment was expected for males and females equally, resulting in more adequate labor market contributions. Women in the East were supported by work-family policies and propagandized gender equality laws in education and employment. As a result, female employment rates in GDR were the highest globally, which is a distinctive disparity with FRG. Also, decades after the Reunification, Eastern women still have much higher household income contribution and higher occupancy in the labor market than Western women (Holst &

Wieber, 2014; Barth et al., 2020). Lippmann et al. (2020) argue these consequences are directly attributable to the culture of the equal-breadwinner norm, which is a legacy of the former gender-equal institution of GDR. Higher discourse power in economics should have improved Eastern women's negotiation power within the family, such as financial decision-making. However, there is still a lack of literature that intertwines this cultural legacy of gender equality with the anti-market cultural legacy of the GDR and discusses their net implications on household finance. This paper sheds light on this shortage of research.

### 4.3 Data and variables

Our primary data source is the German Socio-Economic Panel (SOEP), a nationally representative longitudinal survey spanning from 1984 to 2018. Following the method of Friehe & Pannenberg (2020), we define our sample as respondents who were either born in Germany or immigrants whose household moved to Germany before division and have provided a valid living location before the Reunification. Our working sample contains 142,224 individual respondents and 1,086,572 person-year observations. Notably, as SOEP conducts a yearly panel study and none of the variables must be repeated each year, the observation number and observing survey year vary dramatically across different variables. For the detailed statistics and methodology of variable construction, please see Table 4.1 and Table 4.2.

[Insert Table 4.1 and Table 4.2 about here]

Specifically, the key explanatory variable we construct is the East dummy, which equals one for adult respondents living in East Germany at the survey year. We construct three parallel explanatory variables to identify in more detail of respondents, which include: East dummy 1990, which equals one for adult residents who were living in East Germany before the German Reunification (1990); East-to-West immigrants versus East, which equals one for adult residents who were identified as immigrants moving from East to West Germany between 1984 and 2018, while residents who were living in East Germany and never migrated to West are set to null; East-to-West immigrants versus West, which equals one for adult residents who were identified as immigrants moving from East to West Germany between 1984 and 2018, while residents who were living in West Germany and never migrated to East are set to null.

We construct three sets of outcome variables to measure the cultural legacy of GDR and its implications on household finance. The first battery of indicators measure present-day German residents' cultural norms. This also provides a consistency check to examine the literature's findings using our sample. All the indicators have scale values, with a higher value denoting a stronger supportive answer. We collect residents' answers for the question of "on the whole distrust people," which scales from 1 to 4, and a higher value indicates a higher level of "." We

also collect “willingness to take risks in trusting others,” which scales from 0 to 10. This indicator parallels with the general social trust while capturing residents’ trust level from another perspective. Specifically, we collect willingness to take risks in financial matters, which also scales from 0 to 10, and measures residents’ specific trust in financial matters. Then, we utilize three indicators, which scale from 1 to 3, to measure the resident’s concern about economics and finance: “worried about economic development,” “concerned economic future of children,” and “worried about finance.”

The second battery of indicators measures a household’s access to finance and gender roles regarding financial decisions. First, we utilize a dummy variable, which measures whether this household holds financial assets. This variable equals 1 for a household positive answer and 0 for not holding any financial assets. We also observe the value of financial assets holding, for which we take the natural logarithm value to measure the household’s willingness to participate in the financial market. Next, we collect three dummy variables to observe the negotiation power within the household regarding financial decisions. The question asks who makes financial decisions within the household and provides three answers: male, female, and equally. As discussed in Section 4.2.3, we hypothesize that Eastern women reveal a higher within-household decision power in financial matters than Western women.

For the third battery, we measure the household’s self-perceived financial security and their financial reliance on the state when facing different issues: unemployed, sick, requiring care, and old age. In the previous GDR, residents’ financial security was the obligation of the state rather than the individuals or households. Hence, we hypothesize that this formal practice still affects present-day perceived financial reliance on the state for East Germans. Notably, for the issue of old age, the SOEP does not provide financial reliance on the state as an option when asking for residents’ self-perceived financial security.

#### 4.4 Model and identification strategy

##### 4.4.1 Model construction

Building on the models from the recent literature that discuss the historical shocks in contemporary Germany and utilize SOEP as the data source (i.e., D’Acunto, 2019; Friehe & Pannenberg, 2020), we construct our empirical model as follows:

$$Culture_{i,h} = \alpha + \beta East_{i,h} + F'_{i,h} \Gamma + Z'_{i,h} \Theta + \varepsilon_{i,h} \quad (1)$$

The East represents the four explanatory variables: East dummy, East dummy 1990, East-to-West immigrants versus East, and East-to-West immigrants versus West. These indicators are expressed by individual  $i$  in household  $h$ . The Culture variable represents the indicators of the cultural norms: on the whole distrust people, willingness to take risks in trusting others, willingness

to take risks in financial matters, worried about economic development, concerns economic future of children, and worried about finance. We include a series of control variables to reduce concerns regarding alternative influences (Pierce and Snyder, 2017). In equation (1),  $F_{(i,h)}^{\wedge}$  is a vector of variables capturing the characteristics of our sampling respondents: age, age-square, gender, education years, and household income (log).  $Z_{(i,h)}^{\wedge}$  is a set of fixed effects that we included: hometown size, father’s education level, mother’s education level, and survey-year fixed effect.

$$Finance_{i,h} = \alpha + \beta East_{i,h} + F'_{i,h}\Gamma + Z'_{i,h}\Theta + \varepsilon_{i,h} \quad (2)$$

The Finance represents the two sets of household finance indicators we utilized, which are financial decisions: whether holding financial assets, the value of financial assets holding, who make financial decisions (male, female, and equally), perceived financial security, and perceived financial reliance on the state: financial security and financial reliance on state (when unemployed, sick, requiring care, and old age). The other settings remain the same as equation (1).

Equation (1) enables us to check the legacy of cultural norms that were inherited from the collapsed GDR regime as our channel of discussion. Equation (2) measures a household’s access to finance and gender roles regarding financial decisions. We take these two equations as our method of baseline research, and all the relevant variables have been discussed in Section 4.3.

#### **4.4.2 Identification strategy: the German separation and reunification as a natural experiment**

Our identification strategies are based on the method of taking the German Separation and later Reunification as a natural experiment. More specifically, we treat the establishment of GDR and its later merge with FRG as an exogenous shock for East Germans (e.g., Offe, 1992; Fuchs-Schündeln & Schündeln, 2005). We discuss how this decades-long Separation still causes a disparity between East and West Germans due to the cultural legacy of divergence under different ideological regimes, focusing on their household financial decisions.

Following the argument of Fuchs-Schündeln & Hassan (2016), Friehe & Pannenberg (2020) discuss the solidity of taking German Separation as a natural experiment. Firstly, they argue the imposed division of Germany is truly exogenous. Secondly, they conclude that East and West Germany were “indistinguishable,” or at least there was no structural difference between the two parts of Germany before the division. Thirdly, they show that three million people migrated from the GDR to the FRG before the Berlin Wall was built in 1961(although negligible immigrants after this time). To address the potential selective migration issue, we did a subsample study to exclude and then only to include immigrants as a working sample to observe immigrants’ impact. For

immigrants after the Reunification, we analyze the persistency of cultural norms that shape a person deeply and manifest even long after a shift in surrounding circumstances.

A battery of econometric approaches also underpin our identification strategy. Firstly, following Oster's (2019) approach, we conduct an unobservable selection bias test to see whether our results are driven by unobservable factors, which is a common concern for natural experiment studies. Secondly, we report the marginal effects of the GDR dummy as a robustness check of baseline results and apply Balli & Sørensen (2013) demeaned interaction term to analyze the convergence of division and education inputs. Thirdly, we construct a Dual Difference-in-Differences (Dual-DiDs) approach to analyze the divergence of ingrained culture norms caused by the Separation of Germany, and how the historical Separation explains the lingering East-West division of household financial decision-making.

## 4.5 Empirical results

We present the empirical results of the lingering cultural effect of the GDR on household financial decisions in this section.

### 4.5.1 Baseline results

We report our baseline regression results in Table 4.3, for which our working sample is the pooled overall sample from the SOEP. The East-dummy is repeated as our key explanatory variable in this table. This variable represents whether the respondent was living in East Germany (former GDR territory) in the year when the survey was conducted, regardless of whether they are immigrants or from which cohort. This indicator enables us to identify the cultural division between East and West Germany in the present day from the overview, which equals one for East Germans and equals zero for West Germans. In Table 4.3, each row represents a different regression specification, while each column in (1) to (4) represents the OLS or Probit regression results with increasingly comprehensive control settings. As shown in Table 4.2, a considerable number of our dependent variables show scale values. Hence, we also adopt Ordered-Probit regression as robustness checks for applicable specifications and show the results in column (5) of Table 4.3.

[Insert Table 4.3 about here]

As we can see through column (1) to column (4) of Table 4.3, the increasing comprehensive control settings do not lessen the significance and the magnitude of coefficient results across the regression specifications. In column (5), we see the Ordered-Probit regressions manifest a similar pattern of results compared with the corresponding OLS regressions. This

evidence indicates strong consistency in our results and argues the validity of results when considering different control settings and different model settings. To discuss the coefficient results, we define the variables into three clusters as discussed in Section 4.3: cultural norms, financial decision and gender roles, self-perceived financial security, and financial reliance on the state.

In the top two rows of the “cultural norms” cluster in Table 4.3, we can see the current residents in the Eastern part of Germany report lower trust levels, for both the measurement of “On the whole distrust people” or “willing to take risks in trusting others.” Also, we find East German residents show more concern about economic-financial status. Statistically, as shown in row (1)-(2) in column (4), the East-dummy explains 16.3% (0.111/0.682) of the standard deviation of “On the whole distrust people” and 9.3% (-0.224/2.403) of “willing to take risks in trusting others.” This evidence consists with the literature that discusses the contaminated social capital in East Germany because of the collapse of the communist regime along with the economic shock afterward (Rainer & Siedler, 2009; Heineck & Süßmuth, 2013), and the long-lasting government surveillance in former GDR (Lichter et al., 2021).

In the “financial decision and gender roles” cluster, we see that compared with West Germans, East Germans are less likely to invest in the financial market and hold fewer financial assets when conducting investments. This can be explained by the “anti-Capitalist doctrine” ideology in the former GDR (Laudenbach et al., 2020). Also, as the communist regime of GDR did not support a free financial market, the lack of financial literacy among the territory of GDR still affect the current East Germans’ financial decision-making. This effect works either through the resident’s early-life finance experience (Brown et al., 2019) or through the inter-generational transmission of the cognition to future generations (Dohmen et al., 2012). For the “gender roles,” when observing the within-household financial negotiation power, Eastern women are more likely to make household financial decisions than Western women in Germany. In parallel, Eastern male household members are less likely to make financial decisions when compared with Western males. The two genders in the household are more likely to make decisions together (although statistically weak insignificance) if the household is in East Germany. This result meets our prediction. The equality promoted by the communist GDR is directly attributable to the culture of the equal-breadwinner norm (Lippmann et al., 2020), resulting in Eastern women having more contribution to the labor market and creating higher household income when compared with Western women. We argue that Eastern women’s cultural norms and economic positions mirror their financial decision-making power among household members.

Regarding the households' "self-perceived financial security and financial reliance on the state," we find East Germans feel a lack of financial security when unemployed, sick, old age or requiring care. In parallel, they feel higher financial reliance on the state. This evidence echoes Alesina & Fuchs-Schündeln (2007)'s findings, as the communist ideology keeps shaping Eastern residents' political and economic preferences. Our findings argue that the persistence of this cultural effect is more profound than Alesina & Fuchs-Schündeln (2007)'s estimation.

Overall, our baseline results argue three aspects of present-day Eastern Germans when compared with Western Germans: firstly, they manifest less general trust and less confidence about economic and financial matters; secondly, they have less access to the financial market, while Eastern females have higher within-household financial negotiation power than Western females. Thirdly, they reveal higher financial reliance on the state.

#### **4.5.2 Robustness and causal interpretation**

To check the robustness and establish the causal interpretation of our arguments, we conduct a series of robustness checks, including cohort study, sub-sample/restricted sample analysis, an unobservable selection bias test, and an interaction term for regional effect test.

##### **4.5.2.1 Cohort study**

Our first robustness check is a cohort study, where we divide the respondents into groups according to their birth years: first, pre-WWII cohort: before 1946; second, a cohort which was born after division but before the division was enforced: between 1946 and 1961 (the establishment of the Berlin Wall); third, a cohort which was born during the most antithetical period: between 1961 and 1989, Fourth, a cohort which was born after the Reunification: after 1989. The results are shown in Table 4.4.

[Insert Table 4.4 about here]

We find that for the cultural norms, financial decisions, and gender roles, the East dummy manifests a more profound impact on the second cohort and third cohort reports than the other two groups. The 'between 1946 and 1961' cohort generally reports the highest magnitude of effects. In other words, the cohorts born during the existence of GDR reflect higher East-West diversion, and longer experience under the GDR communist regime leads to more embedded impacts (comparing the coefficient magnitude of 'between 1946 and 1961' and 'between 1961 and 1989'). Also, we find that the biggest division for self-perceived financial security and financial reliance on the state is reflected in the first cohort, the oldest group. Moreover, the cohort born after the Reunification shows less significant East-West division and shows less magnitude where the

impact of former GDR is exhibited. This finding is consistent with literature that argues the post-separation convergence between East and West Germany.

#### 4.5.2.2 Never immigrated sample and marginal effect

Table 4.5 shows the robustness check when we restrict the working sample to the respondents who never cross-border migrated. These are the East and West Germans who never immigrate to the other side of Germany in our sample period (1984-2018). If the cultural channel that we are arguing about is true, we would expect a higher magnitude of division reported from the sample residents whose values were never affected by the experience of living in the other side of Germany, compared with the whole sample.

[Insert Table 4.5 about here]

The results confirm our hypothesis. As we may see in Panel A and Panel B of Table 4.5, the coefficient results generally show higher magnitude while remaining the same level of significance compared to their corresponding regression specification in column (4) of Table 4.3. In Panel C of Table 4.5, we report the marginal linear prediction of the *East dummy*. The significant divergence of the marginal linear prediction of East and West Germany further confirms the significance of East-West division and supports our baseline results.

#### 4.5.2.3 Unobservable selection bias test

We also utilize the unobservable test developed by Oster (2019), which considers coefficient movement and R-square movement in evaluating the omitted variables bias when taking observables as informative. Oster's (2019) approach includes two optional indicators:  $\delta$ , which indicates the weight of selection on unobservables required to make an equivalent impact to the observables;  $\beta$ , which reflects the treatment effect under the assumption of no informative relationship ( $\delta=0$ ) and equal selection ( $\delta=1$ ) between observables and unobservables. We adopt both methods in our applications.

[Insert Table 4.6 about here]

As shown in Table 4.6, the columns (1) and (2) list the  $\delta$  value when using full sample (baseline research) and the never migrated sample individually, while columns (3) and (4) list the  $\beta$  value when assuming no informative relationship ( $\delta=0$ ) and equal selection ( $\delta=1$ ) respectively. First, we find none of the  $\delta$  values in the first two columns are lower than 1, which is the benchmark of selection bias recommended by Oster (2019). For example, the value of 5.89 in the first row of column (1) indicates that the estimated unobservables need to be weighted 5.89 times to make an equivalent impact as observables, which argues that this specification does not suffer

from unobservable selection bias. For the  $\beta$  value, we see that none of the coefficients in columns (3) and (4) change their sign under the assumption of  $\delta=0$  and  $\delta=1$ , which indicates the consistent evidence that unobservables do not significantly drive our results.

#### **4.5.2.4 Reginal effects: interaction with East Germany states**

A potential concern with the assumption of taking German Separation as a natural experiment is whether the inhomogeneity within these two territories drives the results. Friehe & Pannenberg (2020) propose that GDR states' heterogeneity indeed influences the output of their observing GDR treatment effect. However, they argue that this regional effect is not considered when comparing the East-West divergence. Following this hypothesis, we apply the interaction term of the East dummy with each of the previous GDR states to observe whether our baseline results are driven by the inhomogeneity characteristics within the East German states.

[Insert Table 4.7 about here]

This section of results is listed in Table 4.7, where we utilize a sample of dependent variables in our baseline specifications to make the result concise and representative. We find that the variation across different GDR states is insufficient to affect the overall results, especially in cultural norms. However, we find outliers regarding residents' financial behaviors, such as column (4) in the row of Saxony state interaction. This finding corresponds to Friehe & Pannenberg (2020), as although the critical characteristics across the GDR states do not mask the treatment effect of GDR as an integral regime, the pre-separation difference (such as the religious discrepancy between East and West Germany) may confound the results in certain circumstances. This claim is also made by Becker et al. (2020), and we would conduct further research with caution.

#### **4.5.3 Embedding impact: a dual DiDs design**

To further establish the causal interpretation of our results, we utilize the Difference-in-Differences (DiDs) approach to analyze the deeply embedded impact of the Separation of Germany on cultural norms, and through this channel, how the historical Separation explains the lingering East-West division of household financial decisions. Here we apply a "Dual-DiDs design" as shown below. First, we identify the "treatment" group as the immigrants who migrated from East Germany to West Germany, East-to-West immigrants. Second, we identify two "control" groups: the East German residents who never had living experience in West Germany; and the West German residents who never had living experience in East Germany. Hence, we construct two indicators: East-to-West immigrants versus East, and East-to-West immigrants versus West.

We replicate all the regression specifications in our baseline results and show the results for sample variables in Table 4.8 and Table 4.9.

[Insert Table 4.8 about here]

Firstly, as shown in Table 4.8, we do not find significant differences regarding cultural norms and financial behaviors between the East-to-West immigrants and East Germans who never immigrate to the West. That is, the coefficient results of East-to-West immigrants versus East in Table 8 are not significant. The result here indicates a profound persistence of the cultural legacy of the former GDR. Long after moving to the Western territory, the East-to-West immigrants still hold very similar cultural norms compared with East Germans who never migrated, in terms of trust level and access to finance. By contrast, as shown in Table 9, East-to-West immigrants still reveal significant differences compared with West Germans who never migrated to the East, although this division is less profound than the East-West difference. The coefficient results of East-to-West immigrants versus West in Table 4.9 generally show significance. However, the magnitude and significance level is less than the results in the corresponding regression specifications in Table 4.3.

[Insert Table 4.9 about here]

Long-term living in West Germany does not change the cultural norms and the financial preferences and decisions for East-to-West immigrants. This effect is deep-rooted and persistent. The immigrants are presumably “naturally selected,” as they decided to move from East to West and looked forward to living in the cultural atmosphere and social life of West Germany. However, there is still significant divergence between this group and the West Germans, and the immigrants still hold similar cultural norms and preferences as East Germans. Considering this, the lingering effect of early-life experience living under GDR and the intergenerational transmission of social norms reveals more profound impacts.

Taking this one step further, we analyze the early-moved cohort, for which we restrict the sample to 1984-1994. This is the sample period between the earliest year we can collect from SOEP (before the Reunification), and the first five years East Germans can freely move to West Germany. This cohort may be identified as holding extremely strong intentions to break away from the GDR regime and have a more extended living experience in West Germany. As shown in Table 4.10, the early moved cohort still does not report a significant difference when compared to East Germans. However, we may find that the division between this cohort and West Germans shows less significance than their corresponding results in Table 4.9. This evidence further confirms the strong persistence of cultural norms. However, it sheds light on how the altered surrounding circumstances would dilute the ingrained habits in the long run.

[Insert Table 4.10 about here]

#### **4.6 Sluggish convergence**

Following the evidence in the above section, we continue to analyze the sign of convergence between East and West German residents. This section returns to the working sample in the baseline research and examines what factors contribute to the convergence.

We first conduct sub-sample research according to the year when the survey was conducted and divide the working sample into four waves. Because SOEP does not annually repeat the questions, we have placed the question into waves with a range of years. The results are listed in Table 4.11, where the blank cells indicate the question was not asked in the corresponding wave. We find neither the magnitude nor significance of the coefficient results in Table 4.11 show attenuation in later waves of the survey. This indicates that the East-West divergence in social trust and financial decisions has not faded with time.

[Insert Table 4.11 about here]

Also, we analyzed whether education plays a role in helping the convergence of East-West divergence. We apply the demeaned interaction approach developed by Balli & Sørensen (2013) for the regression model, which allows a similar interpretation of the main-terms coefficients compared with the non-interacted regression. The results are shown in Table 4.12. We find that education significantly has an optimistic prediction of Germans' social capital and access to finance, which opposes the negative impact of the former GDR. However, the interaction terms show no significance. This evidence indicates that higher education improves social capital and facilitates residents' access to finance. However, this positive effect has no confounding effect with the GDR impact. Further evidence can be seen in Figure 4.1, as the divergence of East-West manifests through residents from different educational backgrounds, and higher education does not diminish the discrepancy.

[Insert Table 4.12 about here]

#### **4.7 Conclusions and further research implication**

In this study, we take the German Separation and later Reunification (1945-1990) as a natural experiment to analyze the lingering impact of the former GDR regime on present-day financial development. We provide evidence that through the channel of persistent cultural norms, the former communist regime of GDR still causes a significant East-West divergence which manifests in present-day German residents' financial decision-making.

We find that three decades after the fall of the Berlin Wall, which symbolized the collapse of the GDR regime, East Germans still reveal the cultural legacy of the former communist regime.

Compared with the West, East Germans report less social trust, less willingness to access financial markets, perceive less financial security and perceive higher financial reliance on the state. However, Eastern females hold higher within-household financial negotiation power than Western females. This study corresponds to previous literature that discusses the persistency of cultural norms (Dohmen et al., 2012), the long-term impact of communist ideology on residents' political and economic preferences (Fuchs-Schundeln, 2008), and the implications on financial behaviors (Laudenbach et al., 2020). However, classic research on household finance (i.e., Campbell, 2006) lacks attention on the within-household heterogeneity and its impact on household financial negotiation power or decisions. Our paper sheds light on this from the perspective of communist cultural legacy and household financial equality.

We establish consistent results through a series of robustness checks. Our cohort study indicates an embedded cultural impact and sign of convergence: the cohort that was born in the GDR reported the highest East-West divergence; the pre-separation cohort also reported significant results of divergence; the significance of divergence started to fade when observing the post-separation cohort. We find a more profound GDR impact when restricting the working sample to residents who never migrated across the border. Utilizing the unobservable bias test developed by Oster (2019), we argue our evidence is not driven by unobservable bias. Meanwhile, by including interaction terms of former GDR states, we argue that the within-GDR heterogeneity exists, but our results are not suffering from its confounding impact. Notably, we construct a Dual-DiDs test, which compares the East-to-West immigrants with East and West residents who never had the experience of living in the other side, respectively. The results confirm the embedding impact of the former communist regime on present-day residents' cultural norms. In addition, we still do not witness an apparent East-West convergence of cultural norms and the implications of household finance, although three decades have passed since the Reunification. This discrepancy does not show a trend of diminution with time and education when we take the present residents in East and West Germany as two entireties separately.

This study has extensive implications for the present literature and further research. Firstly, our research adds to the literature that argues that historical trauma, such as social shocks, persistently impacts regional social norms. This impact manifests as altered social capital such as general social trust, confidence in economics, and social norms regarding equality, which has profound implications on development.

Secondly, our study discusses the lingering impact of GDR, a former communist regime, on present-day household financial decision-making. Our research is in line with the mainstream research that made a negative impact of GDR on financial development, as the former communist

regime prohibited the operation of the financial market, which made two generations “grow up without finance” (Brown, 2019). However, our research also highlights the positive perspective of former GDR. Its communist ideology nurtured egalitarianism, which has a legacy of the equal-breadwinner cognition for East German females. This manifests as their higher household financial contribution and their higher within-household financial negotiation power, compared with West German females.

Thirdly, our paper contributes to the research of regional development. The deep-rooted cultural legacy of the former communist regime persists in hindering the financial development of East Germany. Our evidence argues from the perspective of household financial decision-making and calls attention to the distinct impact of communist ideology on society as an entirety and social members when considering within-household heterogeneity.

Finally, this study merits further development. As discussed in Section 4.5.4.2 of this paper and noted by Becker et al. (2020), within-East difference or within-West difference in Germany may influence the analysis of East-West divergence. This effect may not be sufficient to change the overall setting when taking German Separation as a natural experiment. However, it is worthwhile to be considered empirically. For this case, the availability of more detailed geolocations of observations (i.e., county-level) would profusely promote this research. Meanwhile, this would enable the application of Regression Discontinuity Design (RDD) in our study as an alternative econometric approach to analyze the lingering cultural difference through the decades-vanished border of East-West Germany.

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**Table 4.1 Explanation of variable construction**

Variable	Explanation
<b>Independent variables</b>	
East dummy (survey-year in East)	A dummy variable that equals one for adult residents who were living in East Germany during the year when survey was conducted (between 1984 and 2018).
East dummy 1990 (before 1990 in East)	A dummy variable that equals one for adult residents who were living in East Germany before the German Reunification (1990).
East-to-West immigrants versus West	A dummy variable that equals one for adult residents who were identified as immigrants moved from East to West Germany (between 1984 and 2018). In comparison, residents who were living in West Germany and never immigrated to East are set to null.
East-to-West immigrants versus East	A dummy variable that equals one for adult residents who were identified as immigrants moved from East to West Germany (between 1984 and 2018). In comparison, residents who were living in East Germany and never immigrated to West are set to null.
<b>Control variables</b>	
Survey year	The year when the corresponding wave of survey was conducted.
Age	Constructed by the corresponding survey year minus the birthyear (SOEP original code: geburt_v2) of respondent.
Gender	Equals one for male respondent and null for female respondent. Other genders are excluded for brevity. SOEP original code: sex.
Education years	Years of schooling for respondent at the survey year. SOEP original code: d11109.
Household income last year (log)	The natural logarithm value of household income in the last year. The values of 0 were replaced by 0.1. SOEP original code: i11102.
Hometown size	One of the four categories of respondents' hometown size: 1 for large city; 2 for medium city; 3 for small city; 4 for countryside.
Father education level	The education level of respondents' father.
Mather education level	The education level of respondents' mother.
State	The indicator of state where the respondent accepted the interview.
Occupation category	The indicator of occupation category which the respondent reports themselves belongs to at the year of survey conducted. SOEP original code: e11105.
<b>Dependent variables</b>	
On the whole distrust people	A ranking indicator scales from 1, completely trust people, to 4, completely distrust. SOEP original code: plh0192.
Willingness to take risks in trusting others	A ranking indicator scales from 0 to 10 to interpret the respondents' self-reported willingness to take the risks in trusting others. SOEP original code: plh0202.
Willingness to take risks in financial matters	A ranking indicator scales from 0 to 10 to interpret the respondents' self-reported willingness to take the risks in financial matters. SOEP original code: plh0325.
Concerns economic development	A ranking indicator scales from 1, not concerned economic development at all to 3, very concerned about economic development. SOEP original code: plh0032.
Concerns economic future of children	A ranking indicator scales from 1, not concerned economic future of children at all to 3, very concerned about economic future of children. SOEP original code: plh0279.
Concerns finance	A ranking indicator scales from 1, not concerned finance at all to 3, very concerned about finance. SOEP original code: plh0033.
Whether holding financial assets	A dummy variable that equals one for adult residents who were holding financial assets at the survey year. SOEP original code: plc0328.
Value of financial assets	The natural logarithm value of financial assets the household holding in the

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holding (log)	last year. The values of 0 were replaced by 0.1. SOEP original code: plc0329.
Who make financial decisions - Male	A dummy variable that equals one for the households that the male members make financial decisions. SOEP original code: plc0011.
Who make financial decisions - Female	A dummy variable that equals one for the households that the female members make financial decisions. SOEP original code: plc0011.
Who make financial decisions - Both-equally	A dummy variable that equals one for the households that the male and female members make financial decisions equally. SOEP original code: plc0011.
Financial security when unemployed	A ranking indicator scales from 1 to 5 to interpret the respondents' self-reported financial security when unemployed. SOEP original code: plc0112.
Financial reliance on state when unemployed	A ranking indicator scales from 1 to 5 to interpret the respondents' self-reported financial reliance on state when unemployed. 1 indicates purely rely on their private force and 5 indicates purely rely on the state support. SOEP original code: plh0019.
Financial security when sick	A ranking indicator scales from 1 to 5 to interpret the respondents' self-reported financial security when sick. SOEP original code: plc0111.
Financial reliance on state when sick	A ranking indicator scales from 1 to 5 to interpret the respondents' self-reported financial reliance on state when sick. 1 indicates purely rely on their private force and 5 indicates purely rely on the state support. SOEP original code: plh0021.
Financial security when requiring care	A ranking indicator scales from 1 to 5 to interpret the respondents' self-reported financial security when requiring care. SOEP original code: plc0107.
Financial reliance on state when requiring care	A ranking indicator scales from 1 to 5 to interpret the respondents' self-reported financial reliance on state when requiring care. 1 indicates purely rely on their private force and 5 indicates purely rely on the state support. SOEP original code: plh0025.
Financial security in old age	A ranking indicator scales from 1 to 5 to interpret the respondents' self-reported financial security when old age. SOEP original code: plc0113.

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**Table 4.2 Summary of statistics**

<b>Variable</b>	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Median</b>	<b>Min</b>	<b>Max</b>
<b>Independent variables</b>						
East dummy (survey-year in East)	1086572	0.200	0.400	0	0	1
East dummy 1990 (before 1990 in East)	455034	0.278	0.448	0	0	1
East-to-West immigrants versus East	126515	0.126	0.332	0	0	1
East-to-West immigrants versus West	344434	0.046	0.210	0	0	1
<b>Control variables</b>						
Survey year	1086572	2005	9.671	2007	1984	2018
Age	1081862	36.33	21.95	36	0	112
Age-square	1081862	1802	1782	1296	0	12544
State	1086365	7.749	3.800	8	1	16
Gender	1086472	0.491	0.500	0	0	1
Education years	818959	11.41	2.515	10.50	7	18
Household income last year (log)	932487	10.30	0.740	10.34	-2.303	14.73
Hometown size	795799	2.739	1.174	3	1	4
Father education level	742804	1.909	1.578	1	0	9
Mather education level	746822	1.857	1.530	1	0	9
Occupation category	378305	4827	2410	4133	100	9330
<b>Dependent variables</b>						
On the whole distrust people	102310	2.320	0.682	2	1	4
Willingness to take risks in trusting others	69892	3.399	2.403	3	0	10
Willingness to take risks in financial matters	68605	2.240	2.221	2	0	10
Worried about economic development	656776	2.127	0.650	2	1	3
Concerns economic future of children	27323	2.187	0.716	2	1	3
Worried about finance	677694	1.887	0.707	2	1	3
Whether holding financial assets	94602	0.462	0.499	0	0	1
Value of financial assets holding (log)	106170	2.959	5.813	-2.303	-2.303	16.25
Who make financial decisions - Male	117624	0.0930	0.291	0	0	1
Who make financial decisions - Female	117624	0.0840	0.277	0	0	1
Who make financial decisions - Equally	117624	0.823	0.382	1	0	1
Financial security when unemployed	64667	2.718	1.075	3	1	5
Financial reliance on state when unemployed	62550	3.918	0.825	4	1	5
Financial security when sick	92405	3.429	0.932	4	1	5
Financial reliance on state when sick	62602	3.498	0.809	3	1	5
Financial security when requiring care	19762	2.190	1.102	2	1	5
Financial reliance on state when requiring care	62639	3.595	0.777	3	1	5
Financial security in old age	88135	2.700	1.091	3	1	5

**Table 4.3 Baseline results: whole sample study**

This table reports our baseline results using the pooled whole sample from the SOEP. The key explanatory variable is the *East-dummy*, which equals one for East Germans and null for West Germans. The East Germans are identified by whether they were living in East German in the year when the survey was conducted. Each row represents a different regression specification, while each column in (1) to (4) represents the OLS or Probit regression results with increasingly comprehensive control settings. Column (5) represents the Ordered-Probit regression results as robustness checks where applicable. *Individual/household controls* include indicators of respondents' age, age-square, gender, education-year, and natural logarithm value of their household income. *Survey-year fixed effect* represents the set of survey-year dummies when the questionnaire was conducted. *Household fixed effects* include respondents' hometown-size, father's education level and mother's education level. Parentheses contain P-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Independent Var: East-dummy (survey-year living in East Germany)				
	(1)	(2)	(3)	(4)	(5)
<b>Dependent Vars: cultural norms</b>					
On the whole distrust people	0.111*** (0.000)	0.121*** (0.000)	0.115*** (0.000)	0.111*** (0.000)	0.197*** (0.000)
Willingness to take risks in trusting others	-0.220*** (0.000)	-0.223*** (0.000)	-0.213*** (0.000)	-0.224*** (0.000)	-0.092*** (0.000)
Willingness to take risks in financial matters	-0.147*** (0.000)	-0.073*** (0.006)	-0.065** (0.013)	-0.085*** (0.002)	-0.033** (0.023)
Worried about economic development	0.122*** (0.000)	0.114*** (0.000)	0.081*** (0.000)	0.075*** (0.000)	0.144*** (0.000)
Concerns economic future of children	0.115*** (0.000)	0.081*** (0.000)	0.091*** (0.000)	0.094*** (0.000)	0.166*** (0.000)
Worried about finance	0.202*** (0.000)	0.212*** (0.000)	0.177*** (0.000)	0.191*** (0.000)	0.329*** (0.000)
<b>Dependent Vars: financial decision and gender roles</b>					
Whether holding financial assets	-0.062*** (0.000)	-0.033** (0.045)	-0.036** (0.027)	-0.086*** (0.000)	
Value of financial assets holding (log)	-0.393*** (0.000)	-0.294*** (0.000)	-0.313*** (0.000)	-0.524*** (0.000)	
Who make financial decisions - Male	-0.168*** (0.000)	-0.136*** (0.000)	-0.134*** (0.000)	-0.120*** (0.000)	
Who make financial decisions - Female	0.119*** (0.000)	0.090*** (0.000)	0.096*** (0.000)	0.089*** (0.000)	
Who make financial decisions - Both-equally	0.027 (0.123)	0.032* (0.080)	0.028 (0.117)	0.024 (0.221)	

**Dependent Vars: self-perceived financial security and  
financial reliance on state**

Financial security when unemployed	-0.132*** (0.000)	-0.110*** (0.000)	-0.101*** (0.000)	-0.096*** (0.000)	-0.102*** (0.000)
Financial reliance on state when unemployed	0.200*** (0.000)	0.189*** (0.000)	0.192*** (0.000)	0.196*** (0.000)	0.263*** (0.000)
Financial security when sick	-0.119*** (0.000)	-0.092*** (0.000)	-0.090*** (0.000)	-0.085*** (0.000)	-0.112*** (0.000)
Financial reliance on state when sick	0.202*** (0.000)	0.198*** (0.000)	0.203*** (0.000)	0.220*** (0.000)	0.307*** (0.000)
Financial security when requiring care	-0.256*** (0.000)	-0.176*** (0.000)	-0.183*** (0.000)	-0.165*** (0.000)	-0.164*** (0.000)
Financial reliance on state when requiring care	0.168*** (0.000)	0.161*** (0.000)	0.166*** (0.000)	0.175*** (0.000)	0.254*** (0.000)
Financial security in old age	-0.184*** (0.000)	-0.140*** (0.000)	-0.138*** (0.000)	-0.133*** (0.000)	-0.141*** (0.000)
Specification	OLS/Probit	OLS/Probit	OLS/Probit	OLS/Probit	Ordered-Probit
Individual/household controls	No	Yes	Yes	Yes	Yes
Survey-year fixed effect	No	No	Yes	Yes	Yes
Household fixed effects	No	No	No	Yes	Yes

**Table 4.4 Robustness: cohort study**

This table reports regression results of our cohort study, where the original pooled full sample is divided into four cohorts. The key explanatory variable is the *East-dummy*, which equals one for East Germans and null for West Germans. The East Germans are identified by whether they were living in East Germany in the year when the survey was conducted. Each row represents a different regression specification, while each column represents the OLS or Probit regression results. *Individual/household controls* include indicators of respondents' age, age-square, gender, education-year, and natural logarithm value of their household income. *Survey-year fixed effect* represents the set of survey-year dummies when the questionnaire was conducted. *Household fixed effects* include respondents' hometown-size, father's education level and mother's education level. Parentheses contain P-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	Independent variable: East-dummy (survey-year living in East Germany)			
	Birth before 1946 (1)	Birth between 1946 and 1961 (2)	Birth between 1961 and 1989 (3)	Birth after 1989 (4)
<b>Dependent Vars: individual's cultural norms</b>				
On the whole distrust people	0.112*** (0.000)	0.125*** (0.000)	0.101*** (0.000)	0.057* (0.071)
Willingness to take risks in trusting others	-0.069 (0.237)	-0.359*** (0.000)	-0.244*** (0.000)	-0.170 (0.303)
Willingness to take risks in financial matters	0.030 (0.548)	-0.189*** (0.000)	-0.067 (0.104)	-0.175 (0.274)
Worried about economic development	0.092*** [0.000]	0.075*** [0.000]	0.064*** [0.000]	0.048** [0.028]
Concerns economic future of children	-0.188 [0.499]	0.163** [0.025]	0.090*** [0.000]	0.198 [0.374]
Worried about finance	0.183*** [0.000]	0.227*** [0.000]	0.167*** [0.000]	0.128*** [0.000]
<b>Dependent Vars: financial decision and gender roles</b>				
Whether holding financial assets	0.023* [0.070]	-0.040*** [0.001]	-0.042*** [0.000]	-0.117*** [0.000]
Value of financial assets holding (log)	0.014 [0.924]	-0.604*** [0.000]	-0.599*** [0.000]	-1.009*** [0.000]
Who make financial decisions - Male	-0.035*** [0.000]	-0.023*** [0.000]	-0.010** [0.039]	0.042** [0.027]
Who make financial decisions - Female	0.012 [0.158]	0.015** [0.024]	0.010* [0.056]	-0.011 [0.534]

Who make financial decisions - Both-equally	0.023** [0.043]	0.008 [0.374]	0.000 [0.995]	-0.031 [0.198]
<b>Dependent Vars: self-perceived financial security and financial reliance on state</b>				
Financial security when unemployed	-0.224*** [0.000]	-0.145*** [0.000]	-0.039** [0.024]	-0.128** [0.037]
Financial reliance on state when unemployed	0.345*** [0.000]	0.189*** [0.000]	0.115*** [0.000]	0.023 [0.651]
Financial security when sick	-0.118*** [0.000]	-0.142*** [0.000]	-0.028* [0.067]	-0.047 [0.337]
Financial reliance on state when sick	0.371*** [0.000]	0.200*** [0.000]	0.141*** [0.000]	0.127*** [0.009]
Financial security when requiring care	-0.220*** [0.000]	-0.137*** [0.001]	-0.105** [0.016]	- -
Financial reliance on state when requiring care	0.290*** [0.000]	0.162*** [0.000]	0.117*** [0.000]	0.101** [0.043]
Financial security in old age	-0.078*** [0.001]	-0.203*** [0.000]	-0.111*** [0.000]	-0.062 [0.336]
Specification	OLS/Probit	OLS/Probit	OLS/Probit	OLS/Probit
Individual/household controls	Yes	Yes	Yes	Yes
Survey-year fixed effect	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes

**Table 4.5 Robustness: never cross-border immigrated sample**

This table reports regression results when using the never cross-border immigrated cohort as sample. Here we keep the respondents who never switched their identification as East or West residents. Here the key explanatory variable is still the *East-dummy*, while a positive value indicates the respondent has been living in the East Germany throughout the observing sample period, and null for always living in Western Germany. Each column represents a different regression specification. Panel A lists the results when taking respondents' values as independent variables and Panel B lists the results of respondents' financial situation and financial behaviors. *Full control set* includes individual/household controls, survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions. Parentheses contain P-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

**Panel A: Variable set 1**

	On the whole distrust people	Willingness to take risks in trusting others	Willingness to take risks in financial matters	Worried about economic development	Concerns economic future of children	Worried about finance	Whether holding financial assets	Value of financial assets holding
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
East dummy	0.116*** (0.000)	-0.260*** (0.000)	-0.090*** (0.002)	0.078*** (0.000)	0.099*** (0.000)	0.197*** (0.000)	-0.080*** (0.000)	-0.513*** (0.000)
Full control set	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.052	0.060	0.099	0.125	0.179	0.140		0.167
Pseudo R2							0.105	
Observations	78347	54778	54020	498820	24190	500601	77010	81976

**Panel B Variable set 2**

	Who make financial decisions - Male	Who make financial decisions - Female	Who make financial decisions – Both equally	Financial security when unemployed	Financial reliance on state when unemployed	Financial security when sick	Financial reliance on state when sick	Financial security when requiring care	Financial reliance on state when requiring care	Financial security in old age
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
East dummy	-0.127*** (0.000)	0.095*** (0.000)	0.025 (0.213)	-0.102*** (0.000)	0.199*** (0.000)	-0.087*** (0.000)	0.232*** (0.000)	-0.169*** (0.000)	0.180*** (0.000)	-0.133*** (0.000)
Full control set	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

R2				0.065	0.026	0.072	0.044	0.057	0.030	0.137
Pseudo R2	0.015	0.034	0.013							
Observations	96133	96133	96133	51619	48241	75476	48282	14416	48315	72589

**Panel C Marginal effect (example variables)**

	On the whole distrust people (1)	Willingness to take risks in trusting others (2)	Willingness to take risks in financial matters (3)	Whether holding financial assets (4)	Value of financial assets holding(log) (5)
Marginal linear prediction					
West	2.286*** (0.000)	3.460*** (0.000)	2.255*** (0.000)	0.491*** (0.000)	3.443*** (0.000)
East	2.402*** (0.000)	3.200*** (0.000)	2.166*** (0.000)	0.459*** (0.000)	2.930*** (0.000)
Full control set	Yes	Yes	Yes	Yes	Yes
R2/ Pseudo R2	0.052	0.060	0.099	0.105	0.167
Observations	78347	54778	54020	77010	81976

**Table 4.6 Oster (2019) unobservable robustness check**

This table reports the robustness check for our baseline results when applying Oster’s (2019) unobservable selection approach. The key explanatory variable is the East-dummy, which equals one for East Germans and null for West Germans. The East Germans are identified by whether they were living in East German in the year when the survey was conducted. Each row represents a different regression specification. As Oster’s (2019) approach applies for liner regressions, here we exclude our Probit specifications. The column (1) and column (2) report the Oster’s (2019)  $\delta$  value when using our pooled full sample and never cross-border immigrated sample separately. The column (3) and column (4) report the bounding set for Oster’s (2019)  $\beta$  value when letting the  $\delta$  equals one and zero individually. *Individual/household controls* include indicators of respondents’ age, age-square, gender, education-year, and natural logarithm value of their household income. *Survey-year fixed effect* represents the set of survey-year dummies when the questionnaire was conducted. *Household fixed effects* include respondents’ hometown-size, father’s education level and mother’s education level. Parentheses contain P-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	Independent variable: East-dummy (survey-year living in East Germany)			
	Oster’s (2019) $\delta$ value		Bounding set for Oster’s (2019) $\beta$ value	
	Full sample	Never immigrated sample	$\delta = 1$	$\delta = 0$
	(1)	(2)	(3)	(4)
On the whole distrust people	5.890	5.595	0.09988	0.11096
Willingness to take risks in trusting others	8.086	6.419	-0.20660	-0.22434
Willingness to take risks in financial matters	1.761	1.719	-0.03826	-0.08537
Worried about economic development	3.386	3.241	0.05640	0.07518
Concerns economic future of children	5.245	4.718	0.08070	0.09378
Worried about finance	8.865	8.968	0.17935	0.19076
Value of financial assets holding (log)	8.071	7.438	-0.47261	-0.52406
Financial security when unemployed	2.471	2.541	-0.06238	-0.09647
Financial reliance on state when unemployed	2.849	2.804	0.16334	0.19559
Financial security when sick	2.475	2.317	-0.05374	-0.08512

Financial reliance on state when sick	6.934	6.670	0.21727	0.22005
Financial security when requiring care	1.294	1.367	-0.04609	-0.16526
Financial reliance on state when requiring care	6.441	6.176	0.17195	0.17544
Financial security in old age	13.758	14.494	-0.12560	-0.13305
Individual/household controls	Yes	Yes	Yes	Yes
Survey-year fixed effect	Yes	Yes	Yes	Yes
Household fixed effects	Yes	Yes	Yes	Yes

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**Table 4.7 Robustness: interaction with East states**

This table reports the robustness check for our baseline results when applying East-states interactions. *Full control set* includes individual and household controls, survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions.

	On the whole distrust people (1)	Willingness to take risks in trusting others (2)	Willingness to take risks in financial matters (3)	Whether holding financial assets (4)	Value of financial assets holding(log) (5)
East*Thuringia	0.093*** (0.000)	-0.127* (0.063)	0.045 (0.466)	-0.087** (0.038)	-0.556*** (0.002)
East*Saxony-Anhalt	0.170*** (0.000)	-0.499*** (0.000)	-0.236*** (0.000)	-0.131*** (0.001)	-0.754*** (0.000)
East*Saxony	0.085*** (0.000)	-0.225*** (0.000)	-0.034 (0.533)	0.068** (0.040)	0.105 (0.447)
East*Mecklenburg-Western Pomerania	0.103*** (0.000)	-0.275*** (0.008)	-0.056 (0.525)	-0.166*** (0.003)	-0.947*** (0.000)
East*Brandenburg	0.147*** (0.000)	-0.131* (0.070)	-0.073 (0.242)	-0.021 (0.600)	-0.268 (0.124)
Full control set	Yes	Yes	Yes	Yes	Yes
R2	0.053	0.062	0.107		0.147
Pseudo R2				0.093	
Observations	57535	42536	42126	57978	60942

**Table 4.8 Dual DiDs: compare the East-to-West immigrant with East**

This table reports the difference in differences (DiDs) regression results that compares the East-to-West immigrant cohort with the East Germans that never had experience of living in Western Germany. Here the key explanatory variable is East-to-West immigrant dummy (comparing with East), which equals one for East-to-West immigrants and null for unaltered East Germans. The lower part of table lists the marginal linear prediction for East-to-West immigrants and unaltered East Germans on the dependent variables, individually. *Full control set* includes survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions. Parentheses contain P-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	On the whole distrust people	Willingness to take risks in trusting others	Willingness to take risks in financial matters	Whether holding financial assets	Value of financial assets holding(log)
	(1)	(2)	(3)	(4)	(5)
East-to-West immigrants versus East	-0.007 (0.871)	0.185 (0.250)	0.056 (0.716)	-0.117 (0.199)	-0.395 (0.269)
Age	0.007 (0.200)	-0.038 (0.119)	-0.035 (0.110)	0.005 (0.719)	0.010 (0.847)
Age-square	-0.000** (0.044)	0.000 (0.111)	0.000 (0.316)	0.000* (0.080)	0.001** (0.037)
Gender	0.034* (0.054)	0.213*** (0.002)	0.590*** (0.000)	-0.070** (0.028)	-0.197 (0.126)
Education years	-0.026*** (0.000)	0.121*** (0.000)	0.074*** (0.000)	0.085*** (0.000)	0.410*** (0.000)
Household income	-0.141*** (0.000)	0.210** (0.017)	0.454*** (0.000)	0.557*** (0.000)	2.135*** (0.000)
Marginal linear prediction					
East	2.453*** (0.000)	2.873*** (0.000)	2.028*** (0.000)	0.504*** (0.000)	3.471*** (0.000)
East-to-West	2.447*** (0.000)	3.057*** (0.000)	2.084*** (0.000)	0.457*** (0.000)	3.076*** (0.000)
Full control set	Yes	Yes	Yes	Yes	Yes
R2	0.042	0.048	0.077		0.125
Pseudo R2				0.088	
Observations	6361	5212	5193	6460	6826

**Table 4.9 Dual DiDs: compare the East-to-West immigrant with West**

This table reports the difference in differences (DiDs) regression results that compares the East-to-West immigrant cohort with the Westerners that never had experience of living in East Germany. Here the key explanatory variable is East-to-West immigrant dummy (comparing with West), which equals one for East-to-West immigrants and null for unaltered Westerners. The lower part of table lists the marginal linear prediction for East-to-West immigrants and unaltered Westerners on the dependent variables, individually. *Full control set* includes survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions. Parentheses contain P-values where \* p < 0.1, \*\* p < 0.05, \*\*\* p < 0.01.

	On the whole distrust people (1)	Willingness to take risks in trusting others (2)	Willingness to take risks in financial matters (3)	Whether holding financial assets (4)	Value of financial assets holding(log) (5)
East-to-West immigrants versus West	0.093** (0.022)	-0.268* (0.093)	-0.086 (0.582)	-0.250*** (0.005)	-1.163*** (0.001)
Age	0.005 (0.249)	-0.000 (0.977)	-0.017 (0.267)	0.011 (0.187)	0.049 (0.170)
Age-square	-0.000** (0.025)	-0.000 (0.456)	-0.000 (0.827)	0.000 (0.389)	0.000 (0.318)
Gender	0.042*** (0.002)	0.200*** (0.000)	0.774*** (0.000)	0.071*** (0.004)	0.362*** (0.000)
Education years	-0.031*** (0.000)	0.138*** (0.000)	0.074*** (0.000)	0.083*** (0.000)	0.393*** (0.000)
Household income	-0.112*** (0.000)	0.107* (0.073)	0.315*** (0.000)	0.454*** (0.000)	1.941*** (0.000)
Marginal linear prediction					
West	2.351*** (0.000)	3.182*** (0.000)	2.167*** (0.000)	0.546*** (0.000)	4.099*** (0.000)
East-to-West	2.445*** (0.000)	2.914*** (0.000)	2.082*** (0.000)	0.447*** (0.000)	2.936*** (0.000)
Full control set	Yes	Yes	Yes	Yes	Yes
R2	0.043	0.052	0.107		0.116
Pseudo R2				0.078	
Observations	12102	9892	9850	12482	13296

**Table 4.10 Early moved cohort: the 1984-1994 immigrants**

This table reports regression results that focus on the East-to-West immigrants that moved between 1984-1994, which is identified as the early-moved Germans, which cohort has extremely strong intention to move from East to West. In panel A and panel B, we compare the early moved cohort with the unaltered East Germans and unaltered West Germans, separately. *Full control set* includes individual and household controls, survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions. Parentheses contain P-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

	On the whole distrust people (1)	Willingness to take risks in trusting others (2)	Willingness to take risks in financial matters (3)	Whether holding financial assets (4)	Value of financial assets holding(log) (5)
Panel A					
East-to-West immigrants versus East	-0.038 (0.585)	-0.169 (0.490)	-0.044 (0.878)	-0.003 (0.985)	-0.126 (0.829)
Full control set	Yes	Yes	Yes	Yes	Yes
R2/ Pseudo R2	0.040	0.047	0.076	0.087	0.124
Observation	6521	5341	5319	6629	6999
Panel B					
East-to-West immigrants versus West	0.029 (0.659)	-0.542** (0.011)	-0.142 (0.589)	-0.174 (0.190)	-1.071** (0.033)
Full control set	Yes	Yes	Yes	Yes	Yes
R2/ Pseudo R2	0.041	0.054	0.107	0.076	0.114
Observation	11735	9600	9556	12108	12908

**Table 4.11 Sign of converge: sub-waves study.**

This table reports the robustness check for our baseline results when applying sub-sample analysis for each dependent variable. According to the year of survey conducted, we divide the full sample into four waves for each dependent variable. This approach would enable us to observe the sign of East-West converge in regarding residents' social values and financial behaviors. *Full control set* includes individual and household controls, survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions.

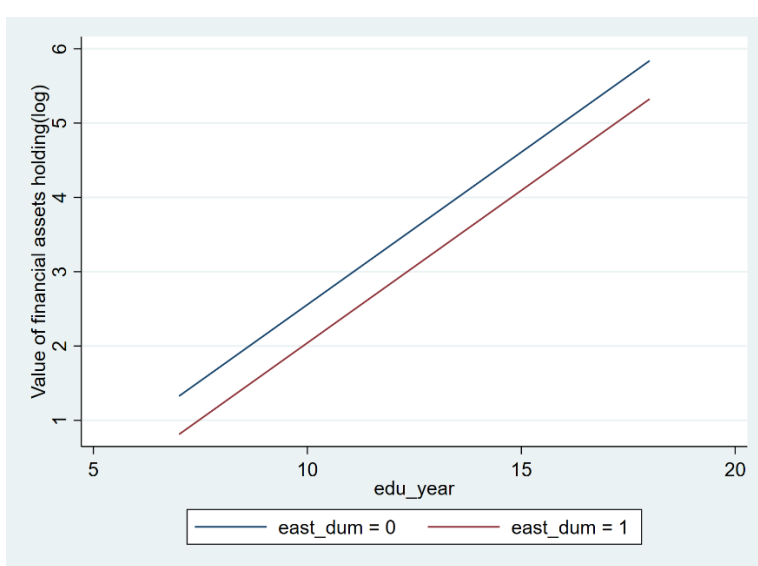
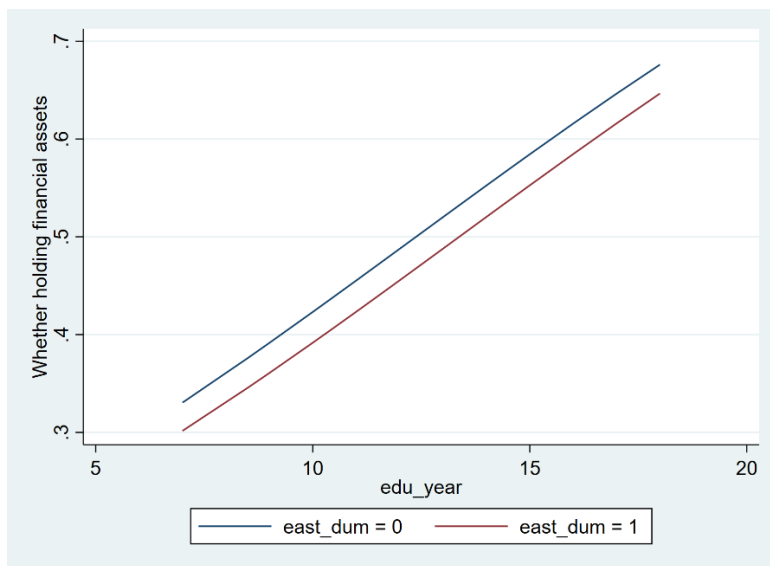
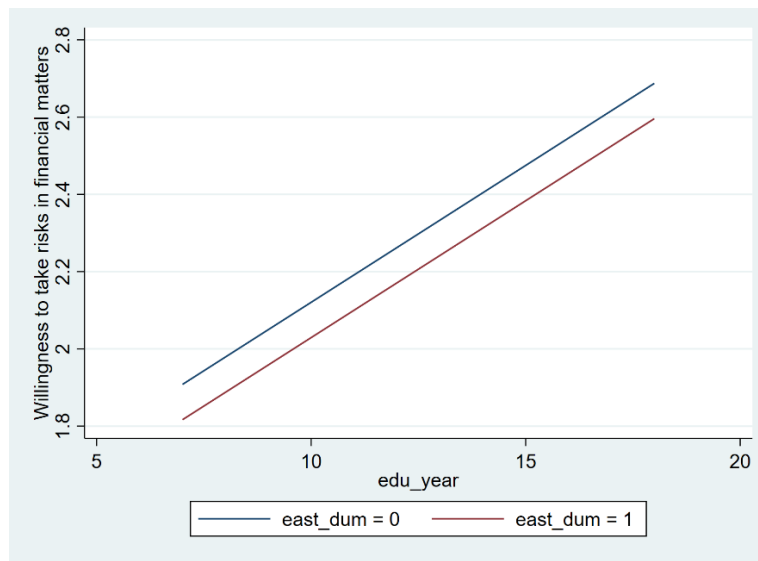
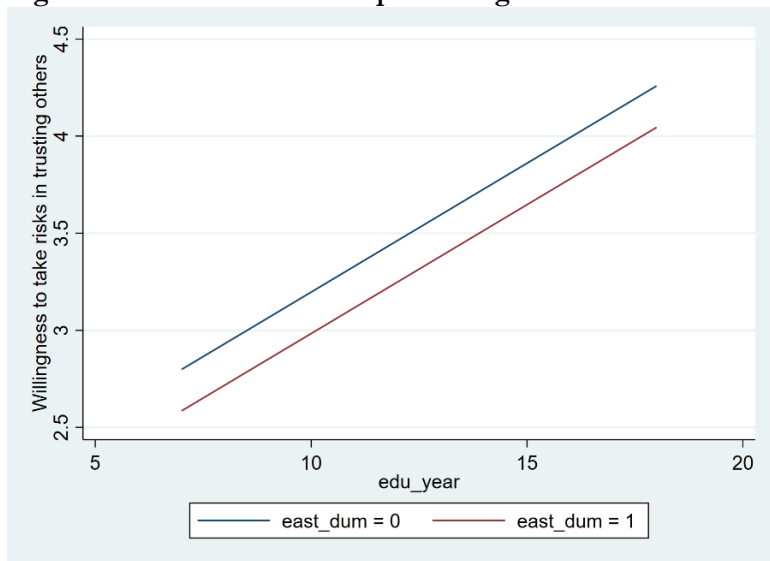
	Wave 1 2002/03/04 (1)	Wave 2 2007/08/09 (2)	Wave 3 2012/13/14 (3)	Wave 4 2017/2018 (4)
On the whole distrust people	0.135*** (0.000)	0.096*** (0.000)	0.114*** (0.000)	0.092*** (0.000)
Willingness to take risks in trusting others	-0.207*** (0.000)	-0.219*** (0.000)	-0.253*** (0.000)	
Willingness to take risks in financial matters	-0.070* (0.083)	-0.090** (0.027)	-0.106*** (0.007)	
Whether holding financial assets	-0.023 (0.429)	-0.091*** (0.001)	-0.110*** (0.000)	-0.094*** (0.000)
Value of financial assets holding	-0.340*** (0.002)	-0.587*** (0.000)	-0.583*** (0.000)	-0.534*** (0.000)
Full control set	Yes	Yes	Yes	Yes

**Table 4.12 Does education helps converge**

This table reports the robustness check for our baseline results when applying demeaned-interaction approach. Here we observe education's role for contributing the East-West converge in regarding residents' social values and financial behaviors. *Full control set* includes individual and household controls, survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions.

	Willingness to take risks in trusting others (1)	Willingness to take risks in trusting others (2)	Willingness to take risks in financial matters (3)	Willingness to take risks in financial matters (4)	Whether holding financial assets (5)	Whether holding financial assets (6)	Value of financial assets holding(log) (7)	Value of financial assets holding(log) (8)
East dummy	-0.224*** (0.000)	-0.213*** (0.000)	-0.085*** (0.002)	-0.091*** (0.001)	-0.086*** (0.000)	-0.087*** (0.000)	-0.524*** (0.000)	-0.515*** (0.000)
Education years	0.132*** (0.000)	0.133*** (0.000)	0.071*** (0.000)	0.071*** (0.000)	0.088*** (0.000)	0.088*** (0.000)	0.410*** (0.000)	0.410*** (0.000)
$(\widehat{East} - \widehat{East}) * (\widehat{Edu} - \widehat{Edu})$		-0.015 (0.188)		0.008 (0.443)		0.002 (0.734)		-0.012 (0.624)
Full control set	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2	0.060	0.060	0.096	0.096			0.167	0.167
Pseudo R2					0.106	0.106		
Observations	57536	57536	56740	56740	80476	80476	85687	85687

Figure 4.1 Does education helps converge



**Appendix Table A2: replicate baseline results with occupation as additional fixed effect**

This table reports regression results when we replicate our baseline regressions with occupation fixed effect as additional control. Panel A lists the results when taking respondents' values as independent variables and Panel B lists the results of respondents' financial situation and financial behaviors. *Full control set* includes individual and household controls, survey-year fixed effect and household fixed effects where all control and fixed settings hold the same as the baseline regressions. Parentheses contain P-values where \*  $p < 0.1$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$ .

**Panel A**

	On the whole distrust people (1)	Willingness to take risks in trusting others (2)	Willingness to take risks in financial matters (3)	Worried about economic development (4)	Concerns economic future of children (5)	Worried about finance (6)	Whether holding financial assets (7)	Value of financial assets holding (8)
East dummy	0.092*** (0.000)	-0.283*** (0.000)	-0.032 (0.379)	0.065*** (0.000)	0.090*** (0.000)	0.162*** (0.000)	-0.069*** (0.001)	-0.394*** (0.000)
Occupation fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full control set	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2/Pseudo R2	0.072	0.076	0.113	0.142	0.201	0.132	0.111	0.176
Observations	44559	32882	32646	292646	17284	293871	47674	48872

**Panel B**

	Who make financial decisions			Perceived financial security when				Financial reliance on state when		
	Male (1)	Female (2)	Both- equally (3)	unemployed (4)	sick (5)	requiring care (6)	old age (7)	unemplo- yed (8)	sick (9)	requiring care (10)
East dummy	-0.084*** (0.004)	0.040 (0.169)	0.029 (0.224)	-0.076*** (0.000)	-0.041*** (0.002)	-0.163*** (0.000)	-0.122*** (0.000)	0.150*** (0.000)	0.173*** (0.000)	0.142*** (0.000)
Occupation fixed effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full control set	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
R2/Pseudo R2	0.035	0.050	0.022	0.090	0.093	0.090	0.116	0.042	0.060	0.043
Observations	58971	58567	59197	40864	47205	9084	45494	30320	30325	30331

## Chapter 5 Conclusion

Based on different regional and historical settings, this thesis examines the formations of social capitals and their lingering and broad implications for financial development. First, I find the Cultural Revolution (1966-1976), as a decade-long social turmoil in China half-century ago, persistently contaminated the population's trust and has continued to hinder financial development to the present-day. The mistrust generated by the Cultural Revolution can be traced to present-day difficulties that confront households when raising money or, equally, when considering providing finance to others. Also, this mistrust impacts the trust in the financial system and present-day residents' willingness to access the financial market. This is manifested by the households' choice of higher flexibility of wealth deposits and by more conservative financial portfolio allocation.

Second, by utilizing the historical setting of "Pale of Settlement (1800-1927)", I show that the long-passed inter-ethnic discrimination can still result in present-day majority's antipathy towards those economic activities specialized in by the discriminated minority. This culture of discrimination towards those activities can persist long after the physical disappearance of the minority group and, in the case considered here, can continue to hinder present-day financial development in terms of access to finance by firms in the region. I find that those present-day firms that are located in regions with a history of more virulent anti-Semitism report (a) higher financial constraints, (b) less access to external credit, and (c) lower access to banking finance. While development results from numerous factors, anti-market culture plays a critical role in inhibiting access to finance. We show that these outcomes have links to historical anti-Semitism.

Finally, by taking the German separation (1945-1990) as a natural experiment, I analyze the lingering effects of GDR, the former communist regime, on present-day East Germans' social capitals and its' broad implications on financial development. I find that thirty years after the fall of the Berlin Wall, East Germans still reveal the cultural legacy of the former communist regime. Compared with the West, East Germans manifest less social trust, less willingness to access financial markets, perceive less financial security, and report higher financial reliance on the state. However, East females hold higher within-household financial negotiation power than West females. This evidence argues that through the channel of persistent cultural norms, the former communist regime of GDR still persistently implicates a significant East-West divergence which manifests in present-day German residents' financial decision-making.

This thesis has broad implications. First, I call for attention to possible antithetical roles of different dimensions of social capital. The general social trust may not be equivalent to the trust in finance; within-group trust may predict an opposite level of inter-group trust. It merits distinguishing the inimitable role of different dimensions of social capitals and their joint effect on financial and economic development. For example, as discussed in the third chapter, historical anti-semitism nurtured within-ethnic group loyalty among non-Jewish majorities. However, this increased indicator of social capital cannot offset the negative effect of the financial antipathy culture, along with the inter-ethnic discrimination regarding Jews and hinders the financial development.

Second, this thesis highlights the importance of inclusive discussion when taking historical background as a topic of study in finance. One specific historical event may have multiple profound impacts on a different aspect of financial development. For instance, 45 years living under the former communist regime of GDR result in East Germany's backward financial literacy. Scholars are broadly taking this divergence as evidence to discuss the shortcomings of communism, as it prohibits the financial and capital market. However, the experience of communist ideology also constructed a cultural norm of equal breadwinner among East women. Hence, females in East Germany possess a higher within-household economic position and higher financial negotiation power than females in West Germany.

Third, this thesis provides considerable evidence to discuss the ingrained cultural impact on people's financial behavior. This impact is profound and persists through intergenerational transmission. The cultural norms have vast implications on social capital, influence people's financial behavior, and lingeringly affect financial development.

Finally, this study remains a fecund implication for future research. As the effect of cultural norms shall be captured through individuals' manifested behaviors, the availability of detailed and inclusive data would essentially affect the effectiveness and accuracy of research outputs. For example, in Chapter 4 of this thesis, more detailed geolocation information of the observing households would enable the application of Regression Discontinuity Design (RDD) as an alternative econometric approach to analyze the lingering cultural divergence between East and West Germany. It would be interesting to look through the decades-vanished border and observe the implications of the two ideological regimes on financial development.