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Antiquity, capitalism & development: The finance-growth perspective

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ABSTRACT

This paper explores the impact of state antiquity (the length of established statehood) on capitalism. We argue that extractive institutions may prevail in societies with ancient roots and offer the in-depth analysis of one particular channel through which these institutions may impair economic growth: the finance-growth nexus. We propose that in countries with ancient statehood, the financial sector might be captured by powerful economic and political elites leading to a distorted finance-growth relationship. We build a model in which the equilibrium relationship between companies and banks depends on elites' entrenchment and the length of established statehood. To validate our argument, we run panel-threshold regressions on a global sample between 1975 and 2014. The results show that financial development—measured by the amount of credit—is indeed negative for growth in states with ancient institutional origins, while it is positive in relatively younger ones. Based on firm-level data, we also find that corruption in lending increases with antiquity.

1. Introduction

This paper explores the impact of state antiquity on capitalism through the finance-growth nexus. We define antiquity as the length of established statehood within the present-day territory of a country. In the tradition of the *deep roots of development* (henceforth DRD) literature, we conjecture that historical legacies are important in understanding the contemporary differences in socio-economic outcomes (Spolaore and Wacziarg, 2013; Voth, 2021). However, in contrast to a large part of this literature, we focus on how capitalism functions rather than on what long-run results it brings about in terms of economic development under state antiquity. The two approaches are inherently connected: the former enables a deeper understanding of the latter.

The paper builds on the result of Borcan et al. (2018) according to which a very long history of statehood might be detrimental to economic development due to the emergence of extractive institutions that accumulate economic resources in the hands of political

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and business elites. Our main contribution to the literature is the elaboration of a particular channel proposed in Dombi and Grigoriadis (2020), the finance-growth nexus, through which extractive institutions may manifest themselves in societies with ancient roots. We present robust evidence that in countries with a long-established statehood, the financial sector tends to allocate society's savings in an inefficient way because of its likely capture by rent-seeking interest groups. The impaired functioning of the financial sector is a devastating example of the heavy legacy of antiquity on capitalism.

We follow a three-step strategy to provide evidence supporting our arguments. First, we develop a theoretical model on the interaction of banks and enterprises to show how antiquity may impair the finance-growth nexus by supporting soft-budget constraints in lending. In this model, there are two equilibrium regimes: *younger countries* with an economic elite too weak to corrupt banks in their lending activity and *older countries* with an economic elite strong enough to capture the financial sector. In the second step, we examine empirically whether financial development, measured by the amount of credit, is less favorable in societies with ancient roots. The regression results are supportive, indicating that the finance-growth nexus is indeed impaired in countries with a long statehood. Finally, based on the firm-level data of World Business Environment Survey (World Bank, 2000), we provide evidence that corruption in lending is more pervasive in societies with ancient roots. This result corroborates our model on the elite capture of financial sector and conveys the microeconomic mechanism underlying the macroeconomic evidence on the impaired finance-growth nexus under antiquity. To supplement these results, in Online Appendix D, we present the tales of two developed countries with ancient statehood, Italy and South Korea, on the capture of their financial sectors by powerful elites.

The paper is motivated by the *finance-growth* literature, the *corruption in lending* literature and two strands of the DRD literature: the *state history* and the *historical development* literatures. The empirical *finance-growth literature* dates back to the early 1990s (King and Levine, 1993). In its first wave, the general conclusion was that financial development was beneficial for growth (Levine, 2005). However, since the early 2000s a growing number of papers have challenged the generalizability of the latter result by exploring different sources of nonlinearity in the finance-growth nexus. Rioja and Valev (2004) suggest that the effect of financial development on growth may depend on the level of economic development in a positive way as the role of banks in selecting promising investments is more enhanced in the intensive phase of economic growth. A second strand of the literature considers the financial sector size and demonstrates that too much finance is harmful, implying an inverted U-shaped relationship between outstanding credit and growth (e.g., Law and Singh, 2014; Arcand et al., 2015). Finally, the nonlinear finance-growth literature emphasizes the role of institutions and argues that better institutions result in better finance (e.g., Law et al., 2013, 2018).

The literature on *corruption in lending* investigates the mechanisms and conditions of the capture of the financial sector by interest groups. Corruption in lending is defined as the provision of loans on preferential terms that are based on bribes and connections to bank officials. These preferential loans frequently support less rentable (or even loss-producing) projects. Consequently, the main insight of the literature is that if the capture of the financial sector occurs the allocation of savings becomes suboptimal, resulting in slower growth and financial instability (Laeven, 2001; La Porta et al., 2003; Charumilind et al., 2006). In their seminal paper, Beck et al. (2006) study how bank supervisory policies are connected to corruption in lending. According to their results, powerful centralized bank supervision tends to increase corruption in lending due to the probable regulatory capture of banking sector. On the other hand, private monitoring of banks reduces the corruption of bank officials. Barth et al. (2009) consider the effect of competition and information sharing among lenders on corruption in lending. They find that the more concentrated the banking sector is, the more widespread corruption in lending is. They argue that a low level of banking sector competition enhances the bargaining power of banks against firms and makes the latter resort to bribery. On the other hand, better information on the credit history of applicants reduce corruption in lending as they confine the arbitrariness in loan conditions. Barry et al. (2016) find that family and state ownership of banks tends to increase lending corruption. The authors explain this outcome by the enhanced importance of relatedness in the lending activity of such banks. Morck et al. (2011) also corroborate the tendency toward the elite-capture of a country's financial system when banks are controlled by tycoons.

Beyond banking sector characteristics, there are some other factors also affecting lending corruption. Houston et al. (2011) demonstrate that state ownership of media increases corruption in lending. They argue that competitive media, which is free of state capture, is more motivated in revealing frauds and corrupt financial practices, thereby, deterring bank officials from engaging in such transactions. Zheng et al. (2013) and Dheera-aumpon (2019) highlight the role of culture. They show that lending corruption is more prevalent in collectivist societies where connectedness and in-group loyalty command human behavior and business.

The literature on *historical development* aims to reveal the persistent effect of historical events and institutions on present socio-economic outcomes.[1] Dell et al. (2018) demonstrate through the evidence of Vietnam that the historical state conditions long-run development. They show that areas in Northern Vietnam historically exposed to a centralized state (Dai Viet) with developed local administrative units have performed economically better in the past 150 years than their Southern counterparts, which were the peripheral tributary of the Khmer Empire prior to French colonization. The authors explain this outcome by the persistence of cooperative norms in local communities crowded in under Dai Viet rule. Lowes et al. (2017) examine the impact of historical institutions on contemporary cultural norms through the example of the Kuba Kingdom established in Central Africa in the 17th century. They find that those individuals whose ancestors lived in the Kingdom are more likely to be associated with weaker forms of rule-following than those whose ancestors lived outside of the Kingdom. The authors argue that this might be the legacy of more developed formal institutions that enabled Kuba citizens to place less importance on the intergenerational transmission of the right norms and values. Becker et al. (2016) take the Habsburg rule with its developed bureaucracy as a positive historical shock in terms of public

[1] For a thorough review, see Nunn (2014) and Voth (2021).

sector quality. As a legacy of the Habsburg empire, they find that public trust in contemporary local authorities (such as courts and police) is significantly higher in those regions of the successor states that were previously under Habsburg rule than in those that were not. As the aforementioned studies show, the proposed transmission channel between the past and the present is cultural norms and attitudes shaped by historical institutions and passed on persistently across generations.

Finally, the *state history* literature was initiated by the seminal paper of Bockstette et al. (2002). These authors construct the state history index of the last two millennia, measuring the length of established statehood in the present-day territories of countries, and conclude that the index is positively associated with economic development. They argue that countries with a longer state history tend to have better institutions and state capacity. The positive effect of early statehood on institutional quality is corroborated by Ang (2013a) too. Ang (2013b) demonstrates that early starter countries are also financially more developed, at least according to the experience of the last two millennia. Furthermore, Ang and Fredriksson (2018) explore that the negative effect of German and Scandinavian civil laws on the level of financial development improves with state history. They argue that a longer history of established statehood enables the legislator to experience the deficiencies of the legal system and, thereby, to implement adequate jurisdictional reforms.

Borcan et al. (2018) extend the original state history index over the last six millennia. They find that if the ages before the Common Era are also taken into account, and ancient societies (e.g., Egypt, Greece) can really be differentiated from younger ones, the relationship of state history with contemporary economic development follows an inverted U-shape (see Figure OA1 in Online Appendix A). They continue to recognize the positive effect of established statehood proposed by Bockstette et al. (2002), but they argue that with a longer state history, societies tend to have more centralized institutions and more powerful interest groups, resulting in more pervasive rent-seeking. In the *state history-economic development* nexus, this implies a tipping point above which the negative consequences of longer state history outweigh the positive ones, leading to a lower level of economic development. Indeed, there is evidence that older societies tend to have more centralized and autocratic political and social systems. Hariri (2012) finds that countries with a longer state history in the pre-Columbian era were more effective in being able to resist European colonization and that way preserve their own regime, resulting in more autocratic establishments today. Lagerlöf (2016) suggests that countries with an early statehood have become stuck in autocracy because of the higher extractive capacities of the incumbent rulers and thus their lower willingness to bestow power in the form of a democratic transition.

The arguments underlying the nonlinear *state history-economic development* nexus also appear in Harish and Paik (2020). These authors reveal an inverted U-shaped relationship between historical state stability (i.e. the average years of ruling of a sovereign entity) in the last two millennia and contemporary economic development in Europe. They argue that low state stability provided little incentives to invest due to the risk of being plundered occasionally. On the other hand, under excessive state stability roving bandits have become stationary leading to rent-seeking and elite capture.

The main hypothesis of the paper builds on the following conclusions of the literature: 1. the past impacts the present due to cultural norms shaped by historical institutions and transmitted persistently across centuries; 2. an extensive length of established statehood tended to result in extractive historical institutions which may have survived to the present due to deeply-rooted cultural norms of elite-rule, cronyism, and informal networks; 3. powerful economic and political elites are prone to capture the financial sector resulting in enhanced corruption in lending; and 4. the effect of financial development on economic growth is conditional.

The conceptual framework is presented in Fig. 1. We start with the hypothesis of Borcan et al. (2018), according to which extractive institutions linked to rent-seeking powerful interest groups (the elites) may prevail in societies with a long-established statehood. These extractive institutions originate in ancient times and have survived to the present due to cultural norms of elite-rule, cronyism and informal networks. One important way of extracting rents is the access to easy credits provided under generous conditions. This permanent striving for corrupt lending leads companies to capture the financial sector through their political and private connections – provided that they have the power needed. Corruption in lending results in the inefficient allocation of society's savings and an impaired finance-growth relationship.

Our paper adds to the literature in several ways. First, we contribute to the *DRD* literature by establishing the finance-growth channel in terms of the suboptimal work of capitalism under the conditions of antiquity. Second, we augment the literature on the soft budget constraint by underscoring the deep historical roots of *corruption in lending*. Finally, we provide a profound establishment of the *legacy perspective* in the non-linear finance-growth literature.[2]

The paper is structured as follows: Section 2 introduces the measures of state antiquity. Section 3 discusses the theoretical model. Section 4 presents the data and the methodology of the macro-econometric analysis, whilst section 5 introduces the results. Section 6 discusses the economic mechanism underlying the macro-econometric results by demonstrating how extractive institutions may perpetuate to the present under the impact of antiquity. Section 7 explores the evidence on corruption in lending under antiquity. Section 8 performs sensitivity analyses. Section 9 concludes.

[2] Dombi and Grigoriadis (2020) find that longer state history over the last two millennia is paired with a less beneficial growth effect of financial development in post-socialist countries. Our paper extends their results in four important respects. First, we apply more comprehensive measures of antiquity: the extended state history index of Borcan et al. (2018) embracing the last six millennia and the agricultural years since the Neolithic Revolution. Second, we provide profound theoretical foundation for the impaired financed-growth nexus in societies with ancient roots. Third, the macro-econometric analysis is performed at the global scale. Finally, we provide microeconomic evidence for the legitimacy of the legacy perspective.

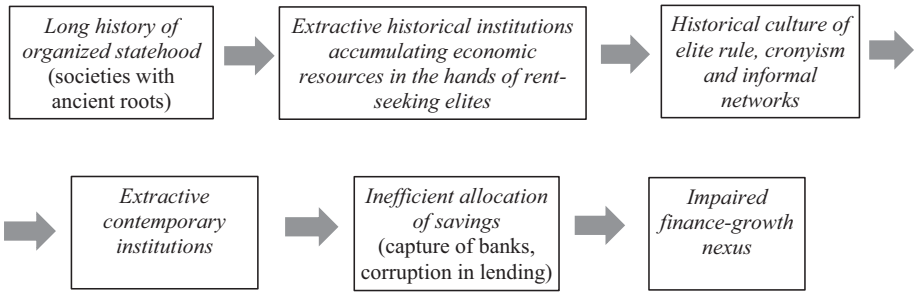

Fig. 1. The conceptual framework.

2. Measures of antiquity

In this paper, antiquity of societies is defined as the length of established statehood in the present-day territory of countries. Mature statehood is a necessary – and most of the time also a sufficient – condition for the settlement of socio-political frameworks and hierarchical power structures. We resort to two commonly used measures of antiquity: the extended state history index of Borcan et al. (2018) and the agricultural years since the Neolithic revolution collected by Putterman and Trainor (2018). This section introduces them (for the technical details, see Online Appendix C).

The extended state history index of Borcan et al. (2018) covers the last six millennia. The index ranges from zero to one and measures the cumulative experience of societies with established statehood in the given period according to three dimensions: level of governance, independence of governance, and territorial coverage. The longer a domestic central government ruled a large part of the current territory of a country, the closer is the state history index to one. In the construction of the index, it is assumed that the experience with established statehood depreciates with time; this implies that earlier experiences matter less in cumulative state history. We use the state history index of the period of 3500 BCE and 1950 CE (SH1950) as our baseline measure of antiquity. Following Borcan et al. (2018), *SH1950* is calculated with 1 % depreciation rate.[3]

The rationale for antiquity having an effect on present socio-economic outcomes is that societies with ancient roots are characterized by norms and values (culture) different from those of relatively younger societies. It is generally believed that culture relates more to people and less to the geographic area they inhabit. However, a country's institutions and the culture of its society mutually shape each other (Alesina and Giuliano, 2015). Consequently, it is uncertain whether the experience of the geographic area or the experience of its inhabitants—and their ancestors—counts more when it comes to the contemporary effect of antiquity. Our baseline measure of antiquity (SH1950) considers the experience of the geographic area with established statehood. However, as an alternative measure, we also use the state history index of the same period (3500 BCE - 1950 CE) adjusted for the 1500 CE ancestral composition of the current population based on Putterman and Weil (2010). The ancestry-adjusted state history index (SH1950adj) is considerably larger than its unadjusted equivalent in New World countries due to the massive post-Columbian population flows (see Figure OC2 in Online Appendix C).

Another crucial point is whether pre-Columbian state history is preferable to total state history including the post-Columbian ages too. On the one hand, the long-lasting effect of early development on contemporary socio-economic outcomes has solid foundations (Comin et al., 2010). On the other hand, it is hard to argue against the importance of post-Columbian experience concerning contemporary economic development. In any case, we use the state history index of the pre-Columbian age (i.e. 3500 BCE – 1500 CE), both unadjusted (SH1500) and adjusted (SH1500adj) for ancestry, as an alternative measure of antiquity.

Finally, we consider agricultural years (AgrY) that is the years elapsed since the Neolithic Revolution as compiled by Putterman and Trainor (2018). This indicator appraises the number of years before 2000 CE that have passed since a considerable share of the population in any area within the present border of countries started to meet their food needs largely from cultivation. The timing of agricultural transition is a common measure of early development in the DRD literature. It is deemed as an approximation for the antiquity of societies because the sedentary mode of agricultural production necessitated a more organized society than hunting and gathering. Indeed, the first states were established in the Fertile Crescent, along with the spread of irrigation-based farming (Diamond, 1997). Fig. 2 corroborates the strong co-movement of state history with agricultural years. To account for the post-Columbian population flows, the ancestry-adjusted agricultural years (AgrYadj) is also calculated.

3. A model of antiquity and finance

The emergence of powerful interest groups that capture the financial system and generate the provision of soft budget constraints in their favor provides an explanatory mechanism for the proposed negative effect of antiquity on the finance-growth nexus. In our model, we complement Borcan et al. (2018) by establishing the financial development channel to elaborate on the inverted U-shaped

[3] If the cumulated state history index is to proxy for antiquity, a low depreciation rate is needed. Otherwise, the difference between societies with ancient roots (e.g., Egypt) and younger ones (e.g., France) decreases substantially.

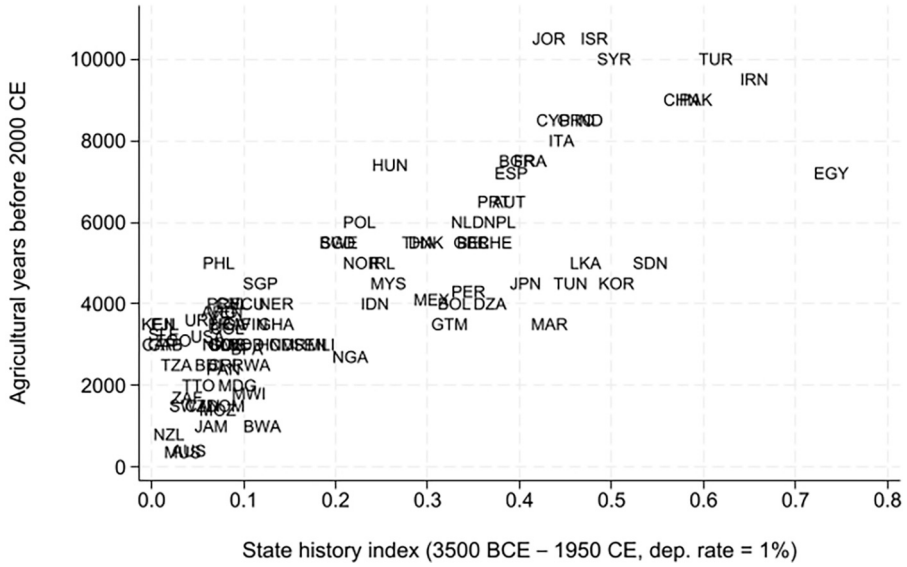

Fig. 2. State history vs. Agricultural years.
Notes: Baseline country sample (see Table A1 in the Appendix). For the data source, see Table A2 in the Appendix.

relationship between state history and economic development. High levels of state history correspond to economic systems with a long exposure to organized statehood and a culture of centralization. In contrast, low levels of state history reflect a more decentralized set of financial institutions and a recent exposure to organized statehood.

To analyze the effect of antiquity on the finance-growth nexus and show why very ancient societies exhibit soft budget constraints, which in return impair their growth, we consider a static game between a bank B and an entrepreneur E per Dewatripont and Maskin (1995). State history is denoted by a stochastic variable α^S such that $\alpha^S \in \{\alpha^L = 1, \alpha^H = \alpha\}$ and $\alpha > 1$, where α^H corresponds to a high level of state history and α^L to a low level of state history. In the case of soft budget constraint, the bank's utility function is $u^B_{SBC} = r_2 - d^j$, where r_2 denotes the bank's return from refinancing the provided credit, d^j is the size of the provided credit such that $r_2 < d^j \leq r_1$ and $d^j = \alpha^S/(1-\lambda^j)$; $\lambda^j \in (0,1)$denotes the bank's monitoring of the credit provided to the entrepreneur. The higher the degree of monitoring imposed by the bank, the higher the overall amount of credit provided. Similarly, in the case of soft budget constraint, the entrepreneur's payoff is provided by $u^E_{SBC} = v_2 + d^j$, where v_2 is exogenous and denotes profit. When defining the status-quo and hard budget constraint payoffs for the bank and the entrepreneur, we assume that there is an opportunity cost for the bank if it decides not to provide credit to the entrepreneur. Furthermore, $i \geq 0$ is the bank's initial endowment and θ indicates the opportunity cost of credit provision s.t. $\theta \in (0,1)$.

Hence, the static *antiquity-capitalism* game is defined as follows:

1. Players: bank B and entrepreneur E such that $N = \{B, E\}$.
2. States: $\alpha^j_t \in \{\alpha^L_t = 1, \alpha^H_t = \alpha\}$, where $\alpha > 1$.
3. Strategies: $\Phi^S = \{\lambda^H, \lambda^L\}$ is the strategy set of the bank, where H refers to a high level of credit monitoring and L refers to a low level of credit monitoring such that $\lambda^L < \lambda^H \in (0,1)$.
4. Payoffs for the bank and the entrepreneur:

$$\text{The status-quo} : u^B_{SQ} = i - \theta d^L \text{ and } u^E_{SQ} = v_1$$

$$\text{Good entreprenur} : u^B_G = r_1 - d^L \text{ and } u^E_G = v_1 + d^L$$

$$\text{Soft budget constraint} : u^B_{SBC} = r_2 - d^H \text{ and } u^E_{SBC} = v_2 + d^H$$

$$\text{Hard budget constraint} : u^B_{HBC} = -\theta\alpha^2 \text{ and } u^E_{HBC} = 0$$

where $v_1 > v_2$. Under conditions of long state history (high state), a bad project entails a high monitoring cost on the part of the bank, both in the case of a soft and a hard budget constraint. State history measures antiquity of institutions and implies that an entrepreneur in the high state is more likely to capture the financial system and receive a soft budget constraint from the bank.

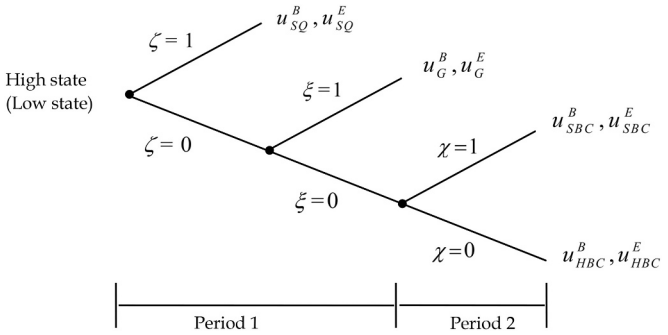

Fig. 3. The model tree.

The timing of the *antiquity-capitalism* game therefore has the following structure (see also Fig. 3.) per Acemoglu and Robinson (2006):

1. $\alpha_t^i \in \{\alpha_t^L, \alpha_t^H\}$ is revealed.
2. The bank decides whether to provide credit to the entrepreneur with monitoring λ^L or revert to the status quo: $\zeta \in \{0,1\}$.
3. The entrepreneur completes the project directly with probability μ or requests refinancing with probability $1-\mu$ such that$\mu \in (0,1) : \xi \in \{0,1\}$.[4] If she completes the project, then the stage game is over.
4. If the entrepreneur requests refinancing, then the bank decides whether to refinance the project (soft budget constraint) with probability η or to terminate (hard budget constraint) with probability $1-\eta$ such that $\eta \in (0,1) : \chi \in \{0,1\}$.[5] In either case, the stage game is over.

Definition 1. The entrepreneur receives credit from the bank under conditions of long state history if $\mu > \theta$, and $r_1 > i$.

Proof

The bank is indifferent between providing credit to the entrepreneur and remaining in the status quo under the following condition:

$$u^B_{SQ} = \mu u^B_G + (1-\mu)\left[\eta u^B_{SBC} + (1-\eta)u^B_{HBC}\right] \Rightarrow i - \theta d^L = \mu\left(r_1 - d^L\right) + (1-\mu)\left[\eta\left(r_2 - d^H\right) - (1-\eta)\theta\alpha^2\right] \Rightarrow$$

$$i = \mu\left(r_1 - d^L\right) + \theta d^L + (1-\mu)\left[\eta r_2 - \eta d^H - (1-\eta)\theta\alpha^2\right] \Rightarrow$$

$$i = \mu r_1 - d^L(\mu - \theta) + (1-\mu)\left[\eta r_2 - \eta d^H - (1-\eta)\theta\alpha^2\right] \Rightarrow$$

$$i = \mu r_1 - \frac{\alpha}{1-\lambda^L}(\mu - \theta) + (1-\mu)\left[\eta r_2 - \eta\frac{\alpha}{1-\lambda^H} - (1-\eta)\theta\alpha^2\right]$$

Hence, the bank will prefer to provide credit to the entrepreneur if and only if:

$$i < \mu r_1 - \frac{\alpha}{1-\lambda^L}(\mu - \theta) + (1-\mu)\left[\eta r_2 - \eta\frac{\alpha}{1-\lambda^H} - (1-\eta)\theta\alpha^2\right].$$

Now, we turn to the state history threshold and identify the antiquity condition under which the bank is captured by the entrepreneur and, therefore, provides a soft budget constraint. The bank provides a soft rather than a hard budget constraint to the entrepreneur under conditions of long state history (high state) if and only if:

$$u^B_{SBC} > u^B_{HBC} \;\Rightarrow\; r_2 - d^H > -\theta\alpha^2 \;\Rightarrow\; \theta\alpha^2 - \frac{\alpha}{1-\lambda^H} + r_2 > 0 \;\Rightarrow$$

$$\alpha_1 < \frac{\frac{1}{1-\lambda^H} - \sqrt{\left(\frac{1}{1-\lambda^H}\right)^2 - 4r_2\theta}}{2\theta}, \quad \text{or} \quad \alpha_2 > \frac{\frac{1}{1-\lambda^H} + \sqrt{\left(\frac{1}{1-\lambda^H}\right)^2 - 4r_2\theta}}{2\theta}$$

[4] $P(\xi = 1) = \mu$ and $P(\xi = 0) = 1-\mu$.
[5] $P(\chi = 1) = \eta$ and $P(\chi = 0) = 1-\eta$.

Since $\frac{\frac{1}{1-\lambda^H}-\sqrt{\left(\frac{1}{1-\lambda^H}\right)^2-4r_2\theta}}{2\theta} < 1$ and $\alpha^L = 1$ is the lowest value of state antiquity, the solution that corroborates $u^B_{SBC} > u^B_{HBC}$ is α_2. Hence, the threshold of state history that makes the bank indifferent between the provision of a soft and a hard budget constraint is the following:

$$\alpha^* = \frac{\frac{1}{1-\lambda^H}+\sqrt{\left(\frac{1}{1-\lambda^H}\right)^2-4r_2\theta}}{2\theta}.$$

Thus, α^*increases with $\lambda^H$and decreases with θ.

Proposition 1. There is a unique subgame perfect equilibrium of the *antiquity-capitalism* game that has the following form:

1. If $\eta < \frac{v_1+d^L}{v_2+d^H}$, then the entrepreneur submits a good project to the bank.
2. If $\eta \geq \frac{v_1+d^L}{v_2+d^H}$, then the entrepreneur submits a bad project to the bank and the following equilibria come into play:

a. If $\alpha \leq \alpha^*$, then in either state the bank terminates an insolvent entrepreneur (hard budget constraint).
b. If $\alpha > \alpha^*$, then the bank refinances an insolvent entrepreneur under conditions of high credit monitoring λ^H (soft budget constraint), while in the low state the bank terminates an insolvent entrepreneur (hard budget constraint).

In our model, we observe that for higher levels of state history, the financial system is more inclined toward the provision of soft budget constraints to inefficient entrepreneurs, and therefore it reinforces the emergence of entrenched interest groups that perpetuate its capture. In contrast, for lower levels of state history, the financial system is less inclined toward refinancing. Hardening the budget constraint of inefficient entrepreneurs allows the entry of new market players that may be more efficient and less dependent on credit. In the low state, the bank does not provide a soft budget constraint to the entrepreneur, but always terminates an inefficient entrepreneur by hardening her soft budget constraint with a low opportunity cost of lending.

Our model treats the opportunity cost of lending as an exogenous parameter. However, θ may increase with state history. As we propose, in societies with more ancient roots, interest groups are powerful and capable of capturing the government and the financial sector. Under such conditions, the rejection of lending—either at the initial or at the refinancing stage—can induce larger costs for banks due to the larger scale of counteractions by the government and business elites in the form of economic punishment. In our model, the threshold for the provision of a soft budget constraint (α^*) decreases with θ , while the probability of exceeding that threshold increases (see Figure OA2 in Online Appendix A). This implies that the probability of a soft budget constraint is higher in societies with a longer state history.

4. Data & methodology

The empirical analysis of the finance-growth nexus conditioned on antiquity is performed on panel data covering the period from 1975 to 2014. We work with 5-year panels in order to average-out business cycles, and are thus left with eight time periods (1975–79, 1980–84, etc.). As a rule, the only countries included in the sample are those possessing the required minimum number of time periods with complete observations in terms of the model variables. In the baseline case, this number is set at four, thus leaving us with a sample of 94 countries.[6] The list of these countries is presented in Table A1 in the Appendix. The panel is unbalanced. Based on our previous arguments in Fig. 1, we pose the following hypotheses:

H1. Antiquity transforms the finance-growth nexus.

H2. The increase in outstanding credit impacts economic growth negatively in states with an ancient tradition of statehood.

To test these hypotheses, we specify the following model:

$$gry_{i,t} = \alpha_1 I(AQ_i \leq \gamma) lnFD_{i,t} + \alpha_2 I(AQ_i > \gamma) lnFD_{i,t} + \phi^T\left(Controls_{i,t}\right) + \mu_i + p_t + \varepsilon_{i,t} \quad (1)$$

where *gry* is the average annual growth rate of GDP per capita (y) in the given 5-year period, *AQ* is the measure of antiquity, *FD* is the measure of financial development, *Controls* represents the control variables, μ is the country-fixed effect, p is the time-fixed effect, i and t are country- and time-indexes, respectively, and ε is the error term. In the baseline model, antiquity is measured by the extended state history index of Borcan et al. (2018) calculated according to a 1% depreciation rate and terminated in 1950 (SH1950).

In accordance with the conceptual framework, we use two size-based measures of financial development: domestic credit (*DC*) and private credit by banks (*PCB*). These measures control for the extent of lending activity in the banking sector and are commonly used in

[6] The requirement is enforced in terms of data transformed by forward orthogonal deviation (see later). For each country, only the years in independence are considered.

the finance-growth literature.[7] The control variables always include the initial logged GDP per capita of the given period ($\ln(y_{t-1})$) to account for conditional convergence. The other control variables are classic growth determinants such as human capital (*HC* – human capital index), physical capital investments (*GFCF* – gross fixed capital formation), inflation (*INFL*), government consumption (*GovCons* – general government final consumption expenditures), social conflicts (*Violence*), and level of democracy (*Polity2*). These variables are meant to control for the production capacities, soundness of economic policy, provision of public goods, social stability, and institutional quality, respectively. Since the more common measures of institutional quality are not available for the whole period under consideration, we are compelled to use *Polity2* for this purpose.[8] Furthermore, we control for financial crises (*BankingCrisis* – number of years in banking crisis) based on the dataset of Laeven and Valencia (2020). This is crucial, as financial crises may impair the finance-growth nexus in the short run (Loayza and Rancière, 2006).

When appropriate, the logged levels of the explanatory variables are considered. Most of the explanatory variables are averaged over the 5-year intervals.[9] There are four exceptions: for GDP per capita and human capital the levels of the last year of the previous 5-year period are taken, while for *Violence* and *BankingCrisis* the period sums are calculated. In the Appendix, Table A2 introduces the data, while Tables A3 and A4 present the correlation matrix and the descriptive statistics.

In Eq. (1), the *I(.)* indicator function takes the value 1 if the condition in the parenthesis is met, and 0 otherwise. We postulate two regimes in terms of antiquity, a lower regime where the *AQ* is below the γ threshold parameter, and an upper regime where *AQ* exceeds γ. In the lower regime, the effect of financial development on the GDP growth rate is represented by α_1, while, in the upper regime, this effect is represented by α_2. For simplicity, we denote the specific financial development indicators of the lower and the upper regimes as *ln(FD_lower)* and *ln(FD_upper)*, respectively, that is:

$ln(PCB\_lower) = I(AQ \leq \gamma) lnPCB$, $ln(DC\_lower) = I(AQ \leq \gamma) lnDC$, $ln(PCB\_upper) = I(AQ > \gamma) lnPCB$, and $ln(DC\_upper) = I(AQ > \gamma) lnDC$.

In eq. (1), we are primarily interested in the alpha and gamma parameters. A difference in the signs of α_1 and α_2 would be a proof of *Hypothesis 1* that antiquity transforms the growth impact of financial development. Moreover, if $\alpha_1 > \alpha_2$ were to hold, *Hypothesis 2*, arguing that antiquity is bad for the finance-growth nexus, would also be corroborated.

We use the method of Seo and Shin (2016) to estimate the dynamic panel threshold regression in eq. (1). The underlying concept of threshold regressions is to estimate the model at the $\hat{\gamma}$ threshold parameter, which optimizes the objective function. Seo and Shin (ibid.) propose a 2-step GMM procedure for dynamic panel threshold models. In the first-step, the model is estimated at the $\hat{\gamma}_{step1}$ threshold parameter, which minimizes the objective function of GMM under the condition of independently and identically distributed (henceforth i.i.d.) error term. Thereafter, in the second-step of GMM, the model is re-estimated at the $\hat{\gamma}_{step2}$ threshold parameter, which again minimizes the objective function but now with the true error covariance matrix, which has been estimated according to the first-step residuals. In each step of GMM, the model is estimated based on a grid search for the threshold parameter conducted on the trimmed sample of the threshold (transition) variable. Following the conventional practice, in our analyses the default trim rate is 0.3 (i.e. 30%) implying that the lower and the upper 15% quantiles are ignored in the grid search. This is to avoid extreme outcomes for the threshold parameter. However, in the trimmed sample of the threshold variable each observation is involved in the grid search.

Seo and Shin (2016) propose the estimation of eq. (1) by the Arellano-Bond estimator that is on first-differenced data with Arellano-Bond-like instrumentation (Arellano and Bond, 1991). We deviate from them in that respect. First, in removing unobserved fixed-effects, we use forward orthogonal deviation (henceforth FOD) – as suggested in Kremer et al. (2013) – instead of first-order differencing; Monte Carlo simulations show that GMM estimators have better finite sample properties with FOD-transformation (Phillips, 2019).[10,11] Second, with respect to the instruments set, we opt for using lagged levels in the classic, 'collapsed' way when the given lag in the individual periods is considered as the observation on the same instrument. This is motivated by the relatively low number of cross-sectional units compared to the time periods in our sample implying that Arellano-Bond-like instrumentation would lead to instruments proliferation and, thereby, to biased results (Roodman, 2009).

The instrumental variables (IVs), on the one hand, include internal IVs which are derived from past observations of the instrumented variable. On the other hand, we also use such IVs which are external to (i.e. not explicitly derived from) the instrumented variables (external IVs) (Roodman, 2009). The internal instruments are as follows. First, the (FOD-transformed) endogenous variables are instrumented by the first- and second-order lags of their original, i.e. not FOD-transformed, levels. Second, (FOD-transformed) pre-determined variables are instrumented by their actual and first-order-lagged original (i.e. not-FOD-transformed) levels.[12] These internal IVs are assumed to be relevant for the instrumented variables as the regressors may be autocorrelated to some order; this

[7] Alternative measures related to the efficiency of banking are also available. However, when it comes to the elite-capture of banking sector the amount of outstanding credit is the most appropriate measure to unveil the impaired finance-growth nexus.

[8] Furthermore, the conventional time-invariant proxies for institutional quality–such as legal origin–cannot be included in the model as regressors due to the data transformation preceding the estimations which removes all observed and unobserved fixed-effects from the process (see below).

[9] As a rule, a minimum of three available observations is required within a 5-year period in order to calculate the period-average instead of reporting a missing value. For the variables subject to period averaging, the logarithm is taken for the 5-year averages.

[10] Forward orthogonal deviation, originally proposed by Arellano and Bover (1995) for removing fixed-effects, performs the following data transformation: $x_{it}^{*} = \sqrt{\frac{T_i - t}{T_i - t + 1}}\left[x_{it} - \frac{1}{T_i - t}\left(x_{i(t+1)} + \ldots + x_{iT_i}\right)\right]$, where T_i is the number of time units available for country i in the sample. As a result of FOD-transformation, the last observation is lost for each country.

[11] Another argument in favor of FOD is that first-differencing aggravates the missing data problem in unbalanced panels due to its inability to perform data transformation in the immediate neighborhood of missing observations.

[12] FOD-transformation renders pre-determined variables endogenous to the transformed error term since the leads of these variables are involved in the transformation. For the same reason, the lags of FOD-transformed data are not valid instruments.

suggests that their past levels may explain their successive levels. This is especially true for stock variables such as GDP-per-capita, human capital, the level of democracy, and the level of financial development. When using the lagged levels of (not-FOD-transformed) regressors as instruments, residual autocorrelation must be absent for the exclusion restriction to hold. This is why in the baseline estimations we also test the absence of residual autocorrelation up to order two (see below). This test is meant to supplement the standard test of overidentification, the Hansen J-test.

All explanatory variables are considered as endogenous to the error term in eq. (1)—and are instrumented accordingly—with the following exceptions. First, the lagged (log) GDP per capita and the lagged (log) human capital index (*L1.*ln*(y)*, *L1.ln(HC)*) are treated as pre-determined variables. Second, the banking crisis and the social conflict measures (*BankingCrisis*, *Violence*) are considered to be strictly exogenous and are, thereby, not instrumented.[13]

The threshold variable is considered to be exogenous. This assumption builds on two considerations. First, both the state history index and the agricultural years are historically determined.[14] Second, our model explains the growth rate controlling for initial GDP per capita. Consequently, even in the unlikely case when these antiquity measures would be endogenous to current levels of development, our regression model is immune to this potential source of bias keeping the state history indexes and the agricultural years exogenous to the growth rate.

The external instruments are the followings: legal origin dummies (French, German, Scandinavian, British), religion shares (Catholic, Protestant, Muslim, other), and ethnolinguistic fractionalization at three different levels of linguistic aggregation (ELF1, ELF5, ELF10) to improve the overall relevance of the instruments set.[15] These variables have been shown to be highly relevant for financial development (PCB/DC), public goods provision (GovCons), and social stability (Violence). In countries with British legal origin, the financial sector tends to be more developed than in countries with German, French, or Scandinavian legal origins since common law legal systems protect shareholder and creditor rights stronger than civil law legal systems (Levine, 1999; La Porta et al., 2008). Stulz and Williamson (2003) reveal the crucial importance of religion and culture in terms of investors' protection. According to their results, in Catholic countries, creditor rights are weaker and, thereby, financial development is lower than in Protestant countries. Desmet et al. (2012) find that diversity affects political economy outcomes differently at different levels of linguistic aggregation. They show that deep linguistic cleavages originating thousands of years ago are relevant for civil conflicts and redistribution, while finer linguistic cleavages (originating in the more recent past) are rather relevant for public goods provision.

Since the explanatory variables in eq. (1) control for all the channels proposed in the literature through which these external instruments might have an effect on economic growth, the respective exclusion restrictions are expected to hold. Nonetheless, the Hansen J-test is decisive in that respect as well.

Based on the above, eq. (1) is estimated by the following GMM-estimator:

$$\widehat{\beta} = \left((Z(\widehat{\gamma})^T X(\widehat{\gamma})_{FOD})^T W(\widehat{\gamma}) Z(\widehat{\gamma})^T X(\widehat{\gamma})_{FOD} \right)^{-1} (Z(\widehat{\gamma})^T X(\widehat{\gamma})_{FOD})^T W(\widehat{\gamma}) Z(\widehat{\gamma})^T gry_{FOD},$$

where $\widehat{\beta} = \left[\widehat{\alpha}_1, \widehat{\alpha}_2, \widehat{\phi}^T\right]^T$, X_{FOD} is the matrix of FOD-transformed regressors, Z is the instruments matrix, W is the weighting matrix, and gry_{FOD} is the FOD-transformed growth rate of GDP-per-capita.[16] As can be observed, both the X_{FOD} and the Z matrices are a function of the estimated threshold parameter as the outcome of the indicator function depends on γ in Eq. 1. Since the model is linear in β and the objective function of the GMM estimator is not continuous in γ, the grid search algorithm is practical for finding that level of the transition variable at which the objective function takes its minimum value (Seo and Shin, 2016).[17] The estimation is performed in two steps: in step one, with i.i.d. error term, and, in step two with the true error covariance matrix estimated according to the first-step residuals.[18]

[13] This is by necessity. Although, financial crises and social conflicts are not always independent of economic growth, we do not have any sensible instruments for *BankingCrisis* and *Violence* as these measures are event variables signaling the irregular and relatively rare occurrences of the underlying events. The results are unchanged when these variables are dropped from the controls and are presented in the sensitivity analysis, in section 8.

[14] In contrast to Borcan et al. (2018), the (baseline) state history index in this paper ends in 1950 CE ignoring the last half-century of 1951–2000 CE. This is for to ensure that *SH1950* does not overlap with our sample period.

[15] For the description of these data, see Table A2. In the estimations, British legal origin and the share of 'other' religions are treated as the benchmark group.

[16] The weighting matrix is $W = (Z^T \Omega Z)^{-1}$, where Ω is the estimated error covariance matrix. In the baseline model, the instruments matrix is the following: Z = [L1.(I(AQ ≤ γ)lnFD), L2.(I(AQ ≤ γ)lnFD), L1.(I(AQ > γ)lnFD), L2.(I(AQ > γ)lnFD), L1.ln(GFCF), L2.ln(GFCF), L1.ln(INFL), L2.ln(INFL), L1.ln(GovCons), L2.ln(GovCons), L1.Polity2, L2.Polity2, L1.ln(y), L2.ln(y), L1.ln(HC), L2.ln(HC), Violence, BankingCrisis, legal origin dummies, religion shares, ELF1, ELF5, ELF10]; where L1 and L2 are the first-order and second-order lag operators, respectively; legal origin dummies include German, French and Scandinavian dummies; religion shares include Catholic, Muslim, and Protestant shares.

[17] Within the framework of this grid search algorithm, the β parameter vector is estimated for each observation in the trimmed sample of the threshold variable.

[18] The covariance matrix of the 2-step GMM coefficients is as follows: $Cov(\widehat{\beta}) = \left(X_{FOD}^T Z W Z^T X_{FOD}\right)^{-1} X_{FOD}^T Z W \left(Z^T \Omega_2 Z\right) W Z^T X_{FOD} \left(\left(X_{FOD}^T Z W Z^T X_{FOD}\right)^{-1} \right)^T$, where Ω_2 is the error covariance matrix estimated based on the second-step residuals, an W is calculated based on the first-step residuals.

5. Results

This section presents the results of the empirical analysis on the finance-growth nexus with different measures of antiquity. Our baseline models are models 1A and 1B. In these models, the applied antiquity measure is *SH1950* calculated with a 1% depreciation rate. The two models differ from each other only in terms of the financial development indicator. As can be observed in Tables 1A and 1B, they deliver similar results. The control variables are mostly significant and have the expected sign. According to the over-identification test (Hansen J-test), the instruments are valid at standard levels in both models. As discussed above, the validity of our internal instruments requires the absence of residual autocorrelation. Motivated by the latter, as an alternative 'overidentification test', we calculate the Wald test of jointly zero first- and second-order residual autocorrelations.[19] The *p*-value of the test is very high in both models reinforcing the conclusion of the Hansen J-test on instruments validity.

In the two baseline models, the sign of the financial development coefficient differs across the two regimes: it is positive and significant at the 5% level in the lower regime (ln*(PCB_lower), ln(DC_lower)*), while it is negative and significant at the 1% level in the upper regime (*ln(PCB_upper), ln(DC_upper)*). According to the supremum Wald test, this difference between the effects of financial development on growth in the two regimes is significant at the 10% level in model 1A, and at the 5% level in model 1B.[20] The results corroborate our hypotheses that antiquity transforms detrimentally the finance-growth nexus rendering the outstanding amount of credit a negative growth determinant in societies with ancient institutional origins.

The estimated threshold parameter, separating young societies from ancient ones in terms of the finance-growth nexus, is 0.226. This means that 40 countries with relatively long history of established statehood fall in the upper regime of the finance-growth nexus in the baseline models. The bootstrapped 90% confidence interval of the threshold parameter is (0.0795, 0.3678) indicating a degree of uncertainty concerning the regime affiliation of countries with an *SH1950* state history index in this range.[21] However, a large part of the sample (50 countries) falls outside of this confidence interval classifying the remaining countries with high certainty into either of the two regimes. Fig. 4 demonstrates the duality of antiquity regimes via the scatterplot of *SH1950* and domestic credit.[22] As can be observed, the USA, Canada, and Australia fall among others into the lower regime (with 90% probability) characterized by the positive effect of financial development on economic growth. On the other hand, for example, France, Italy, and South Korea fall into the upper regime (with 90% probability) characterized by an impaired finance-growth nexus.

In order to fix any concern on the sensitivity of our results to the underlying antiquity measure, we also run the estimation of eq. (1) for the other antiquity measures discussed in Section 2. In models 2# to 4#, we use the state history index of the last six millennia calculated according to different (0%, 2%, 5%) depreciation rates. Although the dispersion of the index is very much impacted by the applied depreciation rate, the estimation results are fairly stable. The underlying reason is that the changes in the depreciation rate mostly do not affect the relative ranking of countries—the important aspect of their distribution—in terms of the state history index (see Figure OC1 in Online Appendix C). However, due to the rescaling, the estimated threshold parameters differ from each other even if they represent similar quantiles of the particular state history index.

In model 5#, we use the ancestry-adjusted state history index as the threshold variable to account for the post-Columbian population flows and to relate antiquity more to the people than to the geographic area. The results are remarkably similar to the baseline case.[23] The only difference to the baseline results is that in model 5A the estimated threshold parameter is relatively low, close to the lower bound of the trimmed sample of *SH1950adj*. It is also indicative that the estimation falls outside of the 90% confidence interval of the parameter. If we eliminate this outcome by increasing the lower bound of trimming to the 25% quantile, the estimated threshold parameter is more robust (model 5A*).

In models 6# and 7#, the threshold variable is the pre-Columbian state history either in original or in ancestry-adjusted form. The results are in line with the baseline ones owing to the fact that the order of pre-Columbian state histories coincides largely with that of overall state histories.

In models 8# and 9#, agricultural years are used as the threshold variable either in original or in ancestry-adjusted form. The high positive correlation of agricultural years with state history produces similar results to the baseline ones. According to models 8#, countries with a history of sedentary agriculture going back further than 4300 years ago tend to have an impaired finance-growth nexus, while countries where Neolithic Revolution happened within the last 4300 years tend to enjoy the conventionally assumed growth-inducing effect of financial development. The threshold level is estimated to be relatively higher when agricultural years are adjusted to the population's ancestral composition (models 9#).

Finally, we estimate a reduced form of eq. (1) including only the initial level of GDP per capita, financial development, and the two variables controlling for the negative shocks in economic growth, *BankingCrisis* and *Violence*; the threshold variable is *SH1950*. Our motivation is to explore whether the impairing effect of antiquity concerning the finance-growth nexus is also detectable on a much larger sample when data availability on control variables is not binding. The results are supportive: private credit and domestic credit

[19] FOD-transformation does not introduce any residual autocorrelation provided that the original error term is uncorrelated. The Wald test of residual autocorrelation is performed by fitting an AR(2) model on the empirical error term by OLS and testing the overall relevance of this model.

[20] The supremum Wald test has the null hypothesis that the coefficient of financial development is the same in the two regimes (Seo and Shin, 2016).

[21] In bootstrapping the confidence interval of γ, we follow suit Seo and Shin (2016). The same holds for the supremum Wald test. The relatively large standard error of the estimated threshold parameter is probably due to the time-invariance of the *SH1950* index.

[22] The same graph for private credit is available in Online Appendix A (Figure OA3).

[23] The estimated threshold parameter is again not comparable to the baseline one due to its different scale.

Table 1A
Results on Private Credit (dependent variable: avr. annual GDP per capita growth rate).

model	(1A)	(2A)	(3A)	(4A)	(5A)	(5A*)	(6A)	(7A)	(8A)	(9A)	(10A)
treshold variable	SH1950	SH1950	SH1950	SH1950	SH1950adj	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj	SH1950
depreciation rate	1%	0%	2%	5%	1%	1%	1%	1%	Ø	Ø	1%
ln(PCB_lower)	1.586**	1.586**	1.598**	1.748**	3.075***	2.014**	1.586**	2.274**	1.448**	1.537**	0.703
	(0.699)	(0.699)	(0.709)	(0.701)	(1.133)	(0.828)	(0.699)	(0.937)	(0.681)	(0.613)	(0.441)
ln(PCB_upper)	−1.988***	−1.988***	−1.999***	−1.547***	−1.275***	−1.760***	−1.988***	−1.882***	−1.900***	−1.130*	−2.806***
	(0.521)	(0.521)	(0.521)	(0.492)	(0.492)	(0.462)	(0.521)	(0.518)	(0.583)	(0.586)	(0.705)
L1.ln(y)	−1.758**	−1.758**	−1.675*	−1.808**	−2.060***	−1.529*	−1.758**	−1.880**	−0.994	−1.214	−2.787**
	(0.856)	(0.856)	(0.868)	(0.891)	(0.743)	(0.844)	(0.856)	(0.748)	(0.989)	(0.860)	(1.164)
ln(GFCF)	0.765	0.765	0.808	0.733	0.605	0.528	0.765	0.460	0.133	0.116	
	(0.663)	(0.663)	(0.663)	(0.659)	(0.695)	(0.699)	(0.663)	(0.664)	(0.655)	(0.682)	
L1.ln(HC)	3.609	3.609	3.569	2.984	0.822	2.007	3.609	0.213	2.533	1.245	
	(2.408)	(2.408)	(2.417)	(2.375)	(1.788)	(2.110)	(2.408)	(1.809)	(2.358)	(1.878)	
ln(INFL)	−0.896**	−0.896**	−0.862**	−0.746**	−0.876**	−0.850**	−0.896**	−1.125***	−0.331	−0.523	
	(0.356)	(0.356)	(0.354)	(0.356)	(0.393)	(0.400)	(0.356)	(0.427)	(0.406)	(0.343)	
ln(GovCons)	1.566*	1.566*	1.511*	1.166	0.761	1.248*	1.566*	1.086	1.257	0.918	
	(0.829)	(0.829)	(0.824)	(0.879)	(0.753)	(0.729)	(0.829)	(0.727)	(0.908)	(0.830)	
Polity2	0.090*	0.090*	0.087*	0.095*	0.060	0.071	0.090*	0.050	0.115**	0.108**	
	(0.051)	(0.051)	(0.051)	(0.053)	(0.056)	(0.054)	(0.051)	(0.052)	(0.053)	(0.055)	
Violence	−0.049**	−0.049**	−0.048**	−0.042*	−0.064***	−0.054***	−0.049**	−0.063***	−0.027	−0.030	−0.067***
	(0.019)	(0.019)	(0.019)	(0.022)	(0.024)	(0.020)	(0.019)	(0.022)	(0.024)	(0.024)	(0.025)
BankingCrisis	−0.471***	−0.471***	−0.471***	−0.513***	−0.544***	−0.520***	−0.471***	−0.530***	−0.475***	−0.533***	−0.584***
	(0.084)	(0.084)	(0.084)	(0.087)	(0.075)	(0.069)	(0.084)	(0.071)	(0.092)	(0.085)	(0.086)
estimated γ	0.226	0.153	0.289	0.473	0.1112	0.2267	0.1457	0.1439	4300	5414	0.3884
est. γ: quantile %	55.9	55.9	55.5	56.7	18.9	39.2	55.9	31.4	59.4	55.3	79.5
supr. Wald test (pv)	0.064	0.039	0.065	0.109	0.120	0.059	0.044	0.099	0.142	0.099	–
CI90%_γ	0.0795–0.3678	0.0485–0.283	0.1145–0.4429	0.2233–0.5938	0.1503–0.3786	0.2159–0.3809	0.0693–0.3738	0.119–0.3264	2000–6000	3568–6005	–
trim rate	0.3	0.3	0.3	0.3	0.3	0.4 (25–85)	0.3	0.3	0.3	0.3	0.3
n	503	503	503	503	503	503	503	503	503	503	689
no. of countries	92	92	92	92	92	92	92	92	92	92	136
no. of IVs	34	34	34	34	34	34	34	34	34	34	24
Hansen J-test (pv)	0.406	0.406	0.401	0.370	0.349	0.439	0.406	0.355	0.193	0.164	0.018
residual Wald test (pv)	0.535	0.535	0.539	0.463	0.238	0.461	0.535	0.377	0.682	0.618	0.003

Notes: Estimation of Eq.(1) on FOD-transformed data by 2-step GMM based on Seo and Shin (2016). Period dummies are included but not presented. Standard errors clustered by countries are in brackets. Asterisks denote the significance level (* 10%, ** 5%, *** 1%). IVs: legal origin dummies, religion shares, ethnolinguistic fractionalization at three aggregation levels, first- and second-order lags of untransformed endogenous variables, actual level and first-order lag of untransformed pre-determined variables. *Violence, BankingCrisis*, and the threshold variable are not instrumented. At the individual tests, only the *p*-values (pv) are presented. The H0 of the supremum Wald test: $\alpha_1 = \alpha_2$. CI90%_γ is the 90% confidence interval for the threshold parameter. CI90%_γ and the p-value of the supr. Wald test are bootstrapped with 5000 replications. The quantile percentage of *est. γ* relates to the sample distribution of the respective antiquity measure. Trim rate = 0.3. The *residual Wald test* is testing the overall relevance of the AR(2) model fitted on the residuum by OLS. *n* is the sample size. *L1.* is the first-order lag operator. For the individual antiquity measures, see section 2. In model 10A, no requirement is applied for the number of time periods with complete observations.

Table 1B
Results on Domestic Credit (dependent variable: avr. annual GDP per capita growth rate).

Models	(1B)	(2B)	(3B)	(4B)	(5B)	(6B)	(7B)	(8B)	(9B)	(10B)
treshold variable	SH1950	SH1950	SH1950	SH1950	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj	SH1950
depreciation rate	1%	0%	2%	5%	1%	1%	1%	Ø	Ø	1%
ln(DC_lower)	1.650**	1.650**	1.088*	1.743***	1.375**	1.650**	1.226**	1.267*	0.693	4.062***
	(0.659)	(0.659)	(0.581)	(0.636)	(0.615)	(0.659)	(0.595)	(0.664)	(0.524)	(1.120)
ln(DC_upper)	−1.778***	−1.778***	−2.198***	−1.356**	−2.020***	−1.778***	−2.080***	−1.538***	−2.280***	−1.083
	(0.575)	(0.575)	(0.649)	(0.551)	(0.656)	(0.575)	(0.677)	(0.597)	(0.644)	(0.678)
L1.ln(y)	−1.843**	−1.843**	−2.020***	−1.858**	−1.595**	−1.843**	−1.849**	−1.193	−2.057***	−0.802
	(0.779)	(0.779)	(0.708)	(0.802)	(0.780)	(0.779)	(0.810)	(0.852)	(0.759)	(1.356)
ln(GFCF)	1.036	1.036	1.334*	1.039	1.182*	1.036	1.472**	0.680	0.693	
	(0.672)	(0.672)	(0.688)	(0.642)	(0.699)	(0.672)	(0.692)	(0.666)	(0.672)	
L1.ln(HC)	4.674**	4.674**	3.858*	3.510	4.572**	4.674**	3.800	3.250	3.354*	
	(2.256)	(2.256)	(2.088)	(2.248)	(2.321)	(2.256)	(2.338)	(2.312)	(1.878)	
ln(INFL)	−1.307***	−1.307***	−1.378***	−1.194***	−0.953**	−1.307***	−0.662*	−0.893**	−1.134***	
	(0.335)	(0.335)	(0.357)	(0.329)	(0.410)	(0.335)	(0.376)	(0.364)	(0.384)	
ln(GovCons)	1.952**	1.952**	2.096**	1.383	1.263	1.952**	1.243	1.419	0.937	
	(0.851)	(0.851)	(0.821)	(0.916)	(0.793)	(0.851)	(0.909)	(0.954)	(0.790)	
Polity2	0.093**	0.093**	0.097**	0.099**	0.088*	0.093**	0.099**	0.107**	0.063	
	(0.047)	(0.047)	(0.046)	(0.048)	(0.047)	(0.047)	(0.047)	(0.047)	(0.044)	
Violence	−0.052**	−0.052**	−0.061***	−0.042**	−0.062***	−0.052**	−0.057***	−0.030	−0.039**	−0.130***
	(0.020)	(0.020)	(0.021)	(0.021)	(0.020)	(0.020)	(0.022)	(0.023)	(0.020)	(0.035)
BankingCrisis	−0.499***	−0.499***	−0.485***	−0.533***	−0.480***	−0.499***	−0.576***	−0.491***	−0.446***	−0.851***
	(0.086)	(0.086)	(0.099)	(0.087)	(0.091)	(0.086)	(0.092)	(0.095)	(0.085)	(0.141)
estimated γ	0.226	0.153	0.3768	0.473	0.2763	0.1457	0.308	4300	6003	0.1057
est. γ: quantile %	56.1	56.1	62.5	56.9	53.3	56.1	72.9	59.2	74.1	44.6
supr. Wald test (pv)	0.029	0.020	0.019	0.045	0.023	0.031	0.051	0.124	0.079	–
CI90%_γ	0.0795–0.3678	0.0494–0.2706	0.1152–0.444	0.221–0.5997	0.1615–0.3786	0.0693–0.3738	0.1391–0.3264	2000–6000	3500–6003	–
trim rate	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
n	510	510	510	510	510	510	510	510	510	695
no. of countries	94	94	94	94	94	94	94	94	94	138
no. of IVs	34	34	34	34	34	34	34	34	34	24
Hansen J-test (pv)	0.157	0.157	0.144	0.121	0.131	0.157	0.132	0.051	0.040	0.016
residual Wald test (pv)	0.840	0.840	0.815	0.758	0.811	0.840	0.714	0.863	0.629	0.001

Notes: In model 10B, no requirement is applied for the number of time periods with complete observations. For further notes, see Table 1A.

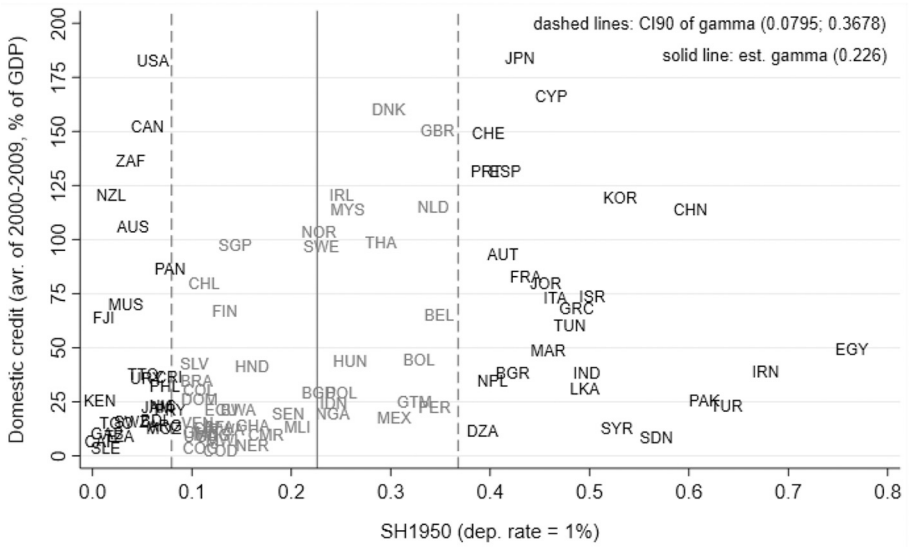

Fig. 4. Financial development and the two antiquity regimes.
Notes: Countries which, according to Model 1B, belong to the lower regime or to the upper regime of the finance-growth nexus with a 90% probability are depicted by black. Countries which fall into the 90% confidence interval of γ are depicted by grey.

have positive growth effects in the lower regime of 'young' countries and negative growth effects in the upper regime of 'old' countries (models 10#).[24]

In both regimes, the effect of financial development is important economically. Considering the baseline results with *SH1950*, a 10% increase in private credit (domestic credit) tends to accelerate the annual GDP-per-capita growth rate by ca. 0.16 (0.17) percentage points in the lower regime (i.e. young societies) and decelerate it by ca. 0.2 (0.18) percentage points in the upper regime (i.e. societies with ancient roots). In case of the other antiquity measures, similar magnitudes characterize the growth impact of financial development.

To conclude, in accordance with the theoretical model, the macroeconomic empirical analysis proves our hypotheses. Antiquity influences the finance-growth nexus by rendering the increase in outstanding credit detrimental to growth in societies with ancient roots. On the other hand, in younger societies, the marginal effect of financial development on growth is positive—as the traditional finance-growth literature would suggest. This result holds irrespective of the measure of antiquity.

The effect of antiquity has been shown to be non-linear on socio-economic outcomes in a number of cases. Borcan et al. (2018) unveil an inverted U-shaped relationship between GDP-per-capita and state history. Vu (2021) explores a U-shaped relationship between state history and income inequality. These papers control directly for the potential non-linear effect of antiquity by including a quadratic term of the state history index in their regressions. In our paper, non-linearity is taken into account by using the antiquity measure as a threshold variable and, thereby, separating countries into two regimes with orthogonal implications for the finance-growth nexus.

Finally, one point is worth emphasizing: our results are not a simple reincarnation of the literature on *institutional quality, economic development, and finance*. Although some of the world's oldest societies are located in the underdeveloped Middle East, there are also leading examples of antiquity in developed countries such as Greece, Italy or South Korea. Indeed, in our baseline estimations, both the lower and the upper regimes of state history include a mix of developed and developing countries (see Fig. 4 and Table A1). Therefore, the general argument of the literature that financial development is more conducive to growth in countries with better institutions is clearly irrelevant in our case. In contrast to the conventional approach, the economic story behind our results is more about informal institutions rather than formal ones. It is about the latent rent-seekers who may render institutional systems extractive – even those systems with a relatively high score of institutional quality according to standard measures – provided that they are powerful enough to do so.

Furthermore, as Fig. 4 indicates, outstanding credit is not systematically higher in upper-regime-countries. This suggests that our results are not driven by the inverted U-shaped relationship between financial sector size and economic growth (Law and Singh, 2014; Arcand et al., 2015). Nonetheless, in the sensitivity analyses we check the robustness of our results to the inclusion of these different channels of nonlinearity explored in the finance-growth literature.

[24] Private credit (domestic credit) is insignificant in the lower (upper) regime at the 10% level, but only marginally so.

6. Discussion

Our results establish a robust relationship between antiquity, in the form of accumulated exposure to state and centralized institutions, and one of the main pillars of capitalism: the banking sector. We provide overwhelming evidence that the lending activity of banks is less conducive to economic growth in countries with a long state history. The malfunctioning of the finance-growth nexus under the condition of antiquity can be attributed to the deeper entrenchment and enhanced power of the business and political elites, which enable them to capture the financial sector and corrupt lending. This section discusses the rationale for this assumption. We focus on the distinguishing features of societies with an ancient statehood in terms of social dynamics, culture, and institutions.

Early starters in state organization were able to dominate territories and extract resources for the benefit of their elites and the consolidation of their military power. These ancient autocratic regimes were characterized by advanced political and economic hierarchies. A long tradition of centralization resulted in social norms which are conformable with elite rule and vested political interests and are deeply settled at the same time. Owing to this, these societies were more effectively able to resist the changing strategic and economic environment resulting from the appearance of competing states, the replacement of old empires, the monetization of economic activities, and the rise of novel types of political-economic organizations on their territories (e.g., democracy in ancient Athens). This persistence also means that the elite-based structure of societies with ancient roots has been less influenced by the emergence of modern capitalist markets and democratic regimes.

Indeed, there is strong evidence that social norms and values can by far survive the institutional and historical environments, which have brought them into being. Guiso et al. (2016) demonstrate that Northern Italian cities, which achieved self-government in the Middle Ages, tend to have higher level of civic capital today than those that did not. They argue that self-government was conducive for the strengthening of self-efficacy beliefs in medieval cities which beliefs were transmitted over the generations of successive centuries. Voigtländer and Voth (2012) investigate the medieval roots of anti-Semitism in Nazi Germany. They find that anti-Semitism in the interwar period was much more severe in those German cities, which experienced pogroms of Jews during the Black Death in the 14th century. Nunn and Wantchekon (2011) trace the origins of mistrust in Africa back to the slave trade. According to their results, those individuals whose ancestors were massively impacted by slave trade exhibit lower levels of trust today.

These studies underpin the persistence of culture. However, culture does not always travel well across centuries; there are several documented cases of relatively rapid change in it (Giavazzi et al., 2019). Investigating the conditions of cultural persistence, Giuliano and Nunn (2021) find that cross-generational stability in the environment crucially enhances persistence in cultural traits. According to their argument, when the societal environment is similar across generations, then an efficient vertical transmission of prevailing attitudes from parents to children may occur.

The findings of the literature on cultural persistence corroborate the proposed mechanism behind our macro-econometric results: the hierarchical social structure and elite-rule emerged under antiquity became the social norm and have survived in the form of informal networks, cronyism, and state capture until the modern era. This cultural persistence has been facilitated by the stability in the economic and political arrangements due to the continuous presence of established statehood. Hence, antiquity in economic terms becomes equivalent to a set of inter-generationally transmitted institutional constraints that may undermine the primacy of competitive markets and result in impaired functioning of some crucial aspects of capitalism, such as the finance-growth nexus.

Beyond cultural persistence, the survival of elite-based social structures is also underpinned by the adaptive formations of formal institutions and social organization (Alesina and Giuliano, 2015). In his seminal paper, Greif (1994) demonstrates how the differing cultural beliefs of medieval Genoese and Maghribi traders shaped their respective societies. Through the evidence of clans in China, Greif and Tabellini (2017) reveal that culture persistently affects the organization of societies. Historical kin-based clans were abolished in China when the communist regime gained power in 1949. However, after the regime stopped persecuting them in 1979, clans have re-emerged and proliferated.

To sum up, there is strong evidence that the hierarchical, elite-based social structures may have survived in countries with ancient roots owing to cultural persistence and the stability facilitated by a long history of established statehood. Moreover, the establishing oligarchic conditions are also reinforced by the dynamic interplay of institutions and culture: a society captured by some major interest groups can easily find itself in a bad equilibrium where formal rules are dominated by informal ones as well as by hierarchical within-group structures. This bad equilibrium is linked to the concept of 'captured democracy' in Acemoglu and Robinson (2008) where elite investments into de facto political power entirely offset the changes in de jure political institutions (such as democratization).

Finally, we want to point out that antiquity is not necessarily a subordinated system. The logic of antiquity appears to be similar to the logic of the soft budget constraint, whose efficiency is rejected *ex-ante*, but confirmed *ex-post*. While antiquity generates conditions for the inefficient provision of credit due to elite capture, it is essential to keep in mind that it also may provide an alternative path to economic efficiency, as it is not possible to undo or disregard the ancient roots of societies. In societies with a longer horizon of state history, it is costlier to replace hierarchical institutions with horizontal ones than to have an impaired financial system captured by established elites. Antiquity prevents a capitalist development based on market-based finance, but this does not preclude the existence of alternative developmental paths that can be relatively successful in capitalism. The latter explains why the upper regime of countries with an impaired finance-growth nexus also includes developed countries. The question of the alternative ways of success in capitalism goes beyond the scope of our paper and may be the topic of future research.

7. Antiquity and corruption in lending: Exploring the microeconomic evidence

This section explores the microeconomic mechanism underpinning the macroeconomic results in section 5. In doing so, we build on the literature on corruption in bank lending (see section 1). To date, the literature has ignored the potential effect of antiquity on

lending corruption. We conjecture that rent-seeking is more characteristic to societies with a long history of established statehood leading to more pervasive lending corruption; and an impaired finance-growth nexus.

Our analysis builds on the cross-country World Business Environment Survey (WBES) conducted by the World Bank in 1999 (World Bank, 2000). The WBES involves more than 10.000 companies in eighty countries monitoring the perceptions of firm leaders concerning the business environment. The literature resorts exclusively to the WBES as this is the only dataset, which contains cross-country data on lending corruption.[25] More specifically, the literature considers one particular question posed to company leaders in WBES: "How problematic is the corruption of bank officials for the operation and growth of your business?". Managers can give their response on a four-points scale: "1- no obstacle, 2- minor obstacle, 3- moderate obstacle, 4- major obstacle". We take this perception of managers as the dependent variable in our model (*Lending corruption*):

$$Lending\ corruption = \beta \times AQ + Firm\ characteristics + Macroeconomic\ controls + Additional\ controls + \varepsilon \quad (2)$$

On the right-hand side of Eq. (2), we focus on the coefficient of the antiquity measure (*AQ*). A positive coefficient would corroborate our hypothesis that in societies with more ancient roots corruption in lending is more pervasive.

We consider three groups of control variables: firm characteristics, macroeconomic variables, and additional controls. The literature includes the first two groups commonly; papers differ mainly in terms of the additional controls. The firm characteristics used in most papers are the value of sales controlling for size, the number of competitors, whether the state owns any stake in the company (dummy), whether a foreign entity owns any stake in the company, whether the company exports (dummy), and industry dummies.[26] The assumption is that company size, state ownership, foreign ownership and export activity tend to lessen corruption in lending as an obstacle to business activity since these characteristics make firms less dependent on bank credits. It is also assumed that more competitors decrease the bargaining power of firms lending more room for bank officials to pursue private gains.

The literature is more heterogeneous in terms of the macroeconomic controls but GDP per capita, GDP growth rate, inflation and outstanding private credit generally appears in the model specifications. The presumption is that lending corruption is lower in high-performing economies, with dynamic growth, monetary stability (low inflation) and abundant financial resources. Beyond these aspects, we also control for financial crisis, institutional quality and the extent of competition. We conjecture that corruption in lending is more pervasive in times of crisis due to the scarcity of available financial resources, under worse government institutions and under more competitive markets.[27]

The country sample of the macro-econometric analysis overlaps only partly with that of WBES. As the additional controls in eq. (2) considered in previous papers are from datasets with specific country coverages, we do not include them in our baseline model in order to keep the country sample at its maximum. In the sensitivity analysis, however, they are controlled for.

Our dependent variable is an ordered categorical variable with four outcomes. Therefore, similarly to the literature, we use the ordered probit estimation for eq. (2). The results are presented in Table 2.[28,29] In the baseline model, model 11, the coefficient of *SH1950* is positive and significant at the 1% level implying that lending corruption is more pervasive in countries with a longer history of established statehood. This result holds through a wide array of sensitivity analyses.

First, we control for banking sector characteristics. In model 12, we introduce information sharing and banking competition. The former is measured by a Public Credit Registry dummy (*PublicReg*) and a Private Credit Bureau dummy (*CreditBur*) (both of them taking value one if the respective agency existed in January 1999, 0 otherwise), whilst the latter by the share of the three largest banks in total banking assets (*Concentr*). In line with the results of Barth et al. (2009), the existence of a Private Credit Bureau reduces lending corruption. *PublicReg* and *Concentr* prove to be insignificant. In model 13, following Beck et al. (2006), we include the official supervisory power (*Supervision*) and the strength of private monitoring (*Monitoring*) in the banking sector.[30] Neither of them prove to be significant. In model 14, we add creditor rights (*CRights*) from Djankov et al. (2007) assuming that lending corruption decreases when creditors enjoy stronger protection. The coefficient of *CRigths* is negative but insignificant. Nevertheless, the most important result is that the antiquity measure retains its positive sign and significance in each specification. When the above characteristics of the banking sector are included jointly in a horse race regression, the coefficients of the additional controls become mostly significant with the expected sign, whilst the state history index retains its significant, positive effect on lending corruption (model 15). Finally, in model 16, motivated by Barry et al. (2016), we control for the shares of state-owned banks (*SOB*) and foreign-owned banks (*FOB*). The result on antiquity is unchanged, while the included additional controls do not prove to be significant.

In model 17, we check the sensitivity of our results to culture. Following Zheng et al. (2013), we include the four major cultural dimensions of Hofstede (Hofstede et al., 2010): individualism (*IDV*), power distance (*PDI*), masculinity (*MAS*), and uncertainty avoidance (*UAI*). According to these authors, in societies with less individualism (more collectivism), more masculinity and less

[25] Beck et al. (2006) point out that the WBES is representative as it contains companies of different size in each country and that the perceptions on lending corruption mirror systemic differences in the expected way.

[26] Firm characteristics are from WBES. For the description of these data, see Table OA1 in Online Appendix A.

[27] Financial crises are controlled by *BankingCrisis*. Institutional quality and market competition are measured by the first principal component of the six Worldwide Governance Indicators and the Index of Economic Freedom of Heritage Foundation, respectively (see Table OA1).

[28] The results are the same for the extended country sample underlying model 10A (see Table OA2 in Online Appendix A).

[29] Cameron and Miller (2015) point out that cluster-robust standard errors may result in the over-rejection of the H0 hypothesis of *t*-tests if the number of clusters is less than 50. In order to lift any related concerns in case of Table 2, all the models are re-estimated with non-robust standard errors. Results are the same and available in Table OA3 in Online Appendix A.

[30] Both measures are from Barth et al. (2013) (see Table A2).

Table 2
Antiquity and corruption in lending.

model	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
Dependent var.	Lending Corruption												LC_D1	LC_D2
AQ	SH1950	SH1950	SH1950	SH1950	SH1950	SH1950	SH1950	SH1950	SH1950	SH1950	SH1500	SH1950adj	SH1950	SH1950
AQ	1.185***	1.133**	1.413**	1.235***	1.590***	1.471**	2.015***	2.116***	1.029**	1.142***	1.089**	0.991*	1.323***	1.395***
	(0.457)	(0.449)	(0.636)	(0.478)	(0.432)	(0.665)	(0.760)	(0.562)	(0.429)	(0.395)	(0.425)	(0.520)	(0.513)	(0.499)
Additional control 1		Concentr			Concentr	FOB	IDV	StatePress	Financing	CC				
		0.0033			0.0066***	−0.0028	−0.010	0.0034**	0.191***	−0.402***				
		(0.004)			(0.0025)	(0.0033)	(0.007)	(0.0016)	(0.032)	(0.122)				
Additional control 2		PublicReg			PublicReg	SOB	PDI		Corruption					
		0.0806			−0.341***	−0.0028	−0.0082*		0.331***					
		(0.133)			(0.105)	(0.0038)	(0.0046)		(0.031)					
Additional control 3		CreditBur			CreditBur		MAS							
		−0.289*			−0.574***		0.0097*							
		(0.155)			(0.108)		(0.0052)							
Additional control 4			Supervision		Supervision		UAI							
			0.0163		0.0895***		0.0028							
			(0.0298)		(0.0157)		(0.0034)							
Additional control 5			Monitoring		Monitoring									
			0.0103		0.0185									
			(0.0618)		(0.0364)									
Additional control 6				CRights	CRights									
				−0.0728	−0.224***									
				(0.0625)	(0.0584)									
Firm characteristics	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Macro controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
constant	No	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes
n	3747	3566	2737	3676	2636	2577	2920	2931	3446	3747	3747	3747	3747	3747
no. of countries	52	48	35	51	33	32	34	39	52	52	52	52	52	52
pseudo R2	0.078	0.087	0.092	0.084	0.121	0.074	0.093	0.106	0.129	0.084	0.077	0.074	0.116	0.115

Notes: Dependent variable: models 11–22: *Lending Corruption*; model 23: *LC_D1* (1 if Lending Corruption >1); model 24: *LC_D2* (1 if Lending Corruption >2). Antiquity measure: models 11–20, 23, 24: *SH1950*; model 21: *SH1500*; model 22: *SH1950adj*. Ordered probit estimation: models 11–22. Probit estimation: models 23–24. Standard errors clustered by countries are in brackets. Asterisks denote the significance level (* 10%, ** 5%, *** 1%). *Firm characteristics* include logged value of sales, number of competitors, state-ownership dummy, foreign-ownership dummy, export dummy, and industry dummies. The *Macro controls* include the average growth rate of GDP per capita in 1995–99, logged GDP per capita in 1999, logged average inflation in 1995–99, logged average private credit in 1995–99, the average of the Index of Economic Freedom (Heritage Foundation) in 1995–99, the number of years with systemic banking crises in 1995–99, and – with the exception of model 20 – the first principal component of the six Worldwide Governance Indicators in 1998. For the complete results, including the coefficient estimates and detailed description of firm characteristics and macroeconomic controls see Table OA1 in Online Appendix A. For the country sample of model 11, see Table A1. For the description of additional controls, see Table A2.

uncertainty avoidance corruption in lending is more pervasive. As can be observed, antiquity continues to be a significant positive determinant of lending corruption even after controlling for these cultural dimensions. This result corroborates that antiquity offers additional insights in the evolution of lending corruption compared to collectivism and the other conventional measures of culture.

In model 18, we control for state ownership in the media by including the share of state-owned journals in the market share of the top five journals (*StatePress*). The result on *SH1950* is unchanged, while the positive, significant coefficient of *StatePress* reinforces the results of Houston et al. (2011).

In model 19, we include the own perceptions of firms in WBES on the extent to which corruption in general and the access to finance are constraining their business operation (*Corruption / Financing*). These measures are used in several papers to control for the general pessimism of respondents (e.g., Barth et al., 2009). However, as Beck et al. (2006) highlight it, they raise some concerns on simultaneity bias. Nonetheless, model 19 delivers the expected results: the effect of antiquity on lending corruption is unchanged, while firms' perception on lending corruption positively correlates with their perceptions on the above general constraints.

In model 20, we replace overall institutional quality with one particular Worldwide Governance Indicator, *control of corruption* (CC). The results are unchanged. Finally, we check the sensitivity of the results to the antiquity measure and the estimation method. In models 21–22, we use the pre-Columbian state history index (*SH1500*) and the ancestry-adjusted state history index (*SH1950adj*) instead of *SH1950*. The results are the same as in the baseline model. In models 23–24, we use standard probit estimation with binary dependent variable. The underlying motivation is that the sample distribution of *Lending Corruption* is unbalanced: nearly 60% of companies do not report any corruption (see Table 3). This may raise concerns against the ordered probit results. In model 23, the dependent variable (*LC_D1*) takes value 1 if the company considers lending corruption as a problem irrespective of its extent (i.e. *Lending Corruption* > 1), 0 otherwise. On the other hand, in model 24, the dependent variable (*LC_D2*) is 1 when lending corruption is perceived at least as a moderate problem (i.e. *Lending Corruption* > 2), 0 otherwise. According to the results, the effect of antiquity is robust to these changes in the estimation methodology and the dependent variable.

To sum up, antiquity is a significant positive determinant of lending corruption even after controlling for those specific factors, which have already been explored in the literature. Furthermore, the effect of antiquity is important economically too. Based on model 11, in Table 3, the calculated marginal effects of *SH1950* on the probabilities of individual outcomes in *Lending Corruption* are presented for an average firm and at the average state history index. The marginal effects are highly significant at each case and have the expected sign. Concerning the magnitudes, a one-standard-deviation increase in state history (0.182) decreases the probability that the firm report no corruption of bank officials by 8.2 percentage points. At the same time, the probability that the firm considers lending corruption as a major obstacle increases by 2.7 percentage points. Taking into account the shares of the respective outcomes in the total sample, these marginal effects are substantial.

8. Sensitivity analyses

This section conducts the sensitivity analyses of the results on the finance-growth nexus in section 5. The section also investigates whether the finance-growth nexus continues to be impaired under antiquity when using stock market capitalization as the measure of financial development.

We are interested in robustness checks to the estimation method, the sample, the threshold effect, the control variables, and the way non-linearity in the finance-growth nexus is implied by antiquity. The sensitivity analyses show that the results are robust to these issues. In order to save space, we primarily present the results on private credit. The results on domestic credit are similar and available in Online Appendix B (Tables OB2-OB5.).[31]

As regards the estimation methodology, we investigate the sensitivity to the defining characteristics of GMM estimation such as the set of IVs and the assumption on the weighting matrix (standard error). We also run the estimation by two-stage least squares (TSLS) using the baseline instruments set. The results are presented in Table 4. In model S1A, we drop external IVs from the instruments. As can be observed, the growth impact of private credit in the two regimes is not sensitive to the inclusion of external instruments. In models S2A and S3A, we keep the external instruments but changes the internal ones. In model S2A, the internal IVs are restricted to the first order lag (actual level) of untransformed endogenous (pre-determined) variables. On the other hand, in model S3A, the internal IVs are extended to include the third-order (second-order) lag of untransformed endogenous (pre-determined) variables. In the two models, private credit preserves its opposing growth effects in the two regimes and is mostly significant. In model S4A, we switch from clustered standard errors to heteroscedasticity-robust standard errors. The conclusion concerning the threshold effect of antiquity on the finance-growth nexus holds in this case too. Finally, in model S5A, eq. (1) is estimated by TSLS leading to results similar to the baseline ones.[32]

Three issues can be raised concerning the sensitivity to the sample: the sensitivity to the time span, the country set, and the required minimum number of complete observations. In the baseline case, the countries included in the sample are required to have at least four time periods with complete observations in terms of the FOD-transformed variables. In model S6A, we increase this threshold to six periods of complete observations leading to a much more balanced panel. The results are unchanged despite the decrease in the number of available countries (Table 5).

We perform four sensitivity checks in relation to the time span. First, we extend the time span by including the first half of the 1970s

[31] In the sensitivity analyses, the supremum Wald test of the threshold effect, the Wald test of residual autocorrelation, and the confidence interval for the threshold parameter are not considered.

[32] Note that the TSLS results coincide with the first-step GMM results of models 1A and 1B in terms of the coefficient estimates.

Table 3
The magnitude of the effects of antiquity on lending corruption.

Outcome of *Lending corruption*:	1	2	3	4
Marginal effects of *SH1950* at 0.2252 (p-values in parentheses)	−0.448	0.160	0.138	0.151
	(0.009)	(0.013)	(0.017)	(0.006)
The effects of a one-standard-deviation (0.1819) increase in *SH1950*	−0.082	0.029	0.025	0.027
Share of category # in total ($n = 3747$)	0.608	0.198	0.102	0.092

Notes: The marginal effects of *SH1950* ($\delta = 1\%$) are calculated for the average firm in the sample (with average firm characteristics and macroeconomic controls) at the average state history index (0.2252) according to model 11. The numbers in columns 1, 2, 3 and 4 indicate the change in the probability that a firm rates corruption of banking officials as no obstacle (1), minor obstacle (2), moderate obstacle (3), and major obstacle (4), respectively.

Table 4
Sensitivity to the estimation method: FD = private credit (dep. var.: *gry*).

model	(S1A)	(S2A)	(S3A)	(S4A)	(S5A)
estimation method	2step-GMM				TSLS
weighting matrix	default	default	default	hc-robust[3]	N/A
internal IVs	default	ev[1]: L1 pdv[2]: L0	ev[1]: L1, L2, L3 pdv[2]: L0, L1, L2	default	default
external IVs	none	default	default	default	default
ln(PCB_lower)	2.224**	1.252*	2.755***	2.361**	1.831**
	(0.939)	(0.658)	(0.849)	(0.929)	(0.862)
ln(PCB_upper)	−1.794***	−2.362**	−0.714	−1.064**	−1.558**
	(0.610)	(0.954)	(0.493)	(0.541)	(0.627)
Controls	Yes	Yes	Yes	Yes	Yes
estimated γ	0.1081	0.3884	0.1041	0.1081	0.226
est. γ: quantile %	43.3	77.1	41.3	43.3	55.9
n	503	554	436	503	503
no. of IVs	25	26	42	34	34
Hansen J-test (pv)	0.398	0.126	0.683	0.071	0.147

Notes: Controls: L1.ln(y), ln(GFCF), L1.ln(HC), ln(INFL), ln(GovCons), Polity2, Violence, BankingCrisis, period dummies. Standard errors are in brackets. In models S1A, S2A, and S3A standard errors are clustered by countries. In models S4A and S5A, heteroscedasticity-robust standard errors are calculated. Asterisks denote the significance level (*10%, **5%, ***1%). Trim rate = 0.3. No. of countries = 92. For further notes, see Table 1A.
Notations: [1] ev: endogenous variable, [2] pdv: pre-determined variable, [3] hc-robust: heteroscedasticity-robust, L0: actual level, L1/L2/L3: first-, second-, third-order lag.

(model S7A). The results are unchanged. Second, we constrain the time span by changing the starting date of the sample to 1985 and 1990, respectively, in order to focus on the post-Keynesian period of liberalization and privatization (models S8A and S9A). This is important because one might be concerned about the distorting effect of state-owned banks, which dominated the financial landscape in several countries before the 1980s. As the results show, the main conclusions hold for these limited time spans too: the outstanding amount of credit is positive for growth in the lower regime, while negative in the upper one.[33] Finally, we drop the last 10 years (2005–14) to see whether the results are driven by the global financial crisis (model S10A). The significant threshold in the finance-growth nexus remains with unchanged conclusions.

In the followings, we investigate the sensitivity to the country sample. In doing so, the trim rate is increased to 0.5 in order to counterbalance the considerable decrease in the number of countries available for the individual constrained samples.[34] In column S11A, model 1A is re-estimated when low-income and lower-middle-income countries are excluded. On the other hand, in column S12A, high-income countries are dropped from the sample. Although the country-samples of these columns partly overlap, their results can be interpreted as reflecting the cases of developed countries and developing countries, respectively.[35] In each case, private credit continues to weigh positively for growth in the lower regime and negatively in the upper regime. The loss in significance is due to the reduced sample size. Nevertheless, the results corroborate our previous reasoning that the antiquity-capitalism nexus is not another representation of the institutional approach tracing back the growth effect of finance to institutional development.

As a second round of the sensitivity check to the country sample, we also drop groups of countries according to their territorial affiliation. Five scenarios are considered (models S13A-S17A): estimation without Latin American & Caribbean, Asian, Middle East &

[33] Private credit loses significance in the lower regime when the sample starts in 1990. This is in line with the weakening growth effect of financial development in the recent decades (Rousseau and Wachtel, 2011).
[34] In most cases, the constrained sample includes only 60–70 countries implying that the original trim rate (0.3) would easily result in extreme threshold parameter.
[35] The inclusion of upper-middle-income countries in both samples is necessary to keep the number of countries sufficiently large for purposes of panel threshold estimation.

Table 5
Sensitivity to the sample: FD = private credit (dep. var.: *gry*).

model	(S6A)	(S7A)	(S8A)	(S9A)	(S10A)	(S11A)	(S12A)	(S13A)	(S14A)	(S15A)	(S16A)	(S17A)
complete obs. (min.)	6	default	default	default	default	default	default	default	default	default	default	default
period	default	1970–2014	1985–2014	1990–2014	1975–2004	default	default	default	default	default	default	default
country sample	default	default	default	default	default	w/o LMIC & LIC	w/o HIC	w/o LAC	w/o Asia	w/o MENA	w/o SSA	w/o West
ln(PCB_lower)	2.206**	1.662**	1.740*	0.594	1.808**	0.087	1.104	2.239***	0.238	2.091**	0.394	1.599**
	(0.887)	(0.665)	(0.975)	(0.781)	(0.714)	(0.551)	(0.828)	(0.866)	(0.472)	(0.834)	(0.507)	(0.792)
ln(PCB_upper)	−1.139**	−1.824***	−1.443***	−1.880***	−1.248*	−1.689***	−0.900	−0.765	−3.236***	−1.118**	−2.190***	−0.455
	(0.518)	(0.506)	(0.526)	(0.641)	(0.668)	(0.597)	(0.776)	(0.527)	(0.607)	(0.480)	(0.534)	(0.696)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
estimated γ	0.1118	0.2159	0.1041	0.1347	0.228	0.2509	0.1353	0.1081	0.3444	0.1041	0.3884	0.1081
est. γ: quantile %	45.1	55.5	40.1	47.0	57.5	55.0	57.7	34.0	74.9	45.4	70.6	52.7
trim rate	0.3	0.3	0.3	0.3	0.3	0.5	0.5	0.5	0.5	0.5	0.5	0.5
n	477	530	401	321	322	307	331	379	431	456	374	389
no. of countries	80	92	91	86	80	53	63	72	80	83	65	71
no. of IVs	34	35	32	31	32	34	33	34	34	34	34	33
Hansen J-test (pv)	0.517	0.488	0.244	0.457	0.866	0.556	0.678	0.598	0.552	0.274	0.051	0.257

Notations: HIC/LMIC/LIC – high-income/lower-middle-income/low-income countries, respectively (World Bank classification, November 2017.); *LAC* – Latin America & the Caribbean; *MENA* – Middle East & North Africa; *SSA* – Sub-Saharan Africa; *West* – Europe & North America.
Notes: Controls: L1.ln(y), ln(GFCF), L1.ln(HC), ln(INFL), ln(GovCons), Polity2, Violence, BankingCrisis, period dummies. Standard errors clustered by countries are in brackets. Asterisks denote the significance level (*10%, **5%, ***1%). For further notes, see Table 1A.

North African, Sub-Saharan, and Western countries. As the results in Table 5 show, for each constrained country sample the impact of antiquity follows the same pattern as in the baseline case: the outstanding credit is positive for growth in the lower regime, while negative in the upper regime.[36]

The threshold parameter naturally varies with the country sample, but mostly in the expected way. First, when the sample consists of developed countries (model S11A) or is dominated by them because of the exclusion of a large set of developing countries (model S16A), the threshold parameter is higher than the baseline level of 0.226. However, when the sample is dominated by developing countries because of the exclusion of a large set of developed countries (models S12A and S17A), the threshold parameter decreases below the baseline level. This is in line with the supposition that the impairing effect of antiquity is more forceful when countries are institutionally underdeveloped and, therefore, more vulnerable to rent-seeking and elite capture.

In the third type of sensitivity checks, we investigate whether the impaired finance-growth nexus holds when a threshold effect is allowed for other explanatory variables too. In order to avoid an adverse increase in the number of regression parameters, beyond financial development, a threshold effect is introduced for the other control variables one-by-one:

$$gry_{i,t} = \alpha_1 I(AQ_i \le \gamma) lnFD_{i,t} + \alpha_2 I(AQ_i > \gamma) lnFD_{i,t} + \eta_1 I(AQ_i \le \gamma) X_{i,t} + \eta_2 I(AQ_i > \gamma) X_{i,t} + \phi^T \left(Controls^*_{i,t} \right) + \mu_i + p_t + \varepsilon_{i,t} \quad (3)$$

where $Controls - Controls^* = \{X : X \in Controls \ X \notin Controls^*\}$. Eq. (3) differs from eq. (1) in also allowing for a threshold effect in control variable *X*. The rationale is that the baseline results on the threshold effect in the finance-growth nexus might be driven by the omitted possible threshold effects in terms of the other control variables. The results are presented in Table 6.

In the case of lagged GDP per capita, lagged human capital, and banking crises, there does not seem to be any essential threshold effect (models S18A, S20A, and S25A). In the case of the other control variables, antiquity seems to matter in a contradictory way. In societies with ancient roots, inflation is more costly and government consumption retards growth – instead of enhancing it (models S21A & S22A). On the other hand, antiquity is conducive for the growth effect of investments (model S19A). These additional threshold effects suggest that beyond the finance-growth nexus, antiquity potentially impacts the contemporary functioning of capitalism through other channels as well. The underlying mechanisms are a subject for future research. Nevertheless, at the moment, the most important result is that the revealed threshold effect in the finance-growth nexus is not sensitive to the inclusion of other channels. In each extension, private credit continues to be positive in the lower regime, although not always in a significant way, and significantly negative at the 10% level in the upper regime.

The fourth type of sensitivity checks considers the robustness to the control variables. We add the total volume of trade, the natural resource rents, the foreign direct investments, and the balance of trade to the baseline model one-by-one. The results are unchanged in each case and are presented in Table OB1 in Online Appendix B (models S26A-S29A). Moreover, all added variables are shown to be insignificant. We also add the interaction of private credit with *Polity2* and the (logged) squared private credit to eq. (1) in order to control for the nonlinearity possibly introduced by institutional quality and the financial sector size (models S30A-S31A). The effect of antiquity on the finance-growth nexus remains unchanged in these cases too. Furthermore, we drop the two control variables which cannot be instrumented: *Violence* and *BankingCrisis* (model S32A). The results on the finance-growth nexus are unchanged suggesting that the potential endogeneity of these right-hand side variables should not be a concern.

Finally, we add the Corruption, the Law and Order, and the Bureaucracy Quality indexes of the International Country Risk Guide (ICRG) to the model one-by-one (models S33A-S35A).[37] Although, we have already controlled for formal institutions with the *Polity2* index, these variables provide more precise as well as more conventional measures of governmental institutional quality. As can be observed in Table OB1, antiquity continues to impair the finance-growth nexus in these cases as well. This result corroborates our hypothesis that (extractive) informal institutions persisting under antiquity rather than formal institutions drive the differential growth effect of financial development in young and old societies.

The fifth type of sensitivity analysis considers the way non-linearity in the finance-growth nexus is implied by antiquity. Our baseline estimation method (i.e. panel threshold regression) assumes the existence of a threshold level of state history above which the growth effect of outstanding credit is significantly impaired. To put it differently, we postulate a discontinuous shift between young and old societies in terms of the finance-growth nexus. While this threshold-based approach is aligned with the theoretical model, we test whether antiquity remains a negative conditioning factor of the finance-growth nexus when state history is assumed to shape the growth effect of outstanding credit in a continuous way. To do so, we estimate the following regression by 2-step GMM[38]:

$$gry_{i,t} = \alpha_1 lnFD_{i,t} + \alpha_2 \left(lnFD_{i,t} \times AQ_i \right) + \phi^T \left(Controls_{i,t} \right) + \mu_i + p_t + \varepsilon_{i,t} \quad (4)$$

In the context of Eq. (4), our hypothesis predicts the following coefficient signs: $\alpha_1 > 0, \alpha_2 < 0$. The results presented in Table 7 are in line with these propositions. Moreover, the turning point in the finance-growth nexus, that is the level of state history above which the growth effect of outstanding credit becomes negative, falls very close to the respective estimated threshold levels in Tables 1A and 1B. The latter corroborates the reliability of our threshold estimations.

[36] Due to the reduced samples, the estimations are less precise and the effect of private credit is not always significant. However, in each case, private credit is significant at least in one regime.

[37] In these estimations, both the country-sample and the underlying time period are reduced substantially as the ICRG data are only available from 1984 and for 84 (85) countries.

[38] The method of removing unobserved fixed-effects and the instruments used in the estimation are the same as in the baseline case.

Table 6
Sensitivity to the threshold effect: FD = private credit (dep. var.: *gry*).

model	(S18A)	(S19A)	(S20A)	(S21A)	(S22A)	(S23A)	(S24A)	(S25A)
X with.threshold effect	L1.ln(y)	ln(GFCF)	L1.ln(HC)	ln(INFL)	ln(GovCons)	Polity2	Violence	BankingCrisis
ln(PCB_lower)	1.073*	0.679	1.313**	1.352**	0.935	0.726	1.753**	1.669**
	(0.625)	(0.559)	(0.619)	(0.608)	(0.598)	(0.541)	(0.804)	(0.775)
ln(PCB_upper)	−1.279**	−1.392**	−0.987*	−2.338***	−1.062**	−2.011***	−1.215***	−1.116**
	(0.544)	(0.587)	(0.505)	(0.615)	(0.462)	(0.578)	(0.464)	(0.466)
ln(X_lower)	−1.022	0.098	2.143	0.147	4.260***	0.113**	−0.165***	−0.527***
	(1.182)	(0.874)	(2.398)	(0.668)	(1.354)	(0.052)	(0.035)	(0.127)
ln(X_upper)	−2.304**	8.859***	1.766	−3.427***	−2.521**	−0.070	0.004	−0.492***
	(0.925)	(1.714)	(2.176)	(1.057)	(1.268)	(0.170)	(0.020)	(0.100)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
estimated γ	0.226	0.226	0.1347	0.226	0.226	0.3786	0.1081	0.1347
est. γ: quantile %	55.9	55.9	48.5	55.9	55.9	76.1	43.3	48.5
Hansen J-test (pv)	0.152	0.282	0.167	0.352	0.131	0.148	0.438	0.385

Notes: Controls: L1.ln(y), ln(GFCF), L1.ln(HC), ln(INFL), ln(GovCons), Polity2, Violence, BankingCrisis, period dummies; excluding the variable *X* in terms of which the additional threshold effect is considered. Standard errors clustered by countries are in brackets. Asterisks denote the significance level (*10%, **5%, ***1%). In each model, $n = 503$, no. of countries = 92, no. of IVs = 36 (35 for models S24A & S25A), trim rate = 0.3. For further notes, see Table 1A.

Table 7
Results with continuous non-linearity in the finance-growth nexus.

model	(S36A)	(S37A)	(S38A)	(S36B)	(S37B)	(S38B)
FD	PCB			DC		
AQ	SH1950	SH1950adj	SH1500	SH1950	SH1950adj	SH1500
ln(FD)	2.225***	2.346***	1.539**	2.266***	2.887***	1.702**
	(0.818)	(0.859)	(0.696)	(0.745)	(0.881)	(0.665)
ln(FD)*AQ	−9.528***	−10.364***	−9.108***	−9.039***	−10.911***	−8.903***
	(2.013)	(2.458)	(1.896)	(1.760)	(2.402)	(1.703)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
turning point in AQ	0.234	0.226	0.169	0.251	0.265	0.191
n	503	503	503	510	510	510
no. of countries	92	92	92	94	94	94
Hansen J-test (pv)	0.257	0.163	0.264	0.101	0.068	0.115

Notes: Estimation of Eq.(4) on FOD-transformed data by 2-step GMM. Standard errors clustered by countries are in brackets. Asterisks denote the significance level (*10%, **5%, ***1%). Controls: L1.ln(y), ln(GFCF), L1.ln(HC), ln(INFL), ln(GovCons), Polity2, Violence, BankingCrisis, period dummies. Each antiquity measure is calculated with a 1% depreciation rate. IVs: legal origin dummies, religion shares, ethnolinguistic fractionalization at three aggregation levels, first- and second-order lags of untransformed endogenous variables, actual level and first-order lag of untransformed pre-determined variables. *Violence* and *BankingCrisis* are not instrumented. The *turning point in AQ* indicates the level of AQ at which $\alpha_1 + \alpha_2 AQ = 0$.

As the final step of the sensitivity analyses, we investigate whether our findings also hold when financial development is measured in terms of stock markets. As opposed to the banking sector, it is less straightforward how powerful elites would be able to extract resources via stock markets. Nonetheless, re-estimating eq. (1) when focusing on this other important segment of financial markets could offer further insights in the impaired nature of the finance-growth relationship under antiquity. In the followings, financial development is measured by stock market capitalization (SMC), log-transformed. The estimations are run with state histories accumulated to the present (SH1950) and in pre-Columbian times (SH1500) as alternative threshold variables. The results reported in Table 8 resonate with those in Tables 1A and 1B; while the effect of stock market development on economic growth proves to be positive in both regimes, it is much larger in young societies than in old ones.[39] To put it differently, stock markets are less efficient in promoting growth in countries with a protracted history of established statehood. The exploration of the underlying mechanism remains for future research.

[39] Due to the large number of missing observations on stock market capitalization, in Table 8 we relax the constraint on the minimum number of time periods with complete observations, i.e. each country with at least one complete observation is included in the sample. This leaves us with a relatively low number of countries. To counterbalance this, the trim rate is set at 0.5. For the country-sample, see online appendix A.

Table 8
Results on stock market capitalization: FD = SMC (dep. var.: *gry*).

model	(1C)	(2C)	(3C)	(4C)	(6C)
treshold variable	SH1950	SH1950	SH1950	SH1950	SH1500
depreciation rate	1%	0%	2%	5%	1%
ln(SMC_lower)	5.213***	5.048***	4.871***	4.624***	4.218***
	(1.217)	(1.184)	(1.171)	(1.066)	(1.186)
ln(SMC_upper)	1.857***	1.733***	1.907***	0.158	1.984***
	(0.645)	(0.654)	(0.632)	(0.877)	(0.629)
Controls	Yes	Yes	Yes	Yes	Yes
estimated γ	0.1497	0.104	0.2187	0.6324	0.1174
est. γ: quantile %	33.7	34.3	34.8	62.4309	38.1215
n	181	181	181	181	181
no. of countries	75	75	75	75	75
Hansen J-test (pv)	0.376	0.384	0.320	0.634	0.182

Notes: Controls: L1.ln(y), ln(GFCF), L1.ln(HC), ln(INFL), ln(GovCons), Polity2, Violence, BankingCrisis, period dummies. Standard errors clustered by countries are in brackets. Asterisks denote the significance level (*10%, **5%, ***1%). Trim rate = 0.5. No. of IVs = 32. For further notes, see Table 1A.

9. Conclusions

This paper investigated the long-run persistent effect of antiquity on the working of capitalism. It did so by exploring the conditioning effect of antiquity, i.e. the length of established statehood and centralized institutions, on the *finance-growth* nexus. The effect of financial development on economic growth has long been in the focus since the efficient operation of financial markets is decisive in terms of the performance of capitalism. An efficient financial sector allocates the savings of the society to the most promising investment projects. In this paper, we argue that the latter deteriorates in countries with ancient roots, leading to an impaired finance-growth nexus at the macroeconomic level. In older societies, interest groups might be more entrenched and political and economic elites might be more powerful due to the persistence of hierarchical social structures enhanced by antiquity. This leads to extractive informal institutions and the continuous endeavor of the elite for access to easy credit. As a result, corruption in lending tends to be more widespread, thus maintaining a modern form of soft budget constraint.

To corroborate our theory, we followed a three-step strategy. First, we modelled the conditionality of the firm-bank relationship on antiquity and introduced the mechanism through which a soft budget constraint might largely characterize older societies. Thereafter, we examined empirically whether the growth impact of the amount of outstanding credit does indeed differ in older and younger societies, and if so, in what way. To do this, we resorted to the method of dynamic panel threshold regressions. We applied different variants of the state history index of the last six millennia, constructed by Borcan et al. (2018), and the agricultural years since the Neolithic Revolution, constructed by Putterman and Trainor (2018), as the threshold variable in the estimations. The sample embraced 94 countries and 40 years (1975–2014). The results corroborate our hypothesis robustly: the finance-growth nexus is considerably impaired in older societies. We found that while the traditionally assumed positive growth effect of financial development holds in younger societies, this effect becomes outright negative in societies with a long history of established statehood.

Finally, in the third step, we explored the microeconomic mechanism underlying the macro-econometric results based on the firm-level data of the World Business Environment Survey (World Bank, 2000). We provided robust evidence that corruption in lending is more pervasive in countries with a longer history of established statehood. Massive corruption in lending results in the inefficient allocation of society's savings and may well explain the negative effect of outstanding credit on economic growth under state antiquity. All in all, our theoretical model and empirical results deliver convincing evidence on the negative effect of antiquity on the finance-growth nexus and thereby on capitalism too.

Our paper contributes to the literature in several respects. First, we provide a profound establishment of the *legacy perspective* in the nonlinear finance-growth literature. Second, we unveil the deep historical roots of corruption in lending. Third, we contribute to the opening of the black-box of the DRD literature by elaborating a channel through which history might exert its persistent effect on current socio-economic outcomes. To date, most of the studies in the DRD literature have focused on the determining effect of historical shocks on contemporary level of development. Much less effort has been devoted to understanding the mechanisms underlying this. A popular explanation is the persistence of culture and social norms. This approach appears in the background of our argumentation as well. However, our study has been more operative by unveiling a concrete economic mechanism related to the malfunctioning of capitalism under the condition of antiquity, the finance-growth nexus. As our results demonstrated, there are other promising alternative channels as well that might help to open up the black-box of the deep roots of economic development further. The exploration of these is a subject for future research.

CRediT authorship contribution statement

Ákos Dombi: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization, Software, Data curation. **Theocharis N. Grigoriadis:** Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing – original draft, Writing – review & editing, Visualization, Software, Data curation. **Junbing**

Zhu: Methodology, Formal analysis, Investigation, Writing – original draft.

Declaration of competing interest

None.

Data availability

Replication files of the paper "Antiquity, Capitalism & Development:The Finance-Growth Perspective" (Reference data) (Mendeley Data)

Appendix A. Appendix

Table A1
The list of countries (*SH1950* in parentheses).

Baseline set of countries (94)			Additional countries included in Model 10B (44)
Algeria (0.3678)	Gambia (0.0823)	*Pakistan (0.5915)**	Albania (0.341)*
Argentina (0.0734)*	Ghana (0.1353)*	Panama (0.078)*	Angola (0.1013)
Australia (0.0408)	*Greece (0.4608)*	Paraguay (0.0784)	Armenia (0.4414)*
Austria (0.3884)	*Guatemala (0.3238)**	*Peru (0.3444)**	Azerbaijan (0.278)*
Bangladesh (0.2018)	Honduras (0.1347)*	Philippines (0.0731)*	Belarus (0.1636)*
Belgium (0.3488)	*Hungary (0.259)**	Poland (0.226)*	Benin (0.0571)
*Bolivia (0.3291)**	*India (0.4752)**	*Portugal (0.3719)**	Bosnia and Herz. (0.3071)
Botswana (0.1201)*	*Indonesia (0.2427)**	Rwanda (0.1081)	Cambodia (0.4105)*
Brazil (0.0799)*	*Iran, Islamic Rep. (0.655)*	Senegal (0.1722)*	Cape Verde (0.0715)
*Bulgaria (0.397)**	*Ireland (0.2509)*	Sierra Leone (0.0133)	Chad (0.0921)
Burkina Faso (0.1036)	*Israel (0.4812)*	Singapore (0.1182)*	Comoros (0.0096)
Burundi (0.0619)	*Italy (0.4455)**	South Africa (0.0386)*	Croatia (0.2791)*
Cameroon (0.1479)*	Jamaica (0.0647)	*Spain (0.3908)**	Czech Republic (0.2473)*
Canada (0.0555)*	*Japan (0.4065)*	*Sri Lanka (0.4717)*	Djibouti (0.3834)
Central African Rep. (0.0075)	*Jordan (0.4317)*	*Sudan (former) (0.5421)*	Equatorial Guinea (0.0377)
Chile (0.0877)*	Kenya (0.0075)*	Swaziland (0.0392)	Estonia (0.097)*
*China (0.5757)**	*Korea, Rep. (South) (0.5053)*	Sweden (0.2037)*	Ethiopia (0.515)*
Colombia (0.0823)*	Madagascar (0.0933)*	*Switzerland (0.3731)*	Georgia (0.3499)*
Congo, Dem. Rep. (0.1025)	Malawi (0.1057)*	*Syrian Arab Rep. (0.5027)*	Germany (0.3521)*
Congo, Rep. (0.0821)	*Malaysia (0.2574)**	Tanzania (0.0269)*	Guinea (0.085)
Costa Rica (0.0769)*	Mali (0.1844)	*Thailand (0.29)**	Haiti (0.0856)*
Cote d'Ivoire (0.0929)*	Mauritius (0.0336)	Togo (0.0239)	Kazakhstan (0.1351)*
Cyprus (0.4366)	*Mexico (0.3042)**	Trinidad & Tobago (0.0508)*	Kyrgyzstan (0.1016)*
Denmark (0.2982)	*Morocco (0.4324)*	*Tunisia (0.4553)**	Laos (0.27)
Dominican Rep. (0.0805)*	Mozambique (0.0719)	*Turkey (0.6131)**	Latvia (0.1072)
Ecuador (0.1041)*	*Nepal (0.3786)*	Uganda (0.083)*	Lebanon (0.4921)
*Egypt (0.7387)**	*Netherlands (0.3434)*	*United Kingdom (0.3475)**	Lesotho (0.0253)
El Salvador (0.0795)*	New Zealand (0.0188)	United States (0.0608)*	Liberia (0.0317)
Fiji (0.0113)	Nicaragua (0.0707)*	Uruguay (0.0548)*	Lithuania (0.158)*
Finland (0.1118)	Niger (0.1354)	Venezuela (0.0807)*	North Macedonia (0.3138)
*France (0.4115)**	Nigeria (0.2159)*		Mauritania (0.1599)
Gabon (0.0149)	*Norway (0.228)*		Moldova (0.1424)*
			Mongolia (0.2082)
			Myanmar (0.4104)
			Namibia (0.0098)
			Romania (0.2456)*
			Russia (0.1497)*
			Slovakia (0.1543)*
			Slovenia (0.2474)*
			Ukraine (0.1491)*
			Vietnam (0.4659)
			Yemen (0.5435)
			Zambia (0.0296)*
			Zimbabwe (0.0223)*

Notes: In the case of private credit, the baseline country sample does not include Bangladesh and the Democratic Republic of the Congo. 'Sudan (former)' refers to Sudan before it has been split into two parts in 2011. After the countries, the baseline state history index (i.e. *SH1950* calculated with a 1% depreciation rate) is presented in parenthesis. In the baseline sample, the countries falling into the upper antiquity regime according to models 1A and 1B are denoted in italics. In case of model 10A, the additional countries included in the extended sample are the same as in model 10B with the following exceptions: Liberia is not included, whereas Bangladesh is included. The countries involved in the sample (extended sample) of the baseline model on corruption in lending, model 11 (model 11*), are denoted by asterisk.

Table A2
Data description and sources.

Variable	Notation	Unit	Data source	Notes
GDP per capita	y	USD (PPP, 2011 prices)	PWT9.0	Own calculation based on population data and real GDP at PPP using national accounts growth rates (code: rgdpna)
Growth rate of GDP per capita	gry	%		Own calculation based on *y* (annual average of the particular 5-year period)
Private credit	PCB	% of GDP	GFDD	Outstanding private credit by deposit money banks (code: GFDD.DI.01)
Domestic credit	DC	% of GDP	GFDD	Outstanding domestic credit to the private sector (code: GFDD.DI.14)
Gross fixed capital formation	GFCF	% of GDP	WDI	(code: NE.GDI.FTOT.ZS)
Human capital index	HC	index	PWT9.0	Index of human capital per person, based on years of schooling and returns to education. The level of human capital increases with the index.
Inflation (price index)	INFL		WDI	100 + annual change of consumer prices (code: FP.CPI.TOTL.ZG)
Gov. consumption expenditures	GovCons	% of GDP	WDI	General government final consumption expenditures (code: NE.CON.GOVT.ZS)
Banking crisis	BankingCrisis	[0; 5]	Laeven and Valencia (2020)	The sum of years in systemic banking crisis in the underlying 5-year period.
The level of democracy/ autocracy	Polity2	[−10; 10]	Polity IV database Center for Systemic Peace	Combined measure of democracy and autocracy. The level of democracy (autocracy) increases (decreases) with the index. (downloaded in August 2017)
Social violence	Violence	[0; 300]	Major Episodes of Political Violence (1946–2018) Center for Systemic Peace	Total measure of international, civil and ethnic warfare and violence (code: actotal). The magnitude of violence increases with the index. In the 5-year panel, the sum of the underlying years is used, scaling up the original index range [0; 60] accordingly. (downloaded in August 2017)
State history index	SH#	[0; 1]	Borcan et al. (2018)	The length of established statehood on the present territory of a country increases with the index. # = 1950 / 1950adj / 1500 / 1500adj *1950*: period included: 3500 BCE-1950 CE *1500*: period included: 3500 BCE-1500 CE *adj*: adjustment for ancestry based on the World Migration Matrix (1500–2000, version 1.1) of Putterman and Weil (2010).
Agricultural years	AgrY#		Putterman and Trainor (2018)	The number of years since the Neolithic Revolution. # = N/A or 'adj' *adj:* adjustment for ancestry based on the World Migration Matrix (1500–2000, version 1.1) of Putterman and Weil (2010).
Legal origin dummies	–	dummy	La Porta et al. (2008)	German, French, English, and Scandinavian legal origins are distinguished
Religion shares	–	%	La Porta et al. (1999)	Shares of Catholic, Protestant, Muslim and 'other' religions in the population in 1980 (for countries of recent formation: 1990–1995). Dem. Rep. of Congo and the share of protestants in Lithuania are taken from CIA Factbook 2021.
Ethnolinguistic fractionalization	ELF1, ELF5, ELF10	[0; 1]	Desmet et al. (2012)	Ethnolinguistic fractionalizations at the 1st, 5th and 10th levels of linguistic aggregation.

(*continued on next page*)

Table A2 (*continued*)

Variable	Notation	Unit	Data source	Notes
Corruption of bank officials	Lending Corruption	[1; 4]	WBES	Answer on the question "How problematic is the corruption of bank officials for the operation and growth of your business?": 1 - no obstacle, 2 - minor obstacle, 3 - moderate obstacle, 4 - major obstacle. (code: corr)
Concentration in banking	Concentr	%	GFDD	Assets of the three largest commercial banks as a share of total commercial banking assets (code: GFDD.OI.01). Average of the years available between 1996 and 1999.
Public credit registry dummy	PublicReg	[0; 1]	Djankov et al. (2007)	1 if a public credit registry operated in January 1999, 0 otherwise (code: pcr99)
Private credit bureau dummy	CreditBur	[0; 1]	Djankov et al. (2007)	1 if a private credit bureau operated in January 1999, 0 otherwise (code: pb99)
Supervisory power in banking	Supervision	[0; 14]	Barth et al. (2013)	Survey 1 (1999) data. Measures whether the supervisory authorities have the authority to take specific actions to prevent and correct problems in the banking sector. Supervisory power increases with the index (code: V.I Sup_Power)
Private monitoring of banks	Monitoring	[0; 12]	Barth et al. (2013)	Survey 1 (1999) data. Measures whether there are incentives/ability for the private monitoring of banks. Private monitoring increases with the index. (code: VII.VI PrivateMonitoring)
Creditor rights	CRights	[0; 4]	Djankov et al. (2007)	Year 1999 data. Creditor rights increase with the index (code: cr1999).
Share of foreign-owned banks	FOB	%	Barth et al. (2013)	Survey 1 (1999) data. Percentage of banking system's assets in banks that are 50% or more foreign owned. (code: IX.III ForeignBanks)
Share of state-owned banks	SOB	%	Barth et al. (2013)	Survey 1 (1999) data. Percentage of banking system's assets in banks that are 50% or more government owned. (code: IX.IV GovernmentBanks)
Individualism	IDV	[0;100]	Hofstede et al. (2010)	Individualism increases with the index (https://geerthofstede.com/; version: 2015 12 08)
Power distance	PDI	[0;100]	Hofstede et al. (2010)	Power distance increases with the index (https://geerthofstede.com/; version: 2015 12 08)
Masculinity	MAS	[0;100]	Hofstede et al. (2010)	Masculinity increases with the index (https://geerthofstede.com/; version: 2015 12 08)
Uncertainty avoidance	UAI	[0;100]	Hofstede et al. (2010)	Uncertainty avoidance increases with the index (https://geerthofstede.com/; version: 2015 12 08)
Market share of state-owned press	StatePress	%	Djankov et al. (2003)	The share of state-owned newspapers in the market share of the top five daily newspapers.
Financing as a general constraint	Financing	[1; 4]	WBES	Answer on the question "How problematic is financing for the operation and growth of your business?": 1- no obstacle, 2- minor obstacle, 3- moderate obstacle, 4- major obstacle (code: gcf)
Corruption as a general constraint	Corruption	[1; 4]	WBES	Answer on the question "How problematic is corruption for the operation and growth of your business?": 1- no obstacle, 2- minor obstacle, 3- moderate obstacle, 4- major obstacle (code: gcorr)
Control of corruption	CC	[−2.5;2.5]	WGI	Year 1998 data. Corruption decreases with the indicator.
Stock market capitalization	SMC	% of GDP	GFDD	Total value of listed shares in the stock market as a percentage of GDP (code: GFDD.DM.01)

Notes: PWT 9.0 – Penn World Table (version 9.0) (Feenstra et al., 2015); WDI – World Development Indicators (World Bank; downloaded in December 2017); GFDD – Global Financial Development Database (World Bank; downloaded in August 2017); WBES – World Business Environment Survey (World Bank, 2000); WGI – Worldwide Governance Indicators (Kaufmann and Kraay, 2020).

Table A3
Correlation matrix of the baseline panel data: 94 countries (see Table A1.) & 1975–2014 (5-year periods).

	gry	lnPCB	lnDC	SH1950 (δ = 1%)	SH1950 (δ = 0%)	SH1950 (δ = 2%)	SH1950 (δ = 5%)	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj	L1.ln(y)	ln (GFCF)	L1.ln (HC)	ln(INFL)	ln (GovCons)	Polity2	Violence
lnPCB	0.168*																		
lnDC	0.182*	0.976*																	
SH1950 (δ = 1%)	0.180*	0.287*	0.259*																
SH1950 (δ = 0%)	0.165*	0.247*	0.222*	0.989*															
SH1950 (δ = 2%)	0.189*	0.315*	0.284*	0.993*	0.964*														
SH1950 (δ = 5%)	0.198*	0.353*	0.317*	0.934*	0.874*	0.970*													
SH1950adj	0.229*	0.419*	0.410*	0.874*	0.878*	0.856*	0.783*												
SH1500	0.174*	0.265*	0.242*	0.990*	0.992*	0.970*	0.883*	0.873*											
SH1500adj	0.220*	0.396*	0.396*	0.822*	0.842*	0.789*	0.685*	0.983*	0.846*										
AgrY	0.102*	0.289*	0.262*	0.812*	0.817*	0.795*	0.730*	0.714*	0.808*	0.677*									
AgrYadj	0.162*	0.441*	0.436*	0.608*	0.628*	0.580*	0.503*	0.804*	0.617*	0.812*	0.798*								
L1.ln(y)	0.065	0.721*	0.733*	0.223*	0.197*	0.242*	0.265*	0.394*	0.213*	0.389*	0.257*	0.469*							
ln(GFCF)	0.425*	0.467*	0.476*	0.273*	0.252*	0.285*	0.292*	0.330*	0.265*	0.318*	0.218*	0.298*	0.421*						
L1.ln(HC)	0.170*	0.648*	0.672*	0.124*	0.093	0.148*	0.185*	0.275*	0.114*	0.272*	0.186*	0.395*	0.850*	0.333*					
ln(INFL)	−0.274*	−0.277*	−0.209*	−0.045	−0.039	−0.049	−0.050	−0.014	−0.048	−0.014	−0.028	0.002	−0.100*	−0.196*	−0.106*				
ln(GovCons)	−0.037	0.366*	0.359*	0.062	0.061	0.062	0.060	0.020	0.068	0.022	0.128*	0.080	0.382*	0.231*	0.320*	−0.115*			
Polity2	0.141*	0.458*	0.466*	−0.004	−0.041	0.026	0.082	0.112*	−0.027	0.096*	0.021	0.219*	0.546*	0.146*	0.653*	−0.059	0.212*		
Violence	−0.082	−0.214*	−0.198*	0.199*	0.213*	0.182*	0.136*	0.131*	0.204*	0.125*	0.171*	0.076	−0.232*	−0.126*	−0.209*	0.114*	−0.226*	−0.139*	
BankingCrisis	−0.273*	0.035	0.035	−0.038	−0.048	−0.028	−0.003	−0.045	−0.050	−0.058	0.016	−0.010	0.046	−0.153*	0.029	0.226*	0.043	0.007	0.044

Notes: Pairwise correlations. The asterisk denotes significance at the 1% level. At the *SH1950* indexes, δ is the depreciation rate.

Table A4
Summary statistics of the baseline panel data: 94 countries (see Table A1.) & 1975–2014 (5-year periods).

	gry	lnPCB	lnDC	SH1950 (δ = 1%)	SH1950 (δ = 0%)	SH1950 (δ = 2%)	SH1950 (δ = 5%)	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj	L1.ln (y)	ln (GFCF)	L1.ln (HC)	ln (INFL)	ln (GovC)	Polity2	Violence	BankingCrisis
Obs	749	728	730	94	94	94	94	94	94	94	94	94	750	722	750	727	730	750	750	750
Mean	1.610	3.300	3.403	0.2252	0.1729	0.2777	0.4029	0.2749	0.1664	0.2234	4424	5190	8.793	3.025	0.679	4.758	2.651	3.109	3.956	0.431
Std.Dev.	2.809	0.944	0.952	0.1819	0.1607	0.2011	0.2328	0.1557	0.1907	0.1656	2372	2052	1.194	0.323	0.346	0.364	0.358	6.821	8.604	1.014
Min	−14.005	−0.709	−0.468	0.0075	0.0046	0.0111	0.0239	0.0222	0.0000	0.0000	362	1400	5.841	1.376	0.010	4.575	1.406	−10	0	0
Max	10.030	5.505	5.509	0.7387	0.7461	0.7289	0.8603	0.7272	0.7598	0.7466	10,500	10,375	11.307	3.865	1.305	8.783	3.704	10	65	5

Notes: GovC is *GovCons.* At the *SH1950* indexes, δ is the depreciation rate. The reason for the discrepancy between the number of observations in this table and the sample size of the baseline models are the followings: 1. in the estimations, the last observation is lost for each country due to FOD-transformation, 2. missing observations on the internal instruments, 3. missing observations on the regressors.

Appendix. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ememar.2024.101113.

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