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Dombi, Akos; Grigoriadis, Theocharis; Zhu, Junbing

Working Paper

Antiquity and capitalism: The finance-growth perspective

Discussion Paper, No. 2020/9

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Suggested Citation: Dombi, Akos; Grigoriadis, Theocharis; Zhu, Junbing (2020) : Antiquity and capitalism: The finance-growth perspective, Discussion Paper, No. 2020/9, Freie Universität Berlin, School of Business & Economics, Berlin, https://doi.org/10.17169/refubium-27248

This Version is available at:
https://hdl.handle.net/10419/217235

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Antiquity and capitalism: The finance-growth perspective

Akos Dombi
Theocharis Grigoriadis
Junbing Zhu

School of Business & Economics
Discussion Paper

Economics

2020/9

Antiquity and capitalism: The finance-growth perspective

Akos Dombi (corresponding author)

Eötvös Loránd University (Budapest, Hungary)

Institute of Business Economics, Department of Comparative Economics

(dombi@gti.elte.hu)

Theocharis Grigoriadis

Freie Universität Berlin (Berlin, Germany)

School of Business & Economics, Institute for East European Studies

theocharis.grigoriadis@fu-berlin.de

Junbing Zhu

Freie Universität Berlin

Institute for East European Studies

junbing.zhu2@fu-berlin.de

Working Paper version (concluded in April 2020)

Abstract

This paper explores the impact of antiquity on capitalism through the finance-growth nexus. We define antiquity as the length of established statehood (i.e., state history) and agricultural years. We argue that extractive institutions and deeply entrenched interest groups may prevail in societies with ancient roots. The paper offers an in-depth analysis of one particular channel through which extractive institutions may impair economic growth: the finance-growth channel. 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 the entrenchment of the economic elites and the length of established statehood. To validate our argument empirically, we run panel-threshold regressions on a global sample between 1970 and 2014. The regression results are supportive and show that financial development – measured by the outstanding amount of credit – is negative for growth in states with ancient institutional origins, while it is positive in relatively younger ones.

Keywords: antiquity, finance-growth nexus, interest groups, rent-seeking

JEL: C70, N20, O16, O17, O47

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 economic development* (henceforth DRD) literature, we conjecture that historical legacies are important in understanding the contemporary differences in socio-economic outcomes (Spolaore and Wacziarg, 2013). 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 intimately connected: the former enables a deeper understanding of the latter.

The paper takes into account the result of Borcan et al. (2018) according to which a much too long history of statehood might be detrimental to economic development because of the probable emergence of extractive institutions and deeper entrenchment of interest groups in the society. Our main contribution to the literature is that we elaborate a particular channel proposed in the seminal paper of Dombi and Grigoriadis (2020), the finance-growth nexus, through which extractive institutions may manifest themselves in societies with ancient roots. We present convincing 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 the economic and political elites. The impaired functioning of the financial sector is a devastating example of the heavy legacy of antiquity on capitalism. The paper is motivated by the *finance-growth* literature, the *corruption in lending* literature and two sub-strands of the DRD literature: the *state history* and the *historical development* literature.

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, from the early 2000s a growing number of papers have challenged the linearity proposed in previous studies (Rosseau and Wachtel, 2002; Deidda and Fattouh, 2002). This second generation of the finance-growth literature has switched the focus to the nonlinear effect of financial development on growth. A group of papers suggests that the effect of financial development on growth may depend on the level of economic development in a positive way (e.g., Rioja and Valev, 2004). Their argument is that higher development is paired with better institutions and the Schumpeterian role of banks in selecting promising investments might be more important in the intensive phase of economic development than in the extensive one. A second source of nonlinearity relates to the size of the financial sector by

assuming that too much finance is bad for growth. Indeed, the inverted U-shaped relationship of financial development with growth is well established (e.g., Law and Singh, 2014; Arcand et al., 2015). The third strand of 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; Law et.al, 2018). Finally, Dombi and Grigoriadis (2020) initiate a new channel of nonlinear finance by demonstrating that longer state history over the last two millennia is paired with a less beneficial growth effect of financial development in post-socialist transition economies.

The literature on *corruption in lending* investigates the mechanisms and conditions of the capture of the financial sector and surveillance authorities by interest groups. Its main insight is that if this capture occurs the allocation of savings becomes suboptimal, resulting in slower growth. 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. They conjecture the state/regulatory capture of the banking sector in the latter case. In contrast to Beck et al. (ibid.), Barth et al. (2009) focus on 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. Barry et al. (2016) considers how banks' ownership structure influences corruption in lending. According to their empirical results, family and state ownership tends to increase lending corruption in both developed and developing countries. The authors explain this outcome with the importance of relatedness in bank lending. Morck et al. (2011) also corroborate the tendency toward the elite-capture of a country's financial system when banks are controlled by tycoons. According to their results, in the case of the latter , not only is capital allocation less efficient, but financial instability is also more prevalent.

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. Based on this index, they conclude that state history is positively associated with economic development. Bockstette et al. (ibid.) argue that countries with a longer state history tend to have better institutions and state capacity. Furthermore, Ang (2013) demonstrates that early starter countries are also financially more developed, at least according to the experience of the last two millennia. 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. They continue to recognize the positive effect of established statehood proposed by Bockstette et al. (2002), but 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 some 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 settlements and preserve their own regime, resulting in more autocratic establishments today. Hariri also demonstrates that older societies pursue more collectivist values. 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.

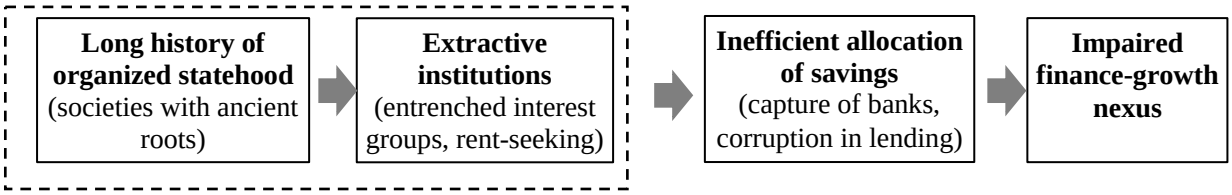
The literature on *historical development* aims to reveal the persistent effect of historical events on present socio-economic outcomes and the underlying transmission channels, mainly focusing on culture and formal institutions (Nunn, 2014).[1] Nunn (2008) finds that the number of slaves exported from a country in Africa negatively affects its current level of economic development. He argues that slave trade reduced interpersonal trust, thereby impeding both the establishment of strong states and the emergence of ethnically homogenous large communities. Lowes et al. (2017) examine the impact of historical institutions on contemporary cultural norms. They take the example of the Kuba Kingdom, established in Central Africa in the 17th century with one of the most developed centralized statehoods of that time in the region. They conclude that those individuals whose ancestors lived in the Kuba Kingdom are more likely to be associated with weaker forms of rule following and are more prone to cheating for material gain than those whose ancestors lived outside 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. Guiso et al. (2016) also emphasize the importance of cultural persistence in establishing a link between historical shocks and contemporary socio-economic outcomes. They find that Italian cities which achieved self-governance in the Middle Ages have a higher level of civic capital today.

[1] This literature has been exploding recently, with a massively growing number of papers. For a thorough review see Nunn (2014).

Gusio et al. (ibid.) argue that this might be the result of the conducive attitudes (such as self-efficacy beliefs) that emerged in independent Medieval cities being transmitted across generations. Becker et al. (2016) take the Habsburg rule as a positive historical shock in terms of public sector quality. They find that corruption in courts and police is significantly lower, while public trust in these institutions is significantly higher, in those regions of the successor state that were previously under Habsburg rule than in those that were not. The authors argue that this can be attributed to the long-run cultural effect of highly developed centralized institutions in the former Habsburg Empire. The long-run cultural legacy of empires is also corroborated in the case of Poland by Grosfeld and Zhuravskaya (2015).

The main hypothesis of the paper builds on the following conclusions of the literature considered: 1. antiquity (i.e. the remote past) still shapes our present, 2. an extensive history of statehood tends to result in deeply entrenched interest groups, 3. powerful economic and political elites are prone to capture the financial sector, and 4. the effect of financial development on economic growth is conditional. The intuitive theoretical framework building on the seminal results of Dombi and Grigoriadis (2020) is presented in Figure 1. We start off with the hypothesis of Borcan et al. (2018), according to which interest groups are more deeply entrenched in societies with a long-established statehood. As a result, rent-seeking and extractive institutions are more prevalent. 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. Figure 1 depicts the sequence of our arguments.

Figure 1. The theoretical framework



The Borcan-Olsson-Putterman (2018) hypothesis

We follow a two-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 more ancient societies. The regression results are supportive, indicating that the finance-growth nexus is indeed impaired in countries with a long statehood.

Our paper builds on Dombi and Grigoriadis (2020) and extends their results in several respects. First, we follow a general approach by focusing on antiquity. Whilst Dombi and Grigoriadis (ibid.) use the state history index of the last two millennia constructed by Bockstette et al. (2002), we resort to the extended index of Borcan et al. (2018) also including the ancient ages before the Common Era. Moreover, as an alternative measure of antiquity, the number of agricultural years since the Neolithic Revolution is also considered in our analysis (see below). The second improvement is that our paper provides a profound theoretical foundation for the impaired financed-growth nexus in societies with ancient roots. Finally, our empirical results embrace the last half-century and the whole globe. With these improvements, our paper contributes to the thorough establishment of the legacy perspective – proposed by Dombi and Grigoriadis (2020) – in the nonlinear finance-growth literature.

Our paper also contributes to the other strands of the literature discussed previously. First, instead of focusing on the contemporary structural characteristics of the financial sector, we augment the literature on *corruption in lending* by revealing the deep historical root of the underlying phenomenon. Second, our paper also contributes to the *DRD* literature by elaborating the finance-growth channel in terms of the suboptimal work of capitalism under the conditions of antiquity.

The paper is structured as follows: Section 2 presents the tales of two countries with ancient statehood and analyzes the capture of the financial sector by powerful elites. Section 3 discusses the theoretical model, while Section 4 introduces the measures of state antiquity. Section 5 presents the data and the empirical methodology and Section 6 the results, with Section 7 offering a general discussion of the results. Section 8 performs the sensitivity analyses and Section 9 concludes.

2. The tales of two countries

We start with the experiences of two ancient and, at the same time, developed countries, Italy and South Korea. The two countries have very different cultural and institutional backgrounds, but one point is common: their banking sectors have frequently suffered from the collusion of political and economic elites, both in times of massive state centralization and liberalized financial markets.

Italy

After the Italian Banking Act of 1936, the government gained considerable control over banks in Italy and strongly influenced credit allocation (Rota, 2013). During the Golden Age (1950-1970), the banking system heavily promoted domestic capital accumulation by providing preferential credits for state-owned enterprises, in close accordance with the industrialization strategy of the government. Although this policy was conducive for growth until the 1970s, the negative side effects of inefficient resource allocation started to proliferate in the ensuing two decades (Del Monte and Papagni, 2007). During the half-century of state centralization the collusion between politicians and industrialists intensified significantly and political connections became an invaluable currency for access to bank credits.[2]

Even after the financial deregulation and nationwide investigation into political corruption in the 1990s, banks continued to be exposed to considerable political influence (Stefancic, 2017). Italy also has a higher ratio of politically connected firms than most other countries (Faccio 2006). Infante and Piazza (2014) find that these firms enjoy loans with lower interest rates than the market average and the preferential treatment is stronger when firms and banks are linked with the same politician. Carretta et al. (2012) focus on politicians on the boards of directors of banks and come to the conclusion that their presence exerts a negative effect on

[2] There are several documented instances of elite collusion and corruption in lending. We cite three notable cases. The first case is the financial scandal involving Milan's Banco Ambeosiano which collapsed in 1982 after unsecured loans were endorsed by the Vatican. As early as 1978, the bank was being investigated by the Bank of Italy. However, the investigation countered heavy political opposition (Lewis, P.: "Italy's Mysterious, Deepening Bank Scandal". The New York Times, 28. July 1982). The second case is the spectacular and rapid rise of Silvio Berlusconi's financial empire, the Fininvest, owing to some extent to the advocacy of Bettino Craxi, socialist party leader and later prime minister (Semler, P.K.: "Italy's Corrupt Industrial Elite". The Journal of Commerce, 15. November 1993). The third case is the bumpy escape of Corriere della Sera, the foremost newspaper in Italy. The company fell into financial trouble in 1977, but was unable to obtain bank credit because of the editor's opposition to the ruling party. Finally, the newspaper managed to acquire financial support from P2 (Masonic Lodge) by serving its political interests. (Gumbel, A.: "Obituary: Franco Di Bella". Independent, 23. December 1997).

loan quality. Even in banks where politicians have no position, the appointment of CEOs and members of the board of directors have frequently been constrained by political power (Rota, 2013). To sum up, there is ample evidence that there is great interference in the governance of Italian banks by political interests. Biased developmental banking has certainly contributed to the weak efficiency of Italian banks and, thereby, the significant share of non-performing loans (Angelini et.al, 2017; Stefancic, 2017).[3]

South Korea (Korea hereafter)

The financial sector in Korea also experienced massive state intervention, but suffered more from the collusive elite networks. A highly institutionalized system of kickbacks was first set up under the Park regime (1963-1979). The regime nationalized the banking sector and, as a major tool of industrial policy, exerted a tight control on credit allocation. This allowed the evolvement of a quasi-institutionalized system of bribery: senior party officials collected fixed payments from business conglomerates (chaebol) and provided access to bank credit (Hellmann, 2017). In 1974, there were 50 chaebols enjoying preferential access to both foreign and domestic loans thanks to governmental backing (Kyong-Dong, 1976). The corruption in lending continued to prevail under the Chun regime (1980-1988) (Schopf, 2011).[4] Surprisingly, the rise of democracy in the late 1980s did not dismantle the collusive elite network (Wad, 2002)[5]. Indeed, Park (2008) finds that the number of collusive networks multiplied after the introduction of free elections, and chaebols continued providing financial support to politicians and probable political candidates.[6]

[3] In 2016, non-performing loans in Italian banks amounted to roughly 22 percent of GDP. Recent examples of easy lending are the preferential credits to two highly indebted companies, Stefanel (the third largest clothing manufacturer in Italy) and the Feltrinelli publishing group (the Italian publishing giant) (Stefancic, 2017). These companies were facing severe financial problems, even bankruptcy, when applying for bank credit. Although there is no direct evidence of political inference, lending to such financially stressed companies under extraordinarily favorable conditions seems to be indicative in our respect.

[4] Schopf (2011) reveals that Chun Doo-hwan's regime allocated private property and loans at no cost to firms which paid the largest bribe and were connected with members of his ruling elite, allowing him to amass at least 1.24 billion USD from the corporate sector illegally.

[5] The government retained control over privatized banks, resulting in a higher ratio of bad loans than in the case of originally privately-owned banks without any state-ownership in the past (An et.al, 2007).

[6] One of the most salient scandals concerns the Hanbo Steel corporation, which went bankrupt in 1997 after accumulating a large number of preferential credits by bribing ruling party officials (Nakarmi, L.: "The fall of Hanbo Steel". Asiaweek CNN, 7. February 1997). The scandal touched the inner-circle of the president too. ("Officials close to Kim charged in South Korea loan scandal" CNN, 11. February 1997)

Owing to elite collusion, the chaebols' economic and political power grew continuously and the financial sector became even more captured after democratization, leading to increasingly clientelistic and biased financial policies (Lukauskas, 2002; Kalinowski and Cho, 2009). The chaebols' leverage on the financial sector evolved as follows. In the 1970s, the control over credit policy was already practiced by the chaebols and the government in a mixed way (Choi, 1993; Woo, 1991). In the late 1980s, the deregulation of interest rates became bogged down due to the opposition of chaebols who feared the growing interest burden and loss of their preferential access to credit (Choi, 1993). In the 1990s, however, much progress was achieved in financial deregulation because the chaebols faced fewer constraints to ownership of non-bank financial institutions and thus freer access to credit (Lee, 2005). In the 2000s, the government aimed to weaken the chaebols' power by admitting foreign investors to the financial sector. However, the endeavor failed due to the sluggish stabilization and restructuring of the financial industry (Kalinowski and Hyekyung, 2009). In recent years, the scandal of Samsung, the largest conglomerate in Korea, has revealed that the collusive elite network still might play a crucial role in the financial sector.[7]

The experiences of these two countries illustrate the point that financial development in societies with ancient statehood may suffer from state intervention and collusive intra-elite relationships. As a counter-example, we may consider briefly the case of Canada, a relatively young state. In Canada, the banking sector faces only minor state and political interventions and is more or less politically independent (Breydo, 2015). Although the banking market is highly concentrated, there are no symptoms of elite collusion in terms of lending (Calomiris and Haber, 2014; Breydo, 2015) and firms face no significant obstacles in access to credit (Beck et.al, 2004; Hendry and King, 2004). Competition among banks is intensive (Shaffer, 1993; Allen and Engert, 2007), which can be effective in curbing corruption in lending (Barth et.al, 2007). Indeed, based on the investigation of Beck et.al (2006), the level of banking corruption in Canada is one of the lowest worldwide. The possible reasons for the contrast between Korea and Italy, on the one hand, and Canada, on the other hand, may be manifold. We conjecture that antiquity and its social legacy might play a crucial role in this respect.

[7] "Samsung scandal: Who is Lee Jae-yong?" (www.bbc.com, 5. February 2018)

3. Measures of antiquity

In this paper, antiquity of societies is defined as the length of established statehood beyond the tribal level 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 established statehood: the state history index, first introduced by Bockstette et al. (2002) and extended by Borcan et al. (2018), and the agricultural years since the Neolithic revolution collected by Putterman and Trainor (2018).

Our baseline measure of antiquity is the extended state history index of Borcan et al. (2018), which embraces the last six millennia (3500 BCE - 2000 AD).[8] This state history index measures the cumulative experience of societies with established statehood in the underlying period. It is computed on the basis of the state history scores of the constitutive half-centuries. The state history score (s) is a composite measure of the type and territorial extent of statehood in the given 50-year period. Three dimensions are considered: 1. the level of governance (z^1), 2. the independence of government (z^2), and 3. territorial coverage (z^3). To each *half-century-country* unit and dimension, a value between 0 and 1 is assigned based on historical records and archeological data. Thereafter, the state history scores are calculated as follows: $s_{it} = z_{it}^1 \cdot z_{it}^2 \cdot z_{it}^3 \cdot 50$, where i and t represent the country and the given half-century, respectively.[9] Based on these scores, the cumulative, normalized index is calculated as follows:

$$(1) \qquad SH_i = \frac{\sum_{t=0}^{\tau} (1+\delta)^{t-\tau} \cdot s_{it}}{\sum_{t=0}^{\tau} (1+\delta)^{t-\tau} \cdot 50}$$, where $t = 0$ is the half-century of 3500-3451 BCE.

The last half-century (τ) can be set according to the focus of the analysis. In the baseline case (SH1950), we equate it to 108, which corresponds to the period from 1901 to 1950 CE. We omit the second half of the 20th century in order to avoid any endogeneity concern related to the state history index in our estimations. Another crucial point is the δ depreciation rate in equation (1). It is reasonable to assume that whatever the impacts of established statehood on culture, norms, and social structures are, they must partly fade away with time. The rate of this depreciation is a matter

[8] Originally, Bockstette et al. (2002) constructed the state history index only for the last two millennia.

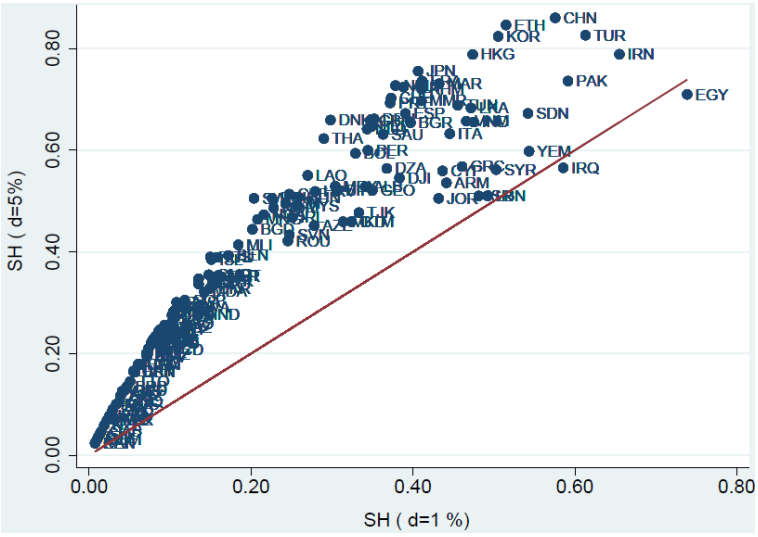
[9] The state history score is maximized at 50, which occurs when the greater part of the current territory of the country was ruled by a domestic government in the given 50 years.

of arbitrary choice. However, if the cumulated state history index is to proxy for antiquity, a low level of δ is needed. Otherwise, the difference between societies with ancient roots (e.g., Egypt) and relatively younger societies (e.g., France) decreases noticeably owing to the overwhelming dominance of the more recent centuries in the calculation. Figure 2 demonstrates this by contrasting the SH1950 indexes based on two alternative depreciation rates, 1 percent and 5 percent.

The rationale for antiquity having an effect on present socio-economic outcomes is that societies with ancient roots are characterized by norms and values different from those of relatively younger societies. Hariri (2012) demonstrates that countries with a longer state history tend to be more centralized and autocratic and pursue more collectivist values. Lagerlöf (2016) also proposes that countries with an early statehood might be more autocratic. Olsson and Paik (2016) find that more ancient societies, with an earlier date of the Neolithic Revolution, tend to be more collectivist today.

It is generally believed that values and norms relate more to people and less to the geographic area they inhabit. However, the institutions of a country can considerably influence the culture of its inhabitants. Indeed, the mutual impact of institutions and culture on each other is well-known (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. This issue is crucial since massive population flows occurred in the post-Columbian era leading to mixed societies, in terms of ancestral history and culture, in several countries.

Figure 2. Evaporating antiquity: The effect of the applied depreciation rate



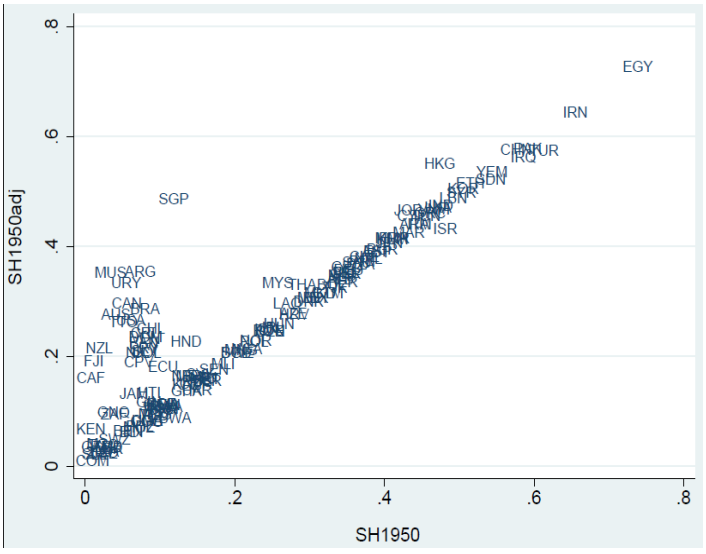
Source: Own graph. For the data source, see Table A2.
Notes: SH=SH1950 in the graph

Our baseline measure of antiquity considers the experience of the geographic area with established statehood. However, as an alternative measure, we also use the ancestry-adjusted state history index to see how the results change when the respective experience of the inhabitants is in focus. We compute the ancestry-adjusted state history index as the (normalized) sum of the weighted average of the pre-Columbian (i.e. 3500 BCE-1500 CE) state histories and the unadjusted post-Columbian (i.e. 1501-1950 CE) state history of the particular country:

$$(2) \qquad SH1950adj_i = \frac{\sum_{t=100}^{108}(1+\delta)^{t-108}\cdot s_{it} + \sum_j w_{ij}\left(\sum_{t=0}^{99}(1+\delta)^{t-108}\cdot s_{it}\right)}{\sum_{t=0}^{108}(1+\delta)^{t-108}\cdot 50} \quad ,$$

where w_{ij} is the share of country j in country i's year-1500AD ancestors as retrieved from the World Migration Matrix of Putterman and Weil (2010). As can be observed in Figure 3, the adjustment for the ancestral composition of the population considerably increases the state history index in those, mainly New World, countries which experienced massive post-Columbian population flows.

Figure 3. Ancestry: unadjusted vs adjusted state history



Source: Own graph. For the data source, see Table A2.

Another crucial point is whether pre-Columbian state history is preferable over total state history (i.e. including the post-Columbian ages). On the one hand, it is true that the long-lasting

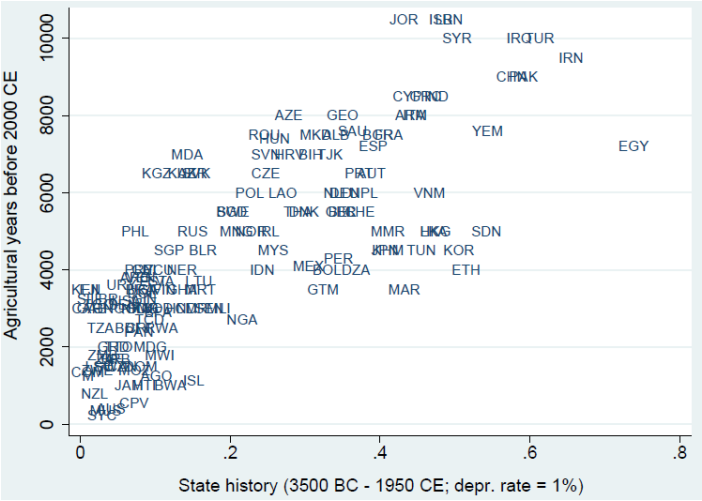
effect of early development on contemporary socio-economic outcomes has solid foundations. On the other hand, it is hard to argue against the importance of post-Columbian experience concerning contemporary economic development. In any case, we use the pre-Columbian state history, both unadjusted (SH1500) and adjusted (SH1500adj) for ancestry, as an alternative measure of antiquity.[10]

As a final alternative measure of antiquity, we consider the years elapsed since the Neolithic Revolution (AgrY) as compiled by Putterman and Trainor (2018) and used, inter alia, in Putterman and Weil (2010). This indicator appraises the number of years before 2000AD 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 (e.g., Olsson and Hibbs, 2005). It is deemed as an approximation for the antiquity of societies due to the fact that the sedentary mode of agricultural production necessitated a much more well-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). Figure 4 corroborates the strong co-movement of state history with agricultural years.

Finally, we briefly discuss the cross-country relationship between state history and financial and economic development. Figure 5 is a scatterplot of state history and average domestic credit in the first decade of the 2000s. In accordance with Ang (2013), we find a moderately positive relationship between antiquity and financial development. In Figure 6, the seminal result of Borcan et al. (2018) on the inverted U-shaped relationship between antiquity and contemporary economic development is reflected.

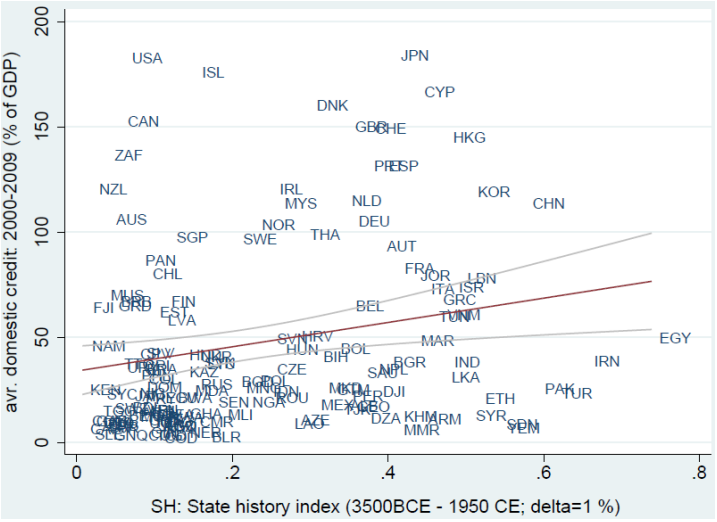
[10] SH1500 is calculated according to equation (1) with $\tau = 99$ representing the half-century of 1450-1500AD. SH1500adj is calculated as follows: $SH1500adj_i = \left(\sum_j w_{ij}\left(\sum_{t=0}^{99}(1+\delta)^{t-99}\cdot s_{it}\right)\right)\Big/\left(\sum_{t=0}^{99}(1+\delta)^{t-99}\cdot 50\right)$.

Figure 4. State history vs. Agricultural years



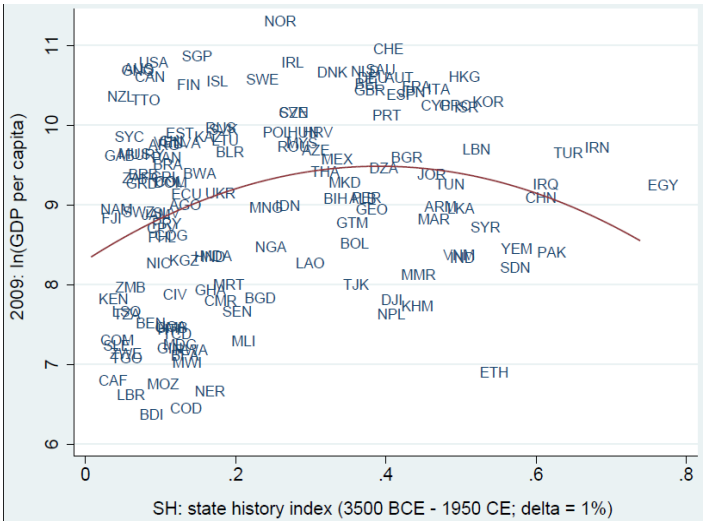
Source: Own graph. For the data source, see Table A2.

Figure 5. Financial development and antiquity



Source: Own graph. For the data source, see Table A2.

Figure 6. Economic development and antiquity



Source: Own graph. For the data source, see Table A2.

4. 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 negative effect of antiquity on the finance-growth nexus. In our proposed model, we complement Borcan et al. (2018) by establishing the financial development channel in order to elaborate on the inverted U-shaped relationship between state history and economic growth. 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 in particular 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* as per Dewatripont and Maskin (1995). State history is denoted by a stochastic variable α^S such that $\alpha^S \in \left\{\alpha^L = 1, \alpha^H = \alpha\right\}$ 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 the 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 $d^j = \frac{\alpha^S}{1-\lambda^j}$; $\lambda^j \in (0,1)$ 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 the 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 the credit provision s.t. $\theta \in (0,1)$.

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

1. Players: a bank *B* and an entrepreneur *E* such that $N = \left\{B, E\right\}$.
2. States: $\alpha^i_t \in \{\alpha^L_t = 1, \alpha^H_t = \alpha\},$ 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:

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

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

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

   Hard budget constraint: $u^B_{HBC} = -\theta\alpha^2$ 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.

The timing of the *antiquity-capitalism* game therefore has the following structure as per Acemoglu and Robinson (2006):

1. $\alpha^i_t \in \{\alpha^L_t, \alpha^H_t\}$ 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 $\mu \in (0,1) : \xi \in \{0,1\}$.[11] 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 $\eta \in (0,1) : \chi \in \{0,1\}$.[12] In either case, the stage game is over.

[11] $P(\xi = 1) = \mu$ and $P(\xi = 0) = 1 - \mu$.

[12] $P(\chi = 1) = \eta$ and $P(\chi = 0) = 1 - \eta$.

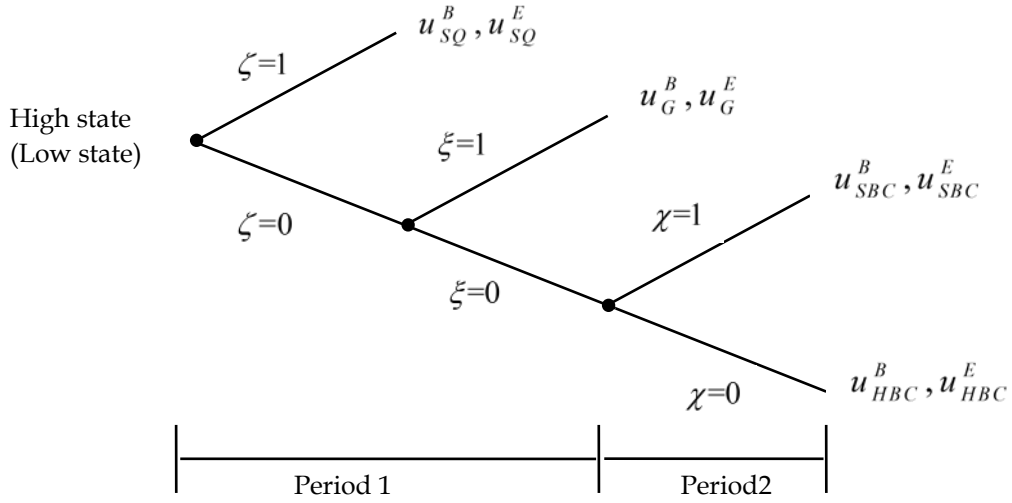


Figure 7: The model tree

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:

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

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. It is the

case that the bank provides a soft budget constraint rather than a hard budget constraint to the entrepreneur under conditions of long state history if and only if:

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

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

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 makes $u^B_{SBC} > u^B_{HBC}$ should be 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 λ^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. We suggest that antiquity in the form of state history may pose institutional barriers to financial development and entrepreneurship.

Our model treats the opportunity cost of lending as an exogenous parameter. However, θ may in reality increase with state history. As we propose, in more ancient societies, interest groups are more 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 cause larger costs for banks due to the larger scale of counteractions by government and business elite in the form of economic punishment. In our model, the threshold for soft budget constraint (α*) decreases with θ and the probability of exceeding that threshold increases. This implies that the probability of a soft budget constraint is higher in societies with a longer state history and the finance-growth nexus might therefore be impaired.

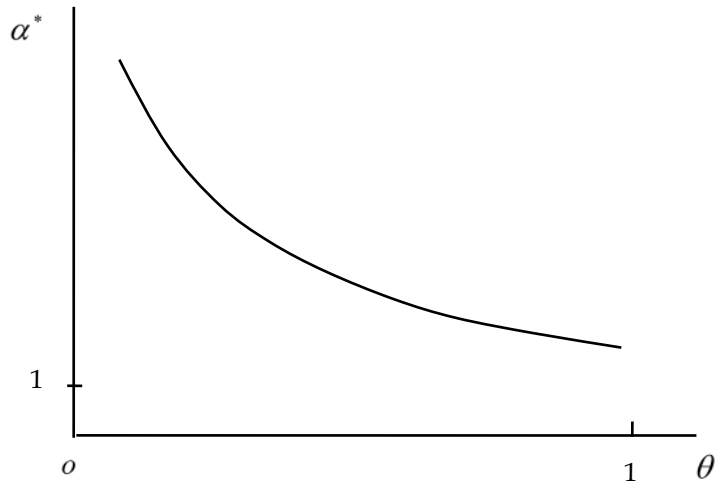


Figure 8: Comparative statics $\alpha^*(\theta)$

5. Data & methodology

Our panel data covers the period from 1970 to 2014. We work with 5-year panels in order to average-out business cycles, and are thus left with nine time periods (1970-74, 1975-79, 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 95 countries. The list of these countries is presented in Table A1 in the Appendix. When this condition is relaxed by reducing the minimum number of time periods with complete observations to 3, the number of included countries jumps to 118.

Most of the variables are averaged over the 5-year intervals. 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. The panel is unbalanced. Table A2 introduces the data and their sources. Table A3 and A4 present the descriptive statistics and the correlation matrix, respectively.

Based on our previous arguments in Figure 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 dynamic model:

$$\ln y_{i,t} = \beta \ln y_{i,t-1} + \alpha_1 I(AQ_i \le \gamma) \ln FD_{i,t} + \alpha_2 I(AQ_i > \gamma) \ln FD_{i,t} + \phi^T (\mathbf{Controls_{i,t}}) + \mu_i + p_t + \varepsilon_{i,t} \quad (3)$$

where *lny* is log GDP per capita, *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 $\varepsilon \sim N(0, \sigma^2)$. In the baseline model, antiquity is measured by the extended state history index of Borcan et al. (2018) calculated according to a 1-percent depreciation rate and terminated in 1950 (SH1950).

We use two size-based measures of financial development: domestic credit and private credit by banks. The control variables include classic growth determinants such as human capital, physical capital investments, inflation, government consumption, social conflicts, and level of democracy. These variables are meant to control for the production capacities of the economy, soundness of economic policy, provision of public goods, social stability, and institutional

quality. The initial GDP per capita of the underlying period is included in the explanatory variables to control for conditional convergence.

In equation (3), 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 bottom regime where the *AQ* is below the γ threshold level, and an upper regime where *AQ* exceeds γ. We are primarily interested in the alpha and gamma parameters. A difference in the sign and/or the significance of α_1 and α_2 would be a proof of our *Hypothesis 1* that antiquity matters for 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 estimate equation (1) using the method of dynamic panel threshold regressions (DPTR). DPTR originates in panel threshold regressions (PTR) introduced by Hansen (1999, 2000). The concept of PTR is to estimate threshold models – like equation (3) – by picking the γ threshold which optimizes the underlying objective function. PTR was, however, originally developed for static models with exogenous explanatory variables. Caner and Hansen (2004) develop an instrumental variable approach to threshold models, but they assume cross-sectional data. Kremer at al. (2013) are the first to consider dynamic panel threshold models with endogenous explanatory variables. They adapt the method of Caner and Hansen (ibid.) on dynamic panel models and use forward orthogonal deviation to remove unobserved unit fixed effects. However, their procedure is of an applied nature lacking any theoretical proof. The theoretical foundations of endogenous dynamic panel threshold regressions are laid down by Seo and Shin (2016).

Seo and Shin (ibid.) propose the estimation of equation (3) by GMM on first-differenced data. However, first-differencing has two major drawbacks. First, it artificially induces first-order residual autocorrelation. Second, it aggravates the missing data problem in unbalanced panels due to its inability to perform data transformation in the immediate neighborhood of missing observations. To avoid these pitfalls of data transformation, we apply forward orthogonal deviation (henceforth FOD) as suggested in Kremer et al. (ibid.).[13] In other respects, however, we closely follow the suggestions of Seo and Shin (ibid.): first, we locate the optimal value of the threshold variable by minimizing the 2-step GMM objective function for equation (3), and thereafter, in the second step, we rerun the 2-step GMM on equation (3), already

[13] Forward orthogonal deviation, originally proposed by Arellano and Bover (1995), performs the following data transformation: $x_{it}^{*} = \sqrt{\frac{T-t}{T-t+1}}\left[x_{it} - \frac{1}{T-t}(x_{i(t+1)} + ... + x_{iT}) \right]$, where T is the number of time units in the panel.

substituting the estimated threshold for γ. Concerning the above, our approach is a hybrid of that of Kremer et al. (2013) and that of Seo and Shin (2016).

In each step of the estimation, we use the same GMM settings. Our internal instruments are the first- and second-order lags of endogenous explanatory variables in their original, i.e. not FOD-transformed, form. With the exception of the social conflict measure (Violence) which is considered to be strictly exogenous, all right-hand side variables are deemed to be endogenous after FOD-transformation. Beyond internal instruments, we also include external instruments such as legal origin, continent dummies, and latitude (see Table A2). Legal origin is a commonly accepted highly relevant instrument for financial development (Levine, 1999; La Porta et al., 2008), while geographic variables are intended to control for the unobserved unit specific variation in the explanatory variables.[14] Concerning the weighting matrix, we assume clustered errors in our baseline estimations.

6. Results

The results of the two baseline models (models 1A & 1B), differing from each other only in terms of the financial development indicator, are presented in Tables 1A and 1B. As can be observed, the two models lead to similar conclusions. The control variables are mostly significant and have the expected sign. According to the overidentification test (J-test), the instruments are valid at standard levels in model 1A and at the 5-percent level in model 1B. In both models, the sign of the financial development coefficient differs across the two regimes: it is positive and significant at the 5-percent level in the bottom regime, while it is negative and significant at the 1-percent level in the upper regime. According to the respective Wald test, this difference between the effect of financial development on growth in the two regimes seems to be significant.

These results corroborate our hypotheses. First, the Wald test rejects the H0 of there being the same effect of financial development on growth in old and young societies. Second, the sign and the significance of the financial development coefficient in the two regimes support our second hypothesis that the increase in outstanding credit is detrimental to growth in societies with ancient roots, while it is conducive to growth in younger ones.

[14] Note, that it would be impossible to include these external IVs in the control variables because FOD-transformation eliminates observed fixed effects too.

Table 1A. Results on Private Credit

Models	1A	2A	3A	4A	5A	6A	7A	8A	9A
Treshold variable	SH1950	SH1950	SH1950	SH1950	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj
depr. rate of SH	1 %	0 %	2 %	5 %	1 %	1%	1%	Ø	Ø
lag(lny)	0.8786	0.8786	0.8786	0.8269	0.8598	0.8786	0.8437	0.8935	0.835
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
ln(GFCF)	-0.0049	-0.0049	-0.0049	-0.0133	0.0047	-0.0049	-0.0054	-0.0481	-0.0264
	(0.912)	(0.912)	(0.912)	(0.771)	(0.91)	(0.912)	(0.921)	(0.354)	(0.614)
lag(ln(HC))	0.3563	0.3563	0.3563	0.3327	0.3833	0.3563	0.1804	0.3676	0.2137
	(0.016)	(0.016)	(0.016)	(0.016)	(0.01)	(0.016)	(0.107)	(0.02)	(0.076)
ln(INFL)	-0.0669	-0.0669	-0.0669	-0.078	-0.0725	-0.0669	-0.0815	-0.0522	-0.0772
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0.01)	(0)
ln(GovCons)	0.035	0.035	0.035	0.0548	0.0225	0.035	-0.021	0.0057	-0.033
	(0.408)	(0.408)	(0.408)	(0.229)	(0.578)	(0.408)	(0.601)	(0.901)	(0.434)
Violence	-0.003	-0.003	-0.003	-0.0028	-0.0035	-0.003	-0.0037	-0.0021	-0.0036
	(0.001)	(0.001)	(0.001)	(0.007)	(0)	(0.001)	(0)	(0.069)	(0)
Polity2	0.0059	0.0059	0.0059	0.0073	0.0045	0.0059	0.004	0.006	0.0047
	(0.007)	(0.007)	(0.007)	(0.001)	(0.033)	(0.007)	(0.116)	(0.006)	(0.054)
ln(PCB_bottom)	0.0826	0.0826	0.0826	0.0757	0.0695	0.0826	0.1461	0.085	0.1161
	(0.018)	(0.018)	(0.018)	(0.03)	(0.046)	(0.018)	(0.014)	(0.029)	(0.021)
ln(PCB_upper)	-0.1008	-0.1008	-0.1008	-0.0959	-0.1237	-0.1008	-0.0804	-0.0865	-0.0653
	(0.002)	(0.002)	(0.002)	(0.001)	(0)	(0.002)	(0.008)	(0.009)	(0.04)
Wald test (pv)	0.157	0.153	0.073	0.020					
γ	0.216	0.147	0.289	0.510	0.276	0.144	0.037	4000	3549
SH quartile	Q3	Q3	Q3	Q3	Q3	Q3	Q1	Q3	Q2
N	536	536	536	536	536	536	536	536	536
no. of countries	93	93	93	93	93	93	93	93	93
J-test (pv)	0.291	0.291	0.291	0.172	0.201	0.291	0.112	0.128	0.070
no. of IVs	32	32	32	32	32	32	32	32	32

Notes: Robust p-values are in brackets. The H0 of the Wald test is $\alpha_1 = \alpha_2$. For the individual tests, only the p-values (pv) are presented. The p-value of the Wald test is based on bootstrapping. *SH quartile* shows the quartile to which γ falls. External IVs: legal origin dummies, continent dummies, latitude. Internal IVs: 1st & 2nd order lags of untransformed variables with the exception of *Violence*.

Table 1B. Results on Domestic Credit

Models	1B	2B	3B	4B	5B	6B	7B	8B	9B
Treshold variable	SH1950	SH1950	SH1950	SH1950	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj
depr. rate of SH	1 %	0 %	2 %	5 %	1 %	1%	1%	Ø	Ø
lag(lny)	0.8681	0.8681	0.8681	0.8475	0.8612	0.8681	0.8265	0.8649	0.8175
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln(GFCF)	0.0083	0.0083	0.0083	0.0188	0.0242	0.0083	0.0021	-0.0366	-0.0053
	(0.862)	(0.862)	(0.862)	(0.688)	(0.603)	(0.862)	(0.967)	(0.491)	(0.919)
lag(ln(HC))	0.3326	0.3326	0.3326	0.2724	0.3275	0.3326	0.1896	0.3475	0.1998
	(0.018)	(0.018)	(0.018)	(0.036)	(0.021)	(0.018)	(0.1)	(0.018)	(0.104)
ln(INFL)	-0.0886	-0.0886	-0.0886	-0.0976	-0.0718	-0.0886	-0.073	-0.0759	-0.0715
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ln(GovCons)	0.0552	0.0552	0.0552	0.0657	0.0407	0.0552	-0.0208	0.0225	-0.0273
	(0.203)	(0.203)	(0.203)	(0.159)	(0.303)	(0.203)	(0.622)	(0.634)	(0.529)
Violence	-0.0029	-0.0029	-0.0029	-0.003	-0.0034	-0.0029	-0.0034	-0.0022	-0.0033
	(0.003)	(0.003)	(0.003)	(0.004)	(0.000)	(0.003)	(0.001)	(0.066)	(0.003)
Polity2	0.0059	0.0059	0.0059	0.007	0.0049	0.0059	0.0048	0.0059	0.0056
	(0.003)	(0.003)	(0.003)	(0.000)	(0.008)	(0.003)	(0.035)	(0.003)	(0.009)
ln(DC_bottom)	0.0709	0.0709	0.0709	0.0532	0.0534	0.0709	0.168	0.0696	0.1193
	(0.014)	(0.014)	(0.014)	(0.051)	(0.067)	(0.014)	(0.005)	(0.026)	(0.024)
ln(DC_upper)	-0.0864	-0.0864	-0.0864	-0.1012	-0.1092	-0.0864	-0.0398	-0.0663	-0.0258
	(0.01)	(0.01)	(0.01)	(0.001)	(0.000)	(0.01)	(0.165)	(0.042)	(0.389)
Wald test (pv)	0.097	0.200	0.097	0.017	0.035	0.130	0.275	0.105	0.165
γ	0.216	0.147	0.289	0.5101	0.276	0.144	0.037	4000	3549
SH quartile	Q3	Q3	Q3	Q3	Q3	Q3	Q1	Q3	Q2
N	544	544	544	544	544	544	544	544	544
no. of countries	95	95	95	95	95	95	95	95	95
J-test (pv)	0.076	0.076	0.076	0.052	0.067	0.076	0.021	0.024	0.015
no. of IVs	32	32	32	32	32	32	32	32	32

Notes: See Table 1A

In order to fix any concern on the sensitivity of our results to the underlying antiquity measure, we also run the estimation of equation (3) for the other antiquity measures discussed in Section 3. In models 2# to 4#, we use the state history index of the last 6 millennia calculated according to different 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 although a higher depreciation rate squeezes the index values to some extent, it leaves the relative ranking of countries – the important aspect of the distribution from the viewpoint of DPTR – mostly untouched (see Figure 2). Note, however, that the estimated thresholds differ considerably from each other even if they represent similar quantile of the distribution of state history. This is the result of the complete rescaling of accumulated state history triggered by the change in the depreciation rate.

In model 5#, we use the ancestry-adjusted state history index calculated according to equation (2) as the threshold variable. With this threshold variable, we account for the post-Columbian population flows and relate antiquity more to the people than to the geographic area. As already discussed, this adjustment changes the relative position of several New World countries in the distribution of state history (see Figure 3). Despite this, the results are remarkably similar to the baseline case.[15]

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. To put it differently, the experience with established statehood in the post-Columbian era does not add much to the ranking of countries in terms of state history.

Finally, 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.

Identically to the case with the threshold effect, the estimated coefficients also show considerable consistency over the different threshold and financial development variables. The underlying reason is that the individual estimates group the countries into the two regimes in a similar way owing to the strong positive correlation of the antiquity measures. In both regimes, the effect of financial development is important economically. Considering the baseline results, a 10-percent increase in private credit tends to accelerate the (cumulated) growth rate over the underlying 5-year period by 0.8 percentage points in the bottom regime (young societies) and decelerate it by 1 percentage point in the upper regime (ancient societies). In the case of domestic credit and the other antiquity measures, similar magnitudes characterize the growth impact of financial development.

[15] Note that the estimated threshold value is again not comparable to the baseline one due to its different scale.

To conclude, in accordance with the theoretical model, the empirical analysis proves our two initial hypotheses. Antiquity impacts the finance-growth nexus by rendering the increase in the amount of 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.

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 bottom and the upper regimes of state history include a mix of developed and developing countries (see Table A1). Therefore, the general argument of the literature that financial development is more conducive to growth in countries with better institutions or with a higher level of economic development is clearly irrelevant in our case. In contrast to the conventional institutional quality literature, the economic story behind our results is more about informal institutions rather than formal ones. Its 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.

7. 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 can be attributed to the enhanced power of the business and political elites to capture the financial sector and corrupt lending under the condition of antiquity. In line with the literature, we conjecture that interest groups are entrenched deeper and have increased bargaining power at their disposal in economies with a long state history (Borcan et al., 2018; Lagerlöf, 2016). In our model, we present the dependence of banks' lending activity on antiquity. The case studies of Italy and South Korea also provide some underpinning of our argument. However, the deep entrenchment and the persistent survival of interest groups in older societies is still rather a supposition than a thoroughly explored stylized fact in the literature. This section provides some evidence on the rationale for this assumption. In doing so, 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, imperial mercantilism in medieval Venice). This resistance also means that the elite-based social structure of countries with ancient roots has been less influenced by the emergence of modern capitalist markets and democratic regimes. The persistence of social norms enable the survival of elite-rule in the form of informal networks, cronyism, and state capture in the modern era too. Hence, antiquity in economic terms becomes equivalent to a set of institutional and inter-generationally transmitted 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.

The probable survival of oligarchic social structures and accommodating social norms has also been supported by the collectivist culture of societies with ancient statehood. Olsson and Paik (2016) explore robust positive correlation between agricultural years since the Neolithic Revolution and cultural collectivism. They argue that the sequential spread of sedentary agriculture was transmitted by the step-by-step outmigration of the most individualist people from the Middle East toward Northern Europe and other regions. Moreover, since climatic conditions were rather favorable for individualist agriculture in the temperate zone, collectivist social norms were not needed compared to the Fertile Crescent where agriculture was based on irrigation (Diamond, 1997). Sedentary agriculture was a major trigger for the formation of states. The above therefore also explains why countries with a longer state history tend to be more collectivist (Hariri, 2012).

As opposed to personal freedom and horizontal relationships in individualist societies, collectivism is characterized by the embeddedness of the individual in the community, hierarchical structures, and loyalty toward the group (Gorodnichenko and Roland, 2017). Individualist societies are driven more by general morality and legal rules, while collectivist societies operate more on the basis of reciprocal moral obligations and personal connections. As a consequence, in collectivist societies informal personalized enforcement mechanisms may dominate the formal rules. All these characteristics are conducive to the survival and perpetuation of elite networks.

Another argument in favor of the perpetuation of elite-based social structures in older countries is the growing empirical evidence of their long-run survival. Oto-Peralías and Romero-Ávila (2016)

investigate how the speed of the Reconquest of the Iberian Peninsula affected the political and social structures established in the newly regained territories. They argue that in regions which were reconquered relatively fast, 'colonization' remained incomplete and resulted in the concentration of power in the hands of the political elite, the nobles. They demonstrate that this oligarchic centralized social structure survived until the industrial revolution in the late 19th century and is one of the main reasons behind the current underdevelopment of the respective Spanish regions. In another recent study, Greif and Tabellini (2017) demonstrate that social organization was historically characterized by patrilineal kin-based clans in China. These clans were abolished when the communist regime gained power in 1949. However, after the regime stopped persecuting them in 1979, clans re-emerged and proliferated. The authors see the latter as evidence of cultural persistence actively shaping the organization of societies.

The survival of social structures is further underpinned by the adaptive formation of formal institutions. Indeed, it has already been pointed out that social norms and values (culture) and institutions mutually influence each other (Alesina and Giuliano, 2015; Nunn, 2014). In his seminal paper, Greif (1994) demonstrates how the differing cultural beliefs of medieval Genoese and Maghribi traders shaped their respective societies. Acemoglu et al. (2001) emphasize the importance of European settlers in terms of the type of institutions that were established in the new colonies. As regards the opposite causation – running from institutions toward social norms and values – the empirical evidence is also abundant. Becker et al. (2016) explore the long-term positive legacy of the Habsburg Empire on the general trust toward bureaucracy and police in the successor states. Lowes et al. (2017) investigate the long-term effect of early centralized institutions on contemporary cultural norms through the evidence of the Kuba Kingdom and find that developed institutions in the past result in weaker norms of rule following and a greater propensity to cheat for material gain in the present. Tabellini (2008) builds a model in which institutions and culture both evolve endogenously, mutually shaping each other.

To sum up, there is strong evidence in the literature that countries with ancient roots are more collectivist and thereby the dominance of powerful elites is more likely to survive. Moreover, the establishing oligarchic economic and political conditions are further reinforced by the dynamic interplay of institutions and culture: a collectivist society captured by some major interest groups can easily find itself in a bad equilibrium where formal rules based on general morality are dominated by personalized informal rules and hierarchical within-group structures.

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 and entrenched interest groups, 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**.** This observation is also in line with the collectivism-individualism dichotomy. Individualist societies are more likely to be richer than collectivist societies. However, this may not always be the case. 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 question goes beyond the scope of our paper and may be the topic of future research.

8. Sensitivity analysis

This section conducts the sensitivity analyses of the results. We are primarily interested in the sensitivity to the estimation method, the sample, the threshold effect, and the control variables. In advance, the sensitivity analyses show that the results are robust to these issues. In order to save space, we present only the sensitivity analyses in the case of private credit. The results of domestic credit are very similar and are available in the Appendix (Tables A5-A8.).

As regards the estimation methodology, we investigate the sensitivity to the defining characteristics of the GMM estimation such as the set of IVs and the assumption on the weighting matrix. The results are presented in Table 2. In sensitivity checks S1A and S2A, we change the set of external IVs first by dropping geography related variables (S1A), and then by discarding legal origin dummies too (S2A). As can be observed, the impact of private credit in the two regimes is not sensitive to the inclusion of external instruments. In sensitivity check S3A, we keep the external instruments unchanged but restrict the internal IVs to the first order lag of untransformed right-hand side variables. The results concerning the coefficient of private credit in the two regimes are similar to the baseline case. Finally, we switch from clustered errors to heteroskedastic errors and adjust the weighting matrix used for the second step of GMM accordingly (S4A). The conclusion concerning the threshold effect of antiquity holds in this case too.

Table 2. Sensitivity to the GMM settings

Sens. check	S1A	S2A	S3A	S4A
Weighting matrix	default	default	default	cross-country & -time heteroskedasticity
Internal IV	default	default	1st order lags	default
External IV	legal origin	none	default	defaut
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2				
ln(PCB_bottom)	0.0989	0.115	0.143	0.0746
	(0.015)	(0.018)	(0.002)	(0.054)
ln(PCB_upper)	-0.0859	-0.088	-0.0738	-0.1041
	(0.009)	(0.035)	(0.08)	(0.000)
Wald test (pv)	0.103	0.080	0.073	0.097
γ	0.216	0.108	0.204	0.216
SH quartile	Q3	Q2	Q3	Q3
N	536	536	604	536
no. of countries	93	93	93	93
Jstat (pv)	0.186	0.136	0.842	0.048
no. of IVs	26	23	25	32

Notes: Robust p-values are in brackets. For further notes, see Table 1A.

Three issues can be raised concerning the sensitivity to the sample: the sensitivity to the time span, the country set, and the inclusion of countries according to the required minimum number of complete observations. In the baseline case, the only countries we keep in the sample are those with at least four time periods containing complete observations in terms of the baseline variables. In sensitivity check S5A, we increase this threshold to six periods of complete observation. The results are unchanged despite the fact that the number of included countries decreased considerably (Table 3). When we loosen the condition of inclusion to three complete observations, the number of countries increases noticeably – to 117 (S6A). However, the results remain similar to the baseline case. Another sign of robustness to the inclusion threshold is that, in both sensitivity checks, the estimated threshold value of state history is the same as in the baseline model.

We perform two sensitivity checks in relation to the time span. First, we drop the last 5-year period (2005-09) to avoid any distortions related to the global financial crisis (S7A). The significant threshold effect in the finance-growth nexus remains, but the estimated threshold value of the state history index is considerably lower than in the baseline case, falling this time into the second quartile of the underlying sample distribution. Second, we drop the 1970s to exclude the turbulent decade of oil crises and to focus on the post-Keynesian period of liberalization, deregulation, and privatization (S8A). This is important because one might be concerned about the distorting effect of state-owned banks, which actually dominated the financial landscape before the turnaround in mainstream economics at the beginning of the 1980s. Namely, one might argue that antiquity counts only when market forces are constrained by state ownership. As the results show, this is not the case, with the

main conclusions being valid for this limited time span too. Moreover, the estimated threshold value of state history is also unchanged.

Finally, we investigate the sensitivity to the country sample. One might argue that the effect of antiquity on the finance-growth nexus might be driven by developing countries or some other groups of countries. In sensitivity checks S9A and S10A, model (1) is estimated separately for developed and developing countries. Although, in each case, private credit continues to weigh positively for growth in the bottom regime, it loses significance.[16] However, in both cases, the significant negative effect of private credit is preserved in the upper regime. These results corroborate our previous reasoning that the antiquity-capitalism nexus is not another representation of the well-known institutional approach suggesting that the finance-growth nexus is impaired in antique societies due to their lower level of economic and 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 (S11A-S15A): estimation without Latin American & Caribbean, Asian, Sub-Saharan, Middle East & North African, and Western countries. As the results in Table 3 show, for each constrained country sample the impact of antiquity follows the same pattern as in the baseline case.

In the third type of sensitivity check, 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 other control variables one-by-one:

$$\begin{aligned} \ln y_{i,t} = {} & \beta \ln y_{i,t-1} + \alpha_1 I(SH_i \le \gamma) \ln FD_{i,t} + \alpha_2 I(SH_i > \gamma) \ln FD_{i,t} + \\ & + \eta_1 I(SH_i \le \gamma) X_{i,t} + \eta_2 I(SH_i > \gamma) X_{i,t} + \phi^T (\mathbf{Controls}^*_{\mathbf{i,t}}) + \mu_i + p_t + \varepsilon_{i,t} \end{aligned} \quad (4)$$

where $\mathbf{Controls} - \mathbf{Controls}^* = \left\{ X : X \in \mathbf{Controls}\ ,\ X \notin \mathbf{Controls}^* \right\}$. Equation (4) differs from equation (3) 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 4.

[16] However, notice that the number of countries in the two groups is much lower than in the baseline case, leading to less precise estimations.

Table 3. Sensitivity to the sample

Sens. check	S5A	S6A	S7A	S8A	S9A	S10A	S11A	S12A	S13A	S14A	S15A
Complete obs. (min.)	6	3	default	default	default	default	default	default	default	default	default
Period	default	default	1970-2004	1980-2009	default	default	default	default	default	default	default
Countries	default	default	default	default	Developed	Developing	w/o LAC	w/o Asia	w/o MENA	w/o SSA	w/o West
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2											
ln(PCB_bottom)	0.0836	0.0685	0.1147	0.079	0.0214	0.0346	0.1108	0.0763	0.0709	0.0114	0.0731
	(0.017)	(0.047)	(0.007)	(0.066)	(0.421)	(0.417)	(0.004)	(0.025)	(0.032)	(0.722)	(0.047)
ln(PCB_upper)	-0.0805	-0.1113	-0.0614	-0.1073	-0.062	-0.0908	-0.0501	-0.1256	-0.1335	-0.08	-0.0775
	(0.009)	(0)	(0.034)	(0.003)	(0.008)	(0.003)	(0.138)	(0)	(0)	(0.001)	(0.072)
Wald test (pv)	0.225	0.087	0.090	0.103	0.193	0.037	0.040	0.075	0.165	0.055	0.080
γ	0.216	0.216	0.112	0.216	0.104	0.216	0.108	0.228	0.216	0.251	0.481
SH quartile	Q3	Q3	Q2	Q3	Q2	Q3	Q2	Q3	Q3	Q2	Q4
N	510	562	440	466	333	203	399	459	481	407	416
no. of countries	81	117	84	93	54	39	73	81	83	66	72
Jstat (pv)	0.225	0.290	0.179	0.188	0.119	0.786	0.199	0.486	0.299	0.013	0.377
no. of IVs	32	32	31	30	32	28	31	31	31	31	30

Notes: Robust p-values are in brackets. Developed countries: high income & upper-middle income countries, Developing countries: low income & lower-middle income countries. For further notes, see Table 1A.
Notations: LAC – Latin America & the Caribbean, MENA – Middle East & North Africa, SSA – Sub-Saharan Africa, West – Europe & North America

Table 4. Sensitivity to the threshold effect

Sens. check	S16A	S17A	S18A	S19A	S20A	S21A
X with.threshold effect	lag(lny)	lnGFCF	lag(lnHC)	ln(INFL)	ln(GovCons)	Polity2
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2						
ln(PCB_bottom)	0.0230	0.0322	0.0606	0.0666	0.0446	0.0773
	(0.421)	(0.199)	(0.017)	(0.019)	(0.142)	(0.026)
ln(PCB_upper)	-0.0518	-0.0819	-0.0714	-0.0952	-0.0461	-0.0713
	(0.099)	(0.015)	(0.044)	(0.006)	(0.098)	(0.022)
ln(X_bottom)	0.8976	-0.0097	0.2802	-0.0269	0.2456	0.0079
	(0.000)	(0.866)	(0.035)	(0.292)	(0.001)	(0.002)
ln(X_upper)	0.8027	0.3260	0.2746	-0.1878	-0.2115	0.0037
	(0.000)	(0.001)	(0.019)	(0.003)	(0.008)	(0.264)
γ	0.216	0.216	0.204	0.226	0.216	0.216
SH quartile	Q3	Q3	Q3	Q3	Q3	Q3
Jstat (pv)	0.084	0.072	0.159	0.166	0.175	0.244

Notes: Robust p-values are in brackets. In each case, N=536, no. of countries = 93, no. of IVs = 32. For further notes, see Table 1A.

In the case of the lagged GDP per capita, the lagged human capital, and Polity2, there does not seem to be any threshold effect (S16A, S18A, S21A). In the case of the other control variables, antiquity seems to matter in a contradictory way. In antique societies, inflation is more costly and government consumption retards growth – instead of enhancing it (S19A & S20A). So, from the perspective of the effect of these two policy variables, antiquity is detrimental just as in the case of financial development. On the other hand, as far as the effect of investments is concerned, antiquity is conducive (S17A). 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.[17] 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 bottom regime, although not always in a significant way, and significantly negative at the 10-percent level in the upper regime.

The final sensitivity check considers the control variables. We add the total volume of trade (lnTrade), the balance of trade (BoT), and a banking crisis measure to the baseline model one-by-one.[18] The banking crisis measure is of particular interest since the finance-growth nexus might be impaired by financial crises in the short run, and so it is important to control for such events (Loayza and Rancière, 2006). Despite this, we decided not to include the banking crisis measure in the baseline model since it is a simple sum of the dummy of crisis events, compiled by Laeven and Valencia (2018), in the underlying five-year period and can therefore be only considered as a fairly crude proxy for the economic consequences of financial collapse. As can be observed in Table 5, although the volume of trade and banking crisis are significant control variables, the results concerning the effect of antiquity on the finance-growth nexus are unchanged in each case (S22A-S24A).

As a final check, we also add the interaction of private credit with Polity2 in order to condition the effect of the former on the latter. Polity2 is a proxy for institutional quality, and so sensitivity check S25A addresses the concern whether our results are driven by the conditionality of the effect of financial development on institutional quality. It turns out not to

[17] In the case of government consumption, the adverse effect of antiquity might be explained by similar arguments as in the case of the finance-growth nexus: in more ancient societies rent-seeking is more prevalent, the state tends to be captured by interest groups leading to corruption in government spending, and an impaired growth effect of the latter.

[18] For the sources of these data, see Table A1.

be the case: the threshold effect in the finance-growth nexus is unchanged, while the introduced interaction proves to be highly insignificant.

Table 5. Sensitivity to the control variables

Sens. scenario	S22A	S23A	S24A	S25A
Add. control	*lnTrade*	*BoT*	*Banking crisis*	*lnPCB*Polity2*
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2				
Add. control	-0.1352	0.0014	-0.0237	-0.001
	(0.014)	(0.629)	(0.000)	(0.674)
ln(PCB_bottom)	0.069	0.0788	0.0555	0.0849
	(0.078)	(0.044)	(0.100)	(0.016)
ln(PCB_upper)	-0.0997	-0.1141	-0.0362	-0.1056
	(0.002)	(0)	(0.087)	(0.000)
Wald test (pv)	0.093	0.060	0.053	0.157
γ	0.216	0.216	0.135	0.216
SH quartile	Q3	Q3	Q3	Q3
N	536	536	431	536
no. of countries	93	93	82	93
Jstat (pv)	0.534	0.331	0.210	0.264
no. of IVs	34	34	32	34

Notes: Robust p-values are in brackets. 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 of economists 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 is harmed 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 prove our theory, we followed a two-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 characterize older societies to a larger extent. 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 118 countries and 45 years (1970-2014). 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. Based on our theoretical model and empirical results, we deliver robust 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 non-linear 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 tried to be 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 empirical 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, such as the *investment-growth* nexus or the *government expenditures-growth* nexus. The exploration of these is a subject for future research.

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Appendix

Table A1. The list of countries

Baseline set of countries				Additional 23 countries included in sensitivity checks S6#
Algeria	Dominican Rep.	Korea, Rep.	Saudi Arabia	Albania
Argentina	Ecuador	Madagascar	Senegal	Armenia
Australia	Egypt	Malawi	Sierra Leone	Benin
Austria	El Salvador	Malaysia	Singapore	Cambodia
Bangladesh	Fiji	Mali	South Africa	Croatia
Belgium	Finland	Mauritius	Spain	Czech Republic
Bolivia	France	Mexico	Sri Lanka	Estonia
Botswana	Gabon	Morocco	Sudan (former)	Germany
Brazil	Gambia	Mozambique	Swaziland	Haiti
Bulgaria	Ghana	Nepal	Sweden	Kazakhstan
Burkina Faso	Greece	Netherlands	Switzerland	Kyrgyzstan
Burundi	Guatemala	New Zealand	Syrian Arab Rep.	Latvia
Cameroon	Honduras	Nicaragua	Tanzania	Lithuania
Canada	Hungary	Niger	Thailand	Moldova
Central African Rep.	India	Nigeria	Togo	Mongolia
Chile	Indonesia	Norway	Trinidad & Tobago	Romania
China	Iran, Islamic Rep.	Pakistan	Tunisia	Russia
Colombia	Ireland	Panama	Turkey	Slovakia
Congo, Dem. Rep.	Israel	Paraguay	Uganda	Slovenia
Congo, Rep.	Italy	Peru	United Kingdom	Ukraine
Costa Rica	Jamaica	Philippines	United States	Vietnam
Cote d'Ivoire	Japan	Poland	Uruguay	Yemen
Cyprus	Jordan	Portugal	Venezuela	Zimbabwe
Denmark	Kenya	Rwanda		

Notes: In the case of private credit, the baseline country sample does not include Bangladesh and the Democratic Republic of the Congo.

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 (rgdpna) – both series are taken from PWT 9.0.
Private credit	PCB	% of GDP	GFDD	Private credit by deposit money banks (code: GFDD.DI.01)
Domestic credit	DC	% of GDP	GFDD	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 average change of consumer prices (code: FP.CPI.TOTL.ZG)
General government final consumption expenditure	GovCons	% of GDP	WDI	code: NE.CON.GOVT.ZS
Balance of foreign trade	BoT	% of GDP	WDI	Code: NE.RSB.GNFS.ZS
Volume of foreign trade	Trade	% of GDP	WDI	import + export of goods and services (code: NE.TRD.GNFS.ZS)
Banking crisis	Banking crisis	[0 ; 5]	Laeven and Valencia (2018)	The original data is a dummy variable taking on value 1 if there was a systemic banking crisis in the given year, 0 otherwise. In the 5-year panel, the sum of the underlying years is used.
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.
Social violence	Violence	[0 ; 300]	Major Episodes of Political Violance (1946-2018) Center for Systemic Peace	The 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.
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: 3500BCE-1950CE *1500*: period included: 3500BCE-1500CE *adj*: adjustment for ancestry based on the World Migration Matrix (1500-2000, version 1.1) of Putterman and Weil (2010). For further details, see Section 3.
Agricultural years	AgrY#		Putterman and Trainor (2018)	The number of years since the Neolithic Revolution # = none / adj *adj:* adjustment for ancestry based on the World Migration Matrix (1500-2000, version 1.1) of Putterman and Weil (2010). For further details, see Section 3.
Legal origin dummies	-		La Porta et al. (2008)	German, French, English, and Scandinavian legal origins are distinguished
Continent dummies	-		own categorization	Constructed dummies: Asia, Sub-Saharan Africa, Middle East & North Africa, Europe, Latin America & the Caribbean (North America and Oceania constiute the reference group.)
Latitude			Spolaore and Wacziarg (2013)	Latitude for the centroid (center point) of a country

Notes: PWT 9.0 – Penn World Table (version 9.0) (Feenstra at el., 2015); WDI – World Development Indicators database (World Bank); GFDD – Global Financial Development Database (World Bank)

Table A3. Correlation matrix of the baseline sample: 95 countries (see Table A1.) & 1970-2014 (5-year periods)

	ln(y)	lnPCB	lnDC	SH1950 (d=1%)	SH1950 (d=0%)	SH1950 (d=2%)	SH1950 (d=5%)	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj	lnGFCF	lag(lnHC)	lnINFL	lnGovC	Violence	Polity2	lnTrade	BoT
lnPCB	0.702*	1																		
lnDC	0.715*	0.976*	1																	
SH1950 (d=1%)	0.240*	0.272*	0.240*	1																
SH1950 (d=0%)	0.210*	0.234*	0.206*	0.989*	1															
SH1950 (d=2%)	0.259*	0.298*	0.264*	0.993*	0.964*	1														
SH1950 (d=5%)	0.285*	0.334*	0.295*	0.934*	0.874*	0.970*	1													
SH1950adj	0.406*	0.399*	0.390*	0.874*	0.878*	0.856*	0.784*	1												
SH1500	0.229*	0.250*	0.225*	0.990*	0.992*	0.970*	0.884*	0.874*	1											
SH1500adj	0.400*	0.377*	0.376*	0.823*	0.843*	0.790*	0.686*	0.983*	0.847*	1										
AgrY	0.275*	0.272*	0.240*	0.813*	0.816*	0.797*	0.734*	0.715*	0.808*	0.677*	1									
AgrYadj	0.482*	0.418*	0.410*	0.611*	0.630*	0.585*	0.509*	0.804*	0.620*	0.811*	0.801*	1								
lnGFCF	0.488*	0.450*	0.458*	0.258*	0.235*	0.271*	0.281*	0.316*	0.251*	0.305*	0.218*	0.297*	1							
lag(lnHC)	0.840*	0.649*	0.672*	0.125*	0.094*	0.148*	0.183*	0.273*	0.114*	0.269*	0.182*	0.386*	0.344*	1						
lnINFL	-0.125*	-0.264*	-0.197*	-0.048	-0.042	-0.052	-0.053	-0.014	-0.051	-0.014	-0.031	0.003	-0.187*	-0.089	1					
lnGovCons	0.385*	0.348*	0.342*	0.080	0.079	0.079	0.074	0.038	0.088	0.042	0.152*	0.102*	0.234*	0.323*	-0.113*	1				
Violence	-0.233*	-0.196*	-0.180*	0.203*	0.218*	0.185*	0.138*	0.136*	0.208*	0.130*	0.176*	0.082	-0.131*	-0.187*	0.116*	-0.217*	1			
Polity2	0.510*	0.465*	0.473*	-0.016	-0.047	0.009	0.057	0.099*	-0.036	0.086	-0.006	0.187*	0.148*	0.655*	-0.043	0.190*	-0.113*	1		
lnTrade	0.279*	0.304*	0.262*	-0.131*	-0.134*	-0.127*	-0.122*	-0.098*	-0.112*	-0.070	-0.076	-0.023	0.289*	0.253*	-0.218*	0.291*	-0.299*	0.120*	1	
BoT	0.504*	0.179*	0.187*	0.022	-0.013	0.051	0.104*	0.101*	0.007	0.090	0.030	0.117*	0.076	0.376*	-0.037	-0.015	-0.063	0.127*	0.088	1
Banking crisis	-0.008	0.021	0.022	-0.067	-0.075	-0.058	-0.033	-0.068	-0.079	-0.080	-0.019	-0.037	-0.125*	0.033	0.234*	0.018	0.040	0.013	-0.064	0.036

Notes: Pairwise correlations. The asterisk denotes significance at the 1-percent level.

Table A4. Summary statistics of the baseline sample: 95 countries (see Table A1.) & 1970-2014 (5-year periods)

	ln(y)	lnPCB	lnDC	SH1950 (d=1%)	SH1950 (d=0%)	SH1950 (d=2%)	SH1950 (d=5%)	SH1950adj	SH1500	SH1500adj	AgrY	AgrYadj	lnGFCF	lag(lnHC)	lnINFL	lnGovCons	Violence	Polity2	lnTrade	BoT	Banking crisis
Obs	852	819	819	95	95	95	95	95	95	95	95	95	800	842	813	816	849	849	824	824	739
Mean	8.859	3.255	3.355	0.227	0.174	0.280	0.405	0.276	0.168	0.224	4457	5216	3.027	0.658	4.752	2.651	3.79	2.58	4.047	-3.2	0.39
Std.Dev.	1.214	0.934	0.942	0.181	0.160	0.201	0.233	0.155	0.190	0.165	2381	2055	0.331	0.349	0.347	0.355	8.32	7.07	0.560	9.6	0.97
Min	5.841	-0.709	-0.468	0.007	0.005	0.011	0.024	0.022	0.000	0.000	362	1400	1.376	0.007	4.575	1.406	0	-10	1.916	-48.9	0
Max	11.456	5.505	5.509	0.739	0.746	0.729	0.860	0.727	0.760	0.747	10500	10375	4.187	1.305	8.783	3.704	65	10	6.018	47.4	5

Table A5. Sensitivity to the GMM settings (FD = domestic credit)

Sens. check	S1B	S2B	S3B	S4B
Weighting matrix	default	default	default	cross-country & -time heteroskedasticity
Internal IV	default	default	1st order lags	default
External IV	legal origin	none	default	defaut
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2				
ln(DC_bottom)	0.0864	0.1272	0.1421	0.0542
	(0.019)	(0.002)	(0.001)	(0.121)
ln(DC_upper)	-0.0805	-0.0548	-0.0346	-0.0934
	(0.024)	(0.163)	(0.406)	(0.004)
Wald test (pv)	0.087	0.163	0.040	0.067
γ	0.216	0.108	0.204	0.216
SH quartile	Q3	Q2	Q3	Q3
N	544	544	614	544
no. of countries	95	95	95	95
Jstat (pv)	0.054	0.030	0.644	0.003
no. of IVs	26	23	25	32

Notes: Robust p-values are in brackets. For further notes, see Table 1A.

Table A6. Sensitivity to the sample (FD = domestic credit)

Sens. check	S5B	S6B	S7B	S8B	S9B	S10B	S11B	S12B	S13B	S14B	S15B
Complete obs. (min.)	6	3	default	default	default	default	default	default	default	default	default
Period	default	default	1970-2004	1980-2009	default	default	default	default	default	default	default
Countries	default	default	default	default	Developed	Developing	w/o LAC	w/o Asia	w/o MENA	w/o SSA	w/o West
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2											
ln(DC_bottom)	0.0752	0.0553	0.0693	0.0569	0.0158	0.0511	0.0278	0.0749	0.0632	0.0163	-0.1663
	(0.011)	(0.055)	(0.026)	(0.099)	(0.497)	(0.157)	(0.313)	(0.004)	(0.027)	(0.558)	(0.003)
ln(DC_upper)	-0.0690	-0.0898	-0.0795	-0.1035	-0.0579	-0.0386	-0.1009	-0.0987	-0.1134	-0.0734	0.0378
	(0.04)	(0.004)	(0.019)	(0.001)	(0.008)	(0.384)	(0)	(0.003)	(0.001)	(0.001)	(0.231)
Wald test (pv)	0.127	0.063	0.060	0.055	0.235	0.045	0.015	0.050	0.080	0.040	0.000
γ	0.216	0.216	0.204	0.216	0.104	0.216	0.388	0.228	0.216	0.228	0.039
SH quartile	Q3	Q3	Q3	Q3	Q2	Q3	Q3	Q3	Q3	Q2	Q1
N	512	570	448	471	336	208	407	462	488	413	424
no. of countries	81	118	87	95	54	41	75	82	85	67	74
Jstat (pv)	0.077	0.085	0.051	0.049	0.092	0.404	0.082	0.198	0.117	0.009	0.219
no. of IVs	32	32	31	30	32	28	31	31	31	31	30

Notes: Robust p-values are in brackets. Developed countries: high income & upper-middle income countries, Developing countries: low income & lower-middle income countries. For further notes, see Table 1A.
Notations: LAC – Latin America & the Caribbean, MENA – Middle East & North Africa, SSA – Sub-Saharan Africa, West – Europe & North America

Table A7. Sensitivity to the threshold effect (FD = domestic credit)

Sens. check	S16B	S17B	S18B	S19B	S20B	S21B
X with.threshold effect	lag(lny)	lnGFCF	lag(lnHC)	ln(INFL)	ln(GovCons)	Polity2
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2						
ln(DC_bottom)	0.0338	0.0414	0.0533	0.0658	0.0543	0.0611
	(0.221)	(0.132)	(0.021)	(0.012)	(0.084)	(0.032)
ln(DC_upper)	-0.0540	-0.0843	-0.0693	-0.0782	-0.0279	-0.0634
	(0.127)	(0.025)	(0.059)	(0.021)	(0.363)	(0.05)
ln(X_bottom)	0.9046	0.0098	0.2982	-0.0628	0.2303	0.0075
	(0)	(0.875)	(0.023)	(0.004)	(0)	(0.002)
ln(X_upper)	0.8188	0.3068	0.2525	-0.1318	-0.1640	0.0055
	(0)	(0.002)	(0.043)	(0.005)	(0.028)	(0.087)
γ	0.216	0.216	0.216	0.226	0.216	0.204
SH quartile	Q3	Q3	Q3	Q3	Q3	Q3
Jstat (pv)	0.044	0.035	0.064	0.069	0.099	0.062

Notes: Robust p-values are in brackets. In each case, N= 544, no. of countries = 95, no. of IVs = 32. For further notes, see Table 1A.

Table A8. Sensitivity to the control variables (FD = domestic credit)

Sens. scenario	S22B	S23B	S24B	S25B
Add. control	*lnTrade*	*BoT*	*Banking crisis*	*lnPCB*Polity2*
Control variables: lag(lny), ln(GFCF), lag(ln(HC)), ln(INFL), ln(GovCons), Violence, Polity2				
Add. control	-0.0814	0.0010	-0.0262	-0.0043
	(0.116)	(0.722)	(-0.004)	(0.017)
ln(DC_bottom)	0.0680	0.0674	0.0341	0.0732
	(0.024)	(0.035)	(0.013)	(0.012)
ln(DC_upper)	-0.0808	-0.0938	-0.0546	-0.1162
	(0.014)	(0.003)	(0.073)	(0)
Wald test (pv)	0.000	0.080	0.010	0.000
γ	0.216	0.216	0.202	0.228
SH quartile	Q3	Q3	Q3	Q3
N	544	544	439	544
no. of countries	95	95	85	95
Jstat (pv)	0.153	0.091	0.146	0.089
no. of IVs	34	34	32	34

Notes: Robust p-values are in brackets. For further notes, see Table 1A.

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