The persistent institutional effect of liberal colonialism: evidence from China’s financial policies

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ABSTRACT
The effect of liberal colonialism on the allocation of capital persists to this day. We exploit the colonial history of China during 1896-1911 with qualitative evidence to measure liberal colonialism. We document that liberal colonialism promotes the subsequent efficiency of financial policies on the capital allocation in 2004 through the quality of economic institutions.

KEYWORDS
Liberal colonialism; economic institutions; allocative efficiency; China

JEL CLASSIFICATION
P34; N45; P26

I. Introduction

Over the last decades, numerous studies have investigated the impact of colonialism on the recent development. A number of works analyse the long-term effects of colonialism on economic development (Acemoglu, Johnson, and Robinson 2001, 2002; Head, Mayer, and Ries 2010; Mizuno and Okazawa 2009) or political development (Lange 2003; Olsson 2009). To the best knowledge, this article offers a first attempt to explore how colonialism affects the allocative efficiency of financial policies. Motivated by the research question, this article will show that liberal colonialism defined by Lange, Mahoney, and Vom Hau (2006) creates an institutional comparative advantage this day to promote the efficiency of financial policies on capital allocation. Therefore, we contribute by enhancing the understanding of colonialism and economic institutions.

This article uses the World Bank Investment Climate Survey undertaken in 2005 for China to investigate the effect of interest with novelty. First, following the approach of Lange, Mahoney, and Vom Hau (2006), we exploit the history of China’s colonialism with qualitative evidence to identify that a bit more than half of the surveyed cities experienced liberal colonialism during 1896–1911. This research avoids the limitation of cross-country studies; it explores the colonial power in the same country to control for the impacts of heterogeneity in the political system, culture and other macro factors.

Second, the existing literature does not measure the allocative efficiency of financial policies, but we refer to Wurgler’s method (Wurgler 2000) to estimate it by the elasticity of value added on the (positive) change of financial access. Because financial policies should allocate capitals to growing firms, the higher elasticity reflects the better capital allocation of financial policies. In particular, to the best of our knowledge, only the survey captures the information on a firm’s financial-access change due to the government’s financial policies. This may explain why the existing literature does not investigate the allocative efficiency of financial policies.

We follow the methodology of Acemoglu et al. (2011) to explore the persistent effect of liberal colonialism. First, we conduct the reduced-form estimates to show that financial policies in 2004 have higher efficiency on capital allocation in the cities that are historically controlled by liberal colonists during 1896–1911. Because our proxy for liberal colonialism may include other noise, we further control for confounding factor and find that confounders are insignificantly related to outcome variables. We also conduct the test suggested by Altonji, Todd, and Christopher (2005) to reveal that the omitted-variables bias is negligible. These findings jointly indicate that the effect of liberal colonialism on the allocative efficiency of financial
policies tends to\(^1\) be robust to the potential endogeneity bias.

Second, we conduct instrumental variable (hereafter IV) estimation to test whether liberal colonialism affects the allocative efficiency of financial policy through the quality of economic institutions (hereafter, institutional quality). For one thing, we find that institutional quality instrumented by liberal colonialism is significantly and positively related to the allocative efficiency. For another, we conduct a series of tests to confirm that liberal colonialism has no direct effect on the allocative efficiency except through institutional quality. Our IV estimates\(^2\) the document that liberal colonialism during 1896–1911 creates a variation in institutional quality to causally promote the allocative efficiency of financial policies in 2004.

Despite theoretical contribution, this article offers applications to historically colonized countries. As Wurgler (2000, 188) points out, ‘a fundamental job of the economy is to allocate capital efficiently.’ This article suggests that most developing countries need to design their financial policies with consideration of their sources of economic institutions. By contrast with the existing literature such as Legal Original Theory (La Porta et al. 1997, 1998; La Porta, Lopez-de-Silanes, and Shleifer 2008) using the source of economic institutions to explain the development of the financial sector, this article shed insight on the allocative efficiency of financial policies. Specifically in China, most of the product of colonial power disappears because of wars, political changes and economic reforms since 1912; whereas the laws and other types of economic institutions are developed. For example, the Qing government in 1908 established the first constitution in China’s history (Cheng 2017). Therefore, this article justifies the application to the allocation of capital from the historical perspective.

The next section introduces the research background and explains our hypothesis. Section III introduces data and describes the measurement of variables. Section IV conducts the reduced-form estimation to investigate the direct effect of liberal colonialism, whereas Section V conducts IV estimation to examine the indirect effect of interest through institutional quality. Section VI concludes.

II. Liberal colonialism as exogenous source of economic institutions in China

In ancient China, the government adopts authority to govern the society instead of laws. After more than 2000 years, the Qing Dynasty (1644–1911) has developed the centralization of politics in peak condition. Specifically, laws are only used to maintain governance and guarantee the authority of the state. Thus, the public pins the hope of the enforcement of laws and contracts on honest and upright officials instead of economic institutions.

The authority-centred governance is destroyed by colonial powers at the end of the nineteenth century. After a series of defeats, the Qing government was forced to allow colonial powers into China during 1896–1899. The colonizers after 1895 launched serious competition and even wars (such as the war in 1905 between Russia and Japan) to control their regions. Not to mention wars, the competition ended up with formal agreements about the division of China for their colonial influence (Hu 1956). Hence, we can identify the regions under colonial powers with reference to those agreements and relevant historical evidence. For clarity, we list the source of the colonial power and the corresponding regions (Twichett and Fairbank 2008) in Table 1.

As Acemoglu, Johnson, and Robinson (2001) and Acemoglu and Robinson (2012) suggest, the colonialism can be classified as “extractive colonialism” versus ‘settler colonialism’ or ‘direct colonialism’ versus ‘indirect colonialism.’ By contrast, Lange, Mahoney, and Vom Hau (2006) define colonialism to be extractive or liberal. In particular, liberal colonialism introduces inclusive (economic) institutions, but it does not rely on the settlement or direct control emphasized by Acemoglu, Johnson, and Robinson.

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\(^1\)If we assume that the liberal colonialism during 1896–1911 is exogenous for the allocative efficiency of financial policies in 2004, we can expect a causal effect of the former on the latter. In fact, we will theoretically justify the assumption in Section II and empirically confirm it in later instrumental variable estimation.

\(^2\)For the cautiousness, we here use ‘tends to be’ instead of ‘is.’

\(^3\)In theory, IV strategy identifies a mediation effect of the variable of interest through the IV on the dependent variable. This explains a number of literature uses IV estimation to show the mediation effect (e.g., Bretschger, Kappel, and Werner 2012). In comparison, it requires the IV has only one channel (mediator) to affect the variable of outcome, so it is more strict than the traditional mediation-effect estimation, but it helps identify the causal effect from the IV on the variable of outcome through the channel.
2001, 2002) and Acemoglu and Robinson (2012). With reference to historical materials, the latter classification is more practically founded in China’s history. We will justify the existence of extractive and liberal colonialisms in the next subsections.

### Extractive colonial powers in China

With reference to the history, we can identify that the colonial powers of France and Russia were extractive. French colonists planned to establish a prospective settlement, but their colonial power was mainly used for opium trades, pornography businesses and gambling abuse (see Lu 2006). The resources were extracted and transferred to develop their colonial settlement in Vietnam. In fact, it is impractical for the French to construct settler institutions because the public has a strong political resistance to the French. The Qing government and France had a war during 1883–1885. The Qing government compromised with France to assign treaties, but France actually experienced a series of military failures. Thus, the public did not accept the compromise to France; the French had no incentive to cooperate with the Chinese people. Consequently, the French colonists exerted effort mainly in resource extraction or illegal businesses.

Russia had a settlement in Northern China, but the Qing government succeeded to regain the territories soon. Thus, it seemed impossible to construct inclusive institutions. More particularly, Russian colonists were so greedy to extract economic resources that they conducted massacre laids with military force in their controlled regions (Chen, Yao, and Feng 1958). Practically speaking, because Russia’s controlled regions in China were far away from its political and economic centre, Russian colonists did not create settler institutions to their controlled regions, neither.

As explained above, the regions controlled by France and Russia might construct rules for trades, but the rules were designed for extraction on resources with military force. Hence, it could not foster market-oriented institutions for subsequent development.

### Liberal colonial powers in China

The other colonist-controlled regions in China’s history got modern economic institutions transplanted. These colonial powers are of interest in this article, so we especially explain why these powers are better qualified as liberal colonialism rather than those defined by Acemoglu, Johnson, and Robinson (2001, 2002). First, the Great Britain has the most important impact on Qing-age China, but its colonial power is neither extractive nor constructed by settlers. It started the first opium war to open China’s door with forced treaties and launched the second opium war to force the Qing government to enforce treaties. Both of these two wars were mainly oriented to international trades between the Qing government and the Great Britain, so the colonial power of the Great Britain is not extractive colonialism. After 1895, the Great Britain extended its colonial power, but it did not directly govern the regions. The Great Britain had settlements in Shanghai and Tianjin, but those cities were also open to other colonial countries and the majority of Shanghai and Tianjin were still controlled by the Qing government. Thus, the Great Britain (almost) did not construct settler colonialism in mainland China.

Moreover, the colonialism of the Great Britain belonged to neither direct nor indirect colonialism. As Table 1 shows, the Great Britain’s colonial power was mainly in the mid and lower reaches of the Yangtze River. However, the Qing government had allowed local governments to control those regions to

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3 As an exception, Hong Kong is ceded to the Great Britain. The cession is the evidence of settler colonialism, but Hong Kong is a very small island of China. More practically, this article focuses on the mainland China, so it is ignored.
quell the Taiping Rebellion (1851–1864), so the Great Britain could not directly govern these regions with the approval of the Qing government. Not to mention the direct colonialism, the indirect colonialism was not really founded in those regions. One of the representative examples was the concession of Guangdong–Wuhan Railway. The central government had been forced to award the rail concession to the Great Britain, but the local governments in Hunan and Hubei Provinces succeeded in failing the concession except the section of railway in Guangdong that had been constructed. Those local governments welcomed the trades with the Great Britain, but they had very strong political resistance to the foreign governance.

As shown above, even the Great Britain did not employ settler colonialism on China and could not employ direct/indirect governance in the Qing dynasty. However, it could exploit the economic benefits by constructing liberal colonialism. The British businessmen realized that tea and silk from China had a large demand in the UK, so they chose to occupy the market of the regions that produced these two products (Sa and Pan 1996). Hence, the British colonizer required the Qing government to liberalize its trade in its controlled regions, thereby breeding the spirit of contract and property rights.

Similar to the Great Britain, German and Japan could only focus on exploiting comparative advantage in trades, so they also employed liberal colonialism. As an example, German creates the first institution of modern land transaction in China’s history. Because of the transplanted land institutions, the Qingdao city controlled by German was urbanized fast but without economic instability (Zheng 2018). Japan invested with a big growth size in finance, timber and other businesses in Fujian Province (Zhang 2007); at the same time, with reference to the available historical materials (e.g. Chen, Yao, and Feng 1958), few evidence shows that the colonial power of Japan illegally extracts economic resources in Fujian.

There may be some small-scale political conflicts at the early stage in regions controlled by the liberal colonists, but the colonialism bred economic institutions for later development. The colonial powers imposed their own civil administration within their respective domains of control; thereby fostering modern legal and police systems in China (Dong, Zhang, and Jiao 2000). For one thing, foreign powers forced the Qing government to assign treaties to protect their business in China; thus, the government could not expropriate the business attached to foreigners. Foreign investments and properties started to be legally protected. Because domestic investors could seek connection with foreigners, the protection generated a positive externality for the investment climate. For another, lawsuits in these regions were adjudicated with reference to the legal systems of respective reigning foreign powers (e.g. Yang and Ye 1993; Tan 1996). Thus, the spirit of contract in the western (economic) institutions is transplanted in these regions. Therefore, we argue that the regions controlled by liberal colonists were developed for liberalization.

Hypotheses: the persistent effect of liberal colonialism

Given the above historical background, we can measure liberal colonialism with the identities of colonial powers and the qualitative evidence. Specifically, we construct the dummy for those regions controlled by the Great Britain, Germany and Japan, i.e. the dummy for liberal colonialism. We argue that liberal colonialism is an exogenous source of economic institutions for the following two reasons.

First, the liberal colonists selected their sphere of colonial power by their political or economic benefits without consideration of the Qing government and the Chinese. The Great British chose to occupy those regions for imports of tea and silk from China (Sa and Pan 1996). The territorial occupation of Germany was a result of bargaining and negotiation with other foreign powers (China History Society, 1959). Japan failed to compete with Germany and then

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4 Opium is not really relevant in trades between the Qing government and the Great Britain. Given that the opium trade cannot be prohibited, the Qing government encouraged the Chinese farmers to grow opium. As a result, the Chinese beat the foreign suppliers for the opium competition (Li 1957).

5 In fact, Shanghai and Tianjin are also settlements. We do not include them because they are governed by multiple colonists so that cannot be identified objectively as liberal colonialism or not. Moreover, Japan’s colonialism during 1931–1945 is mercantilist colonialism, but its militarism was still constrained in its early colonialism process in the later Qing dynasty. More practically, we can drop the Japan colonial power in the period and our results are robust.
chose to occupy Fujian that is close to its southern territories. Ironically, the Qing government cannot participate in the bargaining and affect the competition among colonists, so the distribution of colonial power is exogenous for the Qing government and most Chinese at that time.

Second, the liberal colonialism affects the present development only through economic institutions with reference to the relevant literature. It can introduce the innovation product of modern society involving enterprise and bank and other systems (Acemoglu and Robinson 2012), but only economic institutions as historical product in China remain this day. After subsequent revolution, wars and political chaos in China, the People Republic of China taken over all foreign firms, banks, association and other foreign-related organizations in 1949. Moreover, it initiated the socialist transformation during 1953–1956 to control all economic activities with plans and commands. The Cultural Revolution during 1966–1976 destroyed all foreign and traditional products (Walder 2014). Fortunately, the economic institutions as non-physical foreign heritage remained there and were redeveloped again after the open-door policy since 1978.

Given the above argument, we first predict that liberal colonialism introduces modern economic institutions and then endows an institutional comparative advantage to the cities historically affected by liberal colonialism. This prediction is in line with the theory of institutional comparative advantage (Levchenko 2007, 2013). Specifically, liberal colonists forced the Qing government to uphold private property, encourage commercial production, and enforce the rule of law for their sake (Lange et al., 2006: 1416); but they created the first institutional shock to constrain governmental expropriation in China’s history. Second, we expect that the institutional comparative advantage promotes the allocation of credit (Djankov, McLiesh, and Shleifer 2007), which is more generally the conclusion of the law-and-economics literature (e.g. La Porta et al. 1997, 1998; La Porta, Lopez-de-Silanes, and Shleifer 2008).

To combine the above expectations, we hypothesize that liberal colonialism promotes the allocative efficiency through economic institutions. We will test whether (1) there is a positive relationship between liberal colonialism and the allocative efficiency of financial policies; (2) the variation of institutional quality created by liberal colonialism causally and positively determines the allocative efficiency.

### III. Data and variables

#### Data

The 2005 World Bank Investment Climate Survey data we use have high quality. First, the survey obtains samples from the universe of registered businesses and follows a stratified random sampling methodology. Because of the random sampling methodology, the survey data are not subject to self-selection bias. Moreover, the sampled firms are representative of the country geographically, industrially, and in firm size. The survey includes 12,400 firms located in 120 cities of 30 provinces, whereas only Tibet, Hong Kong, Macao and Taiwan, are excluded from the survey. This is desirable because institutional background in those areas is different from the other provinces. At the same time, the survey covers firms of different sizes in all of China’s manufacturing industries.

More practically, this survey provides information to measure the allocative efficiency of capital. For one thing, it provides balance-sheet information in 2004 to calculate value added (sales minus cost of intermediate goods). For another, as mentioned before, it investigates the surveyed firm’s change of financial access after financial policies implemented since the end of 2003. Thus, we can estimate the allocative efficiency of financial policies, which will be described in the next subsection. Additionally, the survey provides information about the city in 2003, some of which we can use to be control variables.

#### The measurement of the allocative efficiency

We follow Wurgler’s approach (Wurgler 2000) to measure the allocative efficiency of the financial policies as the following.

\[
\Delta Fa_{i,j} = C_j + \theta_j \ln(1 + VA_{i,j,2004}/VA_{i,j,2003}) + \epsilon_{i,j}
\]

(1)

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6In China’s more than 2000 years of feudalism history, a hierarchical regime and the Confucian ideology of ‘putting agriculture before business culture’ (Brook, 1998) results in the lack of the protection on business. As Landes (2006, 6) says, ‘China lacked a free market and institutionalized property rights.’
where \( \Delta FA \) is the change (i.e. improvement) of the surveyed firm’s financial access, whereas \( VA \) is the value added in 2004 or 2003. The subscripts \( i \) and \( j \) refer to firm and city, respectively. In principle, efficient financial policies should allocate capitals to growing firms, so we measure the allocative efficiency by the elasticity of value added (\( VA \)) on the potential improvement of financial access (\( \Delta FA \)), i.e. \( \theta \). The survey requires a responder to report the (positive) change of financial access after the financial policies on a scale from 1 to 5: (1) Can’t get a loan, (2) much more difficult, (3) a little bit more difficult, (4) No change and (5) easier. Given that most firms’ financing relies on credits in China and other most developing countries (Ayyagari, Demirguc-Kunt, and Maksimovic 2012); thus, this question reflects a firm’s access to finance and this measure with focus on loans is a most standardized one in the micro-institutional literature (see Ayyagari, Demirguc-Kunt, and Maksimovi 2010; Fu 2017).

Given that \( \Delta FA \) is measured on a scale, we use Ordinal Logit (Ologit) method for estimation to obtain the allocative efficiency measures of 120 surveyed cities. For robustness, we also use the OLS method. The corresponding measure of the allocative efficiency will lead to the same finding. As Table 2 presents, the allocative efficiency generated by OLS seems significantly less than that by Ologit method, but Table 3 shows that the former is highly related to the latter, i.e. the correlation coefficient equals 0.963. More formally, we will show in Section 4 that the former will generate the same finding as the latter does.

**Liberal colonialism**

As explained in Section 2, we construct a dummy to measure liberal colonialism with the identity of the city. If the city was controlled by the Great Britain, Germany and Japan during the late Qing dynasty, the dummy equals to 1. Specifically, these colonists controlled provinces including Guizhou, Sichuan, Hubei, Hunan, Jiangxi, Anhui, Jiangsu, Henan, Zhejiang, Shandong and Fujian since 1896–1899 to 1911. When the surveyed firm is located in a city of those provinces, we can identify the firm is embedded in a city historically controlled by liberal colonists.

As Table 1 shows, there are a bit more than half of the surveyed cities were historically controlled by liberal colonialism; i.e. the mean of the dummy equals 0.576. Recall that the survey we use randomly sample firms but select the cities on the basis of the economic size. Thus, the dummy indicates liberal colonialism is significant for China’s development.

**The quality of economic institutions**

The survey asks responders to report ‘In commercial or other legal disputes, what percent of cases were your company’s legal contracts or properties protected (a favourable verdict was passed and

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**Table 2. Descriptive statistics.**

| Variable | Obs | Mean | Median | SD | Min | Max |
|----------|-----|------|--------|----|-----|-----|
| Allocative efficiency (Ologit) | 120 | 0.296 | 0.261 | 0.792 | –2.686 | 2.895 |
| Allocative efficiency (OLS) | 120 | 0.198 | 0.163 | 0.421 | –1.211 | 1.628 |
| Liberal colonialism | 118 | 0.576 | 0 | 0.496 | 1 |
| Institutional quality (mean) | 120 | 63.731 | 66.739 | 16.828 | 26.95 | 96.167 |
| GDP per capita | 120 | 9.654 | 9.637 | 0.645 | 11.184 |
| GDP growth | 120 | 22.872 | 21.674 | 12.182 | 8.241 | 132.538 |
| Population | 120 | 6.196 | 6.257 | 0.529 | 4.840 | 7.927 |
| Distance to port | 120 | 4.842 | 5.534 | 2.267 | 0 | 8.313 |
| Political resource | 120 | 0.367 | 0 | 0.484 | 0 | 1 |

Allocative efficiency (Ologit) refers to the allocative efficiency in 2004 of financial policies implemented since the end of 2003, which is estimated with Ordinal Logit method according to the approach of Wurgler (2000). Allocative efficiency (OLS) is that with the OLS method.

**Table 3. Correlation matrix.**

|   | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
|---|-----|-----|-----|-----|-----|-----|-----|-----|
| (1) Allocative efficiency (Ologit) | 1 | | | | | | | |
| (2) Allocative efficiency (OLS) | 0.963 | 1 | | | | | | |
| (3) Liberal colonialism | 0.170 | 0.172 | 1 | | | | | |
| (4) Institutional quality (mean) | 0.025 | 0.067 | 0.332 | 1 | | | | |
| (5) GDP per capita | –0.008 | 0.015 | –0.143 | 0.031 | 1 | | | |
| (6) GDP growth | 0.113 | 0.082 | 0.179 | –0.071 | –0.176 | 1 | | |
| (7) Population | 0.031 | 0.020 | 0.303 | 0.141 | –0.167 | 0.182 | 1 | |
| (8) Distance to port | 0.072 | 0.124 | –0.136 | –0.272 | –0.385 | 0.106 | –0.065 | 1 |
| (9) Political resource | 0.089 | 0.089 | 0.064 | 0.040 | 0.009 | 0.126 | 0.160 | 0.085 |

Allocative efficiency (Ologit) refers to the allocative efficiency in 2004 of financial policies implemented since the end of 2003, which is estimated with Ordinal Logit method according to the approach of Wurgler (2000). Allocative efficiency (OLS) is that with the OLS method.
enforced). This question not only reveals the information on property rights protection (Fu and Jian 2018) but also explicitly mentions enforcement of verdict, so it reflects the quality of economic institutions at vertical and horizontal dimensions (North, 1990). Considering that the survey data are at the firm level, we use the average value among firms in the city to measure the institutional quality in the percentage form.

**Control variables**

We first control for the natural log of GDP per capita in 2003, which represents economic development. Second, we control for GDP growth (%) in 2003 that measures the growth speed. Third, we control for the natural log of population in 2003 that proxy for the city size. Fourth, we control for openness because the openness promotes financial development (Bekaert, Harvey, and Lundblad 2005). Specifically, we measure the openness by the distance from the frequently used port. Finally, we control for the dummy for the (local) political origin of the major official because localism may affect the allocation of capital. Especially, China’s credit is controlled by local governments (Cai, Fang, and Xu 2011; Fu 2017), so the allocative efficiency of financial policies may be affected by the local political origin. Specifically, the dummy equals 1 when the Communist Party of China Secretary is promoted within the city.

**IV. Liberal colonialism and the allocative efficiency**

This section estimates the reduced-form relationship between liberal colonialism during 1896–1899 and the allocative efficiency of financial policies in 2004. We conduct a series of tests to verify that the potential endogeneity bias is negligible. Thus, the relationship of interest tends to be robust.

**Baseline estimates**

We conduct the regression according to the following equation to estimate the relationship between liberal colonialism and the allocative efficiency.

\[ AE_j = C + a_1 LC_j + b_1 Z_j + e_j \]  

where \( AE \) is the outcome of interest, the allocative efficiency of financial policies in 2004. \( LC \) is the dummy for liberal colonialism, the variable of interest. \( Z \) is the set of control variables at the city level, as introduced before. We adopt robust SEs or cluster the SEs at the province level. Given the allocative efficiency is positive or negative, we just use OLS for estimation.

As Columns 1–2 of Table 4 show, liberal colonialism is negatively and significantly related to the allocative efficiency estimated under Ologit method. For robustness, we also use the allocative efficiency generated by the OLS method. OLS method is inefficient to estimate the elasticity for the measurement of outcome, but as Columns 3–4 show, the coefficient of interest is also negatively significant at least 10% level.

Moreover, most control variables are insignificant; only distance to the port is positively and weakly significant. The poor explanation of our control variables partially be explained by the fact that we only control for relatively exogenous variables to avoid the bad-control issue (see Angrist and Pischke 2008). Furthermore, \( R \) square is relatively small; it only reaches 0.07 (or 0.05) for the variable of outcome. This indicates some omitted variables have a significant explanation power on the variable of outcome. However, the ‘Robustness to omitted variables’ section will show that the

### Table 4. Baseline estimates (OLS).

| Dependent variable | Allocative efficiency* |
|--------------------|------------------------|
|                    | Ordinal Logit | OLS       |
| Liberal colonialism| 0.340**   | 0.340*** | 0.159*  | 0.159** |
|                    | (0.165)    | (0.113)  | (0.087) | (0.074) |
| GDP per capita     | 0.149     | 0.149    | 0.046   | 0.046   |
|                    | (0.155)    | (0.110)  | (0.076) | (0.052) |
| GDP growth         | 0.003     | 0.003    | 0.003   | 0.003   |
|                    | (0.004)    | (0.004)  | (0.003) | (0.003) |
| Population         | –0.045    | –0.045   | –0.026  | –0.026  |
|                    | (0.134)    | (0.087)  | (0.073) | (0.052) |
| Distance to the port| 0.066*   | 0.066*   | 0.020   | 0.020   |
|                    | (0.042)    | (0.038)  | (0.021) | (0.018) |
| Political origin of the official | 0.096 | 0.096 | 0.055 | 0.055 |
|                    | (0.161)    | (0.081)  | (0.088) | (0.056) |
| Constant           | –1.480    | –1.480   | –0.353  | –0.353  |
|                    | (2.029)    | (1.389)  | (1.011) | (0.675) |
| SE                 | Robust     | Clusteredb | Robust | Clusteredb |
|                    | 0.07       | 0.07     | 0.05    | 0.05    |

_N = 118_  

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*Allocative efficiency is estimated by the elasticity of interest according to the approach of Wurgler (2000). Specifically, we use the Ordinal Logit method for the estimation; for robustness, we here also use the Allocative efficiency estimated with the OLS method.

bSEs are clustered at the city level.

*p < 0.15; **p < 0.1; ***p < 0.05; ****p < 0.01.
endogeneity bias due to omitted variables is unlikely to offset the effect of interest under our baseline estimates.

**Robustness to measurement errors or confounding factors**

Our measure of liberal colonialism follows the standard approach, but we admit that the measurement is imperfect such that the effect of liberal colonialism may be confounded by other factors. This subsection controls for additional variables to isolate the effect of liberal colonialism on the allocative efficiency.

\[ AE_j = C + a_2 LC_j + b_2 Z_j + dW_j + e_j \]  

(3)

where W is the set of additional controls that may confound the variable of interest. Considering these confounding factors tend to be endogenous, we do not control for them in the main estimation (i.e. baseline estimation and the later IV estimation). At the same time, the following controls for confounding factors one by one to test whether each of them can affect the coefficient of interest.

Considering that colonial power historically stimulated the geographical pattern of territorial partitioning and gradually empowered local governments (Dougherty and Pfaltzgraff 2000), we first control for an additional variable that measures the capacity of local governments (Acemoglu, Garca-Jimeno, and Robinson 2015; Acemoglu, Moscona, and Robinson 2016). With reference to Acemoglu, Garca-Jimeno, and Robinson (2015, 2016), we measure the state capacity of a local government by the natural log of [1 plus the length of highways in the city in 2003]. Considering that highway may be invested by more than one city, we also measure the local state capacity by using the information on roads. As Columns 1–4 of Table 5 show, the local state capacity, measured by either highways or roads, is insignificantly related to the allocative efficiency.

After colonialism, China has another institutional shock to liberalize its economies.7 The Chinese central government in the 1980s–1990s opens some cities. Because these open cities may overlap the cities controlled by the liberal colonial powers, we also try controlling for the dummy for open-cities. As Columns 5–6 show, the dummies

### Table 5. Robustness to confounding variables.

| Dependent variable | Allocative efficiency (Ologit) |
|--------------------|-------------------------------|
| Liberal colonialism (Ologit) | 0.341** 0.341*** |
| GDP per capita | 0.162 0.162 |
| GDP growth | 0.004 0.004 |
| Population | −0.161 −0.161 |
| Distance to the port | 0.060* 0.060* |
| Political origin of the official | 0.095 0.095 |
| State capacity (highway) | 0.174 0.174 |
| State capacity (road) | 0.174 0.174 |
| Open cities | 0.082 0.082 |
| Constant | −2.355 −2.355 |
| SE | Robust Clustering* |
| R² | 0.07 0.07 |
| N | 118 118 |

Allocative efficiency (Ologit) refers to the allocative efficiency in 2004 of financial policies implemented since the end of 2003, which is estimated with Ordinal Logit method according to the approach of Wurgler (2000).

*SEs are clustered at the city level.

**We can also add the dummy for the Japanese invasion of Manchuria in 1931 and the rest of China from 1937. As a result, the effect of interest is qualified as before. We do not report the results because the invasion is obviously illiberal so that the invasion dummy is not a confounding factor. Results are provided upon request.
for open cities are insignificantly related to variable of outcome. Given that 19 open cities have incomparable role in economic growth, our results reveal that the effect of interest is robust to the later economic reform. Moreover, all the open cities are located in coastal regions, so our results suggest that our measurement of colonial power is less of the concern due to the geographic advantage in development.

Robustness to omitted variables

We test the potential bias due to omitted variables as Altonji, Todd, and Christopher (2005) suggest. Theoretically speaking, selection on observables can be used to assess the potential bias from omitted variables. Thus, Altonji, Todd, and Christopher (2005) develop a strategy to gauge the strength of the likely bias arising from omitted variables. Simply speaking, a regression is used as a benchmark; whereas another one uses additional control(s) to obtain a new coefficient, the coefficient change indicates the likely bias due to omitted variables. Put it differently, this method assumes that the additional control(s) to be omitted variables, then the calculation using the coefficient change due to adding additional control(s) should be the strength of the likely bias.

With reference to the coefficients of liberal colonialism in Equations (2) and (3) to calculate the ratio, \( \frac{\alpha_2}{|\alpha_1 - \alpha_2|} \), to test the bias from omitted variables. In words of Nunn and Wantchekon (2011, 3238), the higher is the ratio, ‘the less the estimate is affected by selection on observables, and the stronger selection on unobservables [i.e., omitted variables] needs to be (relative to observables) to explain away the entire effect.’

We report the results in Table 6. If we only use one particular confounder as an unobservable and omitted variable, the ratio reaches at least 36.778. If we use the dummy for open cities and the local state capacity (either highways or roads), the ratio also reaches 27.333 or 11.593. Thus, the bias due to omitted variables should not be big enough to offset the true effect of coefficients. Moreover, when we control the open-cities dummy, the coefficient of interest will be increased. On contrary, controlling the local state capacity decreases the coefficient of interest. Thus, even when we can control for all possible omitted variables, it is less likely that the estimated effect of interest is consistently and fully driven by omitted variables.

This section estimates the effect of liberal colonialism during 1896–1899 on the allocative efficiency of financial policies in 2004. We just conduct reduced-form estimation here, but we use tests to justify the endogeneity concern due to the measurement errors, confounders or omitted variables is negligible. To formally test the causal effect of liberal colonialism and its channel on economic institutions, we will use IV estimation in the next section.

V. Liberal colonialism, economic institutions and the allocative efficiency

To examine whether liberal colonialism as the historical source of economic institutions causally promotes the allocative efficiency, we conduct IV estimation.

First-stage estimates: liberal colonialism as an exogenous source of economic institutions

To verify the exogeneity of liberal colonialism for the allocative efficiency rather than economic institutions, we conduct the following regressions.

\[
IQ_j = C + \alpha_1 LC_j + \beta_1 Z_j + e_j \tag{4}
\]

\[
AE_j = C + fIQ_j + \alpha_3 LC_j + b_3 Z_j + e_j \tag{5}
\]

where IQ in Equation (4) is the institutional quality at the city level in 2004. Equation (4) tests whether liberal colonialism is related to the institutional quality in 2004; the coefficient of \( \alpha_1 \) is expected to be significantly positive. By contrast, we follow
Acemoglu, Johnson, and Robinson (2002) conduct a test for the exclusion restriction. Specially, we examine whether the liberal colonialism has no significant impact on allocative efficiency except through institutional quality (Equation (5)). The coefficient of \( f \) is expected to be insignificant. We also use robust or clustered SEs as before.

We report the corresponding results in Table 7. As the table shows, liberal colonialism indeed is significantly and positively related to institutional quality (see Columns 1–2). In particular, \( F \) statistics of the first-stage estimates are larger than 10. As Columns 3–4 show, liberal colonialism becomes insignificant after liberal colonialism being controlled for. Thus, liberal colonialism should be an exogenous IV of institutional quality for the allocative efficiency.

### Second-stage estimates

We conduct second-stage estimates according to the following equation:

\[
AE_{ij} = C + \gamma \hat{I}Q_i + \delta Z_{ij} + e_i
\]  (6)

where \( \hat{I}Q \) is the fitted value of \( IQ \), which is estimated from Equation (4). As expected, the coefficient of \( \gamma \) is significantly positive as the coefficient of \( a_i \) in Equation (2) to be. As Table 8 shows, institutional quality is significantly and positively related to the allocative efficiency, irrespective of robust or clustered SEs being adopted. Thus, the effect of institutional quality deriving from the liberal colonialism causally promotes the allocative efficiency. Put it differently, liberal colonialism promotes the allocative efficiency through the quality of economic institutions, thereby confirming our second hypothesis.

Moreover, all of controls under second-stage estimation obtain the same signs under the baseline estimation. At the same time, as the baseline estimates show, only the coefficient of distance to the port is moderately significant as before. This reveals that our estimates are highly robust to the potential endogeneity bias.

Additionally, we also conduct second-stage estimation to further test for the assumption of the exclusion restriction. Specifically, we regress the residuals from the second-stage estimation on our IV. If our IV affects allocative efficiency only through institutional quality, the former should be not correlated with the latter. As a result, the IV had no significant impact on the residuals (see Columns 3–4).

### VI. Conclusion and discussion

This article confirms that liberal colonialism in China has a subsequent impact on the allocative efficiency.
efficiency of financial policies in 2004. Specifically, we verify that liberal colonialism affects the allocative efficiency through institutional quality. Thus, we identify liberal colonialism as the source of modern institutions breeds the spirit of market economy for subsequent development. The findings are robust to confounding factors, omitted variables and other potential biases. They jointly contribute by offering a deep understanding of colonialism in long-term developmental trajectories. Most of the existing literature either divides colonialism as settler colonialism and extractive colonialism (Acemoglu, Johnson, and Robinson 2001) or direct colonialism and indirect colonialism (e.g. Lange 2004); by contrast, this article follows a new division of Lange et al. (2006) to identify liberal colonialism. To the best of our knowledge, we contribute a first empirical analysis on the impact of liberal colonialism on allocative efficiency.

On the other hand, the effect of liberal colonialism identified in this article needs to be explained with China’s historical development. We verify that liberal colonialism affects allocative efficiency through institutional quality. It needs to note that the survey measures the institutional quality of the property rights protection and contract enforcement. However, institutional quality in China not only depends formalized institutions but also on government support intervention (see Du, Lu, and Tao 2014; Fu 2017; Feng, Fu, and Kutan 2019; Huang et al. 2017). This article does not distinguish the quality of market-based institutions from that of government-operated institutions (Acemoglu, Golosov, and Tsyvinski 2008). Thus, we never mean to assert that allocative efficiency in regions that had been under colonial control is just relying on liberal colonialism. We hope to see future works exploring how liberal colonialism affects capital-allocation with government-operated mechanisms.

Moreover, China gets modern economic institutions transplanted from colonial countries, but it also abandons, revises or develops the transplanted rules. Thus, we are motivated to explore in future how liberal colonialism foster market-oriented mechanism and how government-operated mechanism guarantees the positive effect of liberal colonialism on the development of market economy. China growth puzzle is actually an institution puzzle (e.g. Xu 2011; Kung and Ma 2018); it attracts much attention, but it is still far away from the potential answer.

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