

Revisiting the effect of institutions on the economic performance of SSA countries: Do legal origins matter in the context of ethnic heterogeneity? ☆

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ABSTRACT

Our knowledge about the role of legal institutions in the developing world is limited. The present paper fills this gap in the literature by estimating, in a production function framework, how legal origins interact with ethnic heterogeneity in determining GDP-per-capita in 35 Sub-Saharan African (SSA) countries over the period 1970–2013. The countries in our sample follow either the Common (British) law or the Civil (French) law system and exhibit a wide range of ethnic heterogeneity. Our findings show that in the context of low ethnic heterogeneity, Common law is associated with better economic outcomes. Nonetheless, in the presence of high ethnic heterogeneity, countries under Civil law experience higher levels of political stability and coordination resulting in a higher level of GDP-per-capita. In SSA countries, stability and coordination are also essential factors in the efficient use of natural resources, which are abundant in Africa, and can substantially contribute to prosperity.

1. Introduction

The paper contributes to the literature that links historical institutions to current economic performance in Sub-Saharan African (SSA) countries. Our goal is to explain how different legal origins, which largely reflect the colonial style of the main colonizers in the SSA region, French and British, have affected the evolution of GDP per capita today. The colonial style has left a lasting legacy in the post-independence era, which shapes the current institutional frame of the economic and social life in Africa (Blanton et al., 2001; Gennaioli and Rainer, 2007; Michalopoulos and Papaioannou, 2020). The two

dominant types of legal systems in SSA are the British Common law and French Civil law.¹ The legacy of the colonial style and the key features of the legal system of the colonizer have been transplanted into the colonies and maintained in the post-colonization period.² Essentially, each legal system represents a different variety of capitalism and a different way of handling socio-economic problems that matter for economic development, social cohesion, and political stability (La Porta et al., 2008; Schiehl and Martins, 2016; Schnyder et al., 2018). Although the existing literature has explored the role of legal origins, in general, on various aspects of economic life (La Porta et al., 1999; Acemoglu et al., 2012), it is yet scarce and inconclusive as to which legal tradition is more development enhancing (Magnin, 2018) as well

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¹ In our analysis, we focus on the differences in the institutional environment and colonial legacies predetermined by the legal origins — Common vs. Civil law. Many territories in Africa were colonized not by France or Britain, but by other (continental) European countries (e.g., Belgium, Portugal, Italy), which can broadly be characterized by the Civil legal tradition. Thus, such former colonies, irrespective of their actual colonizer, still use a version of French civil law today.

² The transplantation includes the transmission of various bundles of codes, practices, and ideologies that largely represent the style of the colonizer. Recent studies question the importance of legal origins and colonial style for current development emphasizing democracy as an engine for economic development (Cooray et al., 2017; Parent, 2018; Christopoulos and McAdam, 2019). We argue that the quality of current institutions follows a historical path whose roots largely lie within the colonial heritage as it is represented by legal origins. Evidence about the importance of legal origins for current institutional quality is, for example, found in Emenalo et al. (2018). Our study adds a new perspective as to what country-specific characteristics moderate the effectiveness of different legal origins and colonial legacies.

as how country characteristics affect the performance of each legal tradition in SSA (Whitley, 1999).³

The literature suggests that institutional quality differences explain about three-quarters of the differences in GDP per capita in the developing world (Acemoglu et al., 2001; Rodrik et al., 2004; Kaufmann et al., 2009; Chang, 2011). The main lesson from empirical evidence is that better quality institutions enhance investment in both physical and human capital, as well as promote the efficient use of national production inputs (Cavalcanti and Novo, 2005; Alguacil et al., 2011; Christopoulos and McAdam, 2013, 2019; Douch et al., 2022). Within this context, legal origins reflect the colonial legacy as a historical input that shapes, at present, the institutional environment in former SSA colonies. In our analysis, the impact of colonial legacy on current socio-economic life helps us to understand: (a) the country's capacity to resolve societal conflict (Blanton et al., 2001), and (b) the country's effectiveness in utilizing natural resources (Maseland, 2018).

Ethnic heterogeneity is widely recognized as a significant source of societal conflict, which threatens society's cohesiveness (Easterly and Levine, 1997; Michalopoulos and Papaioannou, 2020). Ethnic heterogeneity is also critical in driving cross-country differences in economic development (Alesina et al., 2003; Bertocchi and Guerzoni, 2012). We contribute to the literature by exploring whether economic performance in SSA former colonies depends on ethnic heterogeneity interaction with colonial legacy. Theoretically, building on the models of Persson et al. (1997) and Acemoglu et al. (2020), we argue that in the presence of high ethnic heterogeneity, Civil law system would perform better than Common law system by promoting political stability, and coordination. The latter characteristics are necessary for the efficient use of natural resources and together would result in better national economic performance in SSA. A key feature of Civil law and French colonial rule is the importance of a centralized state which subjects individuals from different ethnic groups under a central administration. In the colonial period, the French state represented a centralized bureaucracy with very limited power assigned to local elites. It was within the colonial state's power to decide taxation, land and labor laws, without assigning any intermediate role to local authorities. In the post-colonial period, the administrative machinery was taken over by an emerging (national) elite maintaining the same colonial-like structure. In contrast to the French colonial legacy, the British style of colonialism was much less dependent on central metropolitan power. The British government preferred to assign rights to local elites for establishing mediating networks responsible for preserving British rule (Wilson, 1994). In independence, the newly formed post-colonial state adopted the features of the colonizer's legal prototype that became the main institutional vehicle for governing socio-economic life.

The main objective of the present paper is to identify the capabilities of each legal system to handle effectively economic and societal problems related to ethnic fragmentation. To this end, we evaluate the role of French Civil law and British Common law as inherited institutional devices in SSA countries' economic and political governance. Our paper analyzes the combined effect of legal origins and ethnic heterogeneity on national economic outcomes - a link that has not been explored before despite its critical relevance for former colonies in Sub-Saharan Africa. While ethnic heterogeneity and legal origins have been studied separately and found to be significant determinants of socio-economic outcomes (Easterly and Levine, 1997; Hodler, 2006; La Porta et al., 2008), we lack an analysis of the interplay between the two. Without looking at the joint effect, our understanding of the role of legal origins on current economic performance remains incomplete, as there are substantial differences in the way that Civil and Common law confront

³ The legal origins literature is diverse and well-established. Beck et al. (2003) look at property rights protection and legal origins. La Porta et al. (1998) look at legal origins and financial institutions. Callais (2021) uses Louisiana as a case study of how legal origins can impact institutions today.

ethnic fragmentation. Our study approaches in an integrated fashion the interaction of historical institutions with contemporary societal characteristics analyzing the joint effect of legal origins and ethnic heterogeneity on SSA countries' current income. The rest of the paper is organized as follows: Section 2 summarizes the relevant literature on legal origins and ethnic fractionalization and develops a conceptual framework to guide the empirical analysis in Section 3; Section 4 concludes.

2. Theoretical framework and hypotheses formulation

2.1. Legal origins, ethnic heterogeneity, and the SSA context

Hall and Jones (1999) provide compelling evidence that output per worker differences across countries are strongly associated with differences in social infrastructure. The latter is defined as the combination of underlying institutions and public policies. Social infrastructure favorable to economic performance includes the minimization of resource diversion and fair price setting. This is such that individuals capture social returns from their actions as private returns. The basis of social infrastructure is the legal origins, which in the spirit of Hayek and according to La Porta et al. (2008) define the style of societal control of economic life.⁴

In African countries, the legal system and the administrative structure were inherited from colonizers. We focus on French Civil law and British Common law as French and British are historically the major empires that exercised power in the SSA region; other continental European countries, which colonized territories in Africa are overall characterized by legal systems of French Civil law style.⁵ Colonizer's legal system was used to establish the administration and the machinery of social control in the colonial state, with the structure of this machinery being maintained in its main principles in the post-colonial era. French civil law has a centralized structure for controlling social and economic life. In the colonial era, France assimilated colonies under a centralized authority, which enacted legislation under Presidential rule (Young, 1994; Blanton et al., 2001; Mahoney, 2001). In independence, the post-colonial states kept the same structure, whose main concern was to promote state-desired allocations of national resources and deal effectively with social disorder ensuring that the state elites maintained the existing status quo.

The British Common law system has a more decentralized orientation that favors private market outcomes over central concentration and state-controlled allocations. Concerning the colonial period, the British colonial style promoted indigenous elites as long as they could service British colonial rule.⁶ In independence, the British left in place an unranked system of social and ethnic stratification contrary to former French colonies, which sustained a more structured system of social organization (Blanton et al., 2001).⁷ Within our context, these distinct differences in the colonial style were predetermined by the legal system of the colonizer, which was consequently adopted in the post-colonial

⁴ Often, in studies focusing on substantive law characteristics, legal origins are seen as measuring the independence and quality of the judiciary and the security of property and contract rights.

⁵ Klerman et al. (2011) point out the imperfect overlap between the legal origin and colonial style. They find evidence in favor of non-legal colonial explanations for economic growth, however, for other development outcomes, their results are mixed.

⁶ The style of the British colonizer could be accurately summarized as the "Divide and Rule" strategy. This strategy was intended for exploiting possible differences among ethnic groups, which also prevented the formation of ethnic group alliances against the dominance of the colonizer (Blanton et al., 2001).

⁷ A ranked system of social organization is characterized by the coincidence of social class and ethnic origins, while the opposite characterizes an unranked system. Thus, it is possible to speak of ranked ethnic groups in contrast to unranked groups, which spread cross-class (Horowitz, 2000, p.22).

era of the former colonies. More importantly, we show that differences in the colonial style and the underlying legal system imply different responses to societal conflict and disorder in the post-colonial era, which in turn, leads to different economic outcomes.

A major factor that significantly affects the likelihood of conflict and the degree of societal cohesiveness in the post-colonial period is ethnic heterogeneity, or fragmentation (Bleaney and Dimico, 2017).⁸ Ethnic heterogeneity and tensions are particularly intense in Africa where colonial borders were drawn randomly without capturing particular local ethnic configurations and traditions (Michalopoulos and Papaioannou, 2020). Ethnically heterogeneous societies may find it difficult to coordinate and agree on resource use and policy design. There is usually a high degree of political instability associated with ethnic heterogeneity, which weakens the government's organization and leads to economic vulnerability (Faria and McAdam, 2015). Murphy et al. (1993) argue that ethnic heterogeneity weakens the centralization of control, while Persson et al. (1997) point out to weakening of the useful checks and balances.⁹ Weak political governance makes it harder to minimize resource diversion (Hodler, 2006) and deal effectively with market failure (Alesina and Wacziarg, 1998).¹⁰

In the former French colonies, the elite that captured control of the state machinery in the post-colonial period had monopolistic power in domestic politics. The state preserves a hegemonic role in manipulating and repressing any potential challenge to the existing status quo (Gennaioli and Rainer, 2007). However, to maintain power and political stability, the state provides better public policies and related subsistence guarantees, which is an inhibitory factor for non-state elites to challenge the established regime (Blanton et al., 2001).¹¹ In former British colonies with an unranked system of ethnic stratification, a pattern of severe competition has developed among ethnic groups aiming at gaining power over the state's institutional machinery (Blanton et al., 2001, p.473). This is because the dominating elite controls already the national resources and the revenue associated with them (Hodler, 2006). Ethnic groups that are excluded from the state organization, tend to mobilize (fragmented) structures for collective violent and non-violent action against the dominant elite, which results in conflict and higher political fragility (Bertocchi and Guerzoni, 2012; Acemoglu et al., 2020).

2.2. Formalizing the interaction of legal origins and ethnic heterogeneity

The historic connection of Common law to strengthen the protection of property rights against state actions as compared to Civil law, which is connected to a strong and less constrained central government leads to an important structural difference — the relationship

⁸ Easterly and Levine (1997), Alesina et al. (2003), and Hodler (2006) show that ethnic heterogeneity in Africa explains a large part of the cross-country differences in public policies and economic outcomes resulting from them. These studies demonstrate that ethnic heterogeneity influences economic performance and most of the effect works indirectly.

⁹ According to the “political agenda” effect (Acemoglu et al., 2020) there should not be incentives for fragmented elites to create centralized power in the hands of a national state. This is because, without state centralization, citizens would not band together so elites can keep control of power. In contrast, under state centralization citizens of different ethnicity would coordinate their demands for more general-interest public goods, and away from parochial transfers.

¹⁰ See Easterly and Levine (1997) on how ethnic heterogeneity is linked to competitive rent-seeking, black-market premiums, poor financial development, low provision of infrastructure, and low levels of education.

¹¹ It is important to point out that the centralization of the national state in the SSA context could sometimes be manifested in authoritarian regimes, but this is not necessarily a feature of the centralized national state per se; it is rather due to low civic capital (Djankov et al., 2003). Authoritarian regimes exist in Common law SSA countries (i.e. Zimbabwe).

between the executive and legislature and the role of the judiciary (Hayek, 1973; Mahoney, 2001). In the Common-law system, there is a more pronounced separation of powers with judges being independent policymakers occupying a high-status office, whereas in the Civil-law system, judges are (relatively) low-status civil servants without the authority to create legal rules. With this difference in judicial role, power is further fragmented in the Common law than in the Civil law. There is a near consensus in economics that fragmentation of power limits the ability of government actors (executive and legislature) to grant, and therefore of interest groups to obtain rents because it is more difficult to coordinate the decisions and actions of multiple actors (La Porta et al., 2008).

This is certainly true for homogeneous, democratic societies where good governance is achieved by the presence of effective checks and balances. According to Persson et al. (1997) (p.1166), there are two conditions for checks and balances to be effective: (i) there is a conflict of interests between the executive and the legislature and (ii) legislative decision-making requires joint agreement by both bodies. A mere conflict of interests between the executive and legislature is not a sufficient condition to improve accountability. The key condition to make separation of powers, support good governance and prevent abuse of power is that no policy can be implemented unilaterally.

In ethnically heterogeneous societies with fragile institutions and divergent interests among groups, the two conditions are unlikely to hold simultaneously.¹² Thus, when power is split between ethnic groups, condition (i) is likely to be upheld; however, condition (ii) is often unlikely to hold. Therefore, the government's ability to implement cohesive policies will be limited. In equilibrium, public bodies with opposing interests would compete and make independent claims on national resources. Without effective joint decision-making, separation of powers would worsen accountability by creating a ‘common-pool’ problem, where each group seizes its share of the pool of rents until the pool is exhausted (Persson et al., 1997, p.1167). Using a different theoretical framework Acemoglu et al. (2020)(pp. 751–752) reach similar conclusions when considering the British Common-law colonial experience in Africa.

The decentralized governance system in British Common law countries results in a less stable economic environment with a high frequency of ethnic conflict, while the more centralized administration structure in French Civil law countries mitigates conflicts more effectively and ensures higher levels of political stability. In SSA countries under French Civil law, coordination among government actors is more likely to happen as dominant elites have already penetrated the state thus, preventing any subordinate groups from mobilizing forces that could potentially challenge the status quo. Based on the above arguments, we formulate our main hypotheses:

H1: French Civil law (*Civil*) is better suited to enhancing economic performance in ethnically heterogeneous societies because the centralized state is dominant and able to enforce coordination.

Two corollary hypotheses are also formulated from H1 to assess the supremacy of Civil law over Common law in achieving better economic outcomes in ethnically heterogeneous societies. The supremacy of *Civil* is achieved through the channels of higher political stability and more effective use of natural resources. The two additional hypotheses are as follows:

H2: Former colonies under French Civil law (*Civil*) maintain a higher level of political stability that generates better economic outcomes.

¹² In developing countries, including SSA, there is overwhelming evidence that the judiciary's independence and functioning are often compromised due to low pay, corruption, and other institutional deficiencies (Dam, 2006). This situation further increases power and conflict fragmentation, especially under ethnic heterogeneity in Common law countries.

H3: Former colonies under French Civil law (*Civil*) are able to achieve better coordination, resulting in better utilization of natural resources and, therefore, better national economic performance.

The following section tests empirically the three hypotheses using two alternative econometric approaches. The first approach specifies a single-equation model (baseline) of income per capita similar to the regression framework used in the institutional literature (Aron, 2000). The novel element in our approach is the use of an estimator that addresses more systematically the time-invariant nature of the variables of main interest - *Civil* and *Ethnic*. The second approach refers to Stochastic Frontier Analysis (SFA), which estimates the production frontier in a macroeconomic context (i.e. see Danquah and Ouattara (2015) for a similar application) for 35 SSA countries. SFA assumes that countries in the sample produce under the same technology, while they are allowed to deviate from the frontier (i.e. the most efficient practice) due to systematic inefficiencies or statistical noise (i.e. external shocks). The former represents sources of interest to policymakers, while the latter represents exogenous technological shocks. In our case, SFA captures essentially the core proposition of economic growth theory that growth is the result of innovation effort and exogenous technological progress.¹³ It is within this framework that we identify the role of *Civil* and *Ethnic* (among other factors) as drivers that matter for the allocation of national resources (i.e. reduce inefficiency). Results from the two alternative estimation approaches provide us with ample evidence to draw economic inferences regarding the validity of our three hypotheses.

3. Empirical analysis

This section develops the empirical strategy of the paper. We test the conceptual propositions of the previous section in an unbalanced panel of 35 SSA countries over the period 1970–2013.¹⁴ We first report results from simple pooled OLS and cross-country regressions that associate *Civil* with better economic and governance outcomes relative to *Common* after interacting with ethnic heterogeneity. These regressions indicate that the impact of the Civil law (versus the Common law) depends on the degree of ethnic heterogeneity (*Ethnic*) in the country.

Next, we develop the baseline econometric model that deals more systematically with the time-invariant nature of *Civil* and *Ethnic*. In the second part of the empirical analysis, we estimate the production frontier in the sample of SSA countries investigating whether legal origins and ethnic heterogeneity, among other (economic) factors, determine output deviations from the frontier.¹⁵

3.1. Illustrative regressions

We first run a pooled OLS (POLS) regression of GDP per capita of 35 countries over 44 years on *Civil*, *Ethnic*, and their interaction (*Civil* × *Ethnic*) terms. *Civil* takes the value one if the country adopted the French civil law and zero otherwise (La Porta et al., 1999). The reference category of *Civil* is the British Common law. *Ethnic* is a time-invariant index, which is defined as the probability of two random

¹³ In other words, a country approaches the production frontier over time by eliminating inefficiencies (or improving technology), whilst the frontier can shift outwards because of technological progress.

¹⁴ The sample of countries includes: Angola, Benin, Botswana, Burundi, Cameroon, Central African Republic, Chad, Congo, Cote d'Ivoire, Ethiopia, Gabon, Gambia, Ghana, Guinea-Bissau, Kenya, Lesotho, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Togo, Uganda United Republic of Tanzania, Zambia, Zimbabwe.

¹⁵ Deviations from the frontier are due to inefficient use of national resources. In other words, we seek to identify whether *Civil* and *Ethnic* are (in)efficiency-related factors.

people in a country not sharing the same racial and linguistic characteristics (Alesina et al., 2003). The POLS estimates of GDP per Capita are shown in (1) in Table 1. The coefficients of *Civil* and *Ethnic* have a negative sign, while the coefficient of *Civil* × *Ethnic* indicates that Civil law societies exhibit on average a higher level of income per capita as they become more ethnically fragmented.

Cross-country OLS regressions in (2) to (5) in Table 1 illustrate the relationship between *Civil* and two notions of political stability. These regressions reflect upon our previous discussion that countries adopting civil law experience a higher level of coordination, which results in higher political stability and lower levels of conflict. Specifications (2) to (5) regress the mean values (1970–2013) of political stability (*Stability*) and conflict intensity (*Conflict*) in each SSA country on the time-invariant indices of *Civil*, *Ethnic*, and *Civil* × *Ethnic*. For each variable of *Conflict* and *Stability*, we try one specification that either excludes or includes the interaction variable of *Civil* × *Ethnic*. *Stability* combines scores from various sources regarding perceptions about the likelihood that the government in power will be destabilized or overthrown by unconstitutional and (or) other violent means (Worldwide Governance Indicators; Kaufmann et al., 2009). The index runs from –2.5 to 2.5 with high values corresponding to higher levels of political stability. *Conflict* ranges between 1 and 10 with high values indicating violent incidents within the society due to religious, ethnic, and social differences.

Regressions in Table 1 examine predictions for GDP per capita, *Stability* and *Conflict* conditional on *Civil* and *Ethnic*, and they can be viewed as close approximations to the regressions applied in the institutions and growth literature (see Acemoglu et al., 2020, 2014; Aron, 2000). This is to say that findings in Table 1 provide correlational and not causal evidence regarding the impact of *Civil* and *Ethnic* on socio-economic outcomes. In our regression framework, we safely regard, the legal system of the country and its levels of ethnic fragmentation as pre-determined conditions (La Porta et al., 2008), which allows estimating conditional predictions that associate cross-country differences in income, political stability, and conflict with cross-country variations in *Civil* and *Ethnic*.¹⁶ In (2) and (4), countries under *Civil* tend to have a higher level of political stability and lower conflict intensity. *Ethnic* decreases political stability and increases conflict intensity, whereas the interaction between *Ethnic* and *Civil* (i.e. more centralized states) tends to generate more political stability and less conflict.

Table 2 calculates the overall effect of *Civil* for each of the three variables used in Table 1 (i.e. GDP per Capita (GDPC), *Stability*, and *Conflict*) at the sample min, mean, and max values of *Ethnic*.¹⁷

Figures in Table 2 suggest that in Civil law countries with high levels of *Ethnic*, the levels of GDP per Capita are 0.45 times higher. On the other hand, in Civil law countries with low ethnic heterogeneity income per head is twice smaller (1.97) relative to Common law countries. At ethnic heterogeneity levels close to the mean, *Stability* is higher by 1.2 units in Civil law countries. Looking at the upper bound sample value of *Ethnic*, Civil law countries have approximately 2.55 times higher levels of political stability. Concerning the overall effect of *Civil* on *Conflict*, Civil law countries with high ethnic heterogeneity tend to enjoy lower levels of conflict by 2.61 units. The intensity of *Conflict* increases in Civil law countries with very low levels of *Ethnic*. Overall, pooled and cross-country regressions support H1 and H2 by indicating that French Civil law is associated with better economic and political outcomes as ethnic heterogeneity becomes more intensive. The econometric framework of the next section addresses more systematically the time-invariant nature of *Civil* and *Ethnic* to robustify the evidence for the combined effect of these two variables on economic performance.

¹⁶ The growth and financial development literature employs legal origins as typical instruments for present economic performance.

¹⁷ We calculate the partial derivative of *GDPC*, *Stability*, and *Conflict* with respect to *Civil* based on the coefficients of Table 1 holding *Ethnic* constant at different sample values.

Table 1
The effect of Civil law on GDP per Capita, government stability, and conflict: Regressions for 35 SSA Countries over the period 1970–2013.

	GDP per Capita (1)	Stability (2)	Stability (3)	Conflict (4)	Conflict (5)
<i>Civil</i>	-1.18*** (0.12)	0.404 (0.32)	-1.384* (0.81)	0.438 (0.78)	3.044** (1.50)
<i>Ethnic</i>	-2.086*** (0.16)	-0.389* (0.21)	-0.598*** (0.20)	6.801*** (0.71)	7.297*** (0.68)
<i>Civil</i> × <i>Ethnic</i>	2.728*** (0.22)		4.231*** (0.93)		-6.081*** (2.06)
Observations	1540	35	35	35	35
Adjusted R ²	0.1	0.1115	0.1562	0.8343	0.8620
Log lik.	-2152	-76	-74	-86	-82

(1): Pooled OLS estimates (N = 35, T = 44) with robust standard errors for arbitrary heteroscedasticity in parentheses.
(2) to (5): Cross-Country OLS estimates with robust standard errors at the country level in parentheses. Significance is *p < 0.10, **p < 0.05, ***p < 0.01.

Table 2
The effect of *Civil* on GDP per Capita (*GDPC*), *Stability* and *Conflict* at different sample values.

	$\partial GDPC / \partial Civil$	$\partial Stability / \partial Civil$	$\partial Conflict / \partial Civil$
At min value of <i>Ethnic</i>	-1.97*** (0.19)	-1.22* (0.87)	2.79** (1.78)
At mean value of <i>Ethnic</i>	-0.343 (0.19)	1.20* (0.87)	-0.66 (1.78)
At max value of <i>Ethnic</i>	0.45** (0.19)	2.55** (0.87)	-2.61* (1.78)

Coefficients represent values of partial derivatives from estimates in columns (1) (2) and (4), in Table 1.

3.2. The fixed effects filter estimation (FEF)

The main objective of the empirical model is to assess the effects of *Civil* and *Ethnic* on national output. We initiate our analysis with the specification of an aggregate production function:

$$Y_{it} = f(X'_{it}\beta; C_i) \tag{1}$$

where *Y* is output in per capita terms and *X* is a vector of production inputs including capital stock (*K*) and human capital (*H*) in country *i* at year *t*, all expressed in per capita terms. Parameters β are to be estimated. Variable *C* stands for country-specific idiosyncrasies. In estimating (1), we encounter the notable challenge that *Civil* and *Ethnic* account for time-invariant characteristics. This entails that *Civil* and *Ethnic* are perfectly correlated with individual unobserved fixed effects in *C_i*. In this case, the standard within fixed effect (WFE) estimator becomes inappropriate.¹⁸ To control systematically for time-invariant variables, we consider the fixed effects filter (FEF) estimator of Pesaran and Zhou (2018).

The main steps of FEF estimator are outlined below:

$$y_{it} = a_i + x'_{it}\beta + z'_i\rho + \omega_{it} \tag{2}$$

where *y_{it}* is the log value of output per worker, *x_{it}* is the vector with the log values of time-variant regressors (*k* and *h*) and ρ are parameters to be estimated for the vector of observed time-invariant regressors *z_i*. The specification includes a parameter of unobserved heterogeneity *a* that is decomposed as:

$$a_i = \alpha + \xi_i \tag{3}$$

The key issue in estimating (2) is to identify consistent parameters for ρ imposing restrictions on *a_i*. The FEF estimator produces parameters for ρ in two steps. In step one, a WFE estimator computes parameter values for the time-variant regressors *x_{it}*. These estimates are then used

¹⁸ Another possible source of bias might be endogeneity between *Civil_i*, *Ethnic_i*, and *y_{it}*, as colonization and the implied legal system were not entirely a random process but rather driven by elements of natural resources and geographical proximity. Nonetheless, we follow the corporate governance literature that assumes exogeneity of legal origins in a historical context (i.e. La Porta et al. (2008)).

to filter out the time-varying effects. In a more compact form, the first step computes $\hat{\beta}$ and the associated residuals \hat{u} which are defined as: $\hat{u}_{it} = y_{it} - \hat{\beta}'_{WFE}x_{it}$. In step two, residuals from step one are averaged across units and regressed on an intercept and a vector of time-invariant variables *z*: $\tilde{u}_i = \hat{\alpha}_{FEF} + \hat{\rho}'_{FEF}z_i$. The FEF estimator is found to be asymptotically consistent for a finite time sample with a sufficiently large number of observations like the structure of the present panel (42 years × 35 countries). The FEF estimator is robust in arbitrary heteroscedasticity and unbiased in the presence of serial correlation in ω_{it} (Pesaran and Zhou, 2018).

3.3. Data sources and variable definitions

The data used to estimate (2) are described next. Output is GDP in constant 2005 USD, capital stock is derived from the accumulation of investment flows (*inv*), which are expressed in constant 2005 USD. The perpetual inventory equation for deriving the capital stock series is specified as $Capital_{it} = (1 - \delta)Capital_{it-1} + inv_{it-1}$, where δ is the rate of physical depreciation assumed to be constant across countries and years at 15%. The initial capital stock is derived from the steady state condition: $Capital_{0i} = inv_{0i}/(\bar{g}_i + \delta)$, where \bar{g}_i is the average growth rate of investment in country *i* over the sample period and *inv_{0i}* is investment in the first year of the sample in each country. Labor is the number of workers employed and human capital is the average years of schooling for the population (15 years old and above). Data for output, investment, and labor are taken from the Penn World Tables 8.0 (Feenstra et al., 2015), while for the measurement of human capital, we use the Barro and Lee (2013) data set. The latter is available in five-year intervals; we generate values for years in between using linear interpolation (Klenow and Rodriguez-Clare, 2005). *Civil* is taken from La Porta et al. (1999) and *Ethnic* heterogeneity is from Alesina et al. (2003).¹⁹ Appendix A provides summary statistics of all variables used in the paper. As a robustness test, we augment the per-capita specifications (Table 3) with the additional regressors of *FDI*, *Trade* and *Resources*. *FDI* stimulates capital deepening and enhances the transfer of technology from multinational enterprises of developed economies

¹⁹ Ethnic Heterogeneity aka Ethnic Fractionalization, as it is labeled in Alesina et al. (2003).

Table 3
Determinants of GDP per Capita in 35 SSA Countries, 1970–2013: Fixed Effects Filter (FEF) estimation.

	FEF (1)	FEF 5 Year Averages (2)	FEF (3)	FEF 5 Year Averages (4)
Panel A				
Production Inputs				
β_k	0.281*** (0.044)	0.836*** (0.025)	0.269*** (0.038)	0.553*** (0.04)
β_h	0.154* (0.085)	0.157* (0.086)	0.154* (0.087)	0.194** (0.085)
<i>Resources</i>			−0.003** (0.003)	−0.007*** (0.001)
<i>Stability</i>			0.052** (0.02)	0.061*** (0.01)
<i>Civil</i> × <i>Resources</i>			0.05** (0.000)	0.003*** (0.000)
<i>Civil</i> × <i>Stability</i>			0.005** (0.003)	0.01*** (0.001)
Time Invariant Determinants				
<i>Civil</i>	−2.411*** (0.667)	−0.201** (0.052)	−2.001*** (0.644)	−0.151*** (0.07)
<i>Ethnic</i>	−2.092*** (0.712)	−0.084* (0.048)	−2.685*** (0.615)	−0.224*** (0.06)
<i>Civil</i> × <i>Ethnic</i>	3.523*** (1.033)	0.551*** (0.073)	2.688** (0.917)	0.53*** (0.079)
Additional Determinants				
<i>Credit</i>			0.031** (0.016)	0.014** (0.000)
<i>Trade</i>			0.110*** (0.003)	0.006** (0.000)
<i>FDI</i>			0.05 (0.01)	0.001 (0.1)
<i>Trend</i>			−0.007*** (0.002)	0.03*** (0.002)
Number of Countries	35	32	35	32
<i>N</i>	1540	1408	1517	1254
Panel B				
Overall <i>Civil</i> Effect at Min of <i>Ethnic</i>	−2.270** (0.849)	−0.178** (0.062)	−1.892*** (0.390)	−0.147** (0.039)
Overall <i>Civil</i> Effect at Mean of <i>Ethnic</i>	−0.192 (0.849)	0.146** (0.062)	0.433 (0.390)	0.228** (0.039)
Overall <i>Civil</i> Effect at Max of <i>Ethnic</i>	0.865 (0.849)	0.311*** (0.062)	4.892*** (0.390)	0.602*** (0.039)

Robust standard errors for arbitrary heteroscedasticity are shown in parentheses.

*** denotes 1% significance; ** denotes 5% significance; * denotes 10%.

The overall effect is calculated by holding *Ethnic* constant at the sample value indicated in each row. See the derivation of Eqs. (4) and (5) in the text for further details.

(Rodríguez and Rodrik, 2000; Li and Liu, 2005; Busse and Groizard, 2008). *FDI* is defined as the share of FDI inflows to GDP and data are collected from various issues of the International Monetary Fund (IMF) and International Financial Statistics (IFS). *Trade* improves the allocation of resources through specialization as well as allows developing countries to assimilate knowledge from their trading partners (Fagan et al., 2016; Bournakis et al., 2018). *Trade* is defined as the share of imports to GDP and data are obtained from the World Bank Development Indicators (WDI). Natural resources include the sum of rents from gas, coal, minerals, and forestry as a share of GDP, and data are obtained from WDI. Finally, *Credit* captures the development of financial markets. The financial system is the mediator between savers and borrowers channeling credit into investment projects with high return rates (Rajan and Zingales, 1998). *Credit* is defined as the domestic credit to GDP and data are taken from WDI.

3.4. Baseline estimation results

Table 3 shows results from the FEF estimator considering four alternative specifications. To allow for larger variation in the annual data, we also estimate (2) in averages of five years. Looking at the coefficients of the production function, capital β_k is the factor with the highest returns in SSA countries and tends to become larger in the five years average estimation. The coefficient of human capital β_h is smaller

but remains economically and statistically high. Not surprisingly, the values of β_k and β_h highlight the relative scarcity of human and physical capital in SSA, which means that small increments in these inputs lead to large increases in output.

Regarding the variables of main interest, the coefficient of *Civil* in parsimonious specifications, columns (1) and (2), remains negative. Recall, *Civil* is a dummy variable with British Common law countries to be the reference group. This effect accords well with the findings of the previous literature that emphasize the commonly accepted stance about the supremacy of British common over French Civil law in generating better economic outcomes for a variety of reasons (La Porta et al., 2008).²⁰ *Ethnic* has a negative effect pointing out the distortions caused by ethnic fragmentation in achieving coordination for efficient allocation of national resources. Notably, the interaction term *Civil* × *Ethnic* is positive and statistically significant and remains as such *Civil* × *Ethnic* in all specifications of Table 3. Intuitively, the positive sign of the interaction term suggests that the destabilizing effect due to higher levels of ethnic heterogeneity can be better attenuated in countries with French Civil law, which consequently leads to better economic

²⁰ Among the most prominent channels is that Common law provides a more effective framework for the protection of property rights, which is paramount for enhancing private investment.

outcomes. French Civil law can more effectively deal with a range of issues critical to fragmented societies, such as government function, as well as the functioning of the Executive and Judiciary. Columns (3) and (4) include among others the covariates of *Resources* and *Stability* and their interactions with *Civil*. *Resources* is a negative determinant of output per worker, while the coefficient of the interaction *Civil* × *Resources* is positive. The latter stresses that a more centralized legal system is crucial to achieving a better economic outcome in natural resources management.

To make economic sense of these coefficients, we calculate the total effect of *Civil* from the estimations in columns (1) and (2) as²¹:

$$\frac{\partial y_{it}}{\partial Civil_i} = \hat{\rho}_1 + \hat{\rho}_2 \overline{Ethnic} \tag{4}$$

and from estimations in columns (3) and (4) as:

$$\frac{\partial y_{it}}{\partial Civil_i} = \hat{\rho}_1 + \hat{\rho}_2 \overline{Ethnic} + \hat{\rho}_3 \overline{Resources} + \hat{\rho}_4 \overline{Stability} \tag{5}$$

Panel B in [Table 3](#) calculates the above derivatives at the mean, maximum, and minimum sample values of *Ethnic*, *Resources*, and *Stability*. Given that *y* is in logs, these values also represent semi-elasticities. These figures show some evidence regarding the importance of civil law in SSA countries. In the first parsimonious specification with annual observations, the overall effect of *Civil* is insignificant, nonetheless, in the five-year averages estimations (column 2), Civil law countries with an average level of ethnic heterogeneity can produce 1.46% more output. The supremacy of Civil law becomes even more evident in maximum values of ethnic heterogeneity with the effect on the output being equal to 3.11%. As expected at the minimum value of *Ethnic*, Common law countries perform better. In the expanded specifications (column 3), the overall effect computed at the mean value of *Ethnic* is insignificant but computations at the minimum and maximum values of the sample indicate diversified effects on output per capita based on legal systems. Accordingly, at the minimum level of *Ethnic*, Civil law countries produce 18.9% less output per worker relative to Common law countries, while at the maximum level of *Ethnic*, they can produce 48.9% more. The general message from figures in Panel B is that the overall effect on output from French Civil law worsens at low levels of ethnic heterogeneity, while it improves substantially at high levels of heterogeneity. Essentially, our results highlight the beneficial role of a centralized system of governance in maintaining the status quo, which prevents (lacks the incentives for) subordinate ethnic groups to undertake collective actions against the state. While some SSA countries may be characterized as autocratic regimes, this is not a consequence of inherited colonial styles, but rather a reflection of low civic capital ([Djankov et al., 2003](#)). Furthermore, these results should not lead to the conclusion that countries with French Civil law constitute better democracies, rather as pooled and cross-country estimations also suggest (see [Table 1](#)) heterogeneous societies following the French colonial legacy tend to suffer from fewer conflicts, which undoubtedly benefits economic activity. To emphasize the superiority of the centralized style of government under Civil law, we run subsample estimations ([Appendix C.1](#)) excluding countries that were not former French colonies²² but still, they adopted French Civil law. For comparability, we run estimations that include strictly former French colonies excluding Civil law countries that had been previously colonized by other European countries ([Appendix C.2](#)). All in all, these additional regressions show that while the autonomous effect of *Civil* on GDP per capita is negative,²³ as the degree of ethnic heterogeneity

is intensified in the country, the centralized Civil law legal system is more supportive of economic activity, which is strongly favorable for H1, H2, and H3.

The other determinants in columns (3) and (4) indicate that financial expansion (*Credit*) is beneficial for output as it increases the number of businesses with access to finance. *Trade* illustrates the importance of technical change, which is facilitated by technologically advanced imported commodities. *FDI* is insignificant, a result commonly documented in developing countries, as multinational corporations often fail to create strong ties with local economies that promote knowledge transfer, rather than target host countries' natural resources and labor endowments. Finally, the realization of gains from technical change in SSA is a highly time-consuming procedure as the coefficient of *Trend* is positive and statistically significant only in the estimation of the five-year average (column 4). This finding points to a weak absorption capacity that typically governs less developed countries.

3.5. Stochastic frontier analysis

In this section, we provide further evidence in a comparative context by presenting results from the SSA production frontier. We estimate the elasticity of national output with respect to labor, fixed capital, and human capital. Within the same framework, we identify the factors that prevent efficient input use. The SFA defines technical efficiency as the production of maximum output given the bundle of production inputs and the state of technology. Subsequently, a country is technically efficient when it operates at the upper boundary of its production possibility frontier. Any distance from the frontier represents technical inefficiency in a country. The use of SFA for our analysis has two distinct advantages compared to the restricted specification of output per capita shown in [Tables 1](#) and [3](#). First, it measures each country's output relative to the international best practice (the frontier). Second, SFA decomposes the distance from the frontier into an inefficiency term and pure random noise. The inefficiency term is then modeled as a function of observed national characteristics, including *Civil* and *Ethnic*. The production function in per capita terms in the SFA setup is formulated as follows:

$$y_{it} = \gamma_0 + \gamma_1 k_{it} + \gamma_2 h_{it} + v_{it} - u_{it} \tag{6}$$

As previously, lowercase letters denote log values in per capita terms. The error component *v* represents the standard statistical noise of the frontier with $v \sim N(0, \sigma^2)$, while *u_{it}* is a non-negative stochastic term $N^+(\mu_{it}, \sigma^2)$ with mean μ_{it} and constant variance. The term of interest in (6) is the one-sided technical inefficiency error term *u_{it}* driven by socio-economic factors:

$$u_{it} = Z'_{it} \theta + \epsilon_{it} \tag{7}$$

where *Z_{it}* is the *p* × 1 vector of technical inefficiency factors, θ is a 1 × *p* vector of unknown parameters to be estimated; ϵ_{it} is a random error defined by the right truncation of a normal distribution with zero mean and variance: $\sigma^2 = \sigma_v^2 + \sigma_u^2$. Following ([Battese and Coelli, 1995](#)), we estimate production parameters γ and inefficiency parameters θ in one stage.²⁴ As we also did with the estimation of (2), we first consider a parsimonious specification of the inefficiency Eq. (7), which is then augmented with additional variables. This strategy allows us to scrutinize the robustness of our results concerning the main variables of interest- *Civil* and *Ethnic*. Three inefficiency equations are specified:

$$u_{it} = \theta_0 + \theta_1 Civil_i + \theta_2 Ethnic_i + \theta_3 [Civil_i \times Ethnic_i] + \theta_4 trend_i + \epsilon_{it} \tag{7.1}$$

²¹ See [Pavlik \(2018\)](#) and [Callais et al. \(2021\)](#) for a similar formulation.

²² Civil law countries but not former French colonies are Rwanda and Burundi (former-Belgian colonies); Angola (a former-Dutch colony), Ethiopia (a former-Italian colony), and Mozambique (a former-Portuguese colony).

²³ The average effect of *Civil* found in the paper in [Table 3](#), [Appendix C.1](#), and [Appendix C.2](#) under the parsimonious specification is -1.82, while it is -1.24 in the extended specifications.

²⁴ Applications of the SFA with country-level data can be found, among others, in [Kneller and Stevens \(2006\)](#) and [Christopoulos and León-Ledesma \(2014\)](#).

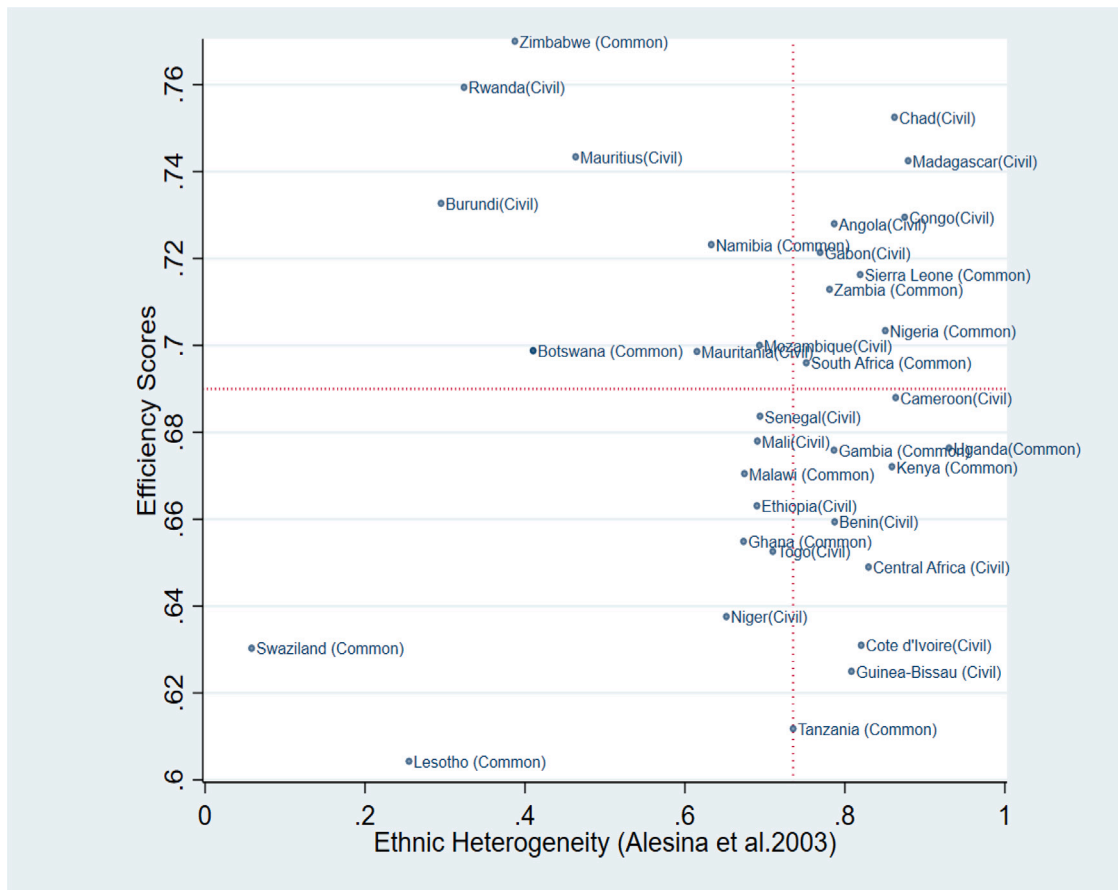


Fig. 1. Efficiency scores versus ethnic heterogeneity in 35 Sub-Saharan African (SSA) countries.

$$u_{it} = \theta_0 + \theta_1 Civil_i + \theta_2 Ethnic_i + \theta_3 [Civil_i \times Ethnic_i] + \theta_4 Trend_t + \theta_5 Stability_{it} + \theta_6 [Civil_i \times Stability_{it}] + \theta_7 Credit_{it} + \theta_8 Trade_{it} + \epsilon_{it} \tag{7.2}$$

$$u_{it} = \theta_0 + \theta_1 Civil_i + \theta_2 Ethnic_i + \theta_3 [Civil_i \times Ethnic_i] + \theta_4 Trend_t + \theta_7 Credit_{it} + \theta_8 Trade_{it} + \theta_9 Resources_{it} + \theta_{10} [Civil_i \times Resources_{it}] + \epsilon_{it} \tag{7.3}$$

The parsimonious specification includes *Civil*, *Ethnic*, the interaction term between the two, and a time trend that captures exogenous technical change. Specification (7.2) includes *Credit*, *Trade*, *Stability* and the interaction term of the latter with *Civil*. Specification (7.3) includes interchangeably *Resources* and its interaction term with *Civil*. Specifications (7.2) and (7.3) are close approximations for H2 and H3, respectively.²⁵

3.6. Efficiency scores and ethnic heterogeneity

Table 4 shows SFA estimates from the specifications (7.1)–(7.3) outlined above. The upper panel of the table shows the estimated coefficients of the frontier (6), while the lower panel shows the estimated parameters of the inefficiency Eq. (7). Since all specifications in Table 4 represent nested models, the Akaike information criterion (AIC) can be used to select the preferred specification. Accordingly, (7.2) provides the best fit of the data, so our interpretation of results refers to this specification.

Parameter $\lambda = \frac{\sigma_u^2}{\sigma_v^2 + \sigma_u^2}$ at the bottom of Table 4 determines the proportion in the variation of y that is due to technical inefficiency. The maximum likelihood (ML) estimates indicate that 72% of the variation in $u_{it} - v_{it}$ in (7.2) is attributed to technical inefficiency, so there is substantial scope to investigate further the sources of this inefficiency.

We first identify correlations between efficiency scores and the degree of ethnic heterogeneity. Sample means of technical efficiency (TE) for each country as derived from specification (7.2) are shown in Appendix B. The average efficiency score of the entire sample is 0.68.²⁶ Zimbabwe, a British Common law country and relatively ethnically homogeneous, has the highest efficiency level (0.77) in the sample. Rwanda, Chad, and Madagascar (and Mauritius) under French Civil law are very close to the frontier too. Irrespective of colonial legacy, countries at the top of the efficiency ranking share the following common characteristics: low dependence on revenue from natural resources, high levels of human capital, and high trade orientation (Sachs and Warner, 1997; Easterly and Levine, 1997). Fig. 1 plots the average efficiency scores in each country against *Ethnic*.

Several points merit discussion; first, there is ample evidence of substantial ethnic heterogeneity in the SSA group. Most countries are placed around or to the right of the vertical (dashed) line which marks the sample median (0.73) of *Ethnic*. Second, the group of countries above the horizontal line and to the right of the vertical line are ethnically heterogeneous with a high-efficiency score, above the median (0.68). Most of the countries within this plot area belong to the Civil

²⁵ Additionally, Appendix C.1 and C.2 provide estimations from different sub-samples, while Appendix C.3 shows coefficients from a Translog specification of the frontier and additional inefficiency factors.

²⁶ Not surprisingly, the efficiency scores in SSA countries are lower than the figures reported for advanced economies (Christopoulos and León-Ledesma, 2014). Current efficiency scores are close to findings for other non-SSA developing countries (Henry et al., 2009).

Table 4
SFA production function estimates: Inefficiency determinants in 35 SSA Countries, 1970–2013.

	(7.1)	(7.2)	(7.3)
Panel A			
Frontier			
γ_k	0.772*** (0.01)	0.708*** (0.01)	0.801*** (0.01)
γ_h	0.114*** (0.02)	0.049** (0.02)	0.141*** (0.02)
Inefficiency			
<i>Civil</i>	0.934*** (0.10)	0.830*** (0.13)	0.893*** (0.15)
<i>Ethnic</i>	1.063*** (0.10)	3.076*** (0.16)	2.065*** (0.09)
<i>Stability</i>		−0.060*** (0.02)	
<i>Resources</i>			0.17*** (0.00)
<i>Credit</i>		−0.069*** (0.01)	−0.104*** (0.02)
<i>Trade</i>		−0.018*** (0.00)	−0.01*** (0.00)
<i>Trend</i>	0.055*** (0.00)	0.010*** (0.00)	0.009*** (0.00)
<i>Civil</i> × <i>Ethnic</i>	−2.862*** (0.12)	−2.988*** (0.16)	−2.044*** (0.12)
<i>Civil</i> × <i>Stability</i>		−0.246*** (0.02)	
<i>Civil</i> × <i>Resources</i>			−0.12*** (0.00)
Panel B			
Overall <i>Civil</i> Effect at the Min of <i>Ethnic</i>	0.819*** (0.11)	1.18*** (0.08)	0.807*** (0.06)
Overall <i>Civil</i> Effect at the Mean of <i>Ethnic</i>	−1.039*** (0.11)	−1.993*** (0.08)	−1.49*** (0.06)
Overall <i>Civil</i> Effect at the Max of <i>Ethnic</i>	−1.72*** (0.11)	−2.24*** (0.08)	−2.11*** (0.06)
Observations	1540	1540	1540
AIC	1474.9	1313.3	1511.1
Log lik.	−729.43	−643.66	−742.55
Wald	6290.99	2451.01	5416.19
Wald-pvalue	0.00	0.00	0.00
λ	0.32	0.72	0.94

Standard errors are shown in parentheses.

***denotes 1% significance; ** denotes 5% significance; * denotes 10%

All specifications include time-fixed effects in the frontier equation.

Wald test refers to the hypothesis that all estimated parameters in the inefficiency equation are jointly zero.

The overall effect is calculated by holding *Ethnic* constant at the sample value indicated in each row. See the derivation of Eqs. (4) and (5) in the text for further details.

law group (Chad, Madagascar, and Congo at the top). Third, the bottom right of the graph includes countries with high ethnic heterogeneity and low average efficiency. Tanzania from the Common law group has the poorest performance with Cote d'Ivoire and Guinea-Bissau from the Civil law group also close to the bottom.

Despite technical efficiency following a similar trend in Civil and Common law countries since 1970 (Fig. 2), Civil law countries consistently dominate over Common law countries in efficiency. On average, all countries in the sample experience efficiency losses close to 32%. Since the 1980s, SSA countries have improved their efficiency substantially, while during the 2000s, they stagnated. After the 2000s, another downward trend was evident.²⁷

3.7. Frontier and inefficiency estimates

Turning to the estimates of the frontier, γ_k and γ_h are both positive and statistically significant. The elasticity of capital per worker k is

²⁷ Botswana has improved performance substantially during the period with an average technical efficiency score of 0.47 in the 1970s which raised to 0.751 at the end of the period. Countries with an efficiency score in the 1970s already close to the sample mean are Chad, Rwanda, and Burundi which kept experiencing small efficiency gains during the period 1980–2000.

around 0.7, while the human capital h coefficient is close to 0.05. The size of the coefficient of k is high as is also illustrated in Table 3 implying substantial output returns in SSA after increments in the relatively scarce capital.²⁸ Recall, Battese and Coelli (1995) specify technical efficiency as $TE_{it} = \exp(-u_{it} = \exp(-Z_{it}\theta))$, which means that a negatively signed coefficient of θ is interpreted as an efficiency enhancer determinant (i.e. reduces inefficiency) or equivalently closes the output gap from the technical frontier. Regarding H1, the variable of main interest in Table 4 is the interaction term *Civil* × *Ethnic*. Coefficients of the autonomous variables *Civil* and *Ethnic* maintain a pattern similar to the FEF estimates in Table 3. In the absence of ethnic heterogeneity, British Common law remains a more supportive legal system for economic prosperity (La Porta et al., 2008). Heterogeneity in ethnic composition is a major source of technical inefficiency. Nonetheless, the combined effect between the two is negative and highly significant in statistical terms, which supports H1. Evaluating the overall effect of *Civil* in (7.2) from $\frac{\partial u_{it}}{\partial Civil_i} = \hat{\theta}_1 + \hat{\theta}_3 \overline{Ethnic} + \hat{\theta}_6 \overline{Stability}$, countries with French Civil law have 1.99% higher efficiency relative to countries with British Common law. If the effect is evaluated at the

²⁸ Méon and Weill (2010) report coefficients for capital per worker no larger than 0.5 for a group of developed countries.

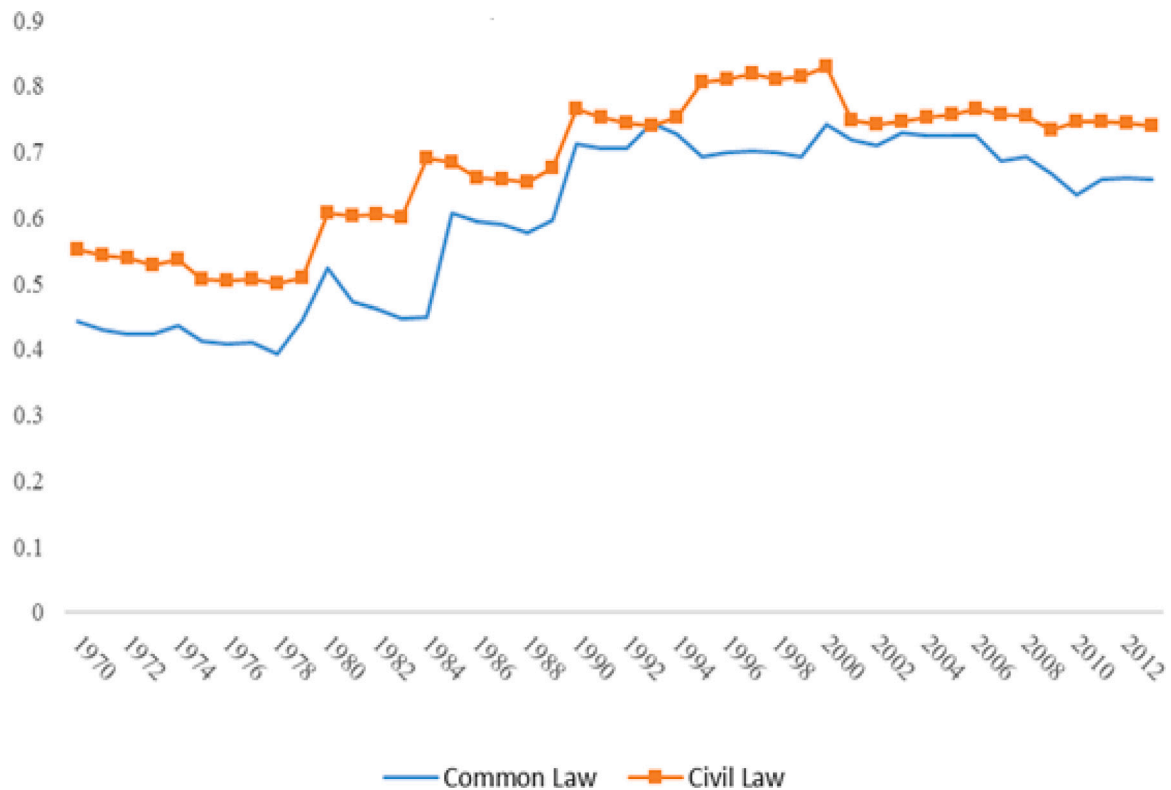


Fig. 2. Efficiency scores 1970–2013, 35 SSA countries.

maximum of *Ethnic* then the effect increases to 2.24%. On the other hand, the overall effect of *Civil* at the minimum level of *Ethnic* suggests that inefficiency increases by 1.18% in Common law countries. These findings highlight a new perspective in the literature which has been ignored to date, the interplay between colonial legacy and the degree of ethnic heterogeneity in SSA countries as a main socio-political driver of economic performance.

Table 5 calculates the total effect of key inefficiency determinants *Ethnic*, *Stability* and *Resources*. Overall, a 10% increase in ethnic heterogeneity increases inefficiency by 0.88 percentage points. This result accords well with our previous discussion that institutions are likely to deteriorate from ethnic fragmentation, which impacts negatively the effectiveness of economic governance. On the whole, *Stability* is a major efficiency enhancer as shown in Table 5 with a 10% increase in the likelihood of the government not being destabilized signifying efficiency gains in the order of 3 percent. This finding highlights the role of political stability as a catalyst for better economic outcomes and even more stresses the need for an appropriate institutional environment that can promote it. Although the interaction term *Civil* × *Resources* is an efficiency enhancer (i.e. negative sign) as shown in Table 4, on the whole, *Resources* remain an inefficiency enhancer with a 10 percent increase in natural resources revenue to increase inefficiency by 0.5 percentage point. Despite the high effectiveness of Civil law in dealing with natural resources management, economic dependence on natural resources per se is a distortive factor that leads to rent-seeking practices and an uneven development pattern.²⁹

Summarizing our results in Table 4 for the role of colonial legacy – as it is represented by legal origins – in the national technical efficiency and allocation of production inputs, the centralized style of economic governance derived from the French colonial legacy through Civil law is proved to be more effective in ethnically heterogeneous societies. Similarly, French Civil law can more easily promote political stability and

Table 5
Overall elasticities, specification (7.2).

	Elasticities
$E_{\mu,ethnic}$	0.088***
$E_{\mu,stability}$	-0.3**
$E_{\mu,resources}$	0.05**

alleviate challenges related to the control of natural resources in SSA countries, even though, the abundance of natural resources remains an obstacle to sustainable economic prosperity. The interpretation of our results concerning the superiority of the French colonial legacy in generating better economic outcomes in ethnically fragmented societies of SSA merits some conceptual caveats. First, the finding that countries under Civil law are more politically stable does not necessarily mean that these societies are also pluralistic democracies, quite the opposite, these countries might have in place authoritarian regimes with a low degree of political competition. Second, the dominant groups that control state resources are powerful enough to protect the status quo from rebellions, nonetheless, this does not guarantee that mobilization against the state will never occur; it does sometimes occur and it might take a revolutionary form that aims at destroying state hegemony (Blanton et al., 2001; Acemoglu et al., 2020). Finally, *Trade* and *Credit* in Table 4 are efficiency enhancers. Trade stresses the importance of trade-embodied technical change, while financial markets provide the credit channels needed for stimulating private investment. These results are consistent with estimates from the restricted specification of output per worker in Table 3. Similarly, *trend* shows that exogenous technical change is not an inefficiency enhancer in SSA countries.³⁰ Appendix C.3 provides coefficients from a translog production function and the following inefficiency determinants: *Polity2* (*Polity*), life expectancy (*Life*)

²⁹ Thus, undermining investment in human capital (Gylfason, 2001; Galor and Mountford, 2008) and expansion of the industrial base (Hodler, 2006).

³⁰ Technical change in developing countries is either input-biased or trade augmented as already shown in Danquah and Ouattara (2015) and Christopoulos and León-Ledesma (2014).

and the share of manufacturing to GDP (*Man*). These are also found to be efficiency-enhancing determinants but more importantly, results for *Civil* and *Civil* × *Ethnic* do not change.

3.8. Counterfactual analysis

To further assess the differences between *Civil* and *Common* in SSA countries, we provide a counterfactual analysis from the estimates shown in Table 4 with a comparison between actual and predicted efficiency scores in Common law countries based on the overall effect of *Civil*. Specifically, we found in our preferred specification that Civil law reduces on average inefficiency by 1.99%. As a placebo exercise, we eliminate initial differences in efficiency between the two groups by adjusting the efficiency score of Common law countries in 1970 with the premium differential. Then, we recalculate the series to see the evolution of efficiency in Common law countries, *ceteris paribus*. The re-calculation of the efficiency scores is derived from the following formula:

$$\hat{T}E_{it}^{Common} = (1 + \bar{g}_i^{Common})^n \times \tilde{T}E_{i1970}^{Common} \quad (8)$$

where $\hat{T}E$ stands for the predicted score of technical efficiency; $\tilde{T}E = (1 + \hat{\theta}_{Civil})\hat{T}E$ is technical efficiency in 1970 adjusted for the efficiency differential, θ , between countries of the two legal origin groups; n is the number of years in the sample, and g_i is the average growth rate of $\hat{T}E$ in Common law country i over the sample period. The actual average efficiency score for Common law countries in 1970 is 0.443. Offering to Common law countries the efficiency premium $\theta = 1.99\%$ of Civil law countries brings the former group to an efficiency score equal to 0.452 in 1970. The recalculation of the efficiency series according to (8) indicates that if in 1970 Common law countries had adopted the Civil law system instead (*ceteris paribus*), they would have achieved an efficiency score in 2013 equal to 0.83 as opposed to the actual figure of 0.65. This placebo exercise points to efficiency losses for Common law countries at the order of 22% (i.e., $1 - (0.65/0.83)$) for 43 years.³¹

4. Conclusions

We study the impact of the colonizer's legal tradition on the national efficiency of former African (SSA) colonies explicitly conditioning the effects on the degree of ethnic fragmentation. The colonial states were characterized by differential styles of political and economic governance in ruling their colonies. On the one hand, we have the more centralized state under the French Civil law system, while on the other hand, we have the more decentralized state under the British Common law system. We argue that the parsimonious and systematic way to capture the differences between styles of colonial governance is to see them through the lenses of legal origins. In that context, legal origins are the legal prototypes transplanted from former colonizers and maintained in the post-independence era. Our study is placed within the strand of literature that looks at how historical aspects of the institutional framework drive current outcomes in African countries. More importantly, differences in legal traditions have significant implications for how countries deal with ethnic heterogeneity and conflict. African countries have persistent ethnic fragmentation with substantial socioeconomic consequences. Therefore, it is imperative to understand how legal traditions interact with ethnic heterogeneity in shaping current economic performance. To our knowledge, our study is the first that explores the interplay between ethnic heterogeneity and legal origins within an integrated economic governance context.

Within a multi-faceted empirical analysis for 35 SSA countries over the period 1970–2013, we incorporate the role of legal origins and

ethnic heterogeneity, first within a standard income-per-capita regression and second, we study their effect as in (efficiency) determinants within an aggregate production function. Two channels are identified through which Civil law, drives economic outcomes. First, the French Civil law system can enforce coordination better due to its centralized orientation, which leads to more efficient use of natural resources; and second, Civil law tends to guarantee greater political stability. Our findings contradict the standard view that Common law is universally the most appropriate legal framework for economic activity. Without considering further conditions the latter statement remains true even in our analysis, but considering ethnic heterogeneity suggests a different story. In countries with inherited substantial ethnic heterogeneity, centralized administration makes social and ethnic conflicts easier to resolve, which is undoubtedly beneficial for the use of natural resources and national inputs. As far as other traditional economic factors are concerned, human capital, trade, and a well-functioning financial market are equally critical for economic growth.

We should note that there is possibly a cost of increased political stability, under French Civil law relative to British Common law — that of a less pluralistic institutional democracy. Thus, our results should not be interpreted as evidence that countries with French Civil law constitute better democracies. Some SSA countries could even be classified as autocratic regimes, but this should not be considered an artifact of the inherited colonial style as both French Civil law and British Common law countries may end up as autocracies. Nonetheless, as our pooled and cross-country econometric estimations suggest, societies following the French legal tradition tend to suffer from fewer conflicts, which is undoubtedly beneficial for economic activity. A related caveat that accompanies the interpenetration of our empirical findings is that political stability does not always follow the institutional centralization of French Civil law, rather it might reflect the fact that France intervened militarily in postcolonial Africa to secure stability more than fifty times. It is important to include this element in future research when assessing the relevance of legal roots to contemporary socioeconomic performance, among other factors. A further suggestion for future research is to distinguish legal origins from other colonial channels, such as educational and health investments, as indicated in Klerman et al. (2011). In our study, we only controlled for educational and health investments through the human capital variable in our growth regressions. Finally, our results and conclusions leave the key distributional issue of development unanswered. The question “Is it more likely that income improvement largely shifts towards the dominant elites?” deserves special attention. Alesina et al. (2016) find that ethnic heterogeneity impacts development indirectly, through ethnic-specific economic inequality. This is potentially an important issue that future research should address more systematically.

Considering the relatively static nature of historic institutions such as legal origins, the main policy implication of our paper concerns ethnic heterogeneity's moderating effect on the performance of legal origins. Achieving better ethnic and cultural integration (especially in Common law countries) could mitigate the negative implications of ethnic heterogeneity on economic growth. Desmet et al. (2017) find that the negative effect of ethnic heterogeneity is strongest when there is an overlap between ethnic and cultural fragmentation. This finding motivates a clear policy intervention channel, focusing on the cultural integration of ethnic groups. Despite being motivated by Africa, this policy intervention is not specific to the continent.

Data availability

Data will be made available on request.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

³¹ Appendix D shows the plots of actual versus predicted efficiency trends for the sub-sample of Common law SSA countries.

Appendix A. Summary statistics

Variable	Mean	SD	Min	Max	Source
<i>y</i>	3.83	0.66	0.66	5.72	PWT 8.0
<i>k</i>	3.79	0.53	0.73	5.77	PWT 8.0
<i>l</i>	3.29	0.73	0.53	4.38	PWT 8.0
<i>h</i>	0.54	0.29	-0.54	1.03	Barro and Lee (2013)
<i>Civil</i>	0.53	0.50	0.00	1.00	La Porta et al. (1999)
<i>Ethnic</i>	0.63	0.22	0.04	0.93	Alesina et al. (2003)
<i>Resources</i>	14.83	15.77	0.03	85.82	WDI
<i>FDI</i>	8.75	17.65	0.00	251.59	WDI
<i>Trade</i>	40.34	24.48	2.04	250.50	WDI
<i>Credit</i>	30.98	41.07	0.00	300.08	WDI
<i>Stability</i>	-0.10	1.00	-1.92	1.97	Kaufmann et al. (2009)
<i>Conflict</i>	5.05	2.13	1.00	10.00	Stiftung (2014)
<i>Polity</i>	-2.78	6.09	-10.00	10.00	Persson et al. (2003)
<i>Life</i>	55.87	10.33	27.08	80.13	WDI
<i>Man</i>	11.50	6.34	0.89	41.72	WDI

Appendix B. Average efficiency scores, legal origins and ethnic heterogeneity

Country(Legal Origin)	Efficiency	Ethnic
Zimbabwe (Common)	0.7700	0.3874
Rwanda(Civil)	0.7594	0.3238
Chad(Civil)	0.7525	0.8620
Mauritius(Civil)	0.7434	0.4634
Nigeria (Common)	0.7034	0.8505
Burundi(Civil)	0.7327	0.2951
Zambia (Common)	0.7129	0.7808
Namibia (Common)	0.7232	0.6329
Angola(Civil)	0.7280	0.7867
Sierra Leone (Common)	0.7163	0.8191
Gabon(Civil)	0.7214	0.7690
South Africa (Common)	0.6960	0.7517
Gambia (Common)	0.6759	0.7864
Mozambique(Civil)	0.7000	0.6932
Botswana (Common)	0.6988	0.4102
Congo(Civil)	0.7295	0.8747
Cameroon(Civil)	0.6880	0.8635
Mauritania(Civil)	0.6986	0.6150
Senegal(Civil)	0.6837	0.6939
Mali(Civil)	0.6780	0.6906
Uganda(Common)	0.6764	0.9302
Kenya (Common)	0.6721	0.8588
Malawi (Common)	0.6705	0.6744
Ethiopia(Civil)	0.6631	0.6900
Benin(Civil)	0.6594	0.7872
Ghana (Common)	0.6549	0.6733
Togo(Civil)	0.6526	0.7099
Central Africa (Civil)	0.6490	0.8295
Madagascar(Civil)	0.7425	0.8791
Niger(Civil)	0.6376	0.6518
Swaziland (Common)	0.6303	0.0582
Cote d'Ivoire(Civil)	0.6310	0.8204
Guinea-Bissau (Civil)	0.6250	0.8082
Tanzania (Common)	0.6118	0.7353
Lesotho (Common)	0.6043	0.2550
Median	0.6880	0.7353
Average	0.6883	0.6775

Appendix C. Additional specifications

C.1. Sub-sample of Common law and Civil law countries, excluding former French colonies

Panel A		
	(1)	(2)
Production Inputs		
β_k	0.227***	0.215**
	(0.08)	(0.07)
β_h	0.135	0.081
	(0.15)	(0.13)
Resources		0.023
		(0.05)
Stability		-0.002
		(0.03)
<i>Civil</i> × Resources		-0.02***
		(0.00)
<i>Civil</i> × Stability		0.081*
		(0.03)
Time Invariant Determinants		
<i>Civil</i>	-2.49***	-1.023
	(0.19)	(0.54)
<i>Ethnic</i>	-3.43***	-0.259
	(0.29)	(0.56)
<i>Civil</i> × <i>Ethnic</i>	4.89***	3.276
	(0.48)	(0.17)
Additional Determinants		
<i>Credit</i>		0.03***
		(0.00)
<i>Trade</i>		0.01**
		(0.00)
<i>FDI</i>		-0.001
		(0.01)
<i>Trend</i>		-0.002
		(0.03)
Number of countries	20	20
N	880	845
Panel B		
Overall <i>Civil</i> Effect at the Min of <i>Ethnic</i>	-3.234***	-1.05***
	(0.385)	(0.19)
Overall <i>Civil</i> Effect at the Mean of <i>Ethnic</i>	-0.349	0.724***
	0.385	(0.19)
Overall <i>Civil</i> Effect at the Max of <i>Ethnic</i>	1.17**	0.402**
	(0.385)	(0.19)

Robust Standard errors for arbitrary heteroscedasticity are shown in parentheses.

***denotes 1% significance; ** denotes 5% significance;* denotes 10%.

The overall effect is calculated by holding *Ethnic* constant at the sample value indicated in each row.

The group of Civil Law countries that are not former French Colonies are Rwanda, Burundi, Angola, Ethiopia, and Mozambique.

C.2. Sub-sample of Common law countries and Civil law countries, including only former French colonies

Panel A		
	(1)	(2)
Production Inputs		
β_k	0.309*** (0.02)	0.345*** (0.05)
β_h	0.12*** (0.04)	0.11* (0.06)
Resources		-0.012*** (0.00)
Stability		0.07** (0.03)
<i>Civil</i> × Resources		0.04** (0.005)
<i>Civil</i> × Stability		0.0421 (0.276)
Time Invariant Determinants		
<i>Civil</i>	-2.18*** (0.47)	-1.861*** (0.47)
<i>Ethnic</i>	-2.43*** (0.47)	-0.286 (0.32)
<i>Civil</i> × <i>Ethnic</i>	3.39*** (0.59)	3.17*** (0.54)
Additional Determinants		
<i>Credit</i>		-0.02*** (0.00)
<i>Trade</i>		0.063*** (0.00)
<i>FDI</i>		-0.007 (0.07)
<i>Trend</i>		-0.00 (0.003)
Number of Countries	30	30
N	1320	1034
Panel B		
Overall <i>Civil</i> Effect at the Min of <i>Ethnic</i>	-2.044*** (0.53)	0.137 (0.17)
Overall <i>Civil</i> Effect at the Mean of <i>Ethnic</i>	-0.0443 (0.53)	0.7293*** (0.17)
Overall <i>Civil</i> Effect at the Max of <i>Ethnic</i>	0.9727* (0.53)	3.536*** (0.17)

Robust Standard errors for arbitrary heteroscedasticity are shown in parentheses.
 ***denotes 1% significance; ** denotes 5% significance;* denotes 10%.

The Civil Law countries that are excluded from the current sample are Rwanda, Burundi, Angola, Ethiopia, and Mozambique.

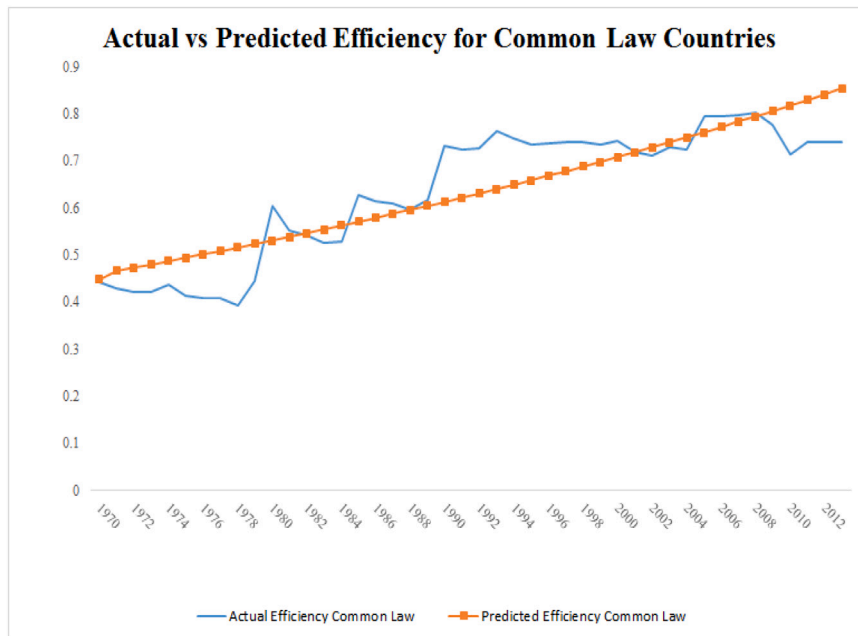
C.3. Translog specification of the national production function with polity, life, and man as efficiency determinants

	(C3.1)	(C3.2)
Frontier		
γ_k	0.782*** (0.01)	0.820*** (0.01)
γ_l	0.151*** (0.02)	0.374*** (0.02)
γ_h	0.230*** (0.03)	0.378*** (0.05)
γ_{lh}		0.169** (0.08)
γ_{kl}		-0.077***
<hr/>		
	(C3.1)	(C3.2)
		(0.03)
γ_{kh}		0.135*** (0.05)
γ_{kk}		0.148*** (0.01)
γ_{ll}		0.170*** (0.02)
γ_{hh}		0.118** (0.05)
Trend		-0.014*** (0.00)
Trend²		-0.002 (0.00)
<hr/>		
Inefficiency		
Civil	0.830*** (0.09)	1.561*** (0.17)
Ethnic	1.059*** (0.09)	1.543*** (0.21)
Civil × Ethnic	-1.888*** (0.11)	-2.321*** (0.20)
Resources		0.001 (0.00)
Credit		-0.017*** (0.01)
Trade		-0.004*** (0.00)
Polity		-0.022** (0.00)
Life		-0.52*** (0.00)
Man		0.002 (0.00)
Observations	1540	1540
AIC	1367.5	-86.4
Log lik.	-631.73	110.21
Wald	7659.83	12743.44
Wald_p	0	0.77
λ	0.57	0.87

Standard errors are shown in parentheses. ***denotes 1% significance; ** denotes 5% significance; * denotes 10%. All specifications include time-fixed effects in the frontier equation.

The *Polity* variable measures the quality of democracy in a society. The index of *Polity* takes values from -10 (strongly autocratic regime) to +10 (strongly democratic regime). We refer to [Persson et al. \(2003\)](#) and [Marshall et al. \(2014\)](#) for further discussion. Wald test refers to the hypothesis that all estimated parameters in the inefficiency equation are jointly zero.

Appendix D. Actual and predicted efficiency in Common law countries



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