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Searching for Growth-conducive Institutions in Emerging Economies: A Stochastic Frontier Analysis

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Abstract

This study aims to identify growth-conducive institutions unique to emerging economies. For that purpose, we examine the roles of Anglo-American institutions in fostering total factor productivity growth through the improvement of technical efficiency in emerging economies. Specifically, the impacts of the liberalistic and paternalistic types of regulatory institutions are discerned. The results show that institutional qualities such as reverence for the rule of law and effective governments robustly promote total factor productivity by improving technical efficiency, while voices of citizens and political stability exhibit a symbiotic relationship, where the efficacy of one of these qualities requires the sufficient prevalence of another. Regarding regulatory institutions, we found evidence that calls for protectionist policies to foster innovation, which is the key driver of technical efficiency.

Keywords: Institutional quality, total factor productivity, technical efficiency, stochastic frontier analysis, strategic niche management

JEL Classification: J24, O43, O47, P48

1. Introduction

The nexus between institutions and economic growth has been heavily researched; however, very much still remains to be discovered. Conventional wisdom supported by empirical evidence (*e.g.*, Rigobon and Rodrik, 2005; Chanda and Dalgaard, 2008; Justesen and Kurrild-Klitgaard, 2013)

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tells us that improvement in institutional quality leads to economic growth. However, the following question remains: Is there a set of universal growth-conducive institutions? Following the rise of the United States as a superpower, liberal Anglo-American institutions, which carry an overtone of civil liberties, maximum market freedom and strong protection of property rights are often advocated to be the Global Standard Institutions (GSIs) that are deemed the ideal institutions for economic growth (Chang, 2011; Chang, 2005). In fact, it is often claimed that a dose of these liberal Anglo-American institutions is exactly what emerging economies need, if they are to ever emerge as first-world countries.

However, leaders of emerging economies would be unthinking if they were to pursue liberal Anglo-American institutions without first considering the social and cultural milieu of their respective countries. Given North's (1990) definition of institutions as rules that underpin the functioning of a society or, more formally, as the humanly devised constraints that shape human interactions, institutions should be endogenously developed rather than exogenously acquired lock, stock and barrel. For example, Pereira and Luis (2019) illustrated that the prevailing institutions in Mozambique are basically the outcomes of its past attributes and developments, while Acemoglu *et al*. (2001) ascribed the endogenic development of a country's institutions to the types of colonization it endured before.

While a large compendium of studies (e.g., Addi and Abubakar, 2022; Dort *et al*., 2014; Sabir *et al*., 2019; Aysan *et al*., 2007; Gwartney *et al*., 2006) have examined the effects of institutions on economic growth by way of capital accumulation, this study takes a slightly different approach. Following the Cobb-Doughlas production function, output level is determined by the quantity of production factors, namely labour and capital. Given that the size of labour – determined by the population size – is relatively invariable, emerging countries have traditionally been focusing on fixed capital accumulation to propel growth such as building of infrastructures. However, given a relatively stagnant labour supply, the marginal productivity of capital falls as the stock of capital increases. This causes the growth of those emerging economies that have already accumulated a significant stock of capital to stagnate and leaves them mired in the middle-income trap.

Thus, instead of focusing on fixed capital accumulation to foster economic growth, emerging economies should turn their attention to improving total factor productivity[1] (TFP). Unlike fixed capital, TFP, another economic growth determinant, is generally lagging and ignored in emerging economies. Therefore, increasing TFP among those emerging economies with excessive capital stock will yield a higher and more sustainable marginal productivity compared to increasing capital. Following Farrell's (1957) frontier analysis, Nishimizu and Page (1982) and Koop *et al*.

1 Total factor productivity, also known as Solow residual accounts for the difference between the actual output level and the level of output that is determined by the inputs.

(1999) maintained that TFP change can be decomposed into technological progress and technical efficiency change. Fully efficient economies of comparable development status are expected to operate on the same efficient production frontier characterized by a common level of technology, which denotes the maximum technically feasible level of output, given the level of inputs. Thus, countries producing below the frontier are deemed technically inefficient. Over time, a country's total factor productivity can change due to the improvement in common technology (technological progress), which leads to a shift in the efficient production frontier or changes in technical efficiency led by better allocation of resources through innovation[2], diffusion of technological knowledge and improved managerial practice, which allows inefficient countries to catch up with the frontier. This study focuses on the latter.

Given the different social attributes of emerging economies and the ascending role of TFP in determining their economic growth, this study aims to identify growth-conducive institutions unique to emerging economies in promoting TFP by way of technical efficiency, using the stochastic frontier analysis (SFA) approach. For this purpose, we examine the extent to which the technical efficiency of emerging economies is fostered through the adoption of Anglo-American institutions. While institutions that improve governance are generally expected to promote TFP by improving technical efficiency, liberalized markets are not expected to work as well in emerging economies as in developed economies.

Market liberalization, one of the key tenets of Anglo-American institutions, emphasizes market selection pressure as the core driver of innovation that leads to factor productivity growth. Since market liberalization is a derivative of neoclassical marginal thinking, the decision to innovate is undertaken only when the marginal benefit of innovation outweighs its marginal cost. However, unless the neoclassical ideal assumption of perfect rationality prevails, imperfections in foresightedness and market uncertainties lead to downward bias in the discounted marginal benefit of innovation owing to an elevated discount factor due to the substantial amount of embedded risks and uncertainties. In comparison with developed economies, the failure to appropriately account for the marginal benefit of innovation is more pronounced in emerging economies given their greater extent of imperfect information and political uncertainties. Coupled with increased marginal costs owing to relatively scarce capital in these economies, the discounted marginal costs of innovation are likely to outweigh its discounted marginal benefits, causing market failure for innovation to prevail.

2 The effects on innovation on technical efficiency can easily be confused with technological progress. The latter requires a shift of the efficient production frontier indicated by improvement in the frontier of technology across the population.

Thus, the strategic niche management (SNM) approach to innovation arguably fits emerging economies better[3] in managing technological transitions, where radical innovations are identified and nurtured in protective spaces under appropriate protectionist policies before they are fully integrated into the wider economy, when all protections are withdrawn and market discipline is instilled[4]. Thus, a blanket adoption of market liberalization in emerging economies is likely to stunt rather than promote growth as innovation is stifled.

Based on these arguments, the analysis in this study has yielded an interesting insight that challenges the orthodoxy of liberal Anglo-American institutions. On top of the expected findings that strong rule of law and effective governments robustly promote TFP by reducing technical inefficiency, market liberalisation is intriguingly found to have a converse effect, suggesting that protectionist policies facilitate TFP growth. In addition, the efficacy of voices of citizens in promoting technical efficiency is conditional on the prevalence of a desirable level of political stability and vice versa.

The remainder of this paper is organized as follows: Section 2 provides a review of the extant literature that studies the implications of institutions on productivity and economic growth, while Section 3 explains the estimation model, methodology adopted and data used to carry out the analysis before discussing the results in Section 4. Finally, Section 5 discusses the policy implications of this study before concluding with recommendations.

2. Literature Review and Gap

2.1 Review of theoretical and conceptual literature

Unlike the Solow-Swan model, which assumes that TFP is exogenously determined, rendering all countries' GDP per capita growing at the same rate, endogenous growth models (Romer, 1986; Lucas, 1988; Barro, 1990; Aghion and Howitt, 1992 and 1998) explain TFP as an endogenization of technological progress through knowledge and human capital accumulation. Thus, the nexus between institutions and TFP becomes apparent when it is perceived in light of endogenous growth theory as the endogenization of technological progress would certainly be affected in many ways by institutions defined loosely as the order and manner in which human interactions are organized in a society.

3 Studies that examine the SNM approach on China's industries include Yin and Xu (2022) and Jin and McKelvey (2019).

4 A thorough review on SNM is presented by Schot and Geels (2008).

The epochal inquiry into the implications and efficacies of institutions began when Douglass North wrote *Institutions, Institutional Change and Economic Performance* in 1990. North provided a detailed illustration of how institutions, being humanly devised constraints that shape human interaction, are capable of creating a conducive environment that facilitates cooperative solutions among agents to tackle complex economic problems, including fostering economic growth. One of the many beneficial outcomes of cooperative solutions facilitated by growth-conducive institutions is improved efficiency of doing business by minimizing the transaction costs.

As pointed out by North (1993), the structure of property rights and the effectiveness of the courts and judicial system, which both concern the rule of law, have direct implications on transaction costs. Strong institutions lead to the prevalence of efficient factor markets, which then allow firms to ascertain the quantity and quality of required factors accurately. This minimizes transaction costs and improves efficiency by reducing the measurement errors and wastages. North's argument is well supported by Williamson's (1987, 1996) framework of transaction cost economics (TCE), which emphasizes the role that institutions play in promoting economic growth by improving productivity through the efficient organization of a network of contractual relations to minimize transaction risk and costs.

In addition to minimizing transaction costs, growth-conducive institutions also give rise to an incentive structure that supports productive economic activities. In accordance with Baumol's theory of entrepreneurial allocation (Baumol, 1996), entrepreneurial activities can be both productive and destructive. Baumol argued that the prevailing institutional framework, encompassing the rule of law, regulatory quality and effectiveness of the public sector, plays a critical role in channelling resources to productive activities by altering the incentive structure. The capability of institutions to perform such a role determines the economic performance. For example, secure copyrights and patents encourage research and development activities, which, in turn, leads to economic growth.

In the domain of industrial organization, institutions play a role in the creation of selection environments that are conducive for innovations to thrive. On the one hand, the classical school is unyielding that growth-conducive institutions need to allow for maximum market freedom to bring about a Darwinism-like market selection process to dynamically allocate and reallocate resources from inefficient to efficient units so that every bit of resources is put to the best use as characterized by Pareto optimality. The importance of the market selection process is apparent in the seminal work of Acemoglu *et al*. (2006), who only suggested the implementation of protectionist policies if the economies switch out of investment-based strategies too soon, but cautioned that these policies come with a long-term cost of delaying the next horizon of innovation-driven growth. Similarly, Zilibotti (2017) called for a market reform in China to make innovation a market-based outcome if it were to transition to the next phase of growth.

On the other hand, evolutionary economists and early contributors who laid the foundation of strategic niche management (SNM) such as Van de Belt and Rip (1987), Levinthal (1998) and Rip and Kemp (1998) attempted to strike a balance by arguing that systemic innovations that are capable of a regime change need to be shielded and nurtured in protective spaces known as "niches" to maximize diffusion before allowing market forces to take over and market discipline to set in. SNM scholars often attribute the basis of SNM to Mokyr (1990), who described new technologies as "hopeful monstrosities" – a term that reflects the challenges and extensive risks of failure that plague new technologies as they transition from lab to market. Thus, the seminal work of Hoogma *et al*. (2002, p. 29), which methodologically documented the SNM approach towards developing a sustainable transportation system, among other things, called for government support in the SNM process. The alignment of government support with other actors in the network determines the success of early niche development[5]. Indeed, recent conceptual studies have been unconvoluted in calling for governmental participation in niche formation to facilitate technological regime shifts (see Kivimaa, 2014; Fu and Mu, 2014; Ashford and Hall, 2018; Warneryd *et al*., 2020).

2.2 Review of empirical literature

As the theoretical elucidation of institutions suffuses, so do the empirical studies, corroborating the theorized relationship between institutions and GDP or TFP growth. However, extant empirical literature is largely unequal with many studies focusing on the nexus between institutions and GDP growth (especially by way of capital accumulation), while studies that examine the effects of institutions, specifically, on TFP are scarce.

Studies that hypothesize the institutions-investment-growth causality such as Addi and Abubakar (2022), Dort *et al*. (2014), O'Toole and Tarp (2014), Aysan *et al*. (2007) and Gwartney *et al*. (2006) have generally found that improvement in institutional qualities and governance spurs efficient gross capital formation, which subsequently leads to a higher level of economic growth, while Akobeng (2017) showed that high-quality institutions significantly reinforce the negative link between gross fixed capital formation and poverty. Delving into the effects of institutions on foreign direct investments, Sabir *et al*. (2019) and Ali *et al*. (2010) found evidence that institutional qualities generally promote inflow of foreign direct investments (FDI), while Dada and Abanikanda (2021) maintained that good institutional qualities are necessary to foster Nigeria's absorptive capacity so that the country can benefit maximally from FDI inflow.

5 While some of the case studies discussed in Hoogma et al. (2002) constitute planned top-down experiments, Giganti and Falcone (2022) claimed that SNM has been misconstrued as a top-down approach to policymaking; instead, it should be considered reflexive governance. Regardless, the participation of government cannot be ignored.

Studies such as Rigobon and Rodrik (2005), Chanda and Dalgaard (2008), Justesen and Kurrild-Klitgaard (2013) and Alabed *et al*. (2015) have generally found positive relationships between institutional qualities and economic growth, but the channels of transmission were obscured in these studies. Rigobon and Rodrik (2005) found that institutions such as the rule of law, openness and democracy lead to income growth, while Chanda and Dalgaard (2008) and Justesen and Kurrild-Klitgaard (2013) put more emphasis on the protection of property rights as the primacy of economic growth. Alabed *et al*. (2021) suggested that improvement in overall institutional quality leads to a higher level of economic growth in Jordan.

Unlike studies that examine the direct effects of institutions on economic growth, Abdulahi *et al*. (2019) studied the moderating effects of institutions on the nexus between natural resource rents and economic growth. Intriguingly, they found that economic rents on natural resources in sub-Saharan African countries only contribute to economic growth when a certain threshold of the rule of law prevails. In addition to assessing the direct effect of institutions on economic growth, Haini (2020) also sought to assess the moderating effects of institutions. To this end, they found that institutional development does not only have a direct positive effect on economic growth, it also strengthens the growth effects of financial institutions and markets.

Apart from the vast literature that expounds on the causality between institutions and economic growth, there are also studies that seek to assess the effects of institutions on productivity. While Quijada (2007) found a positive relationship between economic liberty and TFP in selected Latin American countries, Sanguinetti and Fuentes (2012) found that productivity performance in Spain improves with bankruptcy legislation reform, civil judicial improvements and reduced entry and exit barriers in the retail sector. Unlike most studies that examine formal institutions, Bjørnskov and Méon (2015) delved into the informal institution of social trust, which is found to have a positive impact on TFP.

In a regional study by Rodríguez-Pose and Ganau (2022), overall institutional quality (measured by the World Governance Indicator by the World Bank) was found to affect labour productivity of the European regions. Meanwhile, Égert (2016) concluded that better institutions, a more friendly business environment and lower trade and investment barriers amplify the positive effect of R&D spending on multi-factor productivity. Along the vein of R&D, Coe *et al*. (2009) found that institutions are important determinants of TFP by way of their impacts on R&D spillovers.

Using a sample of 63 countries, Tebaldi (2016) revealed that TFP is significantly determined by institutional quality and openness, while Ajide (2022) found that the positive effect of entrepreneurship on TFP in selected African countries is conditional on the prevalence of conducive institutional qualities. Unlike most studies that generally corroborate the positive effects of institutions on economic growth or productivity, Krammer (2015) surprisingly observed that

institutions consisting of governance, intellectual property rights and economic freedom tend to weaken the positive effect of foreign technological spillover on productivity in transition economies. Nevertheless, ease of doing business enhances the positive effect of foreign technological spillover regardless of the economies' development status.

To empirically support the hypothesized role of governments and government-affiliated intermediaries in the SNM processes, Polzin *et al*. (2016), conducted extensive data collection and analysis before concluding that such intermediaries play a huge role in finance mobilization to operationalize eco-innovation in Germany. In the same vein, the analysis of Xue *et al*. (2016) revealed that financial subsidies are the most important niche protective measure that enable electric vehicle transitioning in China. Likewise, Kwon (2012), who analysed the effect of carbon lock-in, reported the same for South Korea, stating that strong governmental and policy interventions are required to enable the shift to alternative fuel vehicles (AFV).

2.3 Literature gap and contribution

Although there are studies in the literature examining the nexus between institutions and TFP, most of them, except Krammer (2015), either make use of a TFP index from an external database or compute it based on data from external databases before entering it as the dependent variable in their regressions. By contrast, this study adopts an alternative approach by endogenously estimating TFP upon accounting for the technical inefficiency effect, which is captured as the decomposed error of the model. We perceive that such a decomposed error approach is more holistic and generalized as the variation of TFP is explained by technical inefficiency, which is simultaneously determined within the estimation system.

In addition to ascertaining growth-conducive institutions like other studies in the literature, this study puts an emphasis on discerning the different impacts of the liberalistic and paternalistic types of institutional modalities on TFP growth by isolating the effects of market liberalization embedded in the regulatory variable. As explained in Section 1, some paternalistic elements are required in the regulatory institutional frameworks of emerging economies to support growth given their prevailing socio-economic environments. Thus, the findings of this study are capable of empowering emerging economies to chart their tailored paths of institution building by adopting a more pragmatic approach, instead of blindly subscribing to any ideology.

3. Estimation Model, Method and Data

3.1 Model development

Following Lucas (1988), who identified human capital as a factor of economic growth, the estimation model of this study is premised on a standard growth model of the Cobb-Douglass function, augmented with human capital:

$$Y_{it} = A_{it} K_{it}^{\beta} L_{it}^{\rho} H_{it}^{\vartheta}, \tag{1}$$

where Y_{it}, K_{it}, L_{it} and H_{it} are output, physical capital, labour and human capital respectively for the country i at the time t. The parameters β, ρ and ϑ are the corresponding elasticities of output with respect to physical capital, labour and human capital. A_{it} denotes the total factor productivity, which is decomposed into a common level of technology A and the level of technical efficiency of the respective countries τ_{it} as below:

$$TFP_{it} = A\tau_{it} w_{it}, \tag{2}$$

where w_{it} is the stochastic error term and $0 < \tau_{it} < 1$, with $\tau_{it} = 1$ indicating full technical efficiency; that is, the country i is producing at the efficient frontier at the time t.

Consistent with Battese and Coelli (1995), the measure of technical efficiency τ_{it} is assumed to be determined by a set of covariates Z_{jit}:

$$TFP_{it} = A\tau_{it}\left(Z_{jit}\right) w_{it.}. \tag{3}$$

Substituting Equation (3) into Equation (1) yields the production stochastic frontier model:

$$Y_{it} = AK_{it}^{\beta} L_{it}^{\rho} H_{it}^{\vartheta} \tau_{it}\left(Z_{jit}\right) w_{it} \tag{4}$$

3.2 Estimation method

For estimation purposes, Equation (4) is expressed in the transcendental logarithmic (translog) form:

$$\begin{aligned} y_{it} = {} & \theta + \beta_1 k_{it} + \beta_2 0.5 k_{it}^2 + \rho_1 l_{it} + \rho_2 0.5 l_{it}^2 + \alpha k_{it} l_{it} + \vartheta_1 h_{it} + \vartheta_2 0.5 h_{it}^2 + \varphi_1 h_{it} k_{it} + \varphi_2 h_{it} l_{it} + \\ & + \theta_1 t + \theta_2 0.5 t^2 + \theta_3 t k_{it} + \theta_4 t l_{it} + \theta_5 t h_{it} + \xi gfc_t - u_{it} + v_{it,} \end{aligned} \tag{5}$$

where $\theta = \ln A$ and each of the lowercase letters represents the natural log of those variables previously defined by their respective uppercases forms in Equation (1) (*e.g.*, $y_{it} = \ln Y_{it}$, *etc.*). To account for non-neutral technological shocks, a transcendental time trend t is included

in Equation (5), while the dummy variable gfc_t is included to control for the effect of the global financial crisis. Incidentally, all the variables on the right-hand side of Equation (5), excluding u_{it} and v_{it}, are known as the frontier arguments.

Furthermore, u_{it} and v_{it} are the decomposed error terms, where $v_{it} = \ln w_{it}$ is a stochastic error term that is normally distributed with a zero mean and a constant variance σ_v^2, *i.e.*, $v_{it} \sim N(0, \sigma_v^2)$, whereas $u_{it} = -\ln \tau_{it}$ is the one-sided normally distributed error truncated at zero, *i.e.*, $u_{it} \sim N^{+}(Z_{jit}\delta, \sigma_u^2)$, which measures technical inefficiency as the vertical distance between the country *i*'s output level at the time *t* and the efficient frontier[6]. By construct, u_{it} is assumed to be independently but not identically distributed because the expected value of u_{it} is stochastic, which is given as $E(u_{it}) = Z_{jit}\delta_j$, where Z_{jit} is the $(1 \times j)$ vector of covariates that affect the level of TFP through u_{it}, and δ is the $(j \times 1)$ vector of coefficients that need to be estimated.

Thus, u_{it} is modelled as follows:

$$\begin{aligned} u_{it} = {} & \delta_0 + \delta_1 trade_{it} + \delta_2 fdi_{it} + \delta_3 bussfree_{it} + \delta_4 voice_{it} + \delta_5 rule_{it} + \delta_6 goveff_{it} + , \\ & + \delta_7 polstab_{it} + \delta_8 corrupt_{it} + \delta_9 regqua\_resid_{it} + \delta_{11} voice_{it} * polstab_{it} + \varepsilon_{it} , \end{aligned} \tag{6}$$

where $trade_{it}$ and fdi_{it} are the trade volume and net foreign direct investment inflow (both of them as a percentage of GDP), respectively. Together, they capture the effects of cross-border activities on technical inefficiency. To account for the effects of institutions, the following institutional variables are included in the model as covariates of technical efficiency: business freedom ($bussfree_{it}$), rule of law ($rule_{it}$), government effectiveness ($goveff_{it}$), political stability and absence of violence ($polstab_{it}$), control of corruption ($corrupt_{it}$), voice and accountability ($voice_{it}$) and quality of market liberalization reform ($regqua\_resid_{it}$). Further details on these institutional variables are discussed in Section 3.3. Consistent with the frontier arguments, the Z_{jit} variables are also in logarithmic form. The multiplicative interaction term $polstab_{it} \times voice_{it}$ is included in the model to evaluate the interplay between these institutional qualities.

Finally, ε_{it} in Equation (6) is a normally distributed stochastic error with a zero mean and a constant variance σ_ε^2 along with a truncation point at $-Z_{it}\delta$, *i.e.*, $\varepsilon_{it} \geq -Z_{it}\delta$ so that u_{it} is necessarily non-negative. Together, Equations (5) and (6) make up the technical inefficiency effect (TIE) model proposed by Battese and Coelli (1995). Following Battese and Coelli, both of the equations are estimated in a single step by using the maximum likelihood estimator (MLE).

6 The efficient frontier captures the most efficient level of production with technical inefficiency = 0. Thus, production units that operate below the efficient frontier will have a positive u_{it}.

The total variance of the stochastic frontier model is given by $\sigma^2 = \sigma_u^2 + \sigma_v^2$. If the stochastic frontier model is of any value in modelling technical inefficiency, the signal-to-noise parameter λ, defined as $\lambda = \sigma_u/\sigma_v$, must be significantly higher than zero; otherwise, the TIE model converges to the ordinary least square (OLS) model as λ tends to zero because $\lambda = 0$ indicates that the variation in TFP is purely stochastic and the inefficiency effect plays little role in it.

3.3 Data

The study sample included 24 emerging and frontier economies (Argentina, Bangladesh, Brazil, Bulgaria, Chile, China, Czech Republic, Egypt, Hungary, India, Indonesia, Malaysia, Mexico, Pakistan, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Uruguay and Vietnam[7]) observed for 20 years, from 2000 to 2019. The dependent variable for Equation (5) is the log of real GDP as a proxy variable for output and the proxy variables for the frontier arguments include the log of physical capital stock (k_{it}), the log of labour force (l_{it}) and the log of human capital input (h_{it}). The GDP and labour force data are obtained from the World Bank's World Development Indicators (WDI) database, while the physical capital stock and human capital series, which capture information on years of schooling as well as returns to schooling, are obtained from the Penn World Tables version 10.0.

Regarding the technical inefficiency covariates, *i.e.*, Z_{it} variables, the two variables that control for cross-border activities $trade_{it}$ and fdi_{it} are obtained from the WDI database. With regard to the institutional variables that capture the effects of institutions, six of them are obtained from the World Bank's World Governance Indicators (WGI) dataset, which summarizes the perceptions of a large number of enterprises, citizens and expert survey respondents on the quality of institutions and governance. WGI consists of six indicators, namely $rule_{it}$, which captures the extent to which rules of the society are abided by, contracts and property rights are enforced, and crime and violence are deterred; $goveff_{it}$, which measures the quality of public and civil services that include formulation and implementation of public policies and their independence from political influence; $polstab_{it}$, which tracks the likelihood of political instability including politically motivated violence; $corrupt_{it}$, which monitors the possibility and extent of using public power for private gains; $voice_{it}$, which captures the amount of freedom in selection of government, expression and association; and finally $regqua_{it}$, which monitors the ability of the government to formulate and implement policies and regulations that are conducive to sectoral development.

7 The sample countries are selected from those included in the emerging market and frontier market indices of MSCI Inc. to have adequate representations of different continents of the world.

Following the descriptions of the six WGI indicators, $regqua_{it}$ appears to be the most ambiguous indicator. While $regqua_{it}$ tracks the quality of regulatory reforms against the ultimate objective of promoting sectoral development, the nature of such regulatory reforms may differ. Delving into the variables used by WGI to construct $regqua_{it}$, the indicator deems both aspects of regulatory reforms, *i.e.*, reduction of regulatory burden and liberalization of markets, to play equal roles in sectoral development. In comparison with the former, which has a more direct implication on firms' cost outlay, the latter is an ideology arising from the free-market doctrine, which is still heavily debated by different schools of thought. Lumping the two aspects into a single indicator attests to the claims of Oman and Arndt (2010) and Hugue and Jongruck (2018) that the WGI indicators are inherently inclined towards the liberalistic-type governance framework.

In order to test the individual effect of the two aspects of regulatory reforms, the institutional variable $bussfree_{it}$ of the Index of Economic Freedom published by the Heritage Foundation is first introduced to the model. It represents the extent of regulatory burden that saddles the private sector by tracking individuals' *de facto* experience in terms of the time and costs spent starting, operating and closing a business. Thereafter, the two aspects of regulation captured in $regqua_{it}$ are decomposed using an orthogonalization procedure that regresses $regqua_{it}$ on $bussfree_{it}$ and the residual of the regression ($regqua_{it}\_resid$) is deemed as the component of $regqua_{it}$ that is independent of regulatory burden. It then enters our estimation model to account for the effects of market liberalization reforms. Other than $regqua_{it}\_resid$, all institutional variables from the source data are on a scale from 1 to 100, where a higher value indicates better institutional quality. Appendix 1 summarizes the descriptions and data sources of all the variables used in the estimation model.

3.4 Summary of statistics and correlation analysis

Appendix 2 provides a summary of the descriptive statistics for each variable entering the model. It can be seen that variables such as Y_{it}, K_{it} and L_{it} are highly skewed to the right as the deviation of the maximum value from the mean is approximately four to eight times the standard deviation, while the deviation of the minimum value is less than one standard deviation from the mean. Nonetheless, the estimation of the stochastic frontier model is not affected by positive skewness because it makes use of the MLE, which is not constrained by the normality assumption. Regardless, the positive skewness will benefit from the logarithmic transformation. The Z_{it} variables are relatively more symmetrical across the sample.

Prior to the estimation, Pearson's correlation matrix was constructed on the log-transformed Z_{it} variables to examine the degree of collinearity among these variables. Referring to Kennedy (2008), who maintained that correlation above 0.8 leads to a multicollinearity problem, Table 1 shows that multicollinearity is not an issue in the dataset as the correlation coefficients are less than the established cut-off.

4. Empirical Results and Discussion

4.1 Results of production frontier estimation

The analysis in this study is carried out by first estimating the TIE model expressed in Equations (5) and (6) without the $voice_{it} \times polstab_{it}$ interaction term. The results are shown in Table 2 as Model 1. While the voice of citizens is a key pillar of democracy in keeping the executive branch of a government in check, excessive voices can cause pluralism in a society and jeopardize political stability. At the other end of the spectrum, draconian laws implemented under the pretext of promoting stability can stifle the voices of citizens. Thus, given the interplay between $voice_{it}$ and $polstab_{it}$, an interaction term between these two variables is added to the estimation in Model 2. Finally, to ensure that our findings are robust, we re-estimate Model 2 on two alternate samples, and yield Model 2a and 2b, respectively.

Table 1: Pearson's correlation matrix

	$trade_{it}$	fdi_{it}	$bussfree_{it}$	$voice_{it}$	$rule_{it}$	$goveff_{it}$	$polstab_{it}$	$corrupt_{it}$	$regqua\_resid_{it}$
$trade_{it}$	1.00 –								
fdi_{it}	0.07 (0.11)	1.00 –							
$bussfree_{it}$	0.29*** (0.00)	0.06 (0.22)	1.00 –						
$voice_{it}$	0.02 (0.59)	0.03 (0.51)	0.31*** (0.00)	1.00 –					
$rule_{it}$	0.48*** (0.00)	0.09 (0.06)	0.34*** (0.00)	0.47*** (0.00)	1.00 –				
$goveff_{it}$	0.50*** (0.00)	0.08 (0.09)	0.40*** (0.00)	0.40*** (0.00)	0.79*** (0.00)	1.00 –			
$polstab_{it}$	0.43 0.67	0.11*** (0.02)	0.23*** (0.00)	0.34*** (0.00)	0.68*** (0.00)	0.68*** (0.00)	1.00 –		
$corrupt_{it}$	0.33*** (0.00)	0.10*** (0.03)	0.43*** (0.00)	0.46*** (0.00)	0.70*** (0.00)	0.78*** (0.00)	0.66*** (0.00)	1.00 –	
$regqua\_resid_{it}$	0.37*** (0.00)	0.08 (0.08)	0.00 (1.00)	0.45*** (0.00)	0.70*** (0.00)	0.70*** (0.00)	0.52*** (0.00)	0.63*** (0.00)	1.00 –

Note: ***, **, * indicate that the coefficients are significant at the 1%, 5% and 10% level, respectively. Values in parentheses are *p*-values.

Source: Author's own calculations

Based on the estimates of Model 1 in Table 2, the output elasticities with respect to each production factor are computed at the mean value of the corresponding factors and are presented in Table 3 along with the relevant formulae. Consistent with the extant literature, the output elasticities are found to be positive and significant. In addition, output elasticities with respect to labour and physical capital stock are individually less than unity, indicating that both labour and physical capital are subjected to decreasing returns to scale. In particular, the identified decreasing returns to capital indicate the convergence of real GDP per capita as suggested by the Solow-Swan model. However, such convergence is unlikely to be absolute, as the output elasticity with respect to human capital is greater than unity, indicating that it is subjected to increasing returns to scale.

Since the estimated λ parameters shown in Table 2 for all the estimated models are significantly more than zero at less than 1% level, we can conclude that the effect of technical inefficiency u_{it} is significant; therefore, Equation (6) is a valid model to account for it. Table 4 presents the mean technical efficiency $\overline{\tau}_i$ for each country in the sample.

The average efficiency score across the panel is 0.68, with Vietnam being the least efficient country with an efficiency score of 0.3. It is followed by Bangladesh with a score of 0.36. In contrast, the most efficient group of countries comprises Chile, which has the highest efficiency score of 0.94, closely followed by Uruguay with a score of 0.93. Incidentally, countries in the Asian region, on average, are seen as less efficient than those in Latin America and Europe. This seems paradoxical given that many of these Asian countries have reported rapid economic growth in recent years. However, this paradox is answered upon considering the definition of efficiency vis-à-vis GDP growth. While the latter is an absolute measure of growth, the former is a relative measure that takes into consideration the quantity of production factors employed by a country to produce the same level of output as other countries. Appendix 2 shows that Asian countries are generally endowed with more production factors, *i.e.*, labour and capital stock, than countries in other regions. Thus, if they were of an equal level of efficiency as others, they ought to produce a higher level of real GDP than what they have already produced. The fact that they have not explains their lower efficiency scores.

4.2 Results of technical inefficiency covariates

As technical inefficiency measures the output deficit relative to the efficient production frontier, a significant and negative effect of an inefficiency covariate represents a positive impact on TFP by improving technical efficiency and vice versa. Estimates of Model 1 presented in Table 2 show that $trade_{it}$, as one of the two variables that control for cross-border activities is found to significantly increase technical inefficiency, while fdi_{it} has no significant effect at all. This indicates that although the wave of globalization could have brought forth much growth to emerging economies, it has only done so inefficiently.

Table 2: Estimation results

Dependent variable (y_{it})		Model 1		Model 2		Model 2a		Model 2b	
		Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.	Coef.	Std. err.
Frontier arguments:									
k_{it}	β_1	−7.11***	0.49	−5.06***	0.53	−3.64***	0.55	−7.57***	0.63
$0.5k_{it}^2$	β_2	0.21***	0.01	0.16***	0.02	0.12***	0.02	0.21***	0.02
l_{it}	ρ_1	0.70***	0.25	0.58**	0.24	−0.07	0.28	0.38	0.61
$0.5l_{it}^2$	ρ_2	−0.15***	0.01	−0.12***	0.01	−0.08***	0.02	−0.15***	0.02
$k_{it}l_{it}$	α	0.08***	0.01	0.06***	0.01	0.06***	0.01	0.09***	0.01
h_{it}	ϑ_1	−12.32***	2.55	2.18	2.56	8.50***	2.66	−13.32***	3.50
$0.5h_{it}^2$	ϑ_2	3.20***	1.08	−1.33	1.04	2.20***	1.31	1.42	1.66
$h_{it}k_{it}$	φ_1	0.06	0.12	−0.30***	0.11	−0.67***	0.12	0.17	0.14
$h_{it}l_{it}$	φ_2	0.56***	0.13	0.54***	0.12	0.63***	0.16	0.52**	0.22
t	θ_1	0.72***	0.07	0.41***	0.08	0.24***	0.09	0.70***	0.08
$0.5t^2$	θ_2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
tk_{it}	θ_3	−0.02***	0.00	−0.01***	0.00	−0.01***	0.00	−0.02***	0.00
tl_{it}	θ_4	−0.01***	0.00	−0.01**	0.00	0.00	0.00	0.00	0.00
th_{it}	θ_5	−0.02	0.02	0.03*	0.01	0.02	0.02	−0.01	0.02
gfc_t	ξ	0.07**	0.04	0.06	0.03	0.04	0.04	0.09**	0.04
_cons	θ	116.37	7.40	83.16***	8.04	66.49***	8.36	238.12***	11.15
Inefficiency, u_{it}									
$trade_{it}$	δ_1	0.49***	0.05	0.34***	0.05	0.14*	0.08	0.08*	0.05
fdi_{it}	δ_2	0.01	0.06	0.01	0.07	0.75	0.64	0.03	0.05
$bussfree_{it}$	δ_3	−0.36***	0.12	0.08	0.13	0.24	0.18	−0.04	0.11
$voice_{it}$	δ_4	−0.08**	0.03	2.03***	0.29	3.52***	0.43	0.45***	0.16
$rule_{it}$	δ_5	−0.57***	0.10	−0.20**	0.10	−0.33***	0.12	−0.16**	0.08
$goveff_{it}$	δ_6	−0.89***	0.09	−1.28***	0.13	−1.19***	0.15	−0.72***	0.10
$polstab_{it}$	δ_7	0.06*	0.03	2.23***	0.29	3.74***	0.45	0.49***	0.18
$corrupt_{it}$	δ_8	−0.05	0.05	0.03	0.05	0.04	0.06	−0.05	0.07
$regqua\_resid_{it}$	δ_9	0.37***	0.07	0.55***	0.09	0.59***	0.11	0.52***	0.07
$voice_{it} \times polstab_{it}$	δ_{11}			−0.60***	0.08	−1.04***	0.12	−0.17***	0.05
_cons	δ_0	5.85***	0.52	−3.15***	1.19	−10.95***	3.05	113.66***	2.47
σ_u		0.16***	0.03	0.15***	0.03	0.13***	0.04	0.18***	0.03
σ_v		0.19***	0.02	0.18***	0.01	0.19***	0.01	0.15***	0.03
λ		0.82***	0.04	0.85***	0.04	0.70***	0.05	1.21***	0.05
Log-likelihood		21.74		62.16		47.03		71.92	
Sample size (*N*)		480		480		380		400	

Note: ***, **, * indicate that the coefficients are significant at the 1%, 5% and 10% level, respectively.

Source: Author's own calculations

With regard to the institutional variables, Model 1 reveals that $bussfree_{it}$, $voice_{it}$, $goveff_{it}$ and $rule_{it}$ have significant negative effects on technical inefficiency, whereas $regqua\_resid_{it}$ and $polstab_{it}$ are found to have significant positive effects. Thus, reverence for the rule of law, prevalence of an effective government, minimized regulatory burden and a higher degree of citizens' voices are individually found to foster TFP by improving technical efficiency, while liberalized markets for a higher level of competition and a stable political environment each leads to the otherwise.

Table 3: Output elasticities

		Elasticity[8]	Std. error[9]	t-stat
Labour	L_{it}	0.79***	0.03	25.08
		$\rho_1 + \rho_2\bar{l} + a\bar{k} + \varphi_2\bar{h}$		
Capital stock	K_{it}	0.26***	0.03	8.46
		$\beta_1 + \beta_2\bar{k} + a\bar{l} + \varphi_1\bar{h}$		
Human capital	H_{it}	2.05***	0.18	11.36
		$\vartheta_1 + \vartheta_2\bar{h} + \varphi_1\bar{k} + \varphi_2\bar{l}$		

Note: *** indicate significance at the 1% level.
Source: Author's own calculations

The identified significant and negative effects of $rule_{it}$, $bussfree_{it}$, $voice_{it}$ and $goveff_{it}$ on technical inefficiency can be explained by the efficacy of each of these institutional qualities in driving down transaction costs and composing an incentive structure that facilitates efficient allocation of resources. Within an environment in which laws are not ambiguous and are strictly enforced, public policies and services are effectively administered and delivered under a government whose efficiency is kept in check by unhindered voices of citizens, transaction costs incurred by businesses will decrease along with the prevalence of an optimal incentive structure to underpin productive economic activities. This motivates firms to grow by devoting more resources to research and development (R&D), purchasing new technologies and investing in human capital[10]. The resulting innovations from R&D activities and the prevalence of more up-to-date technologies,

8 $\bar{l}$, $\bar{k}$ and $\bar{h}$ indicate mean value of labour, capital stock and human capital (in logarithmic form), respectively.

9 The standard error for labour elasticity of output is computed as $(var(\rho_1) + var(\rho_2)\bar{l}^2 + var(\alpha) \times \bar{k}^2 + var(\varphi_2) \times \bar{h}^2 + 2 \times cov(\rho_1, \rho_2) \times \bar{l}^2 + 2 \times cov(\rho_1, \alpha)\bar{k} + 2 \times cov(\rho_1, \varphi_2)\bar{h} + 2 \times cov(\rho_2, \alpha) \times \bar{l} \times \bar{k} + 2 \times cov(\rho_1, \varphi_2) \times \bar{l} \times \bar{h} + 2 \times cov(\alpha, \varphi_2) \times \bar{k} \times \bar{h})^{0.5}$, where *var* and *cov* indicate variance and covariance, respectively. The same methodology is applied to calculate the standard error for capital stock and human capital elasticities of output.

10 Note that the human capital mentioned here is different from the human capital that entered into the model as one of the frontier arguments, which is essentially an index that only captures information on schooling, *i.e.*, not inclusive of professional development.

technical knowledge and a highly skilled labour force will drive efficiency, leading to TFP growth and allowing countries to catch up with the efficient production frontier. This is consistent with Égert (2016), who found that stronger rule of law and better enforcement of law augment the positive effects of R&D spending on productivity.

Table 4: Technical efficiency by country

		Technical efficiency
		$\bar{\tau}_i = \mathrm{E}[\exp(u_{it})]$
South America	Brazil	0.87
	Mexico	0.84
	Peru	0.47
	Chile	0.94
	Argentina	0.92
	Uruguay	0.93
Asia and Africa	India	0.77
	Egypt	0.62
	Indonesia	0.53
	Pakistan	0.56
	Bangladesh	0.36
	Philippines	0.49
	Thailand	0.67
	Malaysia	0.76
	China	0.70
	Vietnam	0.30
	South Africa	0.89
Europe	Czech Republic	0.73
	Russia	0.40
	Romania	0.59
	Poland	0.80
	Turkey	0.86
	Bulgaria	0.55
	Hungary	0.75
Average		0.68

Note: The standard deviation of efficiency across the panel is 0.19.
Source: Author's own calculations

The identified positive effect of $regqua\_resid_{it}$ on technical inefficiency indicates that market liberalization in emerging economies drives technical efficiency down, while a higher level of protectionism is expected to improve it. This challenges the free market doctrine as one of the main tenets of Anglo-American institutions and suggests that state patronage through protectionist policies plays an important role in the efficient allocation of resources. In order to transition to high-income economies, what emerging economies need is the capacity and capability to innovate and adopt modern technologies to drive technical efficiency. Unfortunately, market liberalization has not been unreservedly successful in this regard.

The revealed efficacy of protectionist policies conforms to the literature on strategic niche management, which sidesteps any economic ideologies. Instead, it adopts a more pragmatic approach to fostering innovation that does not negate the role of government in the creation, development and controlled phase-out of protective spaces to facilitate technological regime shifts. Therefore, instead of rushing to adopt the Anglo-American liberal type of regulatory institutions by pursuing aggressive liberalization to corrode market power, emerging economies should adopt a more cautionary and strategic approach to facilitate innovations and other knowledge creation activities. However, as Acemoglu *et al*. (2006) cautioned, anticompetitive policies do carry some risks of negating innovation-based growth. Thus, the emphasis is on being strategic.

To explain the intriguing positive effect of $polstab_{it}$ on technical inefficiency, the interplay between $polstab_{it}$ and $voice_{it}$ is examined in Model 2 by including the interaction term $polstab_{it} \times voice_{it}$. Despite the inclusion of an interaction term, the results presented in Table 2 show that apart from $bussfree_{it}$ and the two institutional variables involved in the multiplicative interaction, the coefficients of all other covariates remain consistent in signs and significance with Model 1. In addition, the significant and negative sign of the interaction term indicates that a conditioning relationship exists between these two institutional variables. To recover the marginal effects of $polstab_{it}$ and $voice_{it}$, we use Equations (7a) and (7b), respectively.

$$\frac{\partial u_{it}}{\partial polstab_{it}} = \delta_7 - \delta_{11} voice_{it} \tag{7a}$$

$$\frac{\partial u_{it}}{\partial voice_{it}} = \delta_4 - \delta_{11} polstab_{it}\,. \tag{7b}$$

Equation (7a) shows that when the value of $voice_{it}$ equals zero, the marginal effect of $polstab_{it}$ on technical inefficiency becomes significant and positive, as represented by δ_7. However, it diminishes and becomes insignificant as the values of $voice_{it}$ increases. Table 5(a) presents the marginal effects of $polstab_{it}$ when $voice_{it}$ assumes a range of values.

Table 5: Marginal effects of $polstab_{it}$ and $voice_{it}$

Values of conditioning variable $voice_{it}$	(a) Marginal effects of $polstab_{it}$ $\delta u_{it}/\delta polstab_{it}$	Std. error[3]	*t*-stat	Values of conditioning variable $polstab_{it}$	(b) Marginal effects of $regqua_{it}$ $\delta u_{it}/\delta voice_{it}$	Std. error[4]	*t*-stat
Minimum value = 1.54	1.30***	0.22	6.06	**Minimum value = −0.76**	2.49***	0.35	7.13
Average value = 3.15	0.33*	0.19	1.75	***Threshold*⁺ = 3.23**	0.08*	0.05	1.66
***Threshold*⁺ = 3.17**	0.32*	0.19	1.68	***Threshold*⁻ =3.50**	−0.08*	0.04	−1.86
***Threshold*⁻ = 4.32**	−0.37*	0.22	−1.68	**Average value = 3.53**	−0.10**	0.04	−2.32
Maximum value = 4.50	−0.48**	0.23	−2.09	**Maximum value = 4.50**	−0.68***	0.08	−8.33
Maximum scale = 4.60	−0.54**	0.23	−2.31	**Maximum scale = 4.60**	−0.74***	0.09	−8.35

Note: ***, **, * indicate that the coefficients are significant at the 1%, 5% and 10% level, respectively. The minimum, average and maximum values of the respective conditioning variables are computed across the panel dataset, whereas the maximum scale is computed as ln(100), which is the maximum value (in logarithmic form) that the institutional variables can take, given their scale from 1 to 100 in the source data. *Threshold*⁺ is the maximum value of the respective conditioning variable for which the recovered marginal effect remains positive and significant at the 10% level; any value above it will render the recovered marginal effect insignificant or negative. *Threshold*⁻ is the minimum value of the respective conditioning variable for which the recovered marginal effect remains negative and significant at the 10% level; any value below it will render the recovered marginal effect insignificant or positive.

Source: Author's own calculations

As shown in Table 5(a), the positive marginal effect of $polstab_{it}$ remains significant until the value of $voice_{it}$ increases beyond *Threshold*⁺. On the contrary, if the value of $voice_{it}$ is upheld at a level beyond *Threshold*⁻, then every effort to promote political stability will reduce technical inefficiency as the marginal effect of $polstab_{it}$ becomes significant and negative. This indicates that policies to increase political stability will only yield a positive impact on technical efficiency when sufficient civil liberties prevail. Efforts to increase political stability by stifling citizens' voices will impede technical efficiency instead. Incidentally, this explains the significant and positive marginal effects of $polstab_{it}$ as revealed in Model 1, given that, the average value of $voice_{it}$ across the panel is below *Threshold*⁺.

Turning to the marginal effect of $voice_{it}$, Equation (7b) shows that it becomes significant and positive when $polstab_{it}$ takes a value of zero and remains positive until it becomes insignificant when

11 The standard error of marginal effects of $polstab_{it}$ is computed as $\sigma^2_{\delta 7} + \sigma^2_{\delta 11}\, voice^2_{it} + 2 \times cov(\delta_7, \delta_{11}) voice_{it}$.

12 The standard error of marginal effects of $voice_{it}$ is computed as $\sigma^2_{\delta 4} + \sigma^2_{\delta 11}\, polstab^2_{it} + 2 \times cov(\delta_4, \delta_{11}) polstab_{it}$.

the value of $polstab_{it}$ increases beyond $Threshold^{+}$ as shown in Table 5(b). However, once the value of $polstab_{it}$ has increased to a level higher than $Threshold^{-}$, the marginal effect of $voice_{it}$ becomes significant and negative. This implies that the positive impact of $voice_{it}$ on TFP materializes only when a sufficient level of political stability prevails. For this reason, the marginal effect of $voice_{it}$ on technical inefficiency is found to be negative and significant in Model 1 as the average value of $polstab_{it}$ across the panel is higher than $Threshold^{-}$.

In sum, policies to increase political stability or amplify citizens' voices should not be implemented at the expense of one another. Countries tipping excessively to either side are expected to see a higher level of technical inefficiency, as unchecked citizens' voices to the extent of creating frequent social unrest will deter investments and, therefore, lead to redundant resources, while draconian laws to mute citizens' voices on the pretext of political stability will increase the likelihood of kleptocracy, which will cause misallocation of resources.

4.3 Robustness check

Model 2 is re-estimated by using two alternative samples to ensure that our findings are robust. The first alteration we made to the sample is to drop off member states of the European Union (EU) to address the suspicion that EU member states might have different behaviours that may affect our findings. However, Model 2a in Table 2, which presents the results for non-EU countries, proves that this is not the case. Instead, Model 2a shows that our findings remain robust as the signs and significance of the coefficients are consistent with those of Model 2. The $Threshold^{+}$ values for the marginal effects of $polstab_{it}$ and $voice_{it}$ are computed at 3.51 and 3.28, respectively, while the $Threshold^{-}$ values are 3.64 and 3.46, respectively. Both the computed $Threshold^{+}$ and $Threshold^{-}$ values for the respective marginal effects of Model 2a are close to those derived from Model 2.

Finally, to ensure that our results are not affected by outliers, we re-estimate Model 2 on a second alternate sample that drops four countries consisting of the two most and two least efficient countries identified in Section 4.1, *i.e.*, Chile, Uruguay, Bangladesh and Vietnam, from the sample. The results for this alternate sample are presented in Model 2b of Table 2. Similar to Model 2a, the covariates of Model 2b are not dissimilar in their signs and significance from the estimates of Model 2. The $Threshold^{+}$ values computed for the respective marginal effects of $polstab_{it}$ and $voice_{it}$ are 2.25 and 2.08, while the $Threshold^{-}$ values are 3.30 and 3.16 correspondingly. Although the computed $Threshold^{+}$ values for the marginal effects of both $polstab_{it}$ and $voice_{it}$ in Model 2b are much lower than those in Model 2, it nevertheless still affirms the existence of a significant conditioning relationship between $polstab_{it}$ and $voice_{it}$.

5. Conclusion and Policy Implications

We set out to identify growth-conducive institutions that are unique to emerging economies against the backdrop of Anglo-American institutions being crowned as the global standard. We argued that TFP growth matters more than GDP growth as the latter could be driven by fixed capital accumulation, which is subjected to the law of diminishing marginal productivity. To that end, we examined the extent to which liberal Anglo-American institutions promote TFP by improving technical efficiency in emerging economies, using the stochastic frontier analysis method.

Based on the findings of our analysis, we conclude that only certain aspects of Anglo-American institutions are conducive to productivity growth in emerging economies, whereas other aspects warrant caution. Although strengthening the rule of law or increasing government effectiveness will unreservedly improve technical efficiency, any policy that amplifies citizens' voices should only be implemented if a desirable level of political stability prevails. Likewise, the efficacy of those policies designed to increase political stability hinges on the prevalence of a desirable degree of citizens' voices. Thus, policymakers should be wary of the symbiotic relationship between the two institutional qualities and avoid veering into the extremes.

Against the mounting empirical evidence in support of market liberalization over protectionism in promoting economic growth, the results of this study suggest otherwise when technical efficiency is concerned. We found that emerging economies with more liberalized markets are expected to have lower technical efficiency. Thus, instead of writing off protectionist policies completely, they warrant attention, given their roles in promoting technical efficiency among emerging economies. Specifically, a certain amount of protectionism is desirable so that adequate short-term market rent is accorded to firms to enable them to build up their capacity and capability to innovate and adopt modern technologies for better efficiency.

In sum, instead of emulating Anglo-American institutions lock, stock and barrel, policymakers of emerging economies should devise a unique set of institutions and regulatory frameworks that make the best use of both liberalist and protectionist policies to ensure that economic growth is driven not only by capital accumulation, which is subjected to decreasing returns to scale, but also by TFP. In other words, policymakers should not be so steadfast in their ideologies that they apply a dichotomous view of protectionist and liberalist policies. Instead, policymakers should allow the full suite of policy instruments, whether they are protectionist or liberalist in nature, to be at their disposal and use them strategically.

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Appendix

Appendix 1: Data descriptions and sources

Variable	*Abbreviation*	Description	Source
Real GDP	Y_{it}	GDP at constant 2017 prices based on purchasing power parity	World Development Indicators
Capital stock	K_{it}	Capital stock at constant 2017 prices (2017 US$)	Penn World Table 10.0
Labour force	L_{it}	Labour force	World Development Indicators
Human capital	H_{it}	Human capital index, based on years of schooling and returns to education	Penn World Table 10.0
Trade as % of GDP	$trade_{it}$	Trade volume as percentage of GDP	World Development Indicators
FDI Inflow as % of GDP	fdi_{it}	FDI inflow as percentage of GDP	World Development Indicators
Rule of law	$rule_{it}$	Perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police and courts, as well as the likelihood of crime and violence	World Governance Indicators
Regulatory quality	$regqua_{it}$	Perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development	World Governance Indicators
Control of corruption	$corrupt_{it}$	Perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	World Governance Indicators
Government effectiveness	$goveff_{it}$	Perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies	World Governance Indicators
Voice and accountability	$voice_{it}$	Perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association and free media	World Governance Indicators
Political stability and absence of violence	$polstab_{it}$	Perceptions of the likelihood of political instability and/or politically motivated violence, including terrorism	World Governance Indicators
Business freedom	$bussfree_{it}$	Indicator of the efficiency of government regulation of business, derived from an array of measurements of the difficulty of starting, operating and closing a business	Heritage Foundation's Index of Economic Freedom

Appendix 2: Summary of descriptive statistics

		Real GDP	Capital stock	Labour force	Human capital	Trade	FDI inflow	Rule of law	Regulatory quality	Control of corruption	Government effectiveness	Voice and accountability	Political stability and absence of violence	Business freedom
	Abbreviation	Y_{it}	K_{it}	L_{it}	H_{it}	$trade_{it}$	fdi_{it}	$rule_{it}$	$regqua_{it}$	$corrupt_{it}$	$goveff_{it}$	$voice_{it}$	$polstab_{it}$	$bussfree_{it}$
	Unit of measurement	USD bill.	USD bill.	mil.	Avg. years of schooling	% of GDP	% of GDP	Percentile 0–100	Percentile 0–100	Percentile 0–100	Percentile 0–100	Percentile 0–100	Percentile 0–100	Percentile 0–100
Argentina	Mean	508	2,610	18.20	2.86	32.96	2.00	33.10	28.58	43.10	51.89	59.79	43.36	64.04
	Std. dev.	90	643	1.18	0.13	7.00	0.77	7.61	11.67	5.58	4.63	2.83	8.37	8.93
Bangla-desh	Mean	150	1,310	57.40	1.86	36.59	0.88	23.11	18.60	12.78	24.53	33.38	12.34	53.98
	Std. dev.	53	784	6.43	0.15	6.97	0.44	4.08	2.59	7.14	2.90	4.69	5.20	10.83
Brazil	Mean	1,580	125	92.50	2.72	25.93	3.27	47.98	54.19	53.32	51.11	61.75	39.81	59.91
	Std. dev.	245	49	7.59	0.14	2.19	0.91	5.05	6.39	7.84	6.92	2.18	9.58	7.20
Bulgaria	Mean	45	10,400	3.37	2.51	109.68	8.36	51.69	70.26	52.39	59.00	62.75	55.93	65.76
	Std. dev.	8	3,740	0.06	0.33	20.20	7.85	1.74	3.26	3.24	3.18	3.05	5.93	8.08
Chile	Mean	199	1,220	7.65	2.97	65.87	6.72	87.38	90.36	88.76	84.22	81.73	64.55	71.93
	Std. dev.	44	503	0.98	0.11	7.13	2.57	1.88	2.08	3.54	2.21	3.79	8.07	6.17
China	Mean	7,640	50,500	775.00	2.48	47.62	3.08	38.63	44.45	41.01	59.94	6.54	30.72	51.84
	Std. dev.	3,730	28,400	21.20	0.12	9.45	1.03	4.31	4.52	5.73	6.01	1.61	4.27	3.69
Czech Republic	Mean	26	1,930	5.25	3.63	128.70	5.00	79.77	82.99	68.21	79.06	77.80	80.77	69.20
	Std. dev.	169	366	0.11	0.03	21.36	2.62	3.61	2.89	2.32	2.09	3.06	7.05	6.49
Egypt	Mean	275	1,130	25.60	2.33	47.73	2.93	44.17	32.77	31.51	36.26	16.27	19.86	59.64
	Std. dev.	67	498	3.43	0.23	11.21	2.67	8.96	10.37	4.77	9.53	4.09	11.87	8.37
Hungary	Mean	117	974	4.39	3.22	150.28	11.63	74.74	79.92	68.30	74.64	74.64	74.28	71.82
	Std. dev.	14	342	0.21	0.15	17.92	24.95	5.64	5.12	6.44	4.43	9.60	7.09	5.46
India	Mean	1,570	8,940	450.00	2.32	42.67	1.63	55.53	41.30	42.24	54.26	60.20	14.41	48.83
	Std. dev.	603	5,860	23.50	0.07	9.13	0.72	2.61	3.61	4.40	4.15	1.56	3.01	7.87
Indonesia	Mean	670	19,800	114.00	1.96	51.79	1.27	32.39	40.30	28.18	46.96	47.65	17.91	53.36
	Std. dev.	208	9,800	11.90	0.12	9.97	1.51	7.37	9.18	11.15	6.12	4.22	10.15	4.98
Malaysia	Mean	239	7,460	12.50	2.60	167.62	3.20	65.98	70.17	62.61	81.13	35.49	53.46	76.90
	Std. dev.	68	2,520	2.01	0.11	32.87	1.26	4.11	4.25	3.52	3.01	4.12	6.43	8.94
Mexico	Mean	1,040	2,220	47.40	2.85	61.60	2.77	36.83	63.16	39.63	59.69	52.44	27.52	73.01
	Std. dev.	131	775	5.79	0.15	10.44	0.63	5.01	3.26	12.35	5.13	5.54	8.86	9.86
Pakistan	Mean	226	1,170	56.30	1.75	30.18	1.18	23.05	26.85	19.26	30.75	22.61	3.77	65.71
	Std. dev.	54	412	9.73	0.07	3.38	1.00	2.76	4.21	4.00	6.81	4.95	4.00	6.92
Peru	Mean	147	890	15.50	2.73	46.87	3.81	33.05	64.27	44.74	44.12	51.61	23.75	65.81
	Std. dev.	44	308	2.03	0.06	6.91	1.55	3.48	5.17	6.83	6.36	4.48	8.62	5.98
Philippines	Mean	240	1,750	37.40	2.58	71.18	1.60	38.76	51.53	32.69	54.85	49.48	12.05	55.17
	Std. dev.	78	580	4.98	0.08	11.31	0.78	3.26	3.72	6.23	3.44	3.56	5.11	4.97
Poland	Mean	405	2,200	17.80	3.23	83.11	3.38	69.25	77.28	71.21	70.92	77.88	69.92	64.76
	Std. dev.	89	593	0.39	0.14	15.25	1.49	4.71	3.07	4.74	2.55	4.23	10.72	5.86
Romania	Mean	157	1,240	9.65	3.09	70.09	3.69	55.62	65.48	48.86	49.13	61.56	51.90	65.71
	Std. dev.	33	486	0.77	0.11	13.39	2.28	7.56	7.55	5.57	4.80	2.74	6.68	7.86
Russia	Mean	220	14,700	74.60	3.29	52.64	2.21	22.19	28.58	17.81	43.12	24.62	18.20	62.27
	Std. dev.	1,200	3,170	1.21	0.08	5.95	1.18	3.63	11.67	3.98	6.89	6.68	5.25	9.59
South Africa	Mean	46	4280	19.60	2.53	53.39	1.42	57.42	39.50	63.19	68.88	68.07	41.41	71.38
	Std. dev.	302	1150	1.80	0.18	5.19	1.22	3.11	6.08	6.31	3.96	1.77	4.51	4.78
Thailand	Mean	340	5300	38.20	2.23	126.35	2.73	54.77	65.87	44.76	64.68	36.51	24.51	72.31
	Std. dev.	73	3090	1.45	0.16	8.82	1.18	5.95	4.19	4.78	2.32	14.53	18.90	3.21
Turkey	Mean	664	221	26.20	2.61	50.74	1.60	53.69	60.35	53.04	60.64	40.16	16.67	64.64
	Std. dev.	201	73	4.03	0.08	5.15	0.85	5.25	3.31	7.39	4.24	7.96	6.72	5.44
Uruguay	Mean	43	1110	1.65	2.41	51.10	4.28	70.31	60.33	85.93	70.16	82.59	77.64	69.57
	Std. dev.	10	478	0.10	0.28	7.96	3.01	3.56	3.45	3.00	2.39	4.36	6.99	4.97
Vietnam	Mean	182	2010	49.20	2.49	155.00	4.94	41.03	66.40	33.45	46.85	9.32	53.79	54.93
	Std. dev.	67	757	5.70	0.26	30.65	1.68	8.06	4.10	4.76	5.32	1.37	4.97	10.11
Overall	Mean	755	5,980	81.60	2.64	73.32	3.48	49.60	55.21	47.79	56.95	39.12	38.68	63.85
	Std. dev.	1,680	12,200	169.00	0.48	43.72	5.94	18.66	19.99	20.55	16.02	15.42	16.32	10.32
	Min	30	59	1.49	1.55	21.85	-40.08	15.79	12.32	1.46	19.12	4.69	0.47	35.50
	Max	14,300	102,000	800.00	3.67	220.41	60.24	89.47	92.72	91.88	87.38	89.42	91.01	93.50
Upper bound deviation (Max – Mean)/Std. dev.		8.06	7.88	4.25	2.15	3.36	9.55	2.13	1.88	2.15	1.90	3.26	3.20	2.87
Upper bound deviation (Min – Mean)/Std. dev.		−0.43	−0.48	−0.47	−2.27	−1.17	−7.33	−1.81	−2.14	−2.25	−2.36	−2.23	−2.34	−2.75