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Testing the Governance-Productivity Nexus for Emerging Asian Countries

Ghulam Mustafa* **and Muhammad Jamil****

Abstract

This paper presents panel data estimates of the relationship between governance, aggregate labor productivity (ALP) growth and total factor productivity (TFP) growth for 12 Asian economies between 1996 and 2013. Our results show that government effectiveness has a positive and significant effect on ALP in both levels and first differences. Regulatory quality has a positive impact on ALP only in first difference. Although both government effectiveness and regulatory quality have a positive effect on TFP growth in first difference, only political stability is significant and positive in the levels specification. Other findings indicate that physical capital and human capital have a positive effect on ALP growth. We also find evidence of positive spillover effects with respect to human capital. The positive association between governance, economic growth and productivity provide a better understanding of the role of governance in enhancing economic performance. Our findings have policy implications for ways to achieve good governance to enhance economic growth and productivity.

Keywords: Governance, total factor productivity, economic growth.

JEL classification: C23, D24, E24, O40.

1. Introduction

The Asian economies are expected to overtake the G7 countries in 2018, with China and India being the two largest and fastest growing economies. Consequently, the Asian economies are expected to contribute significantly to future world output growth (Jorgenson & Vu, 2011). However, the quality of governance in Asia is not comparable with that of higher-income countries, nor is it constant across the regional economies. While the rapid growth of the East Asian 'tiger' economies (Singapore, Hong Kong, South Korea and Taiwan) is due to their strong institutional environment, South Asian countries still suffer from weak governance.

* Assistant Professor, Department of Economics, Federal Urdu University of Arts, Science and Technology, Islamabad, Pakistan.
** Assistant Professor, School of Economics, Quaid-i-Azam University, Islamabad, Pakistan.

Since the seminal contribution of North (1991), an increasing number of studies have shown that governance – defined as 'the traditions and institutions by which authority in a country is exercised' (Kaufmann et al., 2009) – plays a significant role in increasing economic growth and development (see Everhart et al., 2009; Kaufmann & Kraay, 2002; Williams & Siddique, 2008). Therefore, 'good governance' has become critical to political as well as economic agendas. Better governance leads to stronger institutions that are better equipped to tackle corruption and enhance the rule of law and political stability in a country. It also helps protect human rights, ensures government accountability to voters and the public, improves the state's capacity to handle external shocks and lowers transaction costs (Ndulu & O'Connell, 1999).

The 'good governance' agenda has engendered various governance reforms to control corruption, improve the judicial system and build political stability. Economists agree that the successful implementation of such reforms would lead to improvements in 'virtually all aspects of the public sector' (Rodrik, 2004; Grindle, 2004). On the other hand, 'bad governance' is recognized as a major impediment to growth and economic development, with many African countries being a case in point (Moore, 2001). Collier (2007) identifies the 'bottom billion people' of the world's population as living in 58 small countries that lag behind other developing countries in terms of growth and poverty reduction. The study shows that 70 percent of the 'bottom billion' live in Africa and that 76 percent of these countries have undergone prolonged 'bad governance'. In sum, 'good governance' is necessary to achieve faster growth and development.

This paper contributes to two strands of the literature: (i) the current debate on the role of governance quality in growth (see Acemoglu et al., 2002, 2004; Bhattacharyya, 2009; North, 1991) and (ii) macroeconomic studies of the relationship between governance and total factor productivity (TFP) (Olson et al., 2000). While the literature shows that governance has a positive impact on economic growth (see Kaufmann & Kraay, 2002; Cebula & Ekstrom, 2009), to our knowledge there is no existing study on the relationship between governance, average labor productivity growth and TFP growth for Asian countries.

Our objective is to examine how different dimensions of governance affect productivity across a sample of Asian countries, using aggregate labor productivity (ALP) and multifactor productivity (MFP) as measures of productivity. ALP growth measures economic development within a country in terms of growth, competitiveness and living standards (OECD,

2001). MFP growth captures improvements in technology due to organizational and institutional changes, changes in returns to scale, the impact of unmeasured inputs such as research and development, other intangible factors and measurement errors, and disembodied technological change (see Erumban, 2008; Inklaar et al., 2008; van Ark et al., 2008).

This paper contributes to the debate on the relationship between governance, growth and productivity at the country level, based on six dimensions of governance. Using ALP and MFP to measure economic performance, we assess the internal returns to governance as well as its potential to generate important spillover effects. The literature suggests that reliable data on governance is a key problem in identifying the valid association between governance and growth (Williams & Siddique, 2008).

Our results indicate that government effectiveness and regulatory quality have positive and significant effects on ALP growth and MFP growth. The results of the ALP specification in levels show that only government effectiveness is statistically significant at conventional levels. The long-run MFP specification indicates that political stability has a positive and significant effect on conventional levels. To determine the robustness of these results, we also account for the impact of different levels of education – primary, secondary and tertiary. Our main findings remain robust to changes in human capital. We also find that governance can generate spillover effects.

The rest of the paper is organized as follows. Section 2 reviews key studies on the impact of governance on economic growth and productivity. Section 3 describes the data used and related issues. Sections 4 and 5 present our empirical strategy and results as well as a robustness analysis. Section 6 concludes the study.

2. Literature Review

Economists have long striven to explain what causes economic growth. The vast literature includes cross-country analyses that trace growth to physical capital, human capital, trade policy, financial development and geography (see Barro, 1991; Dollar & Kraay, 2003; Levine & Renelt, 1992; Rigobon & Rodrik, 2005). However, since the mid-1990s, the quality of institutions and/or governance has been put forward as one of the most important explanations for economic growth. For example, Rodrik et al. (2004) conclude that the quality of institutions 'trumps' everything else. Better governance promotes economic growth via an ordered and more

transparent environment, incentives for capital accumulation and improvements in technology (North, 1991).

This section presents an overview of the main studies on the role of governance in economic growth. Sen (1999) suggests that democracy is 'an essential component of the process of development.' Similarly, Earle and Scott (2010) argue that democracy helps promote harmony among citizens, reducing conflict and enhancing political stability. Halperin et al. (2005) show that the increase in prevalence of democracy reduced armed conflict and civil war between 1991 and 2003. Using data on revolutions, coups and political assassinations as proxies, Barro (1991) includes a measure of political instability in his growth regressions and shows that these measures are inversely related to growth and investment. His findings imply that democracy is beneficial for growth.

Similarly, Rivera-Batiz (2002) develops a general equilibrium framework to show that democracy improves the quality of governance and fosters economic growth. This model shows that strong democratic institutions have a positive impact on growth by restricting the actions of corrupt officials. Democracy thus reduces corruption and raises economic performance by stimulating technological progress. The empirical findings indicate that democracy was an important determinant of TFP growth during 1960–1990 for a cross-section of countries. Studies on the relationship between political regimes and economic growth are, however, divided as to whether democracy benefits or harms growth. For instance, Gerring et al. (2005) suggest that 'democracy has either a negative effect on GDP growth or no overall effect.'

There is considerable evidence to suggest that the quality of governance matters for economic growth, both in developing and developed countries. Hall and Jones (1999) argue that institutional differences are the main cause of cross-country differences in productivity and GDP per capita. Tracing the influence of institutions to the influence of Western European settlements or colonization and their adaptation to social infrastructure (institutions), they find that institutions have promoted productivity and growth. Cavalcanti and Novo (2005) obtain similar estimates, finding that a 1 percent increase in institutions is associated with a 5 percent increase in GDP per worker, based on a cross-sectional analysis of data for 1988.

Acemoglu et al. (2002) and Rodrik et al. (2004) focus on the different incentives for imposing extractive versus economic institutions in different parts of the world, using settler mortality rates as an instrument. In an

influential study, Acemoglu et al. (2002) show that a 'reversal of fortune' took place in former European colonies: economies that were rich in the sixteenth century are, today, poor. Their evidence does not support the geography hypothesis, which traces income differences to differences in geography. The authors argue that European colonists introduced economic institutions in densely settled areas and imposed extractive ones in poor and unsettled areas. This institutional reversal caused a reversal in income levels.

Rodrik et al. (2004) provide econometric evidence to show that the quality of institutions is the most important factor in enhancing income levels. For a sample of 137 countries in a cross-sectional analysis of data for 1995, they find that trade becomes negative and insignificant while geography has only a weak effect once institutions are controlled for. Furthermore, the identity of the colonial power and the percentage of the European population do not influence income per capita.

Corruption – the misuse of public power for private benefits – comes in many forms, affecting efficiency and investment (Bardhan, 1997). Corruption has a negative influence on economic growth because it lowers the private marginal product of capital, for example, by acting as a tax on the proceeds of investment, by causing inefficiencies in the private and public sectors, by distorting the financial process and environment and, to some extent, by causing political instability and anarchy. In causing the misallocation of production between sectors, corruption discourages domestic and foreign investment, innovation and good governance (Bardhan, 1997; Everhart et al., 2009; Mauro, 1995).

Everett et al. (2007) suggest that corruption creates mistrust of the political government, increases the cost of public infrastructure projects, weakens the rule of law and decreases government revenues. However, some studies argue that corruption has a positive effect on growth because it serves to 'grease the wheels' of a 'rigid administration', thereby proving beneficial in slow bureaucratic countries (Huntington, 1968; Leff, 1964; Leys, 1965). Mauro's (1995) cross-country analysis shows that corruption has a negative influence on investment and economic growth. The results indicate that a one-standard deviation improvement in corruption leads to a five-percentage point increase in investment, with annual GDP growth rising by more than half a percentage point. The empirical findings support the stylized fact that poor countries tend to have less efficient institutions than developed countries and that these lags persist and lead to less growth and greater poverty in the future.

Everhart et al. (2009) find further evidence of the negative effect of corruption on economic growth. Their empirical findings indicate that corruption has an unambiguous negative effect on governance, which further deters economic growth. However, the effect of corruption on investment is ambiguous as opposed to earlier findings in the literature: their results indicate a positive but insignificant effect on public investment while the effect of corruption on private investment is insignificant. This suggests that corruption does not affect private investment, but it does so indirectly through public investment. The results show that a one-percentage point increase in corruption is associated with a 0.124 percentage point decline in governance.

Cebula and Ekstrom (2009) investigate different forms of economic freedom and dimensions of governance to gauge their impact on growth in OECD countries between 2004 and 2007, while adjusting for G8 status and budget status. They use five forms of economic freedom, with trade freedom as an interesting addition to earlier investigations. Trade freedom reflects the openness of an economy in importing goods and services, and the free interaction of citizens in international buying and selling. Governance is measured by control of corruption, political stability and perceived corruption. The study's panel least squares estimates suggest that governance has a positive impact and corruption a negative impact on economic growth. Economic freedom – as measured by trade freedom, business freedom, monetary freedom and property rights – has a positive effect on economic growth.

Li and Samsell (2009) suggest that 'governance matters' for trade flows between two trading partner countries. Therefore, rule-based countries trade more than relation-based ones. Their study suggests that rule-based countries attract trade flows, given their transparent regulation and presence of fair rules. However, it is more difficult and/or costlier to trade with relation-based countries due to their poor governance environment.

3. Data and Summary Statistics

This study uses annual panel data for 12 Asian countries over the period 1996–2013. The sample countries include Bangladesh, India, Pakistan, Sri Lanka, Hong Kong, Indonesia, Malaysia, the Philippines, Singapore, South Korea, Thailand and China. Our main source of data is the Conference Board database, which provides information on real GDP (at purchasing power parity exchange rates) and employment for most of the

countries in this sample.[1] This is complemented by the World Development Indicators series for gross fixed capital formation, which is then used in capital stock calculations.[2] World Governance Indicators (WGIs) are obtained from Kaufmann et al. (2011). We estimate the real capital stock series using the perpetual inventory method (PIM), based on the World Development Indicators investment series.

Human capital is an intangible asset and therefore difficult to measure. The school attainment data from Barro and Lee (2010) includes the share of persons who have completed primary, secondary and tertiary education in a sample of people aged 25 and over. This data is available in five-year periods for 1950–2010 for a large set of countries. We compare the performance of two measures – the Cohen and Soto (2007) series and the Barro and Lee (2010) series. The latter is one of the most commonly used measures of human capital in the macro literature on developing countries. In relation to the quality of schooling data, Krueger and Lindahl (2001) use reliability ratios to compare Barro and Lee (2010) and Kyriacou (1991). The authors suggest that the Barro and Lee dataset is more advanced and more reliable than Kyriacou's education estimates. In addition, it uses census information where available, relying on enrolment data and a PIM to fill in the missing values (de la Fuente & Doménech, 2006).

Cohen and Soto (2007) claim greater precision than Barro and Lee, serving as a direct substitute for the latter. Their measure uses information on educational attainment by age group. Accordingly, we use data on the average years of schooling for the population aged 15 and above from Barro and Lee (2010) to construct a Cohen–Soto measure of human capital. Next to aggregate measures of human capital, we look at the effect of primary, secondary and tertiary education on growth. For this sample of Asian countries, where levels of education are, in some cases, still very low compared to developed countries, changes in basic education could have a greater impact on performance.

Reliable data on governance is an important problem in identifying a valid association between governance and growth (Williams & Siddique, 2008). Using the WGI data obtained from Kaufmann et al. (2011), we consider six dimensions of governance: voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, the rule of law and control of corruption (Table 1). This choice is justified, given that the WGIs are related to Transparency

[1] http://www.conference-board.org/data/economydatabase/
[2] Accessed through www.esds.ac.uk

International's corruption perceptions index. The WGIs are better because they cover six dimensions of governance, including corruption, span more countries and are available consistently for our sample of countries. The WGIs are based on the subjective views expressed by numerous private firms, citizens, think-tanks, NGOs and international organizations on the quality of governance in a country. We have relied on these informed stakeholders for the following reasons.

- Perceptions, impressions and views influence the actions of agents. If agents do not trust the judiciary or police, they are unlikely to avail these services. These perceptions are very important for investment decisions by businesses and voting decisions by citizens.
- Subjective measures are the only choice in the case of 'corruption' where we cannot measure the defined indicator by any objective data.
- Objective indicators capture a de jure notion of laws, which is significantly different from the de facto reality on the ground.
- The choice between subjective and objective indicators of governance reflects a false dichotomy: all measures of governance inherit some degree of judgement.

Table 1: Six dimensions of governance

Dimension	Captures
Voice and accountability	Perceptions of the extent to which a country's citizens can participate in selecting their government, as well as freedom of expression, association and the media.
Political stability and absence of violence	Perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism.
Government effectiveness	Perceptions of the quality of public services, the quality of the civil service and the degree to which it is independent from political pressure, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Regulatory quality	Perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
Rule of law	Perceptions of the extent to which agents have confidence in and abide by the rules of society, particularly the quality of contract enforcement, property rights, the police and the courts as well as the likelihood of crime and violence.
Control of corruption	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.

Source: Kaufmann et al. (2009).

The governance data is available biannually from 1996 and annually between 2002 and 2010. All six governance indicators range from –2.5 to 2.5, with greater numerical values representing stronger governance performance (Kaufmann et al., 2009). Table 2 presents descriptive statistics for the variables used, including the governance indicators. The smallest value (–1.681) for voice and accountability (VOACC) is that of China in 2006, while the largest value (0.729) is that of South Korea in 2010. This indicates that Chinese citizens have the least VOACC, while South Korean citizens have the highest VOACC. Pakistan is the least politically stable country, as shown by the political stability and absence of violence (POLST) indicator for 2011, while Singapore in 2008 has the highest POLST score. Bangladesh fares the worst in terms of government effectiveness (GOVEFF), regulatory quality (REGQU), rule of law (RLAW) and control of corruption (CONCORR) in 2005, 2004, 2003 and 2004, respectively. Singapore has the highest score for these four indicators in 2008, 1996, 2012 and 2004.

Table 2: Summary statistics

Variable	Obs.	Mean	SD	Min	Max
Real GDP (Y)	216	1,070,689	2,025,215	56,954.61	12,600,000
Labor (L), in thousands	216	121,640	216,519	1,800	770,000
Physical capital stock, in billions	216	1,250	2,200	32.6	15,200
Average years of schooling (Barro and Lee)	216	7.50	2.21	3.39	12.08
Primary education	216	4.15	1.09	1.78	5.82
Secondary education	216	2.64	1.14	1.05	5.06
Tertiary education	216	0.36	0.31	0.04	1.20
Average years of schooling (Cohen and Soto)	216	4.69	0.83	2.10	5.73
Voice and accountability (VOACC)	216	-0.215	0.607	-1.681	0.729
Political stability and absence of violence (POLST)	216	-0.543	1.018	-2.812	1.343
Government effectiveness (GOVEFF)	216	0.327	0.867	-0.865	2.430
Regulatory quality (REGQU)	216	0.237	0.890	-1.095	2.247
Rule of law (RLAW)	216	0.109	0.799	-1.020	1.770
Control of corruption (CONCORR)	216	0.003	0.997	-1.488	2.417

Note: Y = real GDP (in 1990 US$ million, converted at Geary–Khamis PPP), L = employment (in thousands), K = physical capital stock. The education variables represent average years of schooling attained (primary, secondary and tertiary) by population aged 15 years and over, based on Barro and Lee (2010). Cohen–Soto measure = average years of schooling attained computed using Cohen and Soto's (2007) methodology, based on Barro and Lee's (2010) data on total average years of schooling.
Source: Authors' calculations.

Figures 1 to 6 illustrate the positive correlation between these dimensions of governance and ALP for our sample of countries. While the positive association between the variables of interest is important, this correlation does not imply causal relationships and needs further analysis through a series of econometric models.

Figure 1: The Association Between Log ALP and VOACC

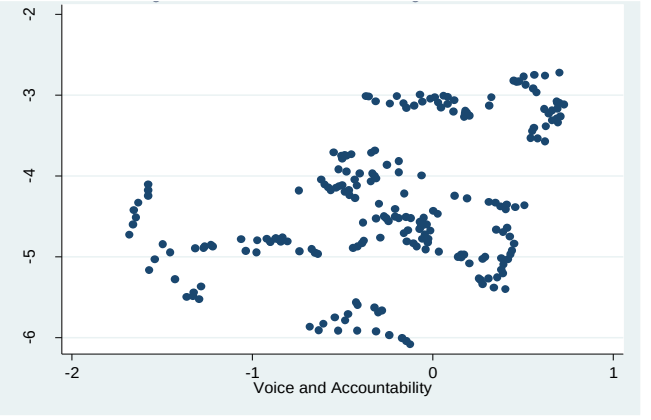


Figure 2: The Association Between Log ALP and POLST

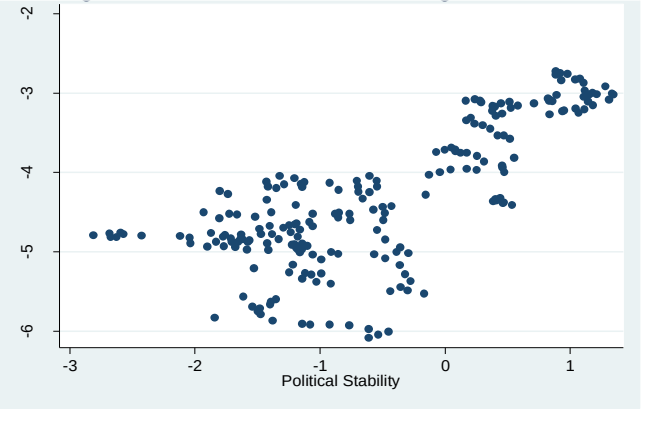


Figure 3: The Association Between Log ALP and GOVEFF

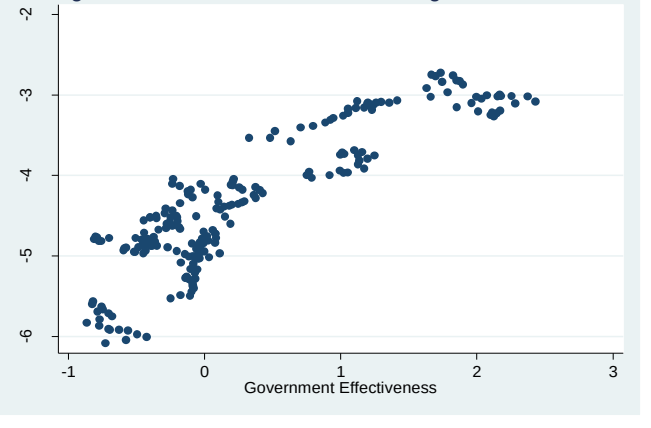


Figure 4: The Association Between Log ALP and REGQUA

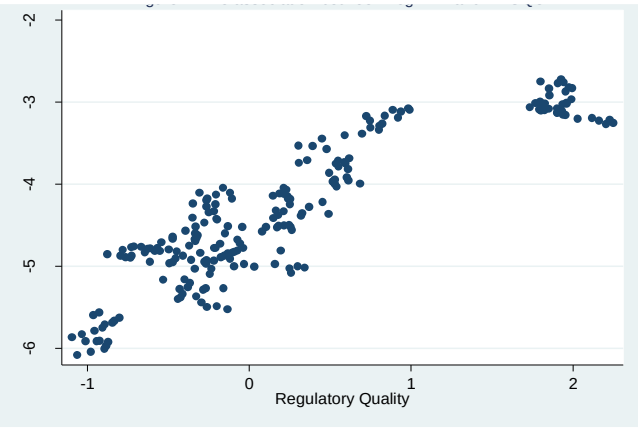


Figure 4: The Association Between Log ALP and RULAW

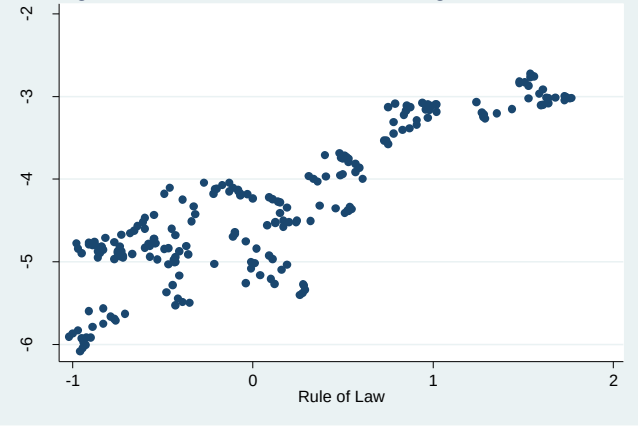
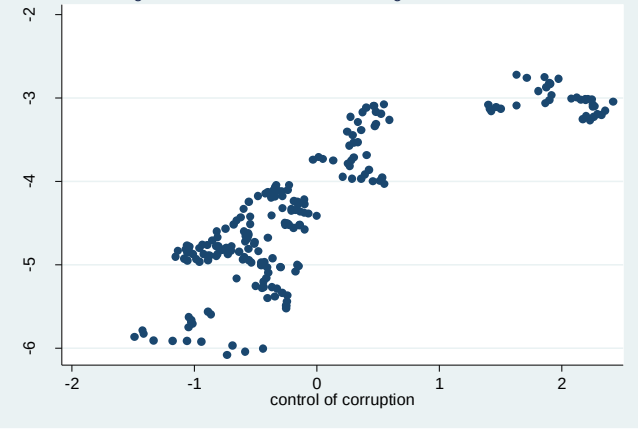


Figure 4: The Association Between Log ALP and CONTCORR



4. Methodology and Empirical Results

We start our analysis of the impact of governance on ALP with an augmented neoclassical production function. This framework models value added (Y) as a function of the total number of workers (L), aggregate physical capital stock (K) and the stock of human capital (H).

$$Y_{it} = A_{it}F_i(L_{it}, K_{it}, H_{it}) \tag{1}$$

where $i = 1, 2, 3, \ldots N$ denotes the sampled countries, $t = 1, 2, 3, \ldots T$ denotes the period and A_{it} is MFP. $F_i(\cdot)$ indicates diminishing returns in factor inputs and constant returns to scale in production technology. Under the Cobb–Douglas production function assumptions, we can rewrite the production function (1) in per capita terms as follows:

$$ln\,(Y/L)_{it} = \alpha_0 + \alpha_1 ln(K/L)_{it} + \alpha_2 ln(H/L)_{it} + \varepsilon_{it} \tag{2}$$

An emerging strand of the literature argues that improvements in the quality of institutions increase the accumulation of human capital and contribute to long-run economic growth (Bhattacharyya, 2009; Dias & Tebaldi, 2012). We include the impact of the six governance indicators by extending equation (2) as follows:

$$ln\,(Y/L)_{it} = \emptyset_0 + \emptyset_1 ln\left(\frac{K}{L}\right)_{it} + \emptyset_2 ln\left(\frac{H}{L}\right)_{it} + \emptyset_3 (GOV)_{it} + \eta_i + \mu_{it} \tag{3}$$

This long-run growth regression models the log of ALP, $ln(Y/L)_{it}$, as a function of (i) physical capital intensity, $ln(K/L)_{it}$, (ii) the stock of human capital per worker, $ln(H/L)_{it}$ and (iii) governance, GOV_{it}. The term u_{it} denotes other stochastic factors influencing ALP growth. Next, we follow Bhattacharyya (2009) in taking first differences of equation (3) to obtain the following equation:

$$\Delta ln(Y/L)_{it} = \pi_1 \Delta ln\left(\frac{K}{L}\right)_{it} + \pi_2 \Delta ln\left(\frac{H}{L}\right)_{it} + \pi_3 \Delta (GOV)_{it} + (\mu_{it} - \mu_{it-1}) \tag{4}$$

where Δ represents the first difference of the variable in question. The growth model in equation (4) is based on the models used by Benhabib and Spiegel (1994), Temple (1999) and Mankiw et al. (1992). We thus account for the role of the governance indicators by extending the Cobb–Douglas production function framework to include these dimensions, using the WGI data.

We use three measures of human capital: (i) the stock of human capital, drawing on Barro and Lee (2010); (ii) three different levels of education (primary, secondary and tertiary); and (iii) average years of schooling, applying Cohen and Soto's (2007) methodology to the Barro and Lee (2010) data. Since the strong correlation between the six governance indicators (Table 3) leads to their joint inclusion in the general productivity growth equation,[3] we run six separate regressions to evaluate the impact of each indicator separately.

Table 3: Correlation between ALP and governance indicators

	VOACC	POLST	GOVEFF	REGQU	RLAW	CONCORR
VOACC	1.000					
POLST	0.394	1.000				
GOVEFF	0.406	0.877	1.000			
REGQU	0.448	0.832	0.947	1.000		
RLAW	0.565	0.857	0.927	0.925	1.000	
CONCORR	0.418	0.856	0.949	0.963	0.933	1.000

Source: Authors' calculations.

Table 4 gives the results of ordinary least squares (OLS) regressions of ALP growth on the growth of physical capital per worker and human capital per worker, and various dimensions of governance. Our estimation strategy allows us to use heteroskedasticity-consistent standard errors. We therefore model governance as a factor in the ALP growth regressions, with country fixed effects and time dummies to account for endogeneity and cross-country heterogeneity. This strategy allows us to avoid historical instruments and use the more reliable WGIs. Here, we employ the Barro and Lee (2010) measure of human capital.[4] The first-difference specification addresses any nonstationarity problems that might arise, given the long period spanning the panel.

Modeling the relationship between institutions and growth is subject to the problems of endogeneity and reverse causality, as high-income countries with greater productivity levels seem to have better institutions (Rodrik et al., 2004). Consequently, the literature on the long-run impact of institutions on growth relies on historical and geographical instruments.

[3] Since the correlation between VOACC and the other indicators is relatively small, it is used initially in addition to the other governance indicators in all the regressions. However, the VOACC coefficient is never statistically significant and thus these results are not presented here.

[4] Similar results were obtained using the Cohen–Soto measure, although the human capital variable does not remain significant (see Appendix).

Acemoglu et al. (2002) and Rodrik et al. (2004) use settler mortality as an instrument for schooling and institutions. Although this has strong explanatory power in the first-stage regression, it encounters the problem of multicollinearity in the second stage of a 2SLS regression. This implies that such cross-country studies on the relationship between institutions and growth are not as meaningful (Dollar & Kraay, 2003; Glaeser et al., 2004; Bhattacharyya, 2009).

To account for the multicollinearity problem, Bhattacharyya (2009) uses a dynamic panel regression model and the five-year average of the natural logarithm of real GDP per capita as the dependent variable to isolate the partial effects of institutions and human capital on growth. The study does not encounter any multicollinearity problems since the preferred instruments' lagged levels and the lagged differences of institutions are valid under the generalized method of moments. Therefore, we model governance as a factor in the ALP regressions with country fixed effects and time dummies to account for endogeneity and cross-country heterogeneity. Again, this allows us to avoid historical instruments and use the more reliable WGIs instead.

Table 4: Impact of governance on ALP growth, using Barro and Lee measure

	First-difference specification						
	VOACC	**POLST**	**GOVEFF**	**REGQU**	**RLAW**	**CONCORR**	**GOVER**
$\Delta \log(K/L)_t$	0.423***	0.424***	0.438***	0.439***	0.412***	0.412***	0.443***
	(0.114)	(0.115)	(0.115)	(0.114)	(0.115)	(0.115)	(0.112)
$\Delta \log(H/L)_t$	0.280**	0.280**	0.285**	0.292**	0.286**	0.288**	0.272**
	(0.127)	(0.127)	(0.128)	(0.130)	(0.127)	(0.129)	(0.124)
$\Delta \log(GOV)_t$	0.009	0.006	0.046**	0.035*	0.005	0.001	0.034
	(0.015)	(0.009)	(0.021)	(0.020)	(0.020)	(0.017)	(0.030)
R-sq.	0.682	0.682	0.691	0.689	0.681	0.681	0.685
Obs.	204	204	204	204	204	204	204
	Levels specification						
	VOACC	**POLST**	**GOVEFF**	**REGQU**	**RLAW**	**CONCORR**	**GOVER**
$\Delta \log(K/L)_t$	0.644***	0.659***	0.643***	0.649***	0.658***	0.648***	0.648***
	(0.026)	(0.031)	(0.031)	(0.029)	(0.028)	(0.029)	(0.029)
$\Delta \log(H/L)_t$	0.216***	0.142***	0.177***	0.149***	0.154***	0.169***	0.169***
	(0.044)	(0.046)	(0.047)	(0.048)	(0.045)	(0.053)	(0.053)
$\Delta \log(GOV)_t$	-0.059***	-0.012	0.068**	0.025	-0.057***	-0.016	-0.016
	(0.014)	(0.009)	(0.027)	(0.023)	(0.014)	(0.027)	(0.027)
R-sq.	0.998	0.998	0.998	0.998	0.998	0.998	0.998
Obs.	216	216	216	216	216	216	216

Note: *** = significant at 1%, ** = significant at 5%, * = significant at 10%. GOVER is the unweighted governance index derived from the average of the six dimensions of governance. In the first-difference specification, the dependent variable is log ΔALP. In the levels specification, the dependent variable is log ALP. Heteroskedasticity-consistent standard errors given in parentheses. All equations include country and year dummies.
Source: Authors' calculations.

The upper part of Table 4 presents the OLS estimates based on equation (4), using the Barro and Lee (2010) human capital measure for the 1996–2013 period. This is a two-way fixed effects model, as we control for both country and time effects. Therefore, our estimates are unbiased since they are not influenced by omitted time-variant or country-variant factors. Furthermore, the panel data estimates are not affected by cross-sectional dependence because the period in question is not very long. The results of the first-difference specification clearly indicate that governance has a positive impact on ALP growth. The estimated coefficient of GOV is positive throughout, although it is significant for only two indicators – government effectiveness (GOVEFF) and regulatory quality (REGQU). The lack of statistical significance in the case of the other four indicators could be due to the small sample used and problems associated with the first-difference estimation technique.

Adams-Kane and Lim (2014) describe two channels by which government effectiveness and regulatory quality can improve productivity and economic growth. First, an effective government can theoretically implement a sound macroeconomic policy that enhances the economic progress of the country. Second, an effective government leads to better public financial management, with effective spending thus increasing productivity and economic growth. Our findings provide evidence that human capital has a positive and significant impact on ALP growth in first differences as well as levels. These results are consistent with previous studies showing that human capital has a positive impact on long-run economic growth (see Barro, 1991; Mankiw et al., 1992; Temple, 1999). We find that physical capital per worker has a strong positive effect on ALP growth. Overall, our results underscore the significance of governance, suggesting that government effectiveness and regulatory quality are important factors in increasing ALP in this sample of Asian economies.

The analysis so far suggests that governance has a positive effect on economic ALP growth in these economies. However, it is well understood that institutional variables change slowly over time. Accordingly, we adopt a long-run specification. Table 4 also gives the fixed effects regressions of ALP in levels. These are based on equation (3), including controls for country effects and time dummies. In these regressions, the dependent variable is ALP, with physical capital per worker, human capital per worker and governance as the independent variables. These results are the long-run estimates of the impact of governance on economic performance.

In general, the results of the levels specification in Table 4 are robust to the first-difference results. In the long-run specification, only government effectiveness (GOVEFF) has a positive and significant effect on ALP, as before. However, VOACC does not remain positive and significant in the results given in Table 5, implying that changes in government structure are more relevant for ALP. Human capital per worker has a positive and significant impact on ALP. Similarly, the coefficient of physical capital per worker remains significant. Overall, the results imply that governance has a positive effect on ALP in this sample of Asian economies.

Next, we examine the impact of the dimensions of governance on MFP growth. Not only does a country's institutional framework have a direct impact on ALP growth, but it can also affect the country's ability to enjoy the spillover effects of governance. Accordingly, we specify equation (5) for MFP growth, following Mason et al. (2012) and Vandenbussche et al. (2006):

$$\Delta MFP_{it} = \varphi_1 \Delta \ln(K/L)_{it} + \varphi_2 \Delta \ln(H/L)_{it} + \varphi_2 \Delta(GOV)_{it} + (\mu_{it} - \mu_{it-1}) \quad (5)$$

As O'Mahony and Vecchi (2009) show, equation (5) can be used to test for the existence of any conceivable spillover effects arising from dimensions of governance, human capital and physical capital. In a recent study, Bournakis et al. (2017) employ a similar specification to demonstrate the positive spillover effect of human capital and foreign direct investment on output per worker.

MFP growth is obtained as a residual based on growth in output that cannot be explained by growth in inputs. We derive MFP growth from equation (7) below, using Solow's (1957) growth accounting framework and assuming Hicks' neutral technological change, constant returns to scale, decreasing returns to factors of production, optimum utilization of the factors of production, and perfect competition. Solow's growth accounting decomposes output growth into the contributions of factors of production inputs and MFP growth:

$$Y = A\, K^{\alpha}\, L^{1-\alpha} \quad (6)$$

The Cobb–Douglas production function in equation (6) shows that output (Y) depends on the stock of physical capital input (K), labor input (L) and a function of time that allows for neutral technological change (A), which is a shift factor in the production function. We compute real capital stock using the PIM based on Nehru and Dhareshwar (1993), allowing a 5 percent depreciation rate (see Wang & Yao, 2003; World Bank, 2006). Drawing on equation (6), we can express the growth rate of output as

$$\frac{\dot{Y}}{Y} = \alpha \frac{\dot{K}}{K} + (1-\alpha)\frac{\dot{L}}{L} + \frac{\dot{A}}{A} \tag{7}$$

Here, α and $(1-\alpha)$ are the shares of capital and labor, respectively, in total revenue, $\frac{\dot{A}}{A}$ is MFP growth, and the overdot denotes the derivative of the variable with respect to time. Wu (2011) provides a detailed analysis of the two parametric methods used to calculate MFP growth, suggesting that, under Solow's framework, technological progress and MFP growth are treated the same. However, the frontier approach decomposes MFP growth into technical change, efficiency change and scale efficiency.

The results in Table 5 provide some tentative evidence of the positive spillover effects of governance on MFP growth, as the coefficients of the governance indicators are all positive. Again, the estimated coefficients of regulatory quality (REGQU) and government effectiveness (GOVEFF) are significant at conventional levels in the first-difference specification. These findings are consistent with Olson et al. (2000), who show empirically that the quality of governance significantly improves the productivity growth of fast-growing developing countries. As in Table 4, the other four dimensions of governance have the correct positive sign, but are statistically insignificant. One explanation for these results is that the governance data available covers a relatively short period (since 1996). The results suggest that governance reforms need more time to produce a spillover effect. Overall, they show that the evolution of political and economic institutions goes hand in hand with increasing productivity and wealth.

Table 5: Impact of governance on MFP growth, using Barro and Lee measure

	First-difference specification						
	VOACC	**POLST**	**GOVEFF**	**REGQU**	**RLAW**	**CONCORR**	**GOVER**
$\Delta \log(K/L)_t$	0.073	0.074	0.088	0.089	0.063	0.062	0.093
	(0.114)	(0.115)	(0.115)	(0.114)	(0.115)	(0.115)	(0.112)
$\Delta \log(H/L)_t$	0.280**	0.280**	0.285**	0.292**	0.286**	0.288**	0.272**
	(0.127)	(0.127)	(0.128)	(0.130)	(0.127)	(0.129)	(0.124)
$\Delta \log(GOV)_t$	0.009	0.006	0.046**	0.035*	0.005	0.001	0.034
	(0.015)	(0.009)	(0.021)	(0.020)	(0.020)	(0.017)	(0.030)
R-sq.	0.566	0.566	0.578	0.575	0.565	0.565	0.570
Obs.	204	204	204	204	204	204	204
	Levels specification						
	VOACC	**POLST**	**GOVEFF**	**REGQU**	**RLAW**	**CONCORR**	**GOVER**
$\Delta \log(K/L)_t$	0.008	0.001	0.005	0.009	0.007	0.009	0.005
	(0.014)	(0.015)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
$\Delta \log(H/L)_t$	0.057	0.081**	0.072*	0.079**	0.068*	0.058	0.068*
	(0.038)	(0.040)	(0.039)	(0.039)	(0.038)	(0.038)	(0.038)
$\Delta \log(GOV)_t$	0.011	0.008*	0.017	-0.03***	0.001	0.014	0.014
	(0.010)	(0.005)	(0.015)	(0.010)	(0.009)	(0.013)	(0.013)
R-sq.	0.514	0.519	0.514	0.524	0.509	0.513	0.513
Obs.	216	216	216	216	216	216	216

Note: *** = significant at 1%, ** = significant at 5%, * = significant at 10%. GOVER is the unweighted governance index derived from the average of the six dimensions of governance. The dependent variable is log ΔMFP (Solow methodology). Heteroskedasticity-consistent standard errors given in parentheses. All equations include country and year dummies.
Source: Authors' calculations.

Table 5 also provides evidence of the positive spillover effects of human capital accumulation in the sampled economies. Our results show that human capital has a positive and significant effect on MFP growth, which is consistent with the positive spillover effect suggested by Bournakis et al. (2017) and Mason et al. (2012). The results of the levels specification are robust to our estimates of the first-difference specification in Table 5. Interestingly, only political stability (POLST) is positive and significant in this specification. Tentatively, these results indicate that political stability is one of the most important factors affecting long-run productivity.

5. Robustness Analysis

To test the robustness of our estimates, we use three different specifications in Table 6, employing primary, secondary and tertiary education in turn as measures of human capital. These findings remain

stable when compared to the results in Table 4. All six dimensions of governance remain positive throughout, although the only ones that are significant are government effectiveness (GOVEFF) and regulatory quality (REGQU). Overall, our results indicate that primary education is positive and significant throughout, emphasizing its importance for developing Asian countries.

Table 6: Impact of governance on ALP growth, first-difference specification

	Primary education as human capital					
	VOACC	**POLST**	**GOVEFF**	**REGQU**	**RLAW**	**CONCORR**
$\Delta \log(K/L)_t$	0.468***	0.469***	0.477***	0.486***	0.457***	0.457***
	(0.102)	(0.104)	(0.105)	(0.101)	(0.105)	(0.104)
$\Delta \log(H/L)_t$	0.222*	0.221*	0.235**	0.230**	0.227*	0.228*
	(0.114)	(0.113)	(0.116)	(0.115)	(0.115)	(0.118)
$\Delta \log(GOV)_t$	0.010	0.006	0.047**	0.035*	0.007	0.002
	(0.015)	(0.009)	(0.022)	(0.020)	(0.020)	(0.017)
R-sq.	0.680	0.680	0.690	0.687	0.680	0.680
Obs.	204	204	204	204	204	204
	Secondary education as human capital					
	VOACC	**VOACC**	**VOACC**	**VOACC**	**VOACC**	**VOACC**
$\Delta \log(K/L)_t$	0.585***	0.577***	0.611***	0.601***	0.570***	0.568***
	(0.115)	(0.112)	(0.114)	(0.114)	(0.112)	(0.109)
$\Delta \log(H/L)_t$	0.077	0.090	0.065	0.086	0.087	0.091
	(0.112)	(0.108)	(0.109)	(0.111)	(0.114)	(0.108)
$\Delta \log(GOV)_t$	0.011	0.007	0.045**	0.0342*	0.006	0.002
	(0.017)	(0.010)	(0.022)	(0.021)	(0.022)	(0.018)
R-sq.	0.673	0.674	0.682	0.680	0.673	0.673
Obs.	204	204	204	204	204	204
	Tertiary education as human capital					
	VOACC	**VOACC**	**VOACC**	**VOACC**	**VOACC**	**VOACC**
$\Delta \log(K/L)_t$	0.579***	0.579***	0.597***	0.598***	0.571***	0.568***
	(0.082)	(0.085)	(0.083)	(0.084)	(0.082)	(0.084)
$\Delta \log(H/L)_t$	0.077	0.076	0.075	0.083*	0.077*	0.079*
	(0.046)	(0.047)	(0.047)	(0.049)	(0.046)	(0.046)
$\Delta \log(GOV)_t$	0.012	0.007	0.045**	0.036*	0.003	-0.003
	(0.016)	(0.009)	(0.021)	(0.020)	(0.021)	(0.017)
R-sq.	0.679	0.679	0.687	0.686	0.678	0.678
Obs.	204	204	204	204	204	204

Note: *** = significant at 1%, ** = significant at 5%, * = significant at 10%. The dependent variable is log ΔALP. Heteroskedasticity-consistent standard errors given in parentheses. All equations include country and year dummies.
Source: Authors' calculations.

Next, we replace Barro and Lee's (2010) measure of human capital with the Cohen–Soto measure: overall, the results remain stable and we conclude once again that government effectiveness and regulatory quality have a positive effect on ALP growth in the sampled Asian economies (see Appendix for results). Similarly, the results show that governance has a positive effect on productivity in these economies. As a final robustness check, we use clustered standard errors via the VCE routine in STATA, which also show that governance has a positive effect on ALP, supporting our earlier findings.[5]

6. Conclusion

Good governance is often regarded as the key to economic growth for developing countries by the World Bank and other international development institutions. In the context of the sampled Asian economies, better governance encourages investment, enhances trade flows, and boosts productivity and economic growth. However, good governance is also considered a 'luxury' that is available only to 'rich' countries (Kaufmann & Kraay, 2002). A key factor explaining the 'East Asian miracle' is the role of dimensions of governance in enhancing productivity and growth. Accordingly, we have attempted to contribute to the debate on the relationship between dimensions of governance, growth and productivity in this region.

We show that government effectiveness and regulatory quality has a positive and significant impact on ALP growth. While the estimated coefficients of the other four governance indicators are generally positive, they are not always significant across different specifications. We argue that this lack of statistical significance may be due to the relatively small time series used, given that institutional development needs time to be effective. When we account for the impact of different levels of education (primary, secondary and tertiary), we find that the contribution of these dimensions of governance remains positive and significant. We also examine the role of these dimensions in enhancing MFP growth. The results support earlier findings (see Hall & Jones, 1999; Acemoglu et al., 2002; Rodrik et al., 2004; Kaufmann et al., 2009) documenting the importance of governance in enhancing economic performance. We also show that human capital has a positive and significant effect on ALP growth. Overall, therefore, we conclude that governance has a positive impact on growth in Asia.

[5] Results available on request.

The Asian economies have achieved strong levels of human capital development over the past 40 years, with average years of schooling among people aged 15 years and above having increased from 2.9 years in 1970 to 7 years in 2010. This progress is tied to the presence of a young population and sturdy improvements in primary and secondary enrolment. However, by 2030, the Asian economies are expected to reach only the 1970 levels of education in advanced economies (Lee & Francisco, 2012). This implies that investing in the quality of governance, together with the quality of education, will be essential to their sustained economic development.

One limitation of this paper is the nonavailability of institutional data at the micro level to explore the mechanism and channels of institution-led development in depth. Future research could examine the role of institutions across regions and gauge whether governance is as important for developing countries as it is for developed ones.

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Appendix

Impact of governance on ALP growth and MFP growth, using Cohen and Soto measure

	First-difference specification: Dependent variable = ALP growth					
	VOACC	**POLST**	**GOVEFF**	**REGQU**	**RLAW**	**CONCORR**
$\Delta \log(K/L)_t$	0.632***	0.614***	0.653***	0.637***	0.609***	0.608***
	(0.151)	(0.137)	(0.142)	(0.138)	(0.136)	(0.134)
$\Delta \log(H/L)_t$	0.016	0.039	0.009	0.037	0.033	0.037
	(0.159)	(0.142)	(0.146)	(0.141)	(0.147)	(0.141)
$\Delta \log(GOV)_t$	0.013	0.008	0.046**	0.035*	0.008	0.002
	(0.019)	(0.010)	(0.023)	(0.021)	(0.022)	(0.017)
R-sq.	0.673	0.673	0.681	0.679	0.672	0.672
Obs.	204	204	204	204	204	204
	First-difference specification: Dependent variable = MFP growth					
	VOACC	**POLST**	**GOVEFF**	**REGQU**	**RLAW**	**CONCORR**
$\Delta \log(K/L)_t$	0.282*	0.264*	0.303**	0.287**	0.259*	0.258*
	(0.151)	(0.137)	(0.142)	(0.138)	(0.136)	(0.134)
$\Delta \log(H/L)_t$	0.016	0.039	0.009	0.037	0.033	0.037
	(0.159)	(0.142)	(0.146)	(0.141)	(0.147)	(0.141)
$\Delta \log(GOV)_t$	0.013	0.008	0.046**	0.035*	0.008	0.002
	(0.019)	(0.010)	(0.022)	(0.021)	(0.022)	(0.017)
R-sq.	0.553	0.554	0.565	0.562	0.552	0.552
Obs.	204	204	204	204	204	204

Note: *** = significant at 1%, ** = significant at 5%, * = significant at 10%. Heteroskedasticity-consistent standard errors given in parentheses. All equations include country and year dummies.

Source: Authors' calculations.