Do institutions matter for growth? Evidence from East Asian countries

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Abstract

Utilizing neoclassical growth framework augmented with institutional controls and latest estimation technique in panel data analysis, this study identifies the crucial institutional qualities in East Asian and other developing countries and uncovers the channel of their effects toward economic growth. Furthermore, it extends the empirical evidence on the institutional importance toward economic growth in the developing countries particularly the East Asian countries which, apart from Rodrik (1997) and Campos and Nugent (1999), have somehow been left out from the empirical investigation.

Keywords: Institutions, economic growth, Asian Financial Crisis, dynamic panel analysis, generalized methods of moments.

1.   Introduction

This study investigates East Asian development over the past 25 years and uncovers the link between institutions and economic performance in the region. The East Asian countries have experienced a dramatic economic performance in the 1990s but this stellar achievement came to an abrupt end when the Asian financial crisis hit in 1997. Empirically, there are only two studies i.e. Rodrik (1997) and Campos and Nugent (1999) that found evidence of the significance of institutions to the region's economic performance, however they are for the period before the crisis. As far as the period after crisis there is no evidence that we are aware of.

This study extends the existing literature on institutions in general and East Asian economic performance in particular, in two ways. Firstly, it gives an explicit focus on East Asian economic development especially for the post-crisis period. Secondly, it formalizes the channel of institutional effect on growth by employing the neoclassical growth framework containing a shift parameter that is capable of accounting for the impacts of numerous factors (including institutions) on total factors productivity.

Overall, this study finds empirical support for the notion that "institutions matter". Specifically it shows that two institutional qualities i.e. security of property rights and bureaucratic quality matter significantly for growth in all developing countries including the East Asian countries. The results also lend evidence to the strong government hypothesis in the East Asian region as political institutions are also found to have significant growth-effects in the region. Meanwhile, during the period of high growth in the region throughout the year 1984-1996, secure property rights and strong governments emerge as the significant growth determinants while for period post-Asian financial crisis 1997-1998, no clear evidence of the institutional impact on growth is found.

This study is organized as follows: this introduction being the first, Section 2 reviews the East Asian economic growth and its institutions. Section 3 discusses the methodology and data sources, followed by Section 4 where the estimation results are presented. Section 5 concludes.

2.   The East Asian economic growth and institutions

The rise of East Asian economic power during the last four decades has been dramatic. Six fastest-growing East Asian economies were China, Japan, Hong Kong, Singapore, South Korea, and Taiwan and they realised about 5 percent per capita growth annually between 1965 and 1995. Besides, three other high-performing economies were Malaysia, Indonesia, and Thailand and their economic growth was about 3.5 percent per year during the same period. Foreign trade growth of the nine countries had been similarly remarkable. From 1965-1990 these countries had increased their share of total world exports from 8 to 18 percent and their respective share of manufactured exports from 9 to 21 percent (Ahrens, 2002).

The phenomenal economic performance during the period 1960s to 1990s was once dubbed as "the East Asian Miracle" by the World Bank (1993) and the world body had hailed these countries' growth model as the blueprint to be emulated by other developing countries seeking higher growth. The model emphasizes policies ensuring stability in macroeconomic fundamentals, setting correct prices, liberalizing the economy and developing the private sector as the engine of growth[1].

Apart from the conventional studies explaining the sources of economic growth in East Asia[2], there are studies that propose the dramatic economic performance the region has seen in the 1990s could have possibly been the result of several institutional factors (see for example theoretical analyses by Ahrens, 2002 –strong and authoritarian East Asian governments; Gonzalez and Mendoza, 2001 –well-functioning public institutions)[3]. Empirically, Rodrik (1997) finds evidence on the significance of institutions to the

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[1] These are essentially the reform policies advocated by international organizations (like the World Bank and the International Monetary Fund) that many policy makers regard as "The Washington Consensus". In general, it consists of price liberalization strategy, unfettered international trade, firms privatization and stabilization policies.

[2] These studies can be divided into two strands of argument. One strand subscribes to the "accumulation view" and claims that growth in East Asian countries was mainly driven by the high rates of capital formation (see Young (1995), Krugman (1995), Collins and Bosworth (1996), Sarel (1997) and Senhadji (2000) and Han *et al.* (2002)). Whereas, the other strand adheres to the "assimilation view" and argues that essential component of East Asian high growth rates was the acquisition and mastery of foreign technology (see Nelson and Pack (1999), Easterly and Levine (2002), Iwata *et al.* (2002).

[3] As far as the institutional impact on growth is concerned, on overall, it is fair to say that the institutional literature has already arrived at the academic consensus with strong empirical evidence supporting "institutions matter for growth" proposition. See for example influential studies by Hall and Jones (1999), Acemoglu *et al.* (2001, 2005), and Rodrik *et al.* (2004).

economic success of the high-performing East Asian economies as he shows an index of subjective institutional indicators is exceptionally well-suited for rank-ordering these countries with respect to their growth performance. His model specification containing only initial income, initial education, and institutional quality accounts for virtually all of the variation in growth performance among these economies even when the quality of institutions is instrumented by using the exogenous determinants. Similarly, Campos and Nugent (1999) show that governance characteristics in the East Asian and Latin American countries are able to explain the economic performance in the regions for period 1972-1995. Specifically they find quality of bureaucracy have played a prominent role in improving the performance in East Asian countries, and rule of law in Latin American countries.

In 1997, the region's dream growth however came to an abrupt end when the financial crisis struck[4]. As discussed in the literature on the East Asian crisis, the possible causes to the crisis are unsustainable deterioration in macroeconomic fundamentals and poor economic policies (Corsetti *et al*., 1998; Frankel, 1998), moral hazard induced by implicit government guarantees (Krugman, 1998), and financial panic (Radelet and Sach, 1998). Meanwhile, the World Bank (1998) suggests that institutional failures such as weakness in financial regulation and corporate governance are among the causes of the crisis. Besides, Lanyi and Lee (1999) and Lingle (2000) argue that the absence of transparency and accountability and too much intervention and politicisation from the autocratic government are the main causes that render the countries vulnerable to crisis.

The key institutional characteristics in East Asian economies can be grouped into three broad categories i.e. property rights, bureaucratic efficiency[5], and political institutions, and the characteristics are: (a) Authoritarian governments implementing interventionist policies to spur growth –such as privatisation, industrialisation and liberalisation policies to enhance private sector-growth driven (*political institutions*), (b) Strong government-business relationship –provision of implicit and explicit government guarantees to loan and subsidies to specific industries (*political institutions*), (c) Well-

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[4] Undoubtedly, the East Asian Financial crisis has taken many by surprise with unpredictably large decline of the foreign exchange rates, heavy losses in the foreign exchange reserves, large scale of capital flights, and huge decline in the share prices and other financial assets in the affected countries.

[5] Bureaucratic efficiency is apparently one of the many institutional qualities that support the existence of secure property rights environment. In this study however, it is considered a separate quality from property rights institutions to allow an explicit identification of the well-functioning public institutions and bureaucracy quality previously shown to support economic growth in the East Asian region.

protected property rights –lower risks of contracts repudiation and expropriation of private property (*property right*s), (d) Well-functioning public institutions and bureaucracy quality (*bureaucratic efficiency*).

On the other hand, a number of "bad" institutions could exist as a consequence of the above institutional characteristics, such as: (a) Legal enforcement is probably lacking due to relationship-based system (lacking rule of law –*property rights*), (b) Inflexibility of the institutional settings and macroeconomic policy making system due to autocratic government (less democratic government, bureaucratic inefficiency –*political institutions, bureaucracy efficiency*), (c) Transparency and accountability issues such as corruption (*property rights*).

3.   Methodology and data sources

Consider the following Cobb-Douglas function, based on Dawson (1998)[6], which exhibits constant returns to scale but diminishing return to individual factors:

$$Y_{it} = K_{it}^{\alpha}(A_{it}L_{it})^{1-\alpha} \qquad (1)$$

where $\alpha < 1$, and Y is the real output, produced by K, the physical capital, and L, the amount of labour. A represents a labour-augmenting technology and is assumed to grow exogenously at rate g. The standard derivation of steady state income per capita function then will be:

$$\ln y_{it} = \ln A_0 + gt + \frac{\alpha}{1-\alpha}\ln s_{it} - \frac{\alpha}{1-\alpha}\ln(n+g+\delta)_{it} \qquad (2)$$

where s_{it} represents physical capital, n is the rate of population growth, g is technological progress and δ is depreciation rate all of which are constant and exogenous for any period.

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[6] Dawson (1998) however utilizes Mankiw *et al.* (1992) growth model which is a Solow (1956) neoclassical growth model augmented with human capital. In his panel analysis, Dawson divides his data into three 5-year subperiods because the data for institutional quality (i.e. economic freedom) and human capital only available in five-year period. Since this study uses annual data, it therefore employs Solow framework and leaves out human capital parameter.

The primary motivation to use Solow framework is particularly due the fact that it has a shift parameter, *A*, that according to Mankiw *et al.* (1992), reflects not just labour-augmenting technology, but also other factors such as resource endowments, climate, institutions, and so on (institutions term is added to the list by Campos and Nugent (1998)). Therefore, the notion of institutions affecting total factor productivity can be explicitly incorporated in the model via a function of *A*, such as:

$$A_{it} = A_0 e^{gt + I_{it}} \qquad (3)$$

Dawson (1998) argues the specification of the *A* function as above implies differences in institutions have an explicit impact on the level of productivity across countries. One important assumption in this specification is that institutions are considered to affect growth via the total factor productivity channel and not via the investment term, s_{it} and therefore measures of both institutions and investment should be statistically significant[7] in a growth estimation. Thus, a growth model based on Equation (1) incorporated with Equation (3) can be conveniently derived as follows:

$$\ln y_{it} = \ln A_0 + gt + I_{it} + \frac{\alpha}{1-\alpha} \ln s_{it} - \frac{\alpha}{1-\alpha} \ln(n + g + \delta)_{it} \qquad (4)$$

The functional form of Equation (4) with appropriate error term and country- and time-specific effect terms is therefore specified as follows:

$$\ln y_{it} - \ln y_{it-1} = \beta_0 + \beta_1 \ln y_{it-1} + \beta_2 I_{it} + \beta_3 \ln s_{it} + \beta_4 \ln(n + g + \delta)_{it} + \eta_i + \gamma_t + \varepsilon_{it} \qquad (5)$$

where *β*'s are the parameters to be estimated. Equation (5) presents a heuristic way of testing the institutional effects on growth via its impact on factors productivity.

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[7] If institutions primarily affect investment and therefore indirectly affecting growth (via investment channel), the Solow framework could therefore be extended to include institutions via s_{it} as a function of institutions i.e. $s = f(I)$ and $f'(I) > 0$. However, the implication from this specification is that, if it is true institutions affect growth via investment channel only, it will be redundant to include both investment and institutions as regressors in a growth model. Investment (as a proximate growth determinant) should therefore be omitted. On the other hand, if institutions affect growth only partially via investment channel, omitting investment would not be appropriate as important information would be lost (see Dawson (1998) for more discussion on the possible channel of institutional impact towards growth and the consequent assumptions need to be made).

In this study, we employ panel data system GMM method developed by Arellano and Bover (1995) and Blundell and Bond (1998) to estimate Equation (5)[8]. This method is able to correct unobserved country heterogeneity, omitted variable bias, measurement error, and potential endogeneity that frequently affect growth estimation (Bond *et al*. 2001). It combines in a system the relevant regressions expressed in first-differences and in levels. First-differencing checks for unobserved heterogeneity and omitted variable bias, as well as for time-invariant component of the measurement error. It also corrects endogeneity bias (time-varying component) via instrumenting the explanatory variables. Instruments for differenced equations are obtained from values (levels) of explanatory variables lagged at least twice, and instruments for levels equations are lagged differences of the variable. Estimating two equations in a system GMM reduced potential bias and imprecision associated with a simple first-difference GMM estimator (Arrellano and Bover, (1995), Blundell and Bond (1998)).

Consistency of the GMM estimator depends on the validity of the instruments. As suggested by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998), two specification tests are used. Firstly, Sargan/Hansen test of over-identifying restrictions which tests for overall validity of the instruments and the null hypothesis is that all instruments as a group are exogenous. The second test examines the null hypothesis that error term ε_{it} of the differenced equation is not serially correlated particularly at the second order (AR2)[9] Ones should not reject the null hypothesis of both tests.

For this study, an annual panel observation for 69 developing countries in three regions namely Asia, Africa and Latin America for a period of 25 years (1984-2008)[10]. Data on

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[8] For additional robustness check, as far as the results are concerned, we also estimate Equation (5) using cross sectional (Pooled Ordinary Least Square-Pooled OLS) and panel fixed effect methods. The estimation using these methods will also afford an appropriate comparison with previous institutional studies, such as Rodrik *et al.* (2004) and Glaeser *et al.* (2004), that rely on such method. Results for Pooled OLS and fixed effects estimations are available upon request.

[9] By construction, the differenced error term is probably serially correlated at first-order even if the original error is not. While most studies that employ GMM dynamic estimation report the test for first order serial correlation, some do not.

[10] The reason we choose annual data for this study is mainly because of the fact that throughout the 25-year period, developing countries in the three regions have undoubtedly experienced unique economic development (including a series of growth and crises episodes) and we are of the opinion that annual observation would therefore allow maximum variations in the data to be captured. Furthermore, the focus of this study is to investigate the possible link institutions have to these growth and crisis episodes, particularly for the region of interest, East Asia. Apparently average data is only suitable if we are

real GDP per capita and population growth are obtained from World Development Indicators (WDI) from the World Bank (2009). We conveniently follow Mankiw, *et al.* (1992), Islam (1995), Caselli *et al.* (1996) and Hoeffler (2002) to assume exogenous technological change plus depreciation rate as 0.05. Similarly, we follow them to use investment share of real GDP per capita as a proxy for physical capital and the investment data are obtained from Penn World Table 6.3 (Heston *et al.*, 2009)[11].

In the previous discussion on East Asian growth and institutions, the key institutional characteristics are loosely clustered into three groups i.e. property rights, bureaucracy quality, and political institutions. To measure these institutional quality parameters, we utilize indicators from the International Country Risk Guide (ICRG) provided by the PRS Group (2009)[12] and Polity IV by Marshall and Jaggers (2008)[13]. Both datasets are conceptually able to proxy the three dimensions of institutional quality previously shown to be present in developing countries under study particularly in the region of interest, East Asia. Furthermore, ICRG and Polity IV data are available for the whole period under study which makes them preferable to other data[14].

Six indicators from ICRG and one from Polity IV are used to measure three dimensions of institutional quality and they are grouped as follows: (a) *Security of property rights –*

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interested in the long run growth relationship to institutions. Nevertheless, system GMM is shown to perform relatively well for panel observation with large N and small T (see Roodman, 2009b) and studies utilizing system GMM invariably use averaged data to ensure that they have N>T. In case when N<T, the empirical strength of the method could be compromised. We will return to this matter when discussing the estimation results in Section 4.

[11] The choice of annual data therefore excludes human-capital variable in the growth framework of this study since data on human capital are available only in 5-year period.

[12] See Knack and Keefer (1995) who first introduce ICRG data and they argue that the data are better and more suitable to measure institutions based on property rights than political violence variables or Gastil indices of civil liberties and political rights.

[13] Polity IV data is compiled via Polity IV Project, *Political Regime Characteristics and Transitions, 1800-2008*, which is an annual, cross-national, time-series and polity-case formats coding democratic and autocratic "patterns of authority" and regime changes in all independent countries with total population greater than 500,000 in 2008 (163 countries in 2008). Acemoglu and Johnson (2005) encourage the use of Polity IV data including executive constraints variable which is able to satisfactorily account for the constraints placed on politicians and elites in a country.

[14] Alternative datasets are such as the Worldwide Governance Index (from the World Bank), Economic Freedom of the World (by the Fraser Institute) and Freedom in the World index or Gastil index (by the Freedom House). World Bank Governance Index (Kaufmann *et al*, 2009) available every two years since for 1996-2000 and annually from 2002-2008, while Economic Freedom of the World data from the Fraser Institute only available 5-yearly from 1970-2000 and annually from 2001-2007. Gastil index of political rights measuring democracy available for the whole period under study, but Knack and Keefer (1995) argue that the data have been compiled without explicit aim of measuring security of property rights, and many of its dimensions are not closely related to property rights.

Investment Profile[15], Law and Order, Corruption; (b) *Bureaucratic efficiency* – Bureaucracy Quality and Government Stability; and (c) *Political Institutions* – Democratic Accountability and Polity2[16].

4.   Estimation results and discussions

The general assumptions for the system GMM regression are as follows: we treat lagged dependent variable as predetermined variable and both investment and population growth as potentially endogenous variables. Similarly, we assume all institutional variables are endogenous since reverse causality from growth to institutions is possible. We use lag two of lagged dependent variable, investment, and population growth as instruments for the variables, and lag three to five as instruments for the institutional variables[17]. This is arguably a crucial assumption in system GMM estimation in order to eliminate endogeneity bias. With this assumption, we postulate that, once the steady state determinants are controlled for, growth-effect of institutions would originate from the state of institutions in the past three to five years to cause an inter-temporal influence on the current institutions. We follow Bond *et al.* (2001) to employ one-step GMM estimators since efficiency gain from two-step GMM estimators is shown by Bond *et al.* to be small, and the two-step estimator normally converge to its asymptotic distribution relatively slowly, and in finite sample its asymptotic standard errors can be seriously biased downwards thus making it unreliable[18].

Furthermore, we employ a two-stage regression strategy for system GMM estimation with the ultimate objective of identifying the institutional quality that truly matters for growth in the developing countries under study. Firstly we begin with the estimation of

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[15] It is a merged version of Government Repudiation of Contracts and Risk of Expropriation indicators previously found in ICRG data (IRIS dataset version). Refer Knack and Keefer (1995).

[16] By construction, Polity2 indicator reflects institutionalised democracy if it receives higher score, and institutionalised autocracy if lower score. Therefore, positive estimated coefficient for Polity2 variable is interpreted as the effect of democracy and negative coefficient as the effect of autocracy.

[17] These sets of lag are finally chosen after a series of attempts involving multiple combinations of lag were made in running the system GMM regression. The decision to use these sets of lag is because they yield the best results as far as the significance of the steady state determinants and institutional variables as well as the strength of diagnostic test of the regressions are concerned. Recall that the dynamic panel GMM regression is capable of identifying the relevant and valid instruments from the endogenous variables' lagged values. Therefore the decision on the lag numbers has to be made depending on the best results obtained from the regression.

[18] Windmeijer (2005) provides correction to this problem to achieve robust standard errors in two-step GMM estimation. Since we already enforce heterokedasticity and autocorrelation robust standard error in the one-step GMM estimation, we therefore consider only one-step GMM estimation.

general model that contains all institutional variables, after controlling for the steady state determinants, to determine the variables' significance. In the second stage, we re-estimate the growth model but now with only significant repressors identified in the first stage. A similar strategy is applied for the Asian sample. Table 1 below presents the results of the estimation.

Based on the overall results, the convergence hypothesis is strongly supported with negative coefficients for the lagged dependent variable particularly in the Asian sample estimations where the coefficients are significant at 5%. Investment is consistently statistically significant and positive across all estimations[19]. Population growth however has mixed results i.e. positive significant for general sample but negative insignificant in Asian sample.

For general sample estimations (model (1)), Investment Profile, Law and Order, Government Stability remains statistically significant at 1% and 5% level as previously found in cross sectional and fixed effect estimations. As for political institutions variable, Polity2 is significant. In model (2), their importance is further tested and the results show all variables except Polity2 survive. On overall, therefore, secure property rights environment and efficient bureaucracy are the important institutional characteristics that matter to the economic growth in developing countries for the whole period under study. This finding therefore extends the existing evidence documented in the literature on the positive effect of institutions towards growth.

In the Asian sample in model (3) i.e. the general estimation, Investment Profile, Government Stability and Polity2 emerge significant at at least 10% confidence level. To confirm this findings, we re-estimate the model, i.e. model (4), with the three variables as the only institutional regressors considered. All three institutional variables remain significant and whilst Government Stability now has an increased significance level, Investment Profile and Polity2 have somehow lesser significance level.

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[19] We compare the size of investment coefficients in the estimation of model (1) in Table 1 with a model with only steady state determinants without institutional controls, and a decrease in investment size of effect is detected. This finding, coupled with significant institutional variables in growth estimation of model (1), clearly supports the assumption we make earlier that institutions affect growth via factor productivity channel and not via investment.

Interestingly, the negative coefficient for Polity2 variable remains and lends some credence to the strong government hypothesis presented by Ahrens (2002)[20].

The findings of these estimations arguably give sufficiently robust empirical evidence that there are two aspects of institutions namely secure property rights (reflected by Investment Profile and Law and Order variables) and bureaucratic efficiency (by Government Stability variable) that matter to growth in developing countries. Meanwhile, in the East Asian countries, in addition to the above two qualities, political institutions (reflected by Polity2 variable) is also a significant determinant that influence the countries' economic growth.

The results of the previous estimations therefore clearly distinguish a set of prominent institutional characteristics that matter to the growth in developing countries including the East Asian countries. It is interesting to note that on overall Investment Profile and Government Stability emerge as the key growth determinant since both variables survive all model specifications either in general or Asian sample. Therefore, these results confirm the finding by Rodrik (1997) on the important secure property rights environment and the finding by Campos and Nugent (1999) on the prominent role of bureaucracy quality in East Asian economic performance. Similarly, this finding also lend empirical support to Gonzalez and Mendoza (2001) hypothesis that well-functioning public institutions and good governance are the reasons behind dramatic economic in East Asian region.

Another important finding is the consistently negative coefficient for the Polity2 variable particularly in the estimation of East Asian sample therefore indicating institutionalised autocracy matter for growth in the region[21]. Conceptually, institutional variables should have a positive relationship to income growth to indicate the better the institutional settings; the higher income could be attained. In the theoretical discussion on East Asian economic performance earlier, we show that strong and autocratic government that is able to govern the markets and pursue (and enforce) pro-growth policies is the underlying reason behind the countries' dramatic economic success. The

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[20] The negative coefficients for Polity2 variable are also found in Pooled OLS and fixed effects estimations, results are available upon request.

[21] Recall again in footnote 16, Polity2 reflects institutionalised autocracy if the coefficient's sign is negative.

finding in this section therefore essentially gives empirical support to the strong government hypothesis.

As far as the empirical performance of system GMM estimation in this study is concerned, it seems to be reasonably satisfactory and robust, particularly the estimation for the general sample. The test for first order serial correlation in the residuals AR(1) show that null hypothesis of no first order serial correlation is overwhelmingly rejected in all estimations. For the whole-country sample, the estimations has no problem of second order serial correlation since AR(2) test statistics are unable to reject the null of no second order serial correlation (*p*-value of 0.104 and 0.091[22] for model (1) and (2), respectively). On the contrary, test for second order serial correlation AR(2) in Asian sample indicates there is a possibility of such a problem as the null hypothesis is completely rejected. This particular inconsistency is highly likely because of too large *T* (recall that we utilize annual data from 1984-2008, hence *T*=25) and too small number of countries in Asian sample i.e. *N*=14 thus making *T>N*. This situation could have possibly caused some of the lags to be invalid instruments[23].

The Hansen test for overidentification indicates the null of exogenous instruments is accepted with *p*-value equal to 1.000. Nevertheless, the implausibly good *p*-value of 1.000 for Hansen *J* test should be interpreted with caution since the test is apparently weakened by a high number of instruments[24]. Roodman (2009a) notes that the number of instruments in difference and system GMM estimations is quadratic in the time dimension of the panel. High numbers of instruments would cause several problems especially for sample with large *T*. Although we limit the instrument lags, the variables we assume as predetermined (lag dependent variable) and endogenous (investment, population growth, and institutional variables) that need instrumenting are always present in every model specification throughout the estimation process. Our sample data of 25 years would undoubtedly generate huge number of instruments (as high as 699 in

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[22] Rejection of null of the presence of second order serial correlation, or AR(2), at 1% and 5% levels is considered satisfactory, according to Cameron and Trivedi (2010).
[23] This can be considered as a trade-off between utilizing annual observation for capturing maximum variations in the data, and the consequent compromise on the strength of the test diagnostics of the method.
[24] Nevertheless, there are numerous studies employing system GMM that report p-value of 1.000 or close to 1.000 for Hansen test of overidentifying restrictions, see for example Baltagi *et al.* (2009), Hassan *et al.* (2009), etc.

general sample and 296 in Asian sample). For as long as the number of instruments higher than number of groups (N), Hansen test will definitely be weakened.

East Asia is the region of interest in this study due to its unique economic development experience in the past 25 years. Thus, we seek to investigate the possible link between institutions and growth in the region particularly for the period before and after Asian financial crisis in 1997-98. As previously discussed, the episode of high growth and unprecedented crisis in the region is arguably an interesting case study for a growth analysis from the perspective of institutions.

The similar strategy of two-stage estimation is applied in this section, and it considers two sub-periods from the 25-year sample data, firstly the period of high growth between 1984-1996 (called pre-Asian financial crisis), and secondly the period when the crisis started until the most recent year in the sample data, that is 1997 until 2008 (post-Asian financial crisis). The following Table 2 presents the results.

The results indicate that convergence parameter and investment variables are statistically significant with correct sign and consistent size of effects. Population growth however is not. Meanwhile, Investment Profile and Polity2 emerge the most important institutional characteristics towards growth of the East Asian countries for the period before crisis as their significance survives both model specifications (model 5 and 6) at consistent significant level and coefficient size. As for the Polity2, the negative coefficient remains to further corroborate the strong government hypothesis previously discussed. As for the Government Stability variable, notwithstanding its significance in the previous section estimations, it however turns out insignificant across all estimations and yields inconsistent sign.

On overall, it is fair to say that as far as the period of high growth is considered, Investment Profile and Polity2 are the key institutional qualities that have been proven to significantly support the achievement of high growth by the East Asian countries. This finding confirms the empirical evidence by Rodrik (1997) on the importance of secure property rights and gives empirical support to Ahrens' (2002) proposition of strong East Asian government that are able to influence the economic growth in the region. In other words, the environment of well-protected property rights and vibrant

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investment activities in the East Asian countries are actually the results of the pro-growth policies implemented by strong and stable government in the Asian countries.

While the results in pre-crisis period are reasonably straightforward and obvious, the estimations for period post-crisis however produce on overall insignificant institutional effects on growth. None of the institutional variables are significant across all estimations. One possible interpretation to this finding is that somehow during the period after crisis, the impact of institutional quality on the economic growth is possibly obscured due to the fact these crisis-hit countries were implementing recovery policies and strategies that were specifically designed and tailored to tackle the crisis impacts of various severity these countries experienced[25]. We are of the opinion that these differed recovery processes and unique development experience between the countries in the East Asian region during the period post-crisis has to some extent prevented the analysis in this section to uncover any meaningful and significant institutional impact towards economic growth.

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[25] For example, Malaysia implemented self-designed capital-control-based policies whereas South Korea implemented the International Monetary Fund (IMF) recovery strategies, and both countries, despite their differed approaches to tackle the crisis impacts, managed to recover somewhat quickly. On the contrary, there were also countries like Indonesia for example who has somewhat extended negative growth post-crisis period (which means delayed recovery) due to political disorder following the downfall of Suharto regime (Abidin, 2003).

Table 1: System GMM regression of growth model augmented with institutional variables[a]

Country sample	Whole sample: 69 countries		Asian sample: 14 countries	
	(1)	(2)	(3)	(4)
Regression model	All institutional variables	Only significant institutional variables	All institutional variables	Only Significant institutional variables
Constant	0.186 (0.152)	0.198 (0.146)	-0.146* (0.078)	-0.149* (0.074)
ln (y_{it-1})	-0.004 (0.004)	-0.005 (0.004)	-0.013*** (0.004)	-0.011** (0.004)
ln (s_{it})	0.025*** (0.007)	0.031*** (0.009)	0.032** (0.011)	0.035*** (0.009)
ln $(n+g+\delta)_{it}$	0.112* (0.063)	0.121** (0.059)	-0.057 (0.035)	-0.055 (0.032)
Investment Profile	**0.004*** (0.002)**	**0.004** (0.002)**	**0.004** (0.002)**	**0.004* (0.002)**
Law and Order	**0.005** (0.002)**	**0.004** (0.002)**	0.001 (0.002)	
Corruption	-0.004 (0.002)		0.001 (0.002)	
Bureaucracy Quality	0.001 (0.001)		0.001 (0.001)	
Government Stability	**0.006*** (0.002)**	**0.006*** (0.002)**	**0.003* (0.002)**	**0.003** (0.002)**
Democratic Accountability	-0.000 (0.001)		0.000 (0.001)	
Polity2	0.002* (0.001)	0.001 (0.001)	**-0.002** (0.001)**	**-0.002* (0.001)**
AR1 p-value	0.002	0.002	0.003	0.002
AR2 p-value	0.104	0.091	0.007	0.006
Hansen p-value	1.000	1.000	1.000	1.000
Observations	1548	1548	299	299
Number of country	68	68	13	13
No. of instruments	699	457	290	286

[a] Dependent variable is log real GDP per capita growth. Robust standard errors are in parentheses. All estimations include time dummies. AR(1) and AR(2) are the Arellano-Bond tests for first-order and second-order autocorrelation in the residuals of differenced equation, respectively. Hansen test of overidentification tests for *Ho*: the instruments as a group are exogenous. ***, **, and * indicate the coefficient is significantly different from zero at 1%, 5%, and 10% respectively.

Table 2: System GMM regression of growth model augmented with institutional variables for Asian countries[b]

Sample period	Pre-Asian financial crisis (1984 – 1996)		Post-Asian financial crisis (1997 – 2008)	
Regression model	(5) All institutional variables	(6) Only significant institutional variables in Asian sample (model 4)	(7) All institutional variables	(8) Only significant institutional variables in Asian sample (model 4)
Constant	-0.108 (0.066)	-0.122** (0.053)	-0.166 (0.100)	-0.193 (0.120)
ln (y_{it-1})	-0.008* (0.004)	-0.008* (0.004)	-0.008* (0.004)	-0.006 (0.004)
ln (s_{it})	0.033** (0.012)	0.034*** (0.010)	0.036*** (0.009)	0.034*** (0.010)
ln ($n+g+\delta)_{it}$	-0.038 (0.028)	-0.039 (0.024)	-0.060 (0.040)	-0.069 (0.047)
Investment Profile	**0.010** (0.004)**	**0.011** (0.004)**	-0.004 (0.005)	-0.002 (0.003)
Law and Order	-0.002 (0.002)		0.001 (0.003)	
Corruption	0.001 (0.002)		0.002 (0.003)	
Bureaucracy Quality	0.001 (0.001)		0.000 (0.004)	
Government Stability	-0.003 (0.004)	-0.003 (0.004)	0.007 (0.004)	0.007 (0.005)
Democratic Accountability	-0.000 (0.002)		0.001 (0.002)	
Polity2	**-0.004*** (0.001)**	**-0.003*** (0.001)**	-0.001 (0.002)	-0.001 (0.001)
AR1 p-value	0.005	0.005	0.003	0.003
AR2 p-value	0.003	0.004	0.003	0.004
Hansen p-value	1.000	1.000	1.000	1.000
Observations	310	310	311	311
Number of country	14	14	14	14
No. of instruments	252	241	199	194

[b]Dependent variable is log Real GDP per capita annual growth. Robust standard errors are in parentheses. Time dummies are included in all estimations. AR(1) and AR(2) are the Arellano Bond tests for first-order and second order autocorrelation in the residuals, respectively. Hansen test of overidentification is the test for *Ho*: the instruments as a group is exogenous. ***, **, and * indicate that the coefficient is significantly different from zero at the 1%, 5%, and 10% respectively.

5. Concluding remarks

The East Asian countries have experienced a dramatic economic performance since early 1990s but an unprecedented financial crisis in 1997-1998 has brought an abrupt end to the dream growth, and has resulted in severe recession and delayed recovery for some of the previously high performing countries in the region. Utilizing Solow growth framework augmented with institutional variables reflecting property rights, bureaucratic efficiency and political institutions, and employing latest estimation technique and dataset, this study is able to achieve the intended objectives to find empirical support to the proposition *"institutions matter"* for economic growth in developing countries and to show that the institutional growth-effect essentially runs via total factor productivity channel.

Specifically, this study finds security of property rights (proxied by Investment Profile and Law and Order) and bureaucratic efficiency (proxied by Government Stability variable) matter significantly for growth in all developing countries under study including the East Asian region and this finding is consistent to different model specifications, sample of countries and time periods. In addition to these two aspects of institutions, political institutions (proxied Polity2 variable) or specifically strong government or institutionalised autocracy (reflected by negative coefficient of Polity2) is shown to have important growth-effect for East Asian countries. Meanwhile, secure property rights and strong government characteristics are shown to be the key institutional quality behind the dramatic growth performance of East Asian countries during the period before crisis (1984-1996), whereas post-crisis this study is unable to establish any clear evidence on the impact of institutions towards growth.

Nevertheless, this study finds that the choice of annual data has on overall compromised the strength of diagnostics tests of the estimation method, system GMM, which relies heavily on the validity instruments obtained from lagged endogenous variables. The empirical performance of this study is plagued with the possibility of serial correlation problem (since orthogonality conditions between differenced error term and endogenous variables are frequently violated) and weakened overidentification test (due to high number of instrument count). In spite of these shortcomings, we are of the opinion that as far as the objective of identifying the institutional quality that matter to economic

growth in developing countries are concerned, the estimated results particularly in general sample estimation (model (1) and (2) in Table 1 that manages to survive serial correlation test and Hansen test) have somehow achieved the aim with reasonable degree of empirical strength.

Furthermore, this effort is arguably the first as far as we are aware of that uses dynamic panel data analysis to test for institutions-growth linkage in developing countries particularly the East Asian countries for the period when significant growth achievement and severe financial crisis have happened.

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