



Public Finance and role of Structural determinants of Potential output growth in Emerging Asia

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Abstract

Potential output is significant in anticipating the longer-term direction of the economy. Its relevance in predicting arises from the fact that, over the longer term, actual output tends to move in line with potential output. Potential output is the maximum GDP that the economy can attain upon proper utilization of its resources. The recent advent of economic crises in multiple countries around the world also brought to attention the effects they have on potential output. A crisis can reduce potential output in the short and medium term through its adverse impact on the economy. We used the Panel Fully Modified Least Squares (FMOLS) methodology to assess the impact of several structural determinants on potential production growth in Asia's emerging economies from the period 1997 to 2019. We also examine the effect of public finance in determining whether fiscal rules caused to the decline of potential growth, particularly following the financial and sovereign debt crises. The concept of potential output is also essential to government operations. An evaluation of the degree of excess demand or excess supply will have its impact on the fiscal policy. According to estimated results, research and development, population, tertiary education, trade openness, and institutional efficiency, and all these factors played a major role in potential output growth over the time span under consideration. Whereas financial integration has negative impact on the potential output. It has also found that debt accumulation has a positive impact on potential output. The two key objectives of fiscal policy are employment and price stability and, both are linked to potential output directly or indirectly. As a result, potential output is essential for understanding and implementing fiscal policy.

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1 Introduction

It has been observed that average growth in Asia has declined in the last decade. In several ways, after the global financial crisis of 2008–2009, growth performance seems to have declined. This raises the question that such a decrease is a transitory deviation from the potential growth rate of actual growth, or that it also implies a decrease in potential output. Globally, the economic consequences of the COVID-19 pandemic are serious. Governments' immediate reaction has been to put forward discretionary fiscal measures to mitigate the macroeconomic shock.

When addressing the economy's productivity, it often refers to the output gap, which is the difference between actual and potential output. But what is the potential output (PO)? A common misconception is that if all were employed and all the capital was used, it is the maximum output the economy could make. Potential output is defined by economists as what can be produced if the economy operates at maximum sustainable employment, where unemployment is at its natural rate. The actual output can therefore be either above or below the potential output. PO represents the supply side of the economy and is an important concept for government fiscal operations because it enables the structural fiscal balance to be measured. With supply-side conditions, the Potential output of the economy depends on many variables, mainly in terms of key labor inputs, capital, and labor productivity factor. In economic terms, policymakers look at the actual output, called the output difference, and its divergence from potential output. Whenever an economy's resources such as manpower, capital, and natural resources, among others, are fully and efficiently employed, potential production is produced. (Radovan, 2020).

Potential GDP cannot be observable, unlike actual GDP, and must estimate it. Consequently, different economists may have different views on potential production (Fontanari et al.,

2020). If actual output is greater than potential output, that is, the economy overheats, demand exceeds supply, and inflationary pressures on the economy are high. Neither state is desirable, as is self-evident. In the economy, the expression of the production gap is generally through inflation. Higher inflation results from a positive output gap, and deflation results from a negative output gap. After a long-term high volatility pattern and volatile movements observed in the past, the potential output has been indicating an increasing trend since 2014-15. The growth trend in the growth rate of PO indicates the country's overall growth potential from a long-term perspective (Pham, 2020).

In this regard, potential GDP is determined by all that influences an economy's long-term production potential: the extent of production factors (labor force size, human resources, physical capital, including infrastructure, and so on), the degree to which they can be used intensively without causing market volatility (NAIRU), and the efficiency with which they can be combined. An economy's potential GDP continues to grow as production factors and technological innovations accumulate over time. However, in some circumstances, such as a war or natural disaster, the amount of potential GDP will temporarily decrease. If some of the capital stock becomes unusable (for example, surplus construction cranes after a real estate bubble bursts) or when some long-term unemployed permanently leave the workforce, potential GDP will fall during an extreme, prolonged recession. (Giorno et al., 1995). There are several other variables affecting potential output growth, such as the diffusion of information and communication technology (ICTs), which can rise potential output growth in the medium to long term through capital strengthening effects and overall productivity increases (Cette et al., 2005).

The effect of several structural determinants such as population, tertiary education, R&D spending, trade, and financial transparency, and institutional efficiency of the potential production growth of the seven emerging countries of Asia for the period from 1997 to 2019 is tested in this paper. The fiscal policy has significant effect not only on GDP growth as well as on potential output growth. Fiscal deficit arises due to imbalance of

public revenue and public expenditure which result in negative impact on the economy and government has to depend upon public debt to overcome this problem. On the other hand, public debt influences the potential output growth, thus the objective of this research is to investigate nexus between potential output and public debt.

Potential output is of vital significance in macroeconomic policymaking. It is the well-admitting fact that understanding and appropriate estimation of potential output has grave results for the economy. In a case where potential output is greater than the actual output means that the economy is performing below its potential which suggests assets and capacity are underutilized. A negative output gap comes about in deflation and on the other hand, a positive output gap comes about in higher expansion. For policymakers, hence, understanding potential yield and the output gap is important.

This analysis focus on the determinants of potential output growth rather than add to the literature on empirical determinants of actual economic growth. There is limiting existing literature on the determinants of potential output growth. There were only a few studies in the past that estimated potential output for the emerging countries of Asia. This research would be important for a deeper understanding of these countries' economies and the formulation of macroeconomic policies. It should be noted in this context that it is essential to assess if the economy deteriorates from excess capacity and under or poor utilization of the resources to evaluate the nature of the economy. There are many considerations why it is important to estimate potential output and its structural determinant to assist in policy making. First, while there are a few studies on estimating potential production, none of them are systematic, so there is a need to investigate this subject, which is also beneficial to policymakers. Second, existing research have ignored the concept of structural determinates of potential production to estimate potential output such as potential output for Pakistan and NAIRU (Shaheen et al., 2015). Third, what impact did the global financial crisis in 2007 have on potential output?

For estimation, Panel Fully Modified Least Squares (Phillips & Hansen, 1990) approach is applied which control the potential sources of endogeneity. The purpose of this paper is to determine whether the determinants of potential production growth are relevant. The outcome of this research shows that mostly structural determinants like Working-age population, school enrolment, R&D, labor productivity, economic openness, and institutional quality all have a considerable impact on potential production growth.

The paper is organized as follows: Section 2 presents the empirical contributions in the literature. Section 3 subsequently presents the Theoretical background, and section 4 includes a detailed description of the dataset and econometric strategy. The estimation results are presented in section 5. At the end, section 6 includes conclusion and policy reconditions.

2 Literature Review

Historically, at different stages of development, a lot of factors are observed to play an important role in assessing the country's economic output. Economic growth determinants are interrelated factors that directly affect the rate of economic growth that is responsible for an economy's real GDP to rise. Standard determinants of potential output growth are demographic variables such as the growth and size of the population, the proportion of the working-age population as well as enrolment rates in primary and secondary education. It has been found that the role of human resources, technology, and capital in economic growth are potentially positive. (Barro, 1997). The importance of strategic advancement and modernization is emphasized in endogenous growth; additionally, the trade and financial openness is seen as a necessary condition for increasing economic expansion. (Romer, 1994). In this paper, an institutional quality indicator such as rule of law is also introduced. The concept of the rule of law refers to people's views of how much they trust and follow the rules of society.

2.1 Empirical Research

On the empirical side, in the wake of the Great Recession, numerous studies have found traces of oscillation in potential output., such as Bank of England, 2012; Cerra & Saxena, 2008;

DeLong et al., 2012; Koopman & Székely, 2009; Furceri & Mourougane, 2009 and Pisani-Ferry & Van Pottelsberghe, 2009. Many of these studies go beyond the recent experience and thus often cover earlier time periods. Serju (2007) analyzed the projected potential production and output difference for the Jamaican economy, using quarterly data from 1981 to 2004.

The production function approach is used by ECFIN (2006) to investigate the reasons of output gap for Cyprus' economy. This research applied the methodology to comparing findings with other countries in the European Union. The potential output growth and output gap for the Brazilian economy was calculated by Barbosa Filho (2005), a study that used the production function method from 1980 to 2000. Hofman & Tapia (2003) estimated potential production using data from 1950 to 2002 in nine Latin American countries. For the estimation of potential output, the Hodrick-Prescott (HP) filter is used moreover, the features of Cobb Douglas function is also explained. The concept of structural breaks in the approach to production functions is a novel feature of this research. In both methods, the results are different.

Over the last 3 decades, Most Emerging markets have performed exceptionally well in terms of growth. China and other Asian economies have been labeled "economic achievements," with growth rates averaging between 8% and 10%. Their performance has sparked an increasing debate in the economic literature about the factors that led to it and whether it can be replicated in other emerging economies. (Lanzafame ,2016). Potential output monitoring helps policymakers in the implementation of appropriate policies because of the economics crises. In the short run, the timing of implementation and removal of stimulus steps can be driven by estimates of the output gap. These projections can also provide the basis for calculating productive capacity in the medium to long term, and therefore guide policies to support sustainable, non-inflationary production growth (Park et al., 2010).

The finding of the Theoretical literature is based on certain assumptions that are not necessarily true in general. When the

economic downturn is extremely severe, Keynesian effects, i.e., positive benefits of expansionary fiscal policy, are more likely to appear. Several studies show that during recessions, the fiscal multiplier is greater. (Deleidi et al., 2020; Górnicka et al., 2020).

Bhoi & Behera (2017) investigated that in the aftermath of the global financial crisis, India's potential growth, which had accelerated to around 8 percent during 2003-2008, decelerated significantly to around 7 percent during 2009-2015, mainly due to a decrease in total factor productivity contribution and rate of change in capital stock growth. Using data for Pakistan's economy from 1950 to 2007, HAS & Ullah (2008) estimated potential production and output gap. The linear trend, HP filter, BP filter, Production Function, SVAR, and Unobserved Component methods are among the six methods used. It demonstrates that different methods result in various output gaps. Beard et al (2018) found that potential growth is expected to increase in emerging-market economies, mainly due to investment recovery and structural reforms that lead to overall productivity growth. In Japan, China, and the euro area, aging populations and decreasing labor inputs are reducing potential output growth. As a result of moderating investment growth, potential output in China is also declining.

Shahrier & Lian (2019) seeks to contribute, firstly, by providing a critical evaluation of the various models in estimating the potential output and output gap, and, secondly, the effectiveness of each model in assessing the drivers of future potential output, forecasting price trends, and identifying economic inflation sources. (Mojica & Tatlonghari, 2017) say that the labor force participation rate and trade openness was found to be significantly related to unemployment in the ARDL model. The economic repercussions of the COVID-19 pandemic are severe on a global scale. The first response of governments has been to propose discretionary fiscal measures to mitigate the macroeconomic shock (Heimberger, 2020).

It is important to note that mostly above-mention studies related to potential output are based upon the economy of the advanced countries. These studies are useful for assessing factors

that contribute to developed country growth, they may not be the best guide for determining the determinants of potential output in developing economies. Advanced economies are far more rely on factors like as the innovation process, the level of competition, and the quality of institutions. On the other hand, potential output of developing nations depend upon basic health and education, economic policy, and factor accumulation. In this context, this research contributes to the Potential output literature by focusing on a selection of Emerging Asian countries that will also be useful for the policymakers.

3 Theoretical Background

Potential output is a difficult term to describe theoretically and empirically, and it is even more difficult to execute. Potential output, estimated with some level of certainty, is difficult to estimate. Potential output is referred to as sustainable real GDP (and the rate of growth) in literature. Potential output is thus an important component of economic government policy, particularly when actual output diverges from its potential output level due to a variety of factors such as the pace with which actual output adjusts.

According to the Keynesian principle, by applying endogenous mechanisms, the speed of return of an economy to equilibrium is questionable, uncertain at best. Long-lasting negative output gaps are likely to occur, with the possibility of hysteresis effects when the actual output or GDP is changed (downward) rather than vice versa due to potential output. Whereas Keynesians advocate aggressive macroeconomic stabilization policies, monetarists and new classical theorists strongly support rule-based policies in terms of policies that are appropriate for structural reform. Effectively, they also believe that economic fluctuations do not affect potential output. In this frame of mind, any government interference functions as a spoilsport. They believe that structural reforms are more necessary for higher economic growth. Through endogenous technological change, macroeconomic policy can and do affect potential output. To measure possible output and output gaps, there are several techniques. For different countries, numerous empirical studies estimate potential production and output

discrepancies using various assumptions and methodologies, providing a variety of conclusions, such as Hofman & Tapia (2003); Cerra & Saxena (2008) Slevin,(2000).

3.1 Methodology and Different approaches to estimating potential output

Potential output is difficult to measure in general. Firstly, it is difficult to observe potential output. In the literature, various definitions have been identified, but no consensus on the precise meaning of potential output has been obtained. Secondly, a large range of approaches are used in estimation exercises, considering the complexity of pinning down a specific description of potential output. Aggregate approaches, production function approaches, and DSGE approaches are three approaches used in the literature to estimate potential output. The aggregate approaches estimate potential output by assuming a constant level of output. Various univariate statistical methods are used to estimate this permanent component of output. The production function approach calculates potential output based on underlying production factors including labor, capital, and total factor productivity. Potential output is the steady state level of output (zero output gap) in the New Keynesian DSGE system, where prices and wages are completely adjusted. The HP filter, the BP filter by Baxter-King, and the Kalman filter are the various statistical approaches to assessing potential output (univariate, bivariate, and common permanent and cyclical components). The linear Time Trend method, SVAR method, and PF method are all approaches for structural relationships (Guisinger et al., 2018).

Table 1
Actual and Average growth rate of potential output, 1997–2019

country	1997		2000		2005		2010		2015		2019	
	A CT	PO T										
China	9.3	8.2	8.4	8.4	11.3	10.7	10.4	9.4	7.4	7.9	6.1	6.9
Indone sia	4.6	4.2	4.9	3.8	5.6	5.6	6.2	6.1	5	5	5	5.9
India	4.3	6.7	4.3	5.9	9.4	7.7	7.2	6.2	7.1	6.2	4.2	5.4
Korea	5.9	5.8	8.9	9.4	3.9	3.6	6.4	6.3	3.3	3.3	2	2.9

Malaysia	7.3	5.3	8.8	5.6	5.3	6.1	7.4	6.4	6.2	5.8	4.3	4.4
Pakistan	0.1	3	4.2	3.6	7.6	4.8	1.6	4.7	5.4	5.4	1	5.3
Philippines	5.9	7.5	4.4	6.2	4.7	7.2	7.6	9.2	7.1	8.4	6	7.1

Source: Asian Development Outlook

Table 1 ACT denotes Actual Output and POT denotes Potential Output. It compares estimated potential growth rates to actual growth rates, revealing that potential growth was more stable than actual growth. The statistics in the table also indicate that the estimated potential growth rate in 2000 was generally higher than in 2014. Furthermore, from 2008 to 2014, the trend was either stable or declining. It is important to note that between 2008 and 2014, Potential output of China and Korea declined whereas, these economies are considered as advanced economies in Asia as well as some of the major economies in the World. In both sub - periods, potential output rose in Pakistan, India, Indonesia, and the Philippines. Overall, the fall in potential output accounts for 39.6 percent of the decrease in actual growth when comparing pre-crisis and post-crisis periods. This means that about 60 percent of the decline tends to be a transitory effect of the business cycle (Bank, 2016).

4 Data, empirical model, and econometric strategy

In this research, over the period 1997-2019, unbalanced panel data is used to examine potential output growth and its determinants for seven emerging Asian economies. The choice of the countries was determined with this fact that these seven countries are among the largest of the emerging markets, which are expected to become the developed countries of the twenty-first century. Emerging economies are not only growing more influential in the global economy, but they are also getting more diversified (Trichet, 2007). According to theoretical and empirical the literature, we include Solow-Swan growth model variables in our list of the potential output growth determinants. The choice of the structural variables is because they are generally considered as determinants of economic growth in the literature and have a strong theoretical foundation. The data is collected from IMF world economic outlook and World Development Indicators (WDI). Whereas the Hodrick & Prescott (1997) (HP) filter

technique, which is the most used statistical method because of its simplicity in measuring the variability of trend output, is applied to calculate potential output.

$$\begin{aligned} PGDP_{it} = & +1RND_{it} + 2Tradeop_{it} + 3Pop_{it} + 4Terat_{it} \\ & + 5Kaopen_{it} + 6Pro_{it} + 7Rulaw_{it} \\ & + 8PublicDT_{it} + 9Cylit_{it} + 10DF_{it} + u_{it} \end{aligned}$$

According to the theory of the Endogenous growth, a fundamental prerequisite for promoting growth is the importance of technical progress and innovation, as well as the level of openness of both commodities and financial markets. In this equation, β_s are the constant terms, 't' is the time period, 'i' is cross section and ε is the error term. This Model encompass total population (Pop) with tertiary education (Terat), the labor productivity (Pro) and "Rule of law" (Rulaw) which is institutional quality indicator. The Research and Development (RND) is another important determinant of the potential output. We include (import + export)-to-GDP ratio as a proxy for trade openness (Tradeopa), Financial openness (Kaopen) is calculated as the sum of net inflows, FDI net outflows and net portfolio investments to GDP. In this model, DF is a dummy variable as DF is equal to 1 if there is a Financial Crises and 0 otherwise. We also include two variables of public finance namely the ratio of debt to GDP (PublicDT). The cyclically adjusted balance is showing the fiscal position when cyclical or automatic movements are removed thus, it is also used in this research as an indicator of fiscal policy. Appendix 1 indicates the complete description and source of the dataset.

There are different methods of cointegration estimation in panel data such as DOLS (Dynamic Ordinary Least Square), FMOLS (Fully Modified Ordinary Least Square) and OLS (Ordinary Least Square). In this analysis, the data consists of a panel of 7 countries for 22 years, where $N = 7$, which is less than $T = 22$. Ordinary Least Square (OLS) cannot applied in the presence of endogeneity problem whereas the Generalized Method of Moments (GMM) has a problem of number of instruments when T is greater than N. Moreover, these parametric methods have strong distributional assumptions which are rarely

satisfied. In such situation, the OLS and the GMM estimator are not appropriate for our analysis. Therefore, we applied a non-parametric method, called, Panel Fully Modified Least Squares (Phillips & Hansen, 1990) to check the impact of structural determinant on the potential output growth. Fully Modified Least Squares is superior to the Ordinary Least squares as Fully Modified Least Squares tackle the problem of endogeneity by adding the leads & lags and in our analysis, public debt is creating endogeneity. FMOLS is a non-parametric approach that measures the correlation between the first alternatives of independent variables and the error term, as well as the presence of a constant term, to solve serial correlation problems (Mehrra, 2007). In addition, white heteroskedastic consistent standard errors are used.

5 Analysis of Empirical Results

The Pesaran (2006) unit root test for the variables is shown in Table 2, which reveals that R&D spending, labor productivity, trade openness, population, education, and fiscal variables are not stationary at levels. However, these variables are stationary at first differences. On the other hand, potential output, financial openness, and rule of law are stationary both in levels and first differences.

According to the literature, panel-data models are likely to experience substantial cross-sectional dependence in errors, which may occur due to the presence of common shocks and unobserved components that ultimately become part of the error term, spatial dependence, and idiosyncratic pairwise dependence in disturbances with no specific pattern of common components (Robertson & Symons, 2000; Pesaran, 2004). The Pesaran (2004) test for CSD is shown in Column 5 of Table 2, which indicates that this problem affects all variables. The result shows that rule of law is the only variable which is not influenced by this problem. The method suggested by Pesaran (2006) can be used to control for CSD.

Table 2
Results of Unit Root Test and Pesaran Cross section Dependence

Variables	Level	First Difference	Integration	CSD
Potential	-12.970 0.0000	-32.526 0.0000	I (0)	21.82181 (0.0000)
Population	1.3256 (0.9075)	-3.0375 (0.0012)	I(I)	22.28289 (0.0000)
Trade openness	0.4828 (0.6854)	-3.8550 (0.0001)	I(I)	2.205413 (0.0274)
R/D	0.98466 (0.8376)	-4.5512 (0.0000)	I(I)	5.192866 (0.0000)
Labor productivity	4.75042 (1.0000)	-3.6788 (0.0001)	I(I)	19.20952 (0.0000)
Financial Openness	-3.6671 (0.0001)	-8.1145 (0.0000)	I (0)	1.988092 (0.0468)
School enrolment	0.49342 (0.6891)	-3.0730 (0.0011)	I(I)	16.04371 (0.0000)
Rule of Law	-1.7465 (0.0404)	-6.2378 (0.0000)	I (0)	0.838492 (0.4018)
Debt	1.71809 (0.9571)	-3.8232 (0.0001)	I(I)	2.594744 (0.0095)
Cyclically Adjusted Balance	0.46927 (0.6806)	-2.5388 (0.0056)	I(I)	4.460505 (0.0000)
Financial Crisis	0.98036 (0.8365)	-4.7989 (0.0000)	I(I)	22.44994 (0.0000)

($p < 0.01, p < 0.05, p < 0.1$)

Source: Author's estimations

In the Table 3, most of the value of coefficients are statistically significant, and the signs are consistent with prior research. More precisely, population serves as a proxy for the size of a country. The fact that population growth contributes to increased labor participation and, as a result, increased employment, and output. According to the estimates, population size has a positive and significant effect on a country's potential output, as Spencer (1971) predicted. The percentage of the population with a tertiary education has a positive and significant coefficient in terms of human capital, as one would expect. Variations in research and development expenditures have a positive impact on the economy, which is consistent with

endogenous growth literature. (Rivera-Batiz & Romer, 1991). However, the economic openness variables, trade openness has a positive effect on potential production, whereas financial integration has a negative impact. Financial integration potentially increases potential productivity if cross-border capital flows are primarily directed toward productive investment. It is important to note, however, that many studies have found that financial integration has weakened the productivity of the weakest member states.

When we consider the periphery countries, this is especially relevant. After the euro was introduced, core EMU countries increased borrowing from outside the EMU and lending to the EMU's periphery (Hale and Obstfield, 2016). Both sets of countries experienced the asymmetric impact of greater financial integration between core and peripheral members. (Aizenman et al., (2013) have also found that Growth and equity flows have a smaller and less stable relationship. Finally, the rule of law index's coefficient is positive and significant. This is in line with research that highlights the importance of good governance and institutions for economic growth. In conclusion, the estimates show that labor productivity, human resources, institutional efficiency, and degree of products, as well as trade openness, all have a substantial impact on potential output growth rate. According to the different estimates, the Asian economy's potential performance decreased considerably in the aftermath of the financial crisis. The financial crisis is likely to have resulted in a one-time permanent decline in the level of potential production due to the economic consequences of the downsizing of certain industries, such as the financial and construction sectors, following their excessive expansion during the boom.

Table 3
Panel Fully Modified Least Squares (FMOLS)

Variables	Coefficient (p value)
Population	7597.369 0.0302
Trade openness	2.68 0.6315

R/D	2.58
	0.0000
Labor productivity	4.16
	0.0000
Financial Openness	-1.99
	0.4817
School enrolment	6.18
	0.0040
Rule of Law	3.06
	0.0016
Debt	3.20
	0.0581
Cyclically Adjusted Balance	2.45
	0.07158
Financial Crisis	5.63
	0.0857

$p < 0.01, p < 0.05, p < 0.1$

Source: Author's estimations

5.1 Nexus between Public Finance and Potential output

The effect of public debt is non-linear, according to the literature, debt is like a burden for economy especially when it is poorly utilized putting negative impact on growth. On the other hand, low rate of public debt with proper utilization resulting promising impact on the economy (Checherita-Westphal & Rother, 2012). The finding of Table 3 shows the nexus between public debt and potential output which is positive. It indicates that proper utilization of resources increases the growth. The relationship between the potential output and cyclically adjusted primary balance elucidates whether fiscal consolidation has various effects depending on the balance size. Consolidation can be more successful when a country has a structural deficit. Similarly, given the low investment rate, an excessive consolidation effort, such as a propensity for positive and growing surpluses, could exacerbate recessionary forces and stifle potential production growth.

Table 4
Debt to GDP

Countries	1997	2000	2005	2010	2015	2019
China	6.55	16.44	17.63	33.82	39.96	52.62
Indonesia	26.41	95.09	46.34	27.43	27.01	30.49
India	50.36	55.00	62.22	51.59	68.77	69.57
Korea	8.67	18.02	28.65	33.44	40.78	41.92
Malaysia	32.26	35.31	42.06	49.55	56.97	57.24
Pakistan	65.79	76.79	58.91	60.58	63.32	85.56
Philippines	55.65	58.59	65.71	50.19	39.64	36.96

Source: IMF world economic outlook

6 Conclusion and Policy Recommendation

In the broadest context, potential production is a measure of the economy's overall productive capacity. To put it another way, potential output refers to the economy's supply side, which is primarily determined by labor, capital, and productivity. However, the potential output also depends on several structural determinate in addition to labor capital and productivity. The results of Panel Fully Modified Least Squares (FMOLS) show that the working-age population, school enrollment, R&D, labor productivity, economic openness, and institutional quality all have a significant impact on potential output growth. This implies that as demographic and structural conditions improve, economies will always experience proportionally higher potential output growth. The findings reflect the behavior of the economies in the sample from 1997 to 2019, and the structural determinants of growth identified by the analyses can be viewed as common factors across all countries. Furthermore, each economy has its own characteristics that must be taken into account, and the complexity, sequencing, and timing of reforms all necessarily require a thorough examination of these idiosyncrasies. The potential output is also determined by public finance. The relationship between potential and debt-to-GDP ratio reveals whether different debt levels have different effects on structural consolidation. This is because, a situation where the rate of public debt is not very high it is needed to follow expansionary fiscal policy which will result in boosting the investment and productive government spending promotes growth. It has also been observed that the potential output of the emerging economic of Asia decreased considerably because of the financial crisis. The longer-

term impact of the financial crisis on potential growth would be largely determined by the economy's ability to respond to the shock.

Eventually, the results of this paper suggest that structural reforms targeting the components identified by the analysis as determinants of potential growth should be implemented. Furthermore, the results suggest that policymakers and analysts should consider the effect of debt accumulation on potential growth while assessing the long run efficiency of public debt. The analysis also has some limitations that we have not included some auxiliary variables in this analysis because of their high correlation with other variables within their categories. This analysis is considered as an attempt towards a better understanding of the various structural determinants of the potential output. Further research is required to explore this matter especially there is need to investigate the impact of monetary policy

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Ashraf & Hasan

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Appendix

Table 1

Data description

Indicator	Explanation	Source
Potential output Growth	Potential output refers to the highest level of real gross domestic product that can be sustained over the long term.	By using Hodrick-Prescott (HP) Filter Approach
Education	(School enrollment, tertiary, total (% gross))	World bank. World development indicators database (WDI)
Financial openness	Financial openness (FO) is calculated as the sum of net inflows, FDI net outflows and net portfolio investments to GDP	World bank. World development indicators database (WDI)
Population	Population size is defined as the number of individuals present in a subjectively designated geographic range	World bank. World development indicators database (WDI)
R&D_EXP	Expenditures for research and development are current and capital expenditures (both public and private)	World bank. World development indicators database (WDI)
Public Debt	Public debt (% GDP)	IMF world economic outlook
Trade openness	Openness of economy (Export + Import)/GDP	World bank. World development indicators database (WDI)
Rule of Law	The quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	World bank. World development indicators database (WDI)
Labor productivity	Workforce productivity is the amount of goods and services that a group of workers produce in a given amount of time	IMF world economic outlook
Cyclically adjusted balance	Revenues -Expenditure = budget balance/ GDP	IMF world economic outlook

Table 2
Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
PotentialGDP	161	1.37e+12	2.17e+12	1.05e+11	1.15e+13
Cyclically-adjusted GDP	156	-.6283884	2.496383	-9.263613	5.175448
DebttoGDP	168	47.05627	18.66853	6.55314	95.8935
Laborproductivity	153	10.9446	8.761757	1.833905	39.6
Population	168	4.46e+08	5.31e+08	2.16e+07	1.44e+09
Tradeopenness	153	71.9915	48.42865	23.17796	220.4068
RuleofLaw	139	-.4650164	.5346373	-1.715052	.6233374
Financialservices	161	-3.75e+09	2.65e+10	-1.07e+11	6.84e+10
Schoolenrollment	151	34.11483	26.93579	2.70068	104.2781
ResearchDevelopment	123	1.148607	1.140529	.04746	4.8
Financialcontrols	168	.5833333	.4944805	0	1
Epidemiccontrols	168	.0416667	.2004237	0	1

Figure 1
Potential growth rate estimates and actual growth rates China

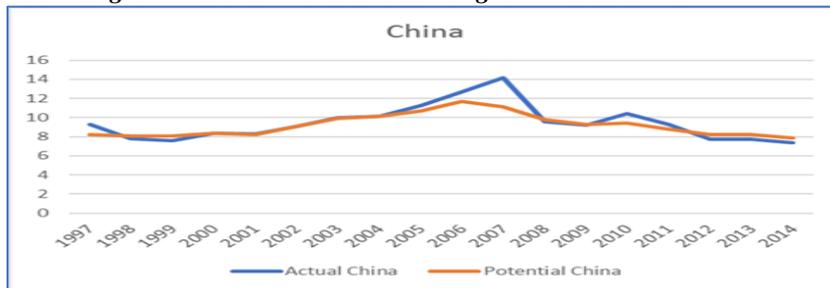


Figure 2
Potential growth rate estimates and actual growth rates India

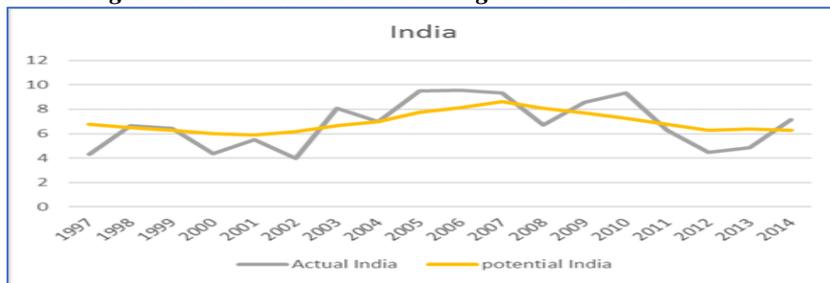


Figure 3

Potential growth rate estimates and actual growth rates Indonesia

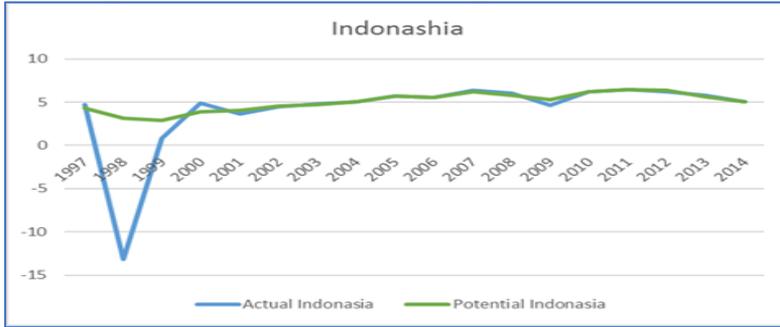


Figure 4
Potential growth rate estimates and actual growth rates Korea

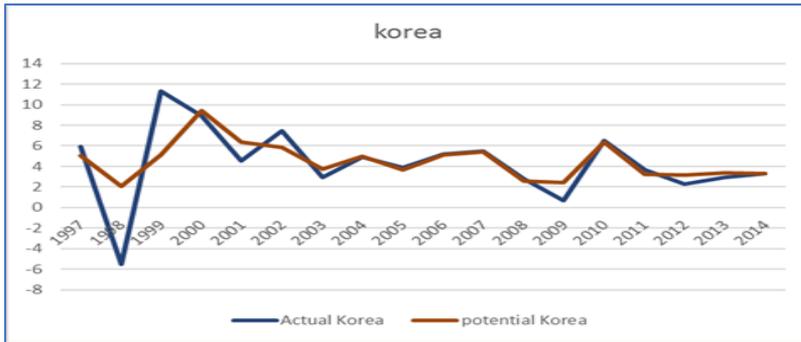


Figure 5
Potential growth rate estimates and actual growth rates Malaysia

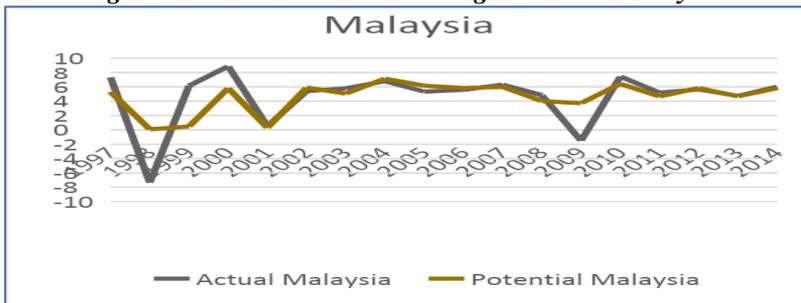


Figure 6

Potential growth rate estimates and actual growth rates Philippines

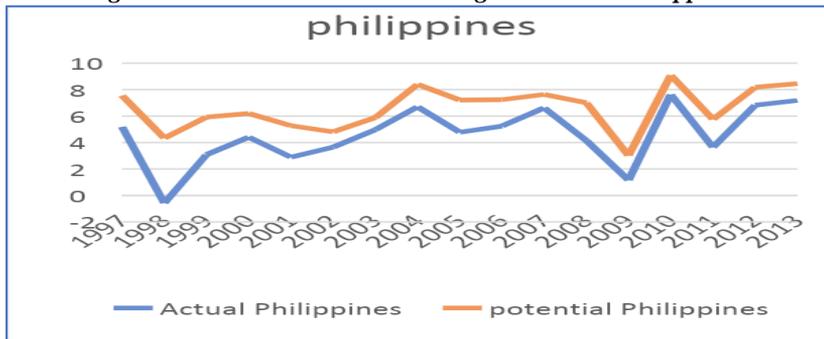
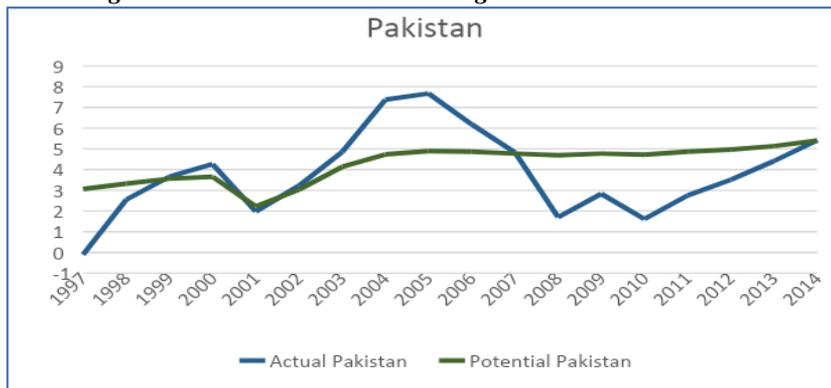
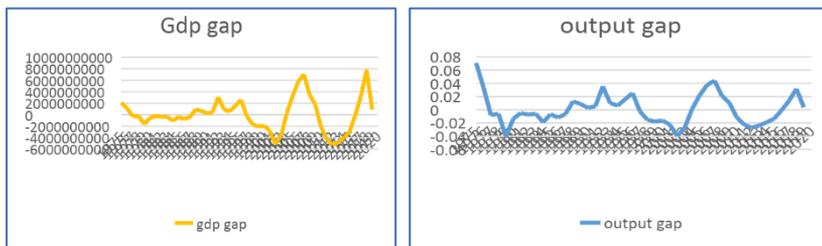


Figure 7
Potential growth rate estimates and actual growth rates Pakistan



Source: ADB estimates.

Figure 8
GDP and output Gap of Pakistan 1973-2019 using Hodrick-Prescott (HP) Filter Approach



Source: Authors' estimation