ASIAN DEVELOPMENT OUTLOOK 2016

ASIA'S POTENTIAL GROWTH

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Asia's potential growth

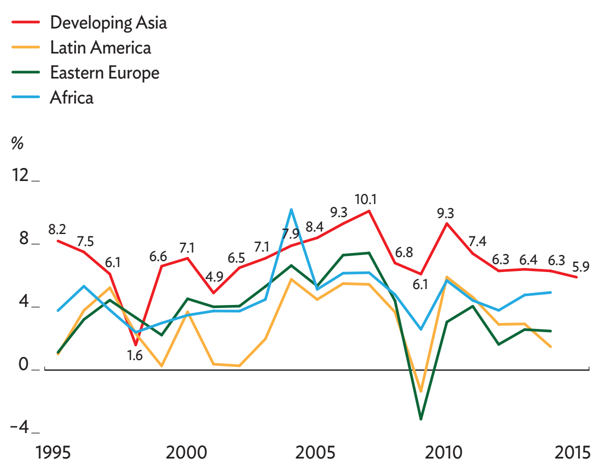
Many Asian economies have registered remarkably high output growth rates in the past 3 decades. This achievement came about despite disruptions caused by economic crises. Arguably, the most serious downturn was the Asian financial crisis of 1997–1998, which severely affected Southeast Asia and the Republic of Korea. By comparison, the global financial crisis (GFC) of 2008–2009 has had much less impact on Asia. The main reason why the region's economies were not directly affected was their low exposure to United States (US) subprime mortgages. The region was nevertheless affected indirectly as demand for its exports from its main trading partners contracted significantly.

This was enough to disrupt growth momentum in Asia, and as a result economic growth in Asia slowed in the aftermath of the GFC. From an average of 8.3% during 2006–2010, gross domestic product (GDP) growth in the region fell to 5.9% in 2015 (Figure 2.1.1). This downward trend in regional growth follows 6 years of accelerating growth in the interval 2001–2007. The People's Republic of China (PRC), which accounts for a large share of the region's GDP, has been the main driver of regional economic growth. Given the recent slowdown in the PRC, some observers have started talking about a "new normal" of substantially lower growth in the region.

While developing Asia is not alone in this regard—growth also declined in Africa, Latin America, and Eastern Europe—its slowdown is likely to have repercussions for the region and the rest of the world. Developing Asia's success in lifting 1 billion individuals out of poverty during 1990–2012 hinged on its ability to sustain high rates of economic growth. Moreover, as the region currently accounts for more than a quarter of world GDP as valued at market exchange rates, a persistent slowdown in developing Asia threatens to undermine the fragile global recovery.

This theme chapter aims to reveal the factors underlying the growth slowdown and the extent to which the slowdown reflects changes in the region's productive capacity. What has happened to developing Asia's productive capacity—its so-called potential growth—and how can policy makers respond?

2.1.1 Average GDP growth in selected regions



Source: ADB estimates.

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Understanding the growth slowdown

The issues posed by the decline in Asia's growth rate, and the nature of that decline, are important from a policy perspective. The right policy response depends on the nature of the region's slowdown. Is it a temporary—albeit prolonged—effect of the business cycle? Or are more persistent changes under way? If weaker growth reflects slack demand such as softening export orders or a downturn in private investment, then fiscal or monetary stimulus may be needed for temporary support. But if supply-side factors are at play, and growth moderation stems from slowing expansion of the region's productive capacity, then any revival of growth prospects may depend on structural policy reform.

The concepts of potential GDP and potential growth, which are grounded in a view of an economy's productive capacity under conditions of stable inflation and full employment, can be used to distinguish temporary deviations from the underlying trend in actual GDP growth. This chapter provides the theoretical foundation for potential growth, develops a simple framework to estimate it from readily available macroeconomic indicators, and applies the framework to a sample of developing economies in Asia.

Conceptualizing potential growth

Standard economic theory assumes that transitory shocks to the actual growth rate do not significantly affect the dynamics of the underlying trend or the potential growth rate. Several studies have recently challenged this view, however, and have proposed arguments and provided empirical evidence that support the hypothesis that there is a significant relationship between the short-run cyclical behavior of economic growth and long-term performance (e.g., Stiglitz 1993, Cerra and Saxena 2008). This suggests that the GFC may indeed have a significant impact on the future growth trajectory of individual economies.

The possibility of a permanent downward shift affects prospects for sustained increases in output. This is an important medium-term concern for policy makers, particularly in less developed countries where intense pressure exists to deliver sustained increases in living standards. Rodrik (2009), for example, argued that the world after the 2008–2009 crisis would be significantly different from its pre-crisis incarnation, in particular as a milieu for East Asian economies thriving as they did in the 20th century. This is because the crisis has permanently reduced growth in both productivity and the labor force.[1] Likewise, Pritchett and Summers (2014) argued that the days of fast growth in Asia might be numbered because regression to the mean is empirically the most robust feature of economic growth. The statistical analysis showed that rapid growth episodes in developing countries are frequently followed by significant slowdowns. Moreover, the historical distribution of growth has an average of 2% with a standard deviation that is also 2%.

One approach to addressing the main issues is to examine the supply side of the economy through the concept of potential or natural output growth. The notion of potential output was initially formulated to quantify the ability of an economy to produce output, i.e., its productive capacity. "Potential output" is therefore the highest level of real GDP that can be attained over the long term. By translating levels to growth rates, one obtains the rate of growth of potential output. A limit to output growth exists because of technical, natural, and institutional constraints on the ability to produce.

Growth theory indicates that in the long run economies tend to grow at a rate consistent with the full utilization of productive resources, i.e., the natural or potential growth rate. Short-term shocks can induce temporary deviations from potential growth rate, which give rise to changes in unemployment and inflation, but over time these changes are corrected by price adjustments and growth returns to its potential. What this means is that the high growth rates enjoyed by Asian economies reflected their high potential growth rates. Nevertheless, the precise meaning of this term has evolved over time (Box 2.1.1).

The approach followed in this chapter is consistent with Harrod's definition of potential growth—the sum of the growth rates of labor productivity and of the labor force—and with Okun's concept of potential output (Harrod 1939, Okun 1962). Hence, potential output growth is defined as the maximum rate of growth that an economy can achieve consistent with macroeconomic stability, in which there are neither inflationary nor deflationary pressures.

There is broad agreement that Asia's spectacular growth in recent decades was enabled by its rapid structural transformation, i.e., its capacity to shift resources out of agriculture into sectors of higher productivity (ADB 2013). The speed of an economy's structural transformation depends largely on institutional barriers that affect, among other things, the reallocation of factors of production, e.g., restrictive labor laws. Given that these barriers are pervasive in many Asian countries and that agriculture is still a large employer (employing 50% of all workers in India and about 30% in the PRC), Asia's prospects to reengineer high growth will depend largely on eliminating these barriers. Arguably, a significant share of the high growth registered by the Republic of Korea and Taipei,China from the mid-1960s to the mid-1990s, and in the PRC after 1980, is accounted for by the weakening of these barriers, which facilitated the absorption of labor by the manufacturing and service sectors. But most Asian economies still have significant barriers that prevent the development of modern manufacturing and services. Moreover, there are important obstacles that make it difficult to efficiently reallocate factors across firms.

This leads to the important point that potential growth consistent with stable inflation as used in this chapter is conditional on the economy's institutions and economic structure. Suppose that one could measure additional growth over and above this potential growth that could be achieved with the removal of all institutional barriers

2.1.1 Evolving notions of potential output growth

The idea of potential output has evolved historically. There are four main stages in the progression.

First stage. When Harrod (1939) discussed the "natural growth rate," this was probably the first formal reference in the literature to the idea of an economy's full-employment growth rate. Harrod defined an economy's natural growth rate ($\hat{g}^N$) as the sum of the growth rates of labor productivity ($\hat{y}^N$) and of the labor force ($\hat{n}^N$), i.e., $\hat{g}^N = \hat{y}^N + \hat{n}^N$. It represents the maximum sustainable rate of growth that technical conditions make available to the economic system. At any particular time, actual growth can diverge from the natural growth rate because of various restrictions, rigidities, and constraints, as well as the effect of positive and negative transitory shocks. Nonetheless, actual growth cannot persistently exceed $\hat{g}^N$ as this would eventually create inflationary pressures, including an excessively tight labor market. With wages rising relative to the price of capital, the economy would adopt more capital-intensive techniques, unemployment would rise again to a comfortable approximation of full employment, and growth would converge on the natural rate. On the other hand, if actual growth were consistently lower than the natural growth rate, the resulting rise in unemployment would trigger the opposite price adjustment process, and falling wages would in due course restore higher employment through the adoption of more labor-intensive production techniques until equilibrium in the labor market was achieved, and actual and natural growth rates were brought into line.

Second stage. It was not until the 1960s that these ideas gave rise to an active body of empirical work around the idea of potential output. Since then, there have been essentially two concepts of potential output in the literature. The first is based on Okun (1962), and the second on Friedman (1968). Okun was interested in the question how much output the economy could produce under conditions of full employment and answered it by introducing the concept of potential gross national product. Okun's work harked back to Harrod but also accommodated Keynes and the Phillips curve. He argued that potential output is a supply concept of the level of output under the full utilization of factor inputs. However, Okun stressed that the social target of maximum production and employment is constrained by a social desire for price stability. This did not imply, however, that inflation had to be stabilized at a low rate. Okun's aim was to specify the appropriate fiscal policy to maximize employment subject to the constraint that inflation should not be excessive. The implied relationship—referred to as Okun's Law—had practical policy implications under conditions of a stable trade-off between inflation and unemployment (the Phillips curve) and the direct responsiveness of employment to demand (as explored by Keynes).

Third stage. Okun was seriously questioned in the 1970s. The reason was not his concept of potential output. Rather, the rise of inflation during that decade caused disappointment with full employment policies. Friedman (1968) and Phelps (1967) questioned the stability of the inflation–unemployment trade-off embodied in the Phillips curve. They argued that the rate of wage increases was stable at only one rate of unemployment, which was termed its "natural rate" or the "nonaccelerating inflation rate of unemployment." If unemployment were beneath this natural rate, expectations of rising wages would cause inflation to accelerate without limit. The Friedman–Phelps critique of the Phillips curve had clear significance for the labor market and cast doubt on the feasibility of full employment, which was the touchstone of Okun's work.

Fourth stage. The result was a radical shift in thinking in the 1980s and 1990s about the relationship between demand pressure and inflation. The outcome was Okun's concept of the output gap being superseded by variants of Friedman's natural rate hypothesis. The central bank reaction function presented in Taylor (1993), for example, became a rule observed by many central banks when setting interest rates. This work led by the end of the 1990s and early 2000s to the so-called New Consensus Macroeconomics, also referred to as the New Keynesian Perspective. Essentially, this is a three-equation model consisting of (i) the relationship between interest rates and the output gap, (ii) the Phillips curve relationship between inflation and the output gap, and (iii) the so-called Taylor Rule, which sets interest rates according to the output gap and the difference between actual and targeted inflation. In these models, prices or real wages adjust toward their long-run equilibrium values but do so slowly, with the result that actual output may deviate from the short-term measure of potential output. Consequently, the output gap measures the deviation of actual from potential output that arises as a result of rigidities in prices and wages that prevent them from responding freely to changes in demand and supply.

and distortions in the economy: market imperfections, collusion, rent-seeking, externalities, and government policies that obstruct the mobility of factors, both capital and labor. This would then be the true maximum rate at which the economy can grow. This concept is referred to as the economy's *frontier potential growth*. It cannot be quantified, but the idea is clear and useful for developing economies.

While the difference between potential growth and frontier potential growth is not large in advanced economies, the distinction is important for economies riddled with inefficiencies. Policies and reforms that ease some of these constraints in the latter group can have salutary effects on potential growth, especially if it languishes far from the frontier. Understanding these constraints can help policy makers propel their economies closer to their true limit.

Estimating potential growth

Potential output is not directly observed. As such, the first step in analyzing developing Asia's potential is to develop an empirical model. This section develops a simple empirical model and applies it to a sample of 22 developing economies in Asia (Box 2.1.2). While limited data availability constrained selection for the sample, the group includes the three largest economies—the PRC, India, and Indonesia—and representatives of all subregions in developing Asia. As the sample accounts for more than 98% of GDP in the region in 2014, the aggregate results should broadly represent the region's experience.

At present, most economists view economic growth as the sum of a cyclical component and a permanent component. The former captures the business cycle or demand fluctuations and the latter the long-run trajectory of growth. This is the "natural" or potential growth rate of the economy, consistent with the full utilization of productive resources—in particular full employment of the labor force accompanied by stable inflation. There are various methods to estimate the potential growth rate, which are summarized in Box 2.1.3.

From the methods listed in the box, this chapter uses a multivariate estimate that relies on information on GDP growth and inflation. This is obviously an improvement over the univariate filters. Unlike the growth accounting approach, it does not require a series of capital stock, which is lacking in most Asian economies. And, unlike the output identity approach, the method employed in this chapter provides an explicit link with concepts of macroeconomic stability. Before the model is estimated, univariate filters are applied to the data series to extract the underlying trends of each variable.

As noted above, deviations of actual growth from the potential rate cause resources to be either overutilized or underutilized, giving rise to changes in the unemployment rate and, consequently, to inflationary or deflationary pressures. Consequently, potential output growth is associated with a stable inflation environment. The framework used in this chapter to estimate the potential growth rate of the Asian economies builds on this intuition.

Potential growth as modeled in this chapter is consistent with the Harrod (1939) concept of the natural rate of growth. The natural rate of growth is described as both the potential growth rate toward which the economy tends in the long-run and the short-term upward limit to growth, which turns cyclical expansions into recessions.

2.1.2 Sample economies

Azerbaijan
Bangladesh
Cambodia
People's Republic of China
Fiji
Hong Kong, China
India
Indonesia
Kazakhstan
Republic of Korea
Malaysia
Pakistan
Papua New Guinea
Philippines
Singapore
Sri Lanka
Taipei,China
Tajikistan
Thailand
Turkmenistan
Uzbekistan
Viet Nam

2.1.3 Methods to estimate potential growth

Potential growth, unlike actual growth, is not directly observable and hence has to be estimated. Some of the most widely used methods are as follows:

Univariate filters. These are statistical procedures that are not based on any underlying economic theory and use information only on GDP. Their objective is to statistically remove the cyclical component of a series from the raw data. The most widely used is the Hodrick–Prescott, but some other filters are the Baxter–King, Christiano–Fitzgerald, Beveridge–Nelson, and Corbae–Ouliaris.

Multivariate estimates. These approaches use information from several economic series to obtain estimates of potential output. The models are typically based on a structural theory. For example, they estimate the rate of economic growth consistent with "macroeconomic stability." One simple model is a bivariate structural time series linking temporary fluctuations in output to inflation, and postulating that the output gap is positively related to inflation pressures. An extended version could add an Okun's Law equation relating unemployment and output growth.

Growth accounting approach. This is also a multivariate approach in that it uses information on variables related through an aggregate production function: output, employment, capital, and residually measured total factor productivity. Typically, authors derive a decomposition of the sources of growth using a Cobb–Douglas production function such as $Y_t = A_t K_t^{\alpha}(L_t H_t)^{(1-\alpha)}$. In most cases it is not estimated econometrically; rather, factor markets are assumed to be competitive, so the labor and capital elasticities equal the factor shares in national income, and these are imposed to derive total factor productivity growth.

Output identity. This approach decomposes output (Y) multiplicatively as the product of a series of terms, e.g., labor productivity in hours (Y/H), hours per employee (H/L), the employment rate (L/P), and working-age population (P), such that $Y = \left(\frac{Y}{H}\right) * \left(\frac{H}{L}\right) * \left(\frac{L}{P}\right) * P$. These series can also be filtered to calculate their trend, which is then interpreted as the potential level. Like the production function approach, this method does not explicitly link the estimation of trend growth to the estimation of the output gap and inflation.

Since by definition it is the sum of the growth rates of labor productivity and the labor force, potential growth can be usefully decomposed into these two elements once it is estimated. Note that when actual growth is equal to potential, employment grows at the same rate as the labor force, keeping the unemployment rate constant. As such, when actual growth is consistently slower than the natural rate, unemployment will rise, and vice versa.

As a consequence, a convenient method to estimate the natural growth rate relies on the relationship between unemployment and output growth formalized in Okun's Law (e.g., León-Ledesma and Thirlwall 2002). Such a choice is complicated, however, by the lack or unreliability of labor market data for many Asian economies. This problem is addressed by noting that a natural extension of the concept of the natural growth rate is the link with the relationship between unemployment and inflation typified in the Phillips curve. The process, as described in Box 2.1.4, is to estimate the relationship of the gap between actual and expected inflation to the gap between actual growth and its natural rate. The model that relates output growth and inflation generates annual estimates of the potential growth rate.

Potential growth trends in developing Asia

When applied to developing economies with significant surplus labor, the model suggests that they can grow fast until the surplus is eliminated. Economies with surplus labor have relatively high labor force growth rates, many unemployed and underemployed workers, and low wages. Under these circumstances, there is room to grow

2.1.4 Multivariate estimates of potential growth

The model used for estimation has three underlying pillars: (i) Harrod's notion of the natural growth rate, (ii) Okun's Law relating unemployment to output, and (iii) the Phillips' curve relating inflation to output.

Since the natural growth rate is defined as the sum of the growth rates of labor productivity and the labor force, unemployment will rise whenever the actual rate of growth ($\hat{g}_t$) falls below the natural rate ($\hat{g}_t^N$), and it will fall when $\hat{g}_t$ rises above $\hat{g}_t^N$. This yields the following specification of Okun's Law:

$$\Delta U_t = \sigma - \varsigma \hat{g}_t \qquad (1)$$

where ΔU_t is the percentage change in the unemployment rate and the natural growth rate given by (σ/ς). This specification and its variants have been widely used in the literature to estimate $\hat{g}_t^N$ for countries and regions and also to investigate its possible endogeneity (e.g., León-Ledesma and Thirlwall 2002, Lanzafame 2010). The specification in equation (1) presents two issues that are addressed in this chapter. First, the model produces only a single estimate of the potential growth rate for the time period under analysis. Since its evolution over time is what is important, a time-varying parameter approach is applied to estimate a time series for $\hat{g}_t^N$. Second, the unemployment rate and, more generally, labor market data are notoriously unreliable for some of the economies in the sample.

To deal with this data problem, Harrod's definition of $\hat{g}_t^N$ is linked to the relationship between unemployment and growth. The potential growth rates of the Asian economies are then estimated based on an aggregate supply model. In the long run, unemployment will be constant when it is equal to the nonaccelerating inflation rate of unemployment (NAIRU). Therefore, the potential growth rate can be defined as that growth rate consistent with $U_t = U_t^N$, which implies $\Delta U_t = 0$. Okun's relation in terms of the NAIRU can be rewritten as follows:

$$U_t = U_t^N - \beta_t(\hat{g}_t - \hat{g}_t^N) \qquad (2)$$

where the Okun coefficient (β_t) and the NAIRU (U_t^N) are assumed to vary over time.

The relationship between inflation and unemployment is given by the following Phillips curve:

$$\pi_t = \pi_t^e - \gamma_t(U_t - U_t^N) \qquad (3)$$

where π_t and π_t^e are, respectively, the actual and expected inflation rates, while γ_t is a time-varying parameter. By substituting (3) into (2), the following equation is obtained:

$$\pi_t = \pi_t^e + \phi_t(\hat{g}_t - \hat{g}_t^N) \qquad (4)$$

where $\phi_t = \beta_t\gamma_t$. The specification in (4) formalizes an aggregate supply model with time-varying parameters.

To estimate the model in (4), an estimate of the expected inflation rate π_t^e is required. Because of limited data for expected inflation, π_t^e is modeled as a function of the actual inflation rate π_t with two possible specifications. One specification, expected inflation in time *t*, is a time-varying function of actual inflation in *t* plus a random shock:

$$\pi_t^e = \alpha_t\pi_t + \varepsilon_t \qquad (5)$$

The estimated model in this case is as follows:

$$\hat{g}_t = \hat{g}_t^N + \frac{(1-\alpha_t)}{\phi_t}\pi_t + \varepsilon_t \qquad (6)$$

The second specification assumes an extreme form of adaptive expectations (a random walk), with expected inflation in *t* equal to actual inflation in *t*–1 plus a random shock:

$$\pi_t^e = \pi_{t-1} + \varepsilon_t \qquad (7)$$

The second model is as follows:

$$\hat{g}_t = \hat{g}_t^N + \frac{1}{\phi_t}\Delta\pi_t + \varepsilon_t \qquad (8)$$

The constant term $\hat{g}_t^N$ in equations (6) and (8) provides an estimate of potential growth over time. To take account of the possible effects of the degree of openness on the slope of the Phillips curve, equations (6) and (8) are augmented with the share of imports in GDP. These equations are specified in state-space form, and the Kalman filter is used for estimation. This is a statistical procedure that can produce time-varying coefficients (Harvey 1989).

faster without stoking inflationary pressures. When surplus labor is eliminated, wages and possibly inflation start increasing. That is when growth is at its potential. It is true that a country with surplus labor can have rising inflation, but the likely explanation in such a situation is that constraints are creating bottlenecks that hamper the reallocation of labor. This implies that an economy's potential growth rate could be higher if such bottlenecks were eased or eliminated.

Meanwhile, in the case of the Central Asian economies, their dependence on natural resources can affect the estimates through the effect of commodity price shocks on domestic inflation. However, it is

2.1.5 How well does the aggregate supply model of potential growth perform?

To gauge whether the model produces sensible estimates of potential output growth, test its key insight: Inflationary pressures should arise when the gap between actual and potential growth rates widens. The test is carried by pooling all data. The following regression is estimated using a fixed effects model:

$$\Delta\pi_{it} = \vartheta_i + \omega(\hat{g}_{it} - \hat{g}^N_{it}) + \varepsilon_{it}$$

where $\Delta\pi_{it}$ is the change in the inflation rate and $(\hat{g}_{it} - \hat{g}^N_{it})$ is the difference between actual and potential growth rates.

The expectation is that $\omega > 0$ and statistically significant. The model is first estimated for a large sample of 71 economies across the world, and then for the sample of 22 developing Asian economies plus Japan. Results confirm the hypothesis that, when the gap between actual and potential growth widens, inflationary pressures emerge. In the larger sample, results confirm that, where inflation rates are below 25%, for each percentage point of actual growth in excess of the natural growth rate, the inflation rate increases by about 0.12 percentage points. Where inflation is above 25%, the relationship breaks down. Meanwhile, in the sample of Asian economies, results show that, where inflation rates are below 45%, for each percentage point of actual growth in excess of the natural growth rate, the inflation rate increases by about 0.2 percentage points.

difficult to state a priori the sign of this relation, which possibly should be stronger in more open economies. This can be controlled for, if only indirectly, by including in the model the share of imports in GDP (Romer 1993). The problem is the lack of sufficiently long time series, with the consequence that meaningful results are difficult to obtain. The model being estimated is therefore based on certain assumptions that may not exactly fit oil-dependent economies. Box 2.1.5 discusses how well the model performs with the given sample.

Graphs of estimated potential growth rates and actual growth rates are presented in Figure 2.1.2. These are for 12 of the 22 developing economies in Asia under consideration.[2]

These graphs show that the potential growth rate was more stable than actual growth, and that it was fairly high and/or increasing in the 1980s and 1990s in most economies. The pattern aligns with expectations. The graphs also suggest that, in most cases, the estimated potential growth rate was higher in 2000 than in 2014. Moreover, the trend was either stable or declining during 2008–2014. Figure 2.1.3 shows the difference between the period average rates for potential growth and actual growth between 2000–2007 (pre-crisis) and 2008–2014 (post-crisis).

It is worth noting that during 2008–2014, potential growth declined in Asia's advanced economies as well as in some of the major economies, including the PRC and the Republic of Korea. Thailand suffered a significant decline in its potential growth rate, which is the lowest in Southeast Asia. Potential growth increased, however, in Indonesia, Pakistan, the Philippines, and Uzbekistan. Meanwhile, Bangladesh, Fiji, and India maintained the same pace in both subperiods. Overall, comparing pre-crisis and post-crisis periods, the decline in potential growth accounts for 39.6% of the decline in actual growth.[3] This implies that about 60% of the decline appears to be a temporary effect of the business cycle.

2.1.2 Potential growth rate estimates and actual growth rates

Note: Broken lines show potential growth, solid lines actual growth.

Source: ADB estimates.

Click here for figure data

Key features of potential growth trends in the four largest economies in the sample, which accounted for about 80% of developing Asia's actual GDP in 2014, were as follows:

People's Republic of China. During the expansionary phase up to 2007, before the GFC, the PRC economy operated at potential or slightly above it. From 2008, a gradual decline in potential growth is observed to be about 7.9% in 2014, just slightly above actual growth at 7.4%. Post-crisis average potential growth declined by 1.11 percentage points relative to the pre-crisis average. During 2008–2014, inflation slowed as the deviation of actual growth from potential growth was only slightly negative. This is consistent with the theoretical framework underlying the model, which states that a decline in the inflation rate is associated with the actual growth rate being below potential.[4]

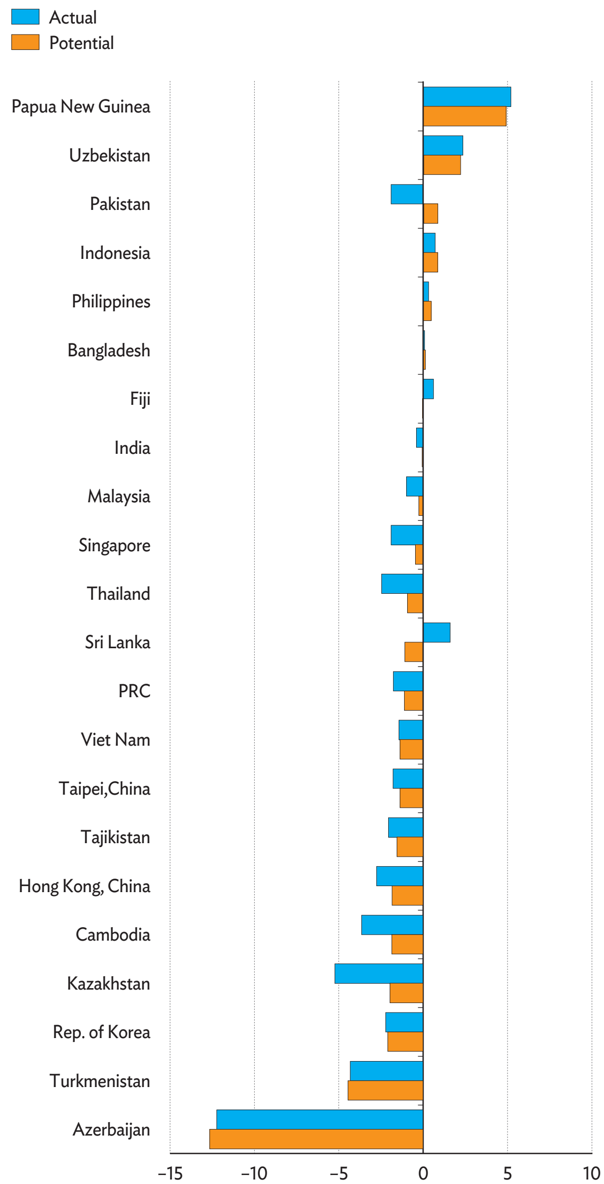
India. For most of the estimation period, India's potential growth rate was quite stable.[5] A substantial increase starting in the early 2000s is observed, with potential growth peaking in 2007 at 8.6%. As with the PRC, potential growth declined in the aftermath of the GFC, falling to 6.3% in 2014. However, the average in 2008–2014 was only 0.06 percentage points lower than in 2000–2007. The average deviation of actual from potential growth was slightly negative. Also as with the PRC, this indicates that India's economy grew at close to its potential during this period.

Republic of Korea. The economy's potential growth rate has been declining for quite some time. It experienced a significant decline during the Asian financial crisis of 1997–1998, after which it recovered slightly. However, the broader trend since 2001 has been negative. The 2008–2014 average was 2.09 percentage points lower than in 2000–2007. The 2008–2014 averages of actual and potential growth were also very close to each other, the deviation being slightly negative. This is consistent with a slightly declining inflation rate. In 2014, the Republic of Korea's potential growth rate was estimated at 3.3%, very close to actual growth.

Indonesia. For most of the estimation period, Indonesia's potential growth rate was stable. However, its potential growth rate declined during the Asian financial crisis of 1997–1998 to 3% from a peak of 8.4% in 1995. It then recovered to an average of almost 5% in 2000–2007 and increased to 5.8% during 2008–2014. During this period, actual and potential growth rates were close, so that the average change in inflation was stable. Among developing Asia's four largest economies, only Indonesia registered a significant increase in potential growth during 2008–2014, rising 0.86 percentage points higher than the 2000–2007 average.

In Figure 2.1.4, the weighted average of the estimated potential growth rates of 13 Asian economies (Asia-13) for which consistent estimates since 1988 are available is calculated. These economies—Bangladesh, Fiji, India, Indonesia, the Republic of Korea, Malaysia,

2.1.3 Differences in average actual and potential growth rates, 2000–2007 versus 2008–2014



PRC = People's Republic of China.

Notes: For Fiji, pre-crisis growth rates are for 2001–2007. For Papua New Guinea, post-crisis growth rates are for 2008–2013. Singapore and Thailand used a model augmented with financial factors (Felipe et al. 2015). For Tajikistan, pre-crisis actual growth is for 2001–2007, and potential growth is for 2002–2007.

Source: ADB estimates.

Click here for figure data

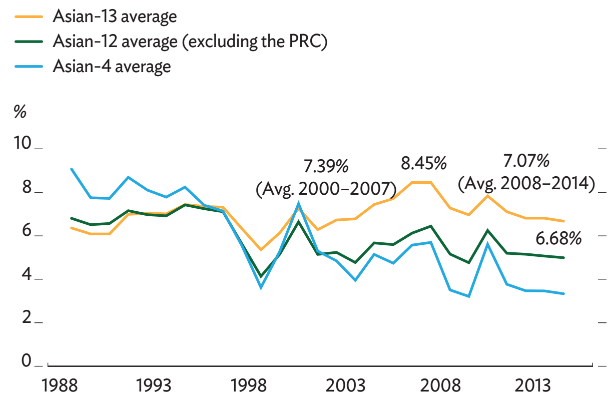
Pakistan, the Philippines, the PRC, Singapore, Sri Lanka, Taipei,China, and Hong Kong, China—represent almost 94% of developing Asia's actual GDP in both 1988 and 2014. The weighted average provides a more aggregate picture of these growth dynamics and will help answer the question whether there is evidence that Asia is entering a new normal of lower potential growth. Average potential growth for two other subgroups is also plotted: One is the same group of economies but excluding the PRC (Asia-12) and the other includes only the Republic of Korea, Singapore, Taipei,China, and Hong Kong, China (Asia-4). A comparison of Asia-13 and Asia-12 averages allows the assessment of the influence of the PRC on the potential growth performance of the region as a whole.

In the case of Asia-4, potential growth declined from an average of about 9% in 1988 to just over 3% in 2014. The aggregate behavior of Asia-13 provides a more complex and nuanced view of Asia's potential growth. First, potential growth increased prior to the Asian financial crisis of 1997–1998. The series peaked at a range of 7.3%–7.4% in 1994–1996. Potential growth declined during the crisis and bottomed out in 1998 at 5.36%. It then recovered and increased from 1999 to 2007, peaking at 8.45%. After the GFC in 2008, potential growth started declining, falling to 6.7% in 2014, almost 2 percentage points below the peak. The significant decline from the peak indicates that the region may have entered a new normal of lower potential growth, an issue that will be explored further in the third section of this theme chapter.

It is also important to note that developing Asia's dynamics of potential growth are increasingly determined by the growth performance of the PRC. The PRC share in regional GDP increased to almost 55% in 2014 from only 25% in 1988. In this context, the surge in regional potential growth between 1998 and 2007 was mostly the result of the phenomenal growth performance by the PRC (Figure 2.1.5). The consequence was that the PRC contributed about three-quarters of the overall rise in potential output growth during this period. Specifically, the PRC contributed 2.31 percentage points out of the total increase of 3.09 percentage points. Of that 2.31 percentage points, 1.09 is derived from its rising potential growth rate, and 1.22 can be attributed to the growing PRC share in developing Asia's GDP. Most of the remaining increase in potential growth was contributed by India and the Republic of Korea, while several economies made negative contributions to the regional average.

In the same vein, the decline from the onset of the GFC to 2014 was determined primarily by events in the PRC, India, and the Republic of Korea. However, the latter two economies played a bigger role in this episode. Specifically, about one-third of the 1.78 percentage point fall in average

2.1.4 Estimates of average potential growth rate



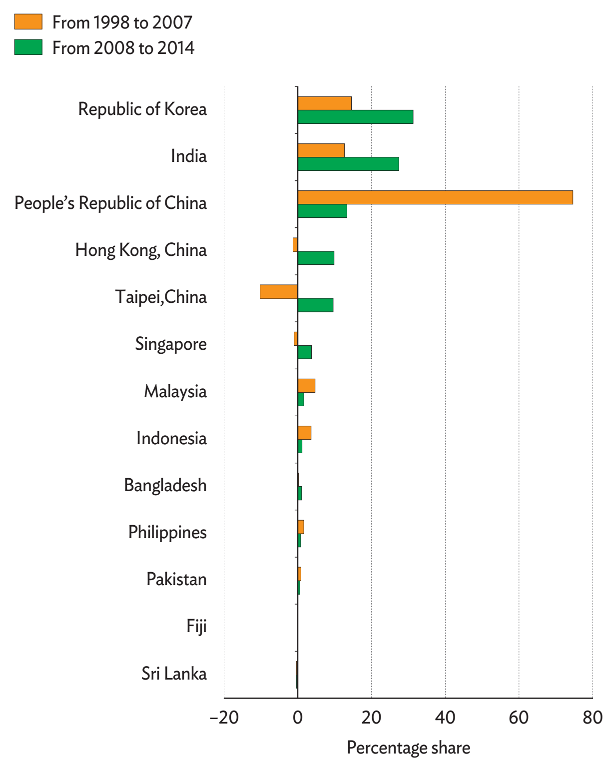
Asia-4 = Republic of Korea, Singapore, Taipei,China, and Hong Kong, China; Asia-12 = Asian-13 minus the People's Republic of China; Asia-13 = Bangladesh, the People's Republic of China, Fiji, India, Indonesia, the Republic of Korea, Malaysia, Pakistan, the Philippines, Singapore, Sri Lanka, Taipei,China, and Hong Kong, China.

Notes: Regional potential growth rate is the average of the individual economies' growth rates, weighted by their share in actual GDP. The regional average including the 22 economies that constitute developing Asia (i.e., the 22 in the study, excluding Japan) since 2000 is as follows (Tajikistan is not included in 2000 and 2001 as its weight is only 0.3%): 2000: 7.04%; 2001: 6.18%; 2002: 6.65%; 2003: 6.75%; 2004: 7.40%; 2005: 7.69%; 2006: 8.40%; 2007: 8.38%. 2008: 7.21%; 2009: 6.87%; 2010: 7.68%; 2011: 7.00%; 2012: 6.70%; 2013: 6.71%; 2014: 6.56%.

Source: ADB estimates.

Click here for figure data

2.1.5 Contributions to change in potential growth



Source: ADB estimates.

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potential growth can be attributed to the Republic of Korea, which experienced a large fall in both potential growth and GDP share—nearly 7 percentage points—from 2007 to 2014. India's GDP share and potential growth rate also declined, by 2 and 2.3 percentage points, respectively. As a result, its contribution to the aggregate decline was also approximately a third. Meanwhile, the decline in potential growth in the PRC was offset by the rise in its regional share of GDP, so that its net contribution to the regional decline was only 0.24 percentage points, or 13% of the total.

The picture without the PRC (Asia-12) is very similar to that of the Asian-13 but, as expected, potential growth without the PRC is lower both before and after the GFC. As with Asia-13, the decline during 2008–2014 was significant. The substantial decline in Asia-12 average potential growth with respect to the earlier part of the 1990s is also noted. Another common feature is that Asia-12 average potential growth during the Asian financial crisis was lower than during the GFC. With or without the PRC, the behavior of potential growth clearly shows a turning point after the GFC.

The question remains whether this slowdown in potential growth is a new normal for the region—and what, if anything, policy makers can do to counteract this trend. Future gains in living standards and poverty elimination rest on a grasp of potential growth. Identifying the institutional and policy constraints that keep an economy from achieving its frontier potential growth will be critical to counteract the current slowdown. Knowing which factors have driven potential growth in the past can guide policy makers' efforts to meet today's growth challenge.

Determinants of potential growth

Several approaches are used to tease out what is behind the recent slowdown in potential growth. First, the time-series estimates of potential growth for the 22 developing economies in Asia can be decomposed using a set of simple techniques that stem from the definitions of the key concepts. From the Harrod (1939) concept of the natural growth rate, potential growth is the sum of labor force growth and potential labor productivity growth—that is, growth in potential output per worker. Potential labor productivity growth itself can be decomposed to show it driven by such factors as within-sector productivity growth, the effect of employment reallocation across sectors, capital accumulation, and total factor productivity growth.

Second, an econometric model is estimated using cross-country data for a larger sample of countries including those outside of Asia to establish the determinants of potential growth. The objective is to obtain robust and reliable estimates of variables significantly correlated with the potential growth rate.

Finally, firm-level data are used to study the role of institutional obstacles in generating distortions that cause resource misallocation. This exercise can help shed light on policies that could help shift an economy closer to its frontier potential growth.

Potential labor productivity growth

Following Harrod's definition of the natural growth rate, potential labor productivity growth is potential growth less the growth rate of the labor force. Because labor market data in many developing economies in Asia are unreliable, working-age population, which is the population aged 15–64, is used as a proxy for the labor force. These data are filtered using appropriate statistical techniques to purge short-term variability, which is caused largely by transitory migration flows.

Figure 2.2.1 shows both potential and actual labor productivity growth rates for the 12 Asian economies whose potential growth was graphed in the previous section. The PRC displays a high potential labor productivity growth rate—significantly higher than that of India. This explains a large part of the difference in potential output growth between these two economies. Consistent with their transition into high-income economies, the Republic of Korea and Taipei,China show marked declines in potential labor productivity growth. This is less obvious in Singapore. Actual and potential labor productivity growth tend to track each other quite closely in most economies. However, the Philippines is a notable exception, with actual labor productivity growth lagging potential for most of the period.

Figure 2.2.2 reports the breakdown of potential output growth into potential labor productivity growth and filtered labor force growth for the periods 2000–2007 and 2008–2013. With a few exceptions—Malaysia, Pakistan, and Singapore—potential labor productivity growth

2.2.1 Potential and actual labor productivity growth rates

Note: Broken lines show potential growth, solid lines actual growth.

Source: ADB estimates.

Click here for figure data

was the main contributor to potential output growth. On average, potential labor productivity growth accounted for 78% of potential output growth during 2000–2007 and 86% during 2008–2013.

Meanwhile, Figure 2.2.3 shows the change in annual average potential output growth between the periods 2000–2007 and 2008–2013. There is a decline in most economies. The figure also shows in each bar the change in the two components. In the PRC, potential output growth declined by about 1 percentage point between the two subperiods. Most of the decline is accounted for by the slowing of working-age population growth, with potential labor productivity growth actually increasing slightly. On the other hand, India saw a very small increase in potential output growth between the two periods. This was accounted for by the increase in potential labor productivity growth, which was slightly larger than the decline in working-age population growth. In the Republic of Korea, most of the decline in potential growth is accounted for by the decline in potential labor productivity growth. And, in Indonesia, most of the increase in potential output growth was accounted for by the increase in potential labor productivity growth.

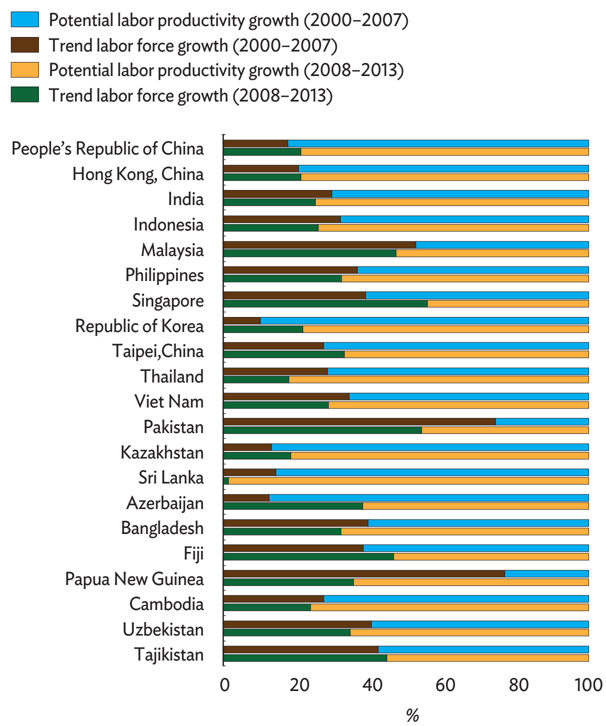
Decomposition of potential labor productivity growth

Using shift-share analysis, the estimates of labor productivity growth are decomposed into productivity growth within the sector, changes in the employment structure, slack in the economy, capital deepening, and total factor productivity growth (Foster-McGregor and Verspagen 2016). This provides a simple but very useful way to assess which component of potential labor productivity growth is the largest and matters the most in explaining labor productivity growth. Box 2.2.1 shows how these decompositions are interpreted.

Equation (3) in Box 2.2.1 shows that potential labor productivity growth can be decomposed into the sum of the within, static, and dynamic effects, plus two terms that capture an *output gap* and a *labor gap*. This decomposition allows the comparison of the changes in the two gaps with the three structural effects. Results are presented in Figure 2.2.4 along with the average potential labor productivity growth for 1990–2011.

In most economies, the contribution of the combined gaps to potential labor productivity growth is relatively small compared to those of the structural effects. Kazakhstan, the Philippines, and Sri Lanka are the main exceptions, all with gaps making positive contributions. The positive contribution means that potential labor productivity growth has been faster than actual labor productivity growth.

2.2.2 Contributions to potential output growth

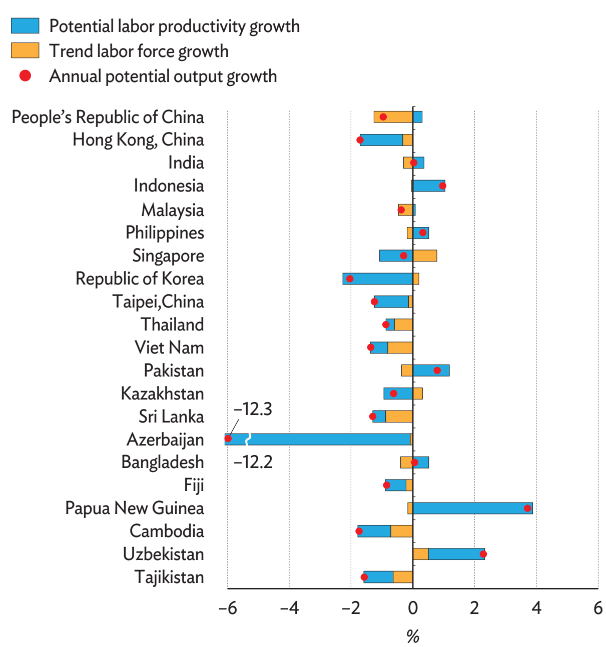


Note: For Fiji and Papua New Guinea, first period refers to 2002–2007. For Taipei,China, Cambodia, and Uzbekistan, second period refers to 2008–2012. For Tajikistan, first period refers to 2002–2007 while second period refers to 2008–2012.

Source: ADB estimates.

Click here for figure data

2.2.3 Change in potential output growth and its components between 2000–2007 and 2008–2013



Note: For Fiji and Papua New Guinea, first period refers to 2002–2007. For Taipei,China, Cambodia, and Uzbekistan, second period refers to 2008–2012. For Tajikistan, first period refers to 2002–2007 while second period refers to 2008–2012.

Source: ADB estimates.

Click here for figure data

2.2.1 Decomposition of labor productivity growth, potential labor productivity growth, and total factor productivity growth

The procedure for decomposing potential labor productivity growth can be depicted in stages:

1. Decomposition of actual labor productivity growth. A well-known structural decomposition of labor productivity growth is given by the following equation (omitting the subscript 't' for time):

$$\hat{g}-\hat{l} \equiv \hat{y} \equiv \Sigma_i \frac{(y_i^1-y_i^0)}{y^0}S_i^0+\Sigma_i \frac{(s_i^1-s_i^0)}{y^0}y_i^0+\Sigma_i \frac{(y_i^1-y_i^0)(s_i^1-s_i^0)}{y^0} \qquad (1)$$

where $\hat{g}$ is the growth rate of GDP, $\hat{l}$ is the growth rate of aggregate labor input, y is labor productivity and $\hat{y}$ denotes actual labor productivity growth, and s_i denotes the share of industry i in aggregate employment. The three terms on the right hand side are the *within effect*, or the contribution of productivity growth rates within each sector i; the *static effect*, or the productivity effect of relocating labor that results from differences in productivity levels at the start of the period; and the *dynamic effect*, or the productivity effect that results from relocating labor from one sector to another, at the same time taking into account the change in the productivity growth rate over the period. The sum of the last two is equal to the effect of employment reallocation across sectors. The symbol Σ denotes summation with this operation carried out for each of the three effects across the nine sectors for which data are available: agriculture, mining, manufacturing, construction, utilities, trade, transport and commerce, the public sector, and finance, insurance, and real estate.

2. Potential labor productivity growth and the output and labor gaps. The same structural decomposition of labor productivity growth is applied to the potential rate of labor productivity growth ($\hat{y}^N$) by rewriting the definition of potential growth rate (g^N) as follows:

$$\hat{y}^N \equiv \hat{g}^N-\hat{n}^N \equiv (\hat{g}-\hat{l})-(\hat{g}-\hat{g}^N)+(\hat{l}-\hat{n}^N), \qquad (2)$$

where $\hat{n}^N$ is the growth rate of potential labor force, $(\hat{g}-\hat{l}) \equiv \hat{y}$ is the growth rate of actual labor productivity, $(\hat{g}-\hat{g}^N)$ is the difference between the actual rate of output growth and the potential rate (or the *output gap*), and $(\hat{l}-\hat{n}^N)$ is the difference between actual employment growth and the growth rate of the potential labor force (and equal to the growth rate of the participation rate). This is called the *labor gap*. These last two terms reflect slack in an economy that is not operating at its potential.

Substituting equation (1) into equation (2), yields a decomposition of potential labor productivity growth:

$$\hat{y}^N \equiv \Sigma_i \frac{(y_i^1-y_i^0)}{y^0}S_i^0+\Sigma_i \frac{(s_i^1-s_i^0)}{y^0}y_i^0+ \\ \Sigma_i \frac{(y_i^1-y_i^0)(s_i^1-s_i^0)}{y^0}-(\hat{g}-\hat{g}^N)+(\hat{l}-\hat{n}^N) \qquad (3)$$

The first three terms have the same interpretation as in equation (1), while the last two are the output and labor gaps. A negative output gap and a positive labor gap add to potential labor productivity growth.

3. Total factor productivity growth. Total factor productivity (TFP) is often used as a measure of the efficiency with which both labor and capital are used and is sometimes preferred to labor productivity. The growth rate of TFP can be decomposed into the same three terms as labor productivity growth by replacing labor productivity in equation (1) with TFP (ϕ). The resulting decomposition is as follows:

$$\hat{\phi} \equiv \Sigma_i \frac{(\phi_i^1-\phi_i^0)}{\phi^0}S_i^0+\Sigma_i \frac{(s_i^1-s_i^0)}{\phi^0}\phi_i^0+\Sigma_i \frac{(\phi_i^1-\phi_i^0)(s_i^1-s_i^0)}{\phi^0} \qquad (4)$$

The same three terms representing the within, static, and dynamic contributions to TFP growth ($\hat{\phi}$) in this case are present.

4. Extended decomposition of potential labor productivity growth: the role of TFP growth and of capital deepening. Combining TFP growth decomposition with decomposition of potential labor productivity growth provides a more detailed decomposition of the latter that allows an estimation of the effects of both capital deepening and TFP growth. From a production function that assumes perfectly competitive factor markets, actual labor productivity growth can be written as follows:

$$(\hat{g}-\hat{l}) \equiv \hat{\phi}+(1-\alpha)(\hat{k}-\hat{l}) \qquad (5)$$

where $\hat{k}$ is the growth rate of aggregate capital, $(1 - \alpha)$ is the share of capital in GDP, and $\hat{\phi}$ is the growth rate of TFP. This equation states that the growth rate of actual labor productivity is equal to TFP growth plus the weighted growth rate of the ratio of capital over labor, with the weight being the share of capital in GDP. Replacing $\hat{\phi}$ in equation (5) with the expression in equation (4) and inserting this into equation (2) results in the following decomposition of potential labor productivity growth:

$$\hat{y}^N \equiv \Sigma_i \frac{(\phi_i^1-\phi_i^0)}{\phi^0}S_i^0+\Sigma_i \frac{(s_i^1-s_i^0)}{\phi^0}\phi_i^0+ \\ \Sigma_i \frac{(\phi_i^1-\phi^0)(s_i^1-s_i^0)}{\phi^0}+(1-\alpha)(\hat{k}-\hat{l})-(\hat{g}-\hat{g}^N)+(\hat{l}-\hat{n}^N) \qquad (6)$$

This relates potential labor productivity growth to the within, static, and dynamic contributions to TFP growth, capital deepening, and the output and labor gaps.

The analysis implies that, on average, the within effect accounts for 91% percent of potential labor productivity growth, and the static effect for 15%. Meanwhile, the dynamic effect is small, and the contribution of the two gaps is negative. It can therefore be concluded that the failure to realize potential because of the two gaps has a minimal role in explaining potential labor productivity growth.

Subsequent decomposition accounts for capital deepening and TFP growth (Figure 2.2.5). As shown in Box 2.2.1, the contribution of TFP growth is equal to the sum of the within, static, and dynamic effects. Interestingly, the contribution of capital deepening is always positive and high in many countries. Hence, a significant portion of overall labor productivity growth comes from capital deepening rather than from pure efficiency improvements. This also implies that actual labor productivity growth is higher than TFP growth in all cases. As in the previous decomposition, the within effect is found to make the dominant contribution to potential labor productivity growth.

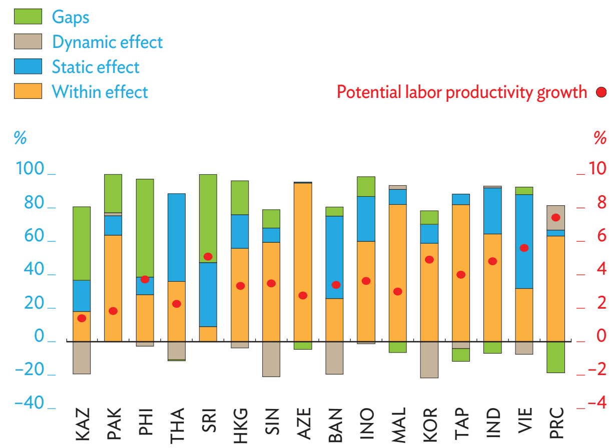
Factors affecting structural transformation

The findings show that the structural transformation effects (that is, the static and dynamic effects) contributed much less than the within effect. This raises the question what has prevented the faster reallocation of labor. Felipe et al. (2014) documented that the share of agricultural employment in the Republic of Korea recorded a 1.23 percentage point decline per annum during 1962–2013, falling from 69% to 6%. Meanwhile, the corresponding decline for the PRC was 1 percentage point per annum, from a share of 82% to 31%, and for Taipei,China 0.88 points, from a share of 50% to 5%. These are among the fastest declines in history, even faster than the declines experienced by the advanced economies in the 19th and 20th centuries. Meanwhile, India, Pakistan, and many other economies still have very high agricultural employment shares, which are declining very slowly.

Figure 2.2.6 shows the employment structure of typical low-, middle-, and high-income country. Probably, the most salient feature is the different shares of agriculture: 39% of total employment in low-income economies, 17% in middle-income economies, and 2% in high-income economies. The flip side of this is the share of services.

Structural transformation has been much faster in some Asian economies than in others. Differential paces of economic growth can, by themselves, generate different speeds of structural change that reflect the relative productivity growth of different sectors, or changes in the composition of demand (Herrendorf, Rogerson, and Valentinyi 2014). Impediments to the reallocation of factors of production are also important. These can be related to government failure or market failure caused by coordination problems and underdeveloped financial markets (Sen 2016).

2.2.4 Structural decomposition of potential labor productivity growth, 1990–2011



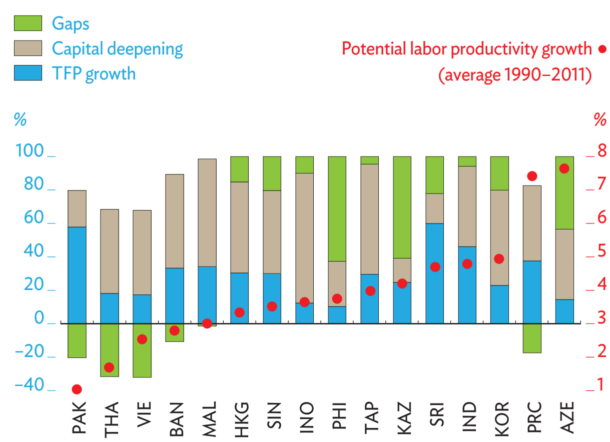
AZE = Azerbaijan, BAN = Bangladesh, HKG = Hong Kong, China, IND = India, INO = Indonesia, KAZ = Kazakhstan, KOR = Republic of Korea, MAL = Malaysia, PAK = Pakistan, PHI = Philippines, PRC = People's Republic of China, SIN = Singapore, SRI = Sri Lanka, TAP = Taipei,China, THA = Thailand, VIE = Viet Nam.

Note: For Kazakhstan, 1999–2008. For Pakistan, 1995–2008. For Thailand, 1994–2011. For Sri Lanka, 1995–2011. For Azerbaijan, 2001–2011. For Bangladesh, 2003–2009. For Viet Nam, 1996–2011.

Source: ADB estimates.

Click here for figure data

2.2.5 Extended decomposition of potential labor productivity growth, 1990–2011

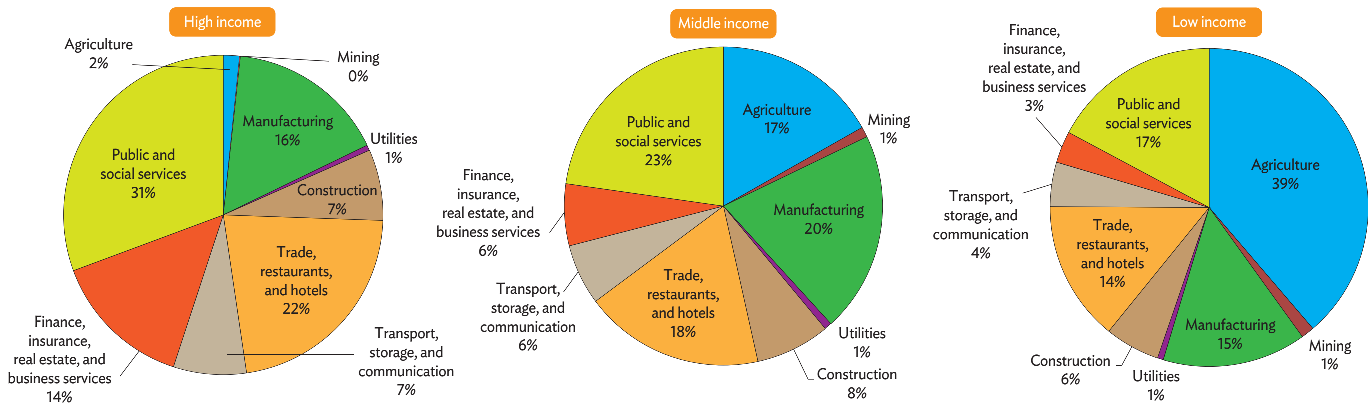


AZE = Azerbaijan, BAN = Bangladesh, HKG = Hong Kong, China, IND = India, INO = Indonesia, KAZ = Kazakhstan, KOR = Republic of Korea, MAL = Malaysia, PAK = Pakistan, PHI = Philippines, PRC = People's Republic of China, SIN = Singapore, SRI = Sri Lanka, TAP = Taipei,China, TFP = total factor productivity, THA = Thailand, VIE = Viet Nam.

Source: ADB estimates.

Click here for figure data

2.2.6 Typical employment structures by type of economy



Notes: These are derived from Lowess regressions (Foster-McGregor and Verspagen 2016). The shares in the three charts are the predicted values of these regressions at three distinct values of GDP per capita: $24,189 (the 2011 value for Taipei,China as the high-income reference), $8,737 (the 2011 value for the People's Republic of China as the middle-income reference), and $3,372 (the 2010 value for India as the low-income reference). To be precise, the employment structure of these three economies is not used, but instead the predicted values of the employment structure derived from the Lowess regression at these levels of GDP per capita.

Source: ADB estimates.

Click here for figure data

Government failures that slow down the rate of structural transformation often occur in four policy areas. First, land reform and land-use policies affect the reallocation of labor resources from low- to high-productivity sectors, albeit indirectly. Widespread land reform through the fair redistribution of agricultural land can boost agricultural productivity and provide surplus labor that may be reallocated to industry. Agrarian reform can also effect income redistribution that encourages the formation of human capital and increase aggregate demand. The Republic of Korea and Taipei,China successfully implemented widespread land reform prior to industrialization, allowing their economies to undergo rapid structural transformation from the 1970s to the 1990s. Other economies in Asia attempted to implement land reform but with few tangible results.

Second, labor policies that are geared toward protecting labor welfare impose rigidities in nominal wages and introduce barriers to labor reallocation. These regulations provide incentive to substitute capital for labor and can slow down the pace of investment. As such, labor market regulations potentially impede structural transformation when they are overly rigid. One problem partly responsible for India's slow pace of structural transformation is its rigid labor market as stipulated in the Industrial Disputes Act, 1947.

A third government failure is migration policy that restricts worker mobility. Limiting the mobility of labor directly affects the availability of this resource and can create geographic imbalance between the availability of qualified workers and demand for them. An example of a restrictive migration policy is the *hukou* system of residency permits in the PRC, which constrains the free flow of labor between urban and rural areas and consequently slows the pace of structural transformation.

Lastly, governments inadvertently raise the cost of business by imposing product and market regulations. These slow structural transformation through their negative effects on investment and, consequently, firms' scale of operations. While governments often impose labor market and product market regulations to mitigate market failures, the failure of regulatory reform to keep pace with economic development can introduce barriers to structural transformation.

The other set of determinants involve market failures such as coordination problems that result from the high cost of collating and processing information on new products, technologies, and industries, and credit market failures. Both of these market failures involve externalities and information asymmetries.

Coordination problems typically arise when externalities create significantly large differences between private and social returns. In particular, a problem arises when externalities depress private returns. Investment in new technology, for example, is risky, with the first mover typically bearing the brunt of the risk. Meanwhile, successful investment invites the entry of other investors and undercuts the first mover's effective rate of return on the investment. To avoid exposure to this risk, the investor may forego the investment unless it is possible to prevent or delay the entry of competition, even though society would view competition as beneficial. This state of affairs discourages investment in new technology and the adoption of new production processes unless governments intervene.

Credit market failures often stem from bad choices and moral hazards in the allocation of loans. Developing economies typically have underdeveloped financial markets and suffer severe information asymmetries. In addition, misguided government policies can force the misallocation of credit, making it difficult to obtain financing for new projects with promise and to scale up operations that have already proven their worth (León-Ledesma and Christopoulos 2016). The resulting low rate of investment and small scale of operations in high-productivity sectors slows the pace of structural transformation. To overcome credit market failures, governments can implement selective credit policies by providing credit directly to targeted sectors and indirectly through loan guarantees.

Macroeconomic determinants of potential growth

The panel of Asian countries under study is augmented by including other economies, both emerging and advanced, to arrive at a total of 69 economies studied over the period 1960–2014 (the list is reported in Table 2.2.1). As potential growth is the sum of the growth rates of potential labor productivity and the labor force, the analysis needs to account for both components. Moreover, the decomposition analysis indicates that potential labor productivity growth is attributed mostly to productivity growth within sectors.

The search for the determinants of productivity growth is complex because the literature provides a long list. To overcome this difficulty, various procedures for model selection were devised with the objective of determining which variables robustly correlate with economic growth (e.g., Sala-i-Martin, Doppelhofer, and Miller 2004). One such methodology is applied in this chapter: the Bayesian model-averaging

2.2.1 Economies included in the analysis

Developing Asia	Azerbaijan, Bangladesh, Cambodia, the People's Republic of China, Fiji, India, Indonesia, Kazakhstan, the Republic of Korea, Malaysia, Pakistan, Papua New Guinea, the Philippines, Singapore, Sri Lanka, Tajikistan, Thailand, Turkmenistan, Uzbekistan, Viet Nam, Taipei,China, and Hong Kong, China
Other emerging economies	Algeria, Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, Egypt, Hungary, Mexico, Morocco, Panama, Peru, Poland, Qatar, Saudi Arabia, South Africa, Turkey, Uruguay, and Venezuela
Advanced economies	Australia, Austria, Belgium, Canada, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, the United Kingdom, and the United States

approach to estimating classical linear regression models when uncertain about the choice of the explanatory variables (e.g., Magnus, Powell, and Prüfer 2010). Of the long list of 35 possible determinants, details of which are in Lanzafame et al. (2016), the process identified nine robust variables. Two other important institutional variables are included, but only as interactions with two of the robust variables. The definitions and sources of the variables are in Table 2.2.2.

2.2.2 List of variables

Variable name	Definition and explanation	Source
Robust variables		
Working-age population growth rate	This is the trend growth rate of the working-age population aged 15–64, obtained by filtering the data with the Corbae–Ouliaris filter.	Calculations using World Bank's World Development Indicators data
Initial GDP per capita	The value of GDP per capita in the initial period is used to test for convergence.	World Bank's World Development Indicators
Technological gap with the United States	This variable captures the advantage enjoyed by the country that introduces new goods into a market. It is computed as 1 minus the ratio of the level of productivity to that of the United States in purchasing power parity. Closing the gap—that is, taking the variable toward zero—is a sign of progress and catch-up with the frontier. The expected impact is positive since the advantage of backwardness dissipates as the gap closes.	Calculations using Penn World Tables 8.1 data
Gross enrollment ratio in tertiary education	This is the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the tertiary level.	CANA Database for cross-country analyses of national systems, growth, and development (v. Jan 2011). Original source: United Nations Educational, Scientific, and Cultural Organization
Index of labor market rigidity	This index varies from 0 (most flexible) to 3.5 (most rigid). It has four components that are equally weighted: minimum wage, rigidity of hours, the difficulty of laying off redundant workers, and the cost of laying off redundant workers.	World Bank's *Doing Business* database; LAMRIG database by Campos and Nugent (2012)
Voice and accountability index	This index reflects perceptions of the extent to which a country's citizens are able to participate in selecting their government. It incorporates freedom of expression, freedom of association, and freedom in the media. The index ranges from –2.5 (low) to +2.5 (high).	World Bank's Worldwide Governance Indicators, 2014 Update
Government effectiveness index	This index reflects perceptions of the quality of public services, the quality of the civil service, and the degree of civil service independence from political pressures; the quality of policy formulation and implementation; and the credibility of the government's commitment to such policies. The index ranges from –2.5 (low) to +2.5 (high).	World Bank's The Worldwide Governance Indicators, 2014 Update
Trade ratio	This is the sum of exports and imports of goods and services as a percentage of GDP.	World Bank's World Development Indicators national accounts data; Organisation for Economic Co-operation and Development national accounts data
Financial capital integration Index	This is the sum of total foreign assets and liabilities as a percentage of GDP.	Updated and extended version of data set constructed by Lane and Milesi-Ferretti (2007)
Supplementary interaction variables		
Regulatory quality	This index reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development. It varies from –2.5 (low) to 2.5 (high). The variable interacts with financial capital integration.	World Bank's Worldwide Governance Indicators, 2014 Update
Political stability	This index reflects perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. It varies from –2.5 (low) to 2.5 (high). This variable interacts with the technology gap with the United States.	World Bank's Worldwide Governance Indicators, 2014 Update

Source: ADB.

The working-age population growth rate is a proxy for the growth rate of the labor force. As the estimates control for labor force growth, the other independent variables are essentially determinants of potential labor productivity growth. A model with country fixed effects is estimated to quantify the effect of these variables on potential growth. Results of the benchmark model estimates are in line with expectations (Table 2.2.3).

2.2.3 Model estimates

Variable	Benchmark	Macro stability
Initial GDP per capita	−0.00033**	−0.00033**
Working-age population growth	1.15725**	1.22262**
Gap with the US	0.07306*	0.07345*
Gap with the US × political stability	−0.00613*	−0.00759*
Tertiary enrollment ratio	0.16284**	.122695**
Tertiary enrollment squared	−0.00160**	−0.00140**
Labor market rigidity	−2.92375**	−2.76644**
Voice and accountability	1.65097^	2.0438*
Government effectiveness	1.36106**	1.15356**
Trade ratio	0.06488**	0.08178**
Trade ratio squared	−0.00007**	−0.000097**
Financial capital integration	0.00452*	0.00415*
Financial capital × regulatory quality	−0.00313**	−0.00289**
Break in 2008–2014	−2.72717**	−2.82251**
Actual–potential growth gap		0.05946
Growth gap volatility		−0.19208**
Number of economies	61	61
Number of observations	425	421

Notes: ** indicates significance at the 1% level, * at 5%, and ^ at 10%. Variables instrumented with first lag. Driscoll and Kraay (1998) standard errors. Fiji and Papua New Guinea were not included in the regression analysis for lack of data, but the model estimates include the other 20 developing economies in Asia.
Source: ADB estimates.

Benchmark model results

The coefficient of working-age population growth is the elasticity of potential output with respect to that variable. It is statistically significant and at the same time not significantly different from 1. This is consistent with the definition of the natural or potential growth rate used in this chapter. The results also indicate that working age is a good proxy for the potential growth rate of the labor force.

The process of capital accumulation has as its proxy initial income per capita. The rationale is that a poor country has a low ratio of capital to labor, which translates into potential to grow quickly. This is driven primarily by the greater opportunity to accumulate capital. The coefficient in the benchmark model implies that an additional $1,000 of initial income per capita lowers potential output growth by 0.33 percentage points.

Using the preferred specification shown in the left column of Table 2.2.3, it is determined that the gross enrollment ratio in tertiary education and an economy's openness to international flows of goods and services have quadratic effects. This means that the effect of these two variables on potential growth increases but only up to a limit.

Meanwhile, coefficients on the technology gap and the three proxies for institutional quality are statistically significant. The positive sign of the technology gap variable is consistent with the observation that the advantage of backwardness dissipates as the gap narrows. The possibility that institutional quality may also affect potential growth indirectly is also considered. For example, Kose et al. (2009) suggested that the effect of integration on international financial markets may be dependent upon institutional quality. To explore this possibility, interaction variables are specified involving the technological gap with the US and political stability, and financial capital integration and regulatory quality. If the impacts of the technological gap and of the integration index depend on institutional quality, then the interaction terms should turn out to be significant.

The empirical results show that the gap with the US has a positive and significant impact on potential growth for the entire range of values of the index of political stability, and its effect is smaller for countries with greater political stability. A 1 percentage point reduction in the gap with the US raises potential output growth by 0.085 percentage points for the least politically stable countries and 0.055 percentage points for the most politically stable.[6] This means that economies that are far from their productivity frontiers and that also have lower political stability can be expected to reap larger benefits from technological spillovers.

Institutional quality also affects the impact of financial integration. Moreover, the effect becomes higher for small values of regulatory quality, with a maximum of 0.0115 percentage points for countries with the lowest regulatory quality.[7] This result may seem counterintuitive at first. From a policy viewpoint, however, it means that financial integration acts as a substitute for high-quality institutions. For emerging economies with low-quality institutions, including some in Asia, the implication is that successful integration into international financial markets may bring about significant long-term growth benefits by raising the potential growth rate.

Incorporating macro stability

The benchmark model is extended by including two variables that capture business cycle features. The first is the actual–potential growth gap, the average of the deviation between an economy's actual growth rate and its potential in the previous 5 years. This variable measures the average distance between actual and potential growth rates. A statistically significant coefficient implies that expansionary or recessionary phases affect the potential growth rate.[8] The second is growth gap volatility, measured as the standard deviation of the actual–potential growth gap during the previous 5 years. This variable measures the volatility of actual growth with respect to the potential growth rate. This captures the possible effects of business cycle features, such as growth volatility, on potential growth.

The coefficient on growth gap volatility is significant with the expected negative sign. The results suggest that reducing volatility by 1 percentage point brings about an increase in potential growth of about 0.193 percentage points. This outcome is in line with other evidence in the literature (e.g., Ramey and Ramey 1995) and indicates that higher growth volatility may harm the potential growth rate and, consequently, that demand-management policies aiming to stabilize actual growth near potential growth can benefit the economy's long-term performance.

Potential growth, misallocation, and institutional obstacles

The impact of reducing or eliminating institutional barriers to factor mobility is examined in this section. The analysis considers the factors that affect structural transformation. The concept of *frontier potential growth* is related to activities and operations at the level of the firm that misallocate factors of production. This analysis complements the results on determinants of potential growth, particularly the importance of institutional variables. Better institutions facilitate the efficient allocation of productive resources, bringing potential growth closer to the frontier and pushing up the frontier itself.

A further motivation for the firm-level analysis is that differences in income per capita across economies are explained mostly by differences in productivity (Caselli 2005). According to the recent literature, differences in productivity and their persistence are attributed in turn to resource misallocation (Kalemli-Ozcan and Sorensen 2012). Factors of production are said to be misallocated if a different allocation of the current aggregate endowment of capital and labor across firms would increase the economy's aggregate productivity.

Misallocation is generated by obstacles. These create in turn distortions or wedges in the marginal products of capital and labor across firms. For example, subsidized credit makes the marginal product of capital artificially low for firms receiving the subsidy and artificially high for other firms. The result is that subsidized firms are more capital intensive than they otherwise would be, and unsubsidized firms are more labor intensive. The outcome is a misallocation of resources. Eliminating the credit subsidy and other distortions allows resources to be better allocated, resulting in faster productivity growth.

Surveys reveal a list of issues that firms consider to be important for them: inspection rules, access to credit, corruption, and labor regulations, among others. The implication is that an economy's potential rate of growth is not independent of policy. Understanding the role of these obstacles is therefore important from a policy and institutional perspective.

Two types of wedges or distortions on the marginal product of capital and labor across firms are calculated by comparing each firm's factor shares of labor and capital with the average of the economy. The measures are explained in more detail in Box 2.2.2. The first is a measure of *output distortion*, wherein the marginal products of capital and labor increase by the same proportion. An example is inspection rules that affect firms beyond a certain size. If there are no distortions, the share of labor in total value added is equal across all firms. However, if a firm avoids inspection rules by being smaller than the optimal size, it will employ fewer workers and hence the labor share will be smaller than the average. Therefore, the ratio of the firm's labor share to the average of the economy is a useful measure of output distortion.

The second is a measure of *factor market distortion*. These distortions alter the use of capital relative to labor, making the ratio different from what is optimal. As noted above, lack of access to credit reduces firms' use of capital, making them more labor intensive than they would otherwise be. Note that, if there were no distortions, the ratio of the shares of capital and labor would be the same across firms. Factor market distortion is therefore measured by comparing the firm's labor to capital ratio with the average ratio in the economy.

Firm-level data for 62 developing economies obtained from World Bank Enterprise Surveys data—the Standardized Data for 2006–2014—are used for empirical analysis. This is a stratified survey of firms that contains financial and business environment information. The original data set contains 134 surveys that cover a total of 61,669 firms. However, the sample is considerably reduced when the data are cleaned. Since multiple cross-sectional surveys are available for some economies, only those with the largest number of firms are kept, such that every economy is represented only once. The final sample is made up of 62 economies and a maximum of 21,539 firms. Details are provided in León-Ledesma (2016). The empirical analysis will determine to what extent certain obstacles to a firm's operations explain the two distortions.

Since the distortion is measured as the difference from the country mean, the average distortion within an economy is zero by construction. Therefore, to see how distortions differ across economies, one needs to look at some other aspect of the distribution such as the standard deviation. The standard deviation, a measure of how dispersed the distortion is within an economy, is calculated using the sample of firms within each economy. As shown in Table 2.2.4, the output distortion is more dispersed on average than the factor market distortion in the full sample of 62 economies and in the subsample of 13 Asian ones. Also, the dispersion of both distortions is slightly wider in the Asian economies.

2.2.4 Within-economy dispersion of the misallocation measures

	Mean	Min	Max
All 62 economies (21,539 firms)			
Output distortion	1.6288	0.7257	2.3836
Factor distortion	1.3958	0.8579	3.0764
13 Asian economies (10,593 firms)			
Output distortion	1.7110	1.3639	2.2137
Factor distortion	1.4966	1.0342	2.1345

Note: Within-economy dispersion is the standard deviation of the distortion across the sample firms within each economy.

Source: ADB estimates based on data from the Standardized Data 2006–2014, World Bank Enterprise Survey.

2.2.2 Distortion measures and misallocation

Measures of distortion are derived from the Hsieh and Klenow (2009) theoretical framework. The framework proposes a model with heterogeneous firm productivity and two types of distortions: output distortions (τ_y) and factor market distortions (τ_k). Output distortions increase the marginal products of capital and labor by the same proportion, and factor market distortions raise the marginal product of capital relative to that of labor. Because these distortions are specific to individual firms and different for each one, they introduce dispersion in firms' incentives to employ factors of production.

The framework assumes that output (Y) is produced using labor (L) and capital (K) with a Cobb–Douglas technology as $Y_i = A_i K_i^{\alpha} L_i^{1-\alpha}$, where A_i is firm-specific total factor productivity (TFP). With competitive markets, α and $(1 - \alpha)$ are the aggregate capital and labor shares, respectively, in total value added (or total costs). Firms maximize profits (subject to this production technology):[a]

$$\pi_i = \max_{K,L}\left[(1-\tau_{y,i})P_iY_i - wL_i - (1+\tau_{k,i})rK_i\right], \tag{1}$$

where w and r are the wage rate and the rental price of capital, respectively, and they are assumed to be equal across firms since factor markets are competitive. Note that the output distortion $\tau_{y,i}$ affects output, while factor-market distortion $\tau_{k,i}$ affects the cost of capital. Also note that TFP and the two distortions are firm-specific, thus causing misallocation as explained in the main text. To obtain measures of the two distortions with a counterpart in the data, Hsieh and Klenow (2009) uses the first order conditions of the maximization problem. After a few transformations, they are as follows:

$$1+\tau_{k,i} = \frac{\alpha}{(1-\alpha)}\frac{wL_i}{rK_i} \tag{2}$$

$$1-\tau_{y,i} = \theta\frac{wL_i}{(1-\alpha)P_iY_i} \tag{3}$$

where $(1 + \tau_{k,i})$ and $(1 - \tau_{y,i})$ are the measures of the two distortions. Equation (2) indicates that if $\tau_{k,i} = 0$, i.e., if there is no misallocation, the left-hand side equals 1, which implies that $\frac{wL_i}{rK_i}$ (the firm's relative share) is equal to $\frac{(1-\alpha)}{\alpha}$, or the economy's relative share; that is, in the absence of distortions, all firms have the same relative factor share. On the other hand, when there is a factor market distortion, the ratio of labor to capital compensation is higher if the distortion is positive, or smaller if the distortion is negative, than the ratio of the aggregate shares, and the firm is more labor intensive or capital intensive than would be otherwise be optimal. For example, $\tau_{k,i}$ will be high for firms with problems accessing credit, and low otherwise. Likewise, equation (3) indicates that if $\tau_{y,i} = 0$, i.e., if there is no misallocation, all firms should have the same labor share, $(1 - \alpha)$ (θ is a term that captures the effect of the price elasticity of demand). On the other hand, when there is an output distortion, the firm's labor share is higher if the distortion is negative, or smaller if the distortion is positive, than the aggregate labor share, so the firm will be either larger or smaller than is optimal. For example, $\tau_{y,i}$ will be high for firms that face restrictions on size, and low for firms that benefit from output subsidies.

At the level of the individual economy, the dispersion of the distortions, as measured by the standard deviation, is an index of misallocation. This is because, as noted above, in the absence of distortions all firms have the same shares and hence the dispersion is zero.

The empirical strategy follows from the framework. The logarithms of the two distortions $(1 + \tau_{k,i})$ and $(1 - \tau_{y,i})$ are regressed on 15 obstacles that are declared by firms to affect their operations. To quantify the effect of the obstacles, a dichotomous or dummy variable is created; it takes a value of 1 if a firm answered that the obstacle was "major" or "very severe," and otherwise it takes 0 (i.e., it was "no obstacle," "minor," or "moderate"). This is done separately for the large sample containing 21,539 firms and for the reduced sample of 10,593 Asian firms (the exact number of firms varies depending on whether all firms replied or not). The regressions take the form

$$log\ Distortion = a + \sum_{i=1}^{15}\gamma_i X_i + \delta Firm\ size_i + \sum country\ dummies$$

for each of the two distortions, and for the firms in the complete sample of countries and for the firms in the sample of Asian countries (i.e., a total of four regressions). X_i denotes the 15 obstacles considered, and the proxy for firm size is the number of employees, full-time equivalent. The complete sample includes 62 country dummies (fixed effects) and the Asian sample 13 country dummies. Of interest would be whether the coefficients γ_i are statistically significant or not. Note that, in the absence of misallocation, all factor shares should be equal and so the obstacles should not be good predictors of the distortions. If, on the other hand, there is misallocation and it relates to firms' declared obstacles, then the latter should be good predictors of the distortions.

[a] The model assumes that all firms use the same Cobb–Douglas production function. Therefore, in equilibrium, α is the "average" capital share in the economy. In practice, Hsieh and Klenow (2009) allow for α to differ across sectors.

Reference:

Hsieh and Klenow 2009.

Measures of institutional obstacles are also obtained from the same database. Fifteen such obstacles to firms' operations are considered. Firms are asked whether a specific obstacle is important for their operations. Table 2.2.5 presents the list of 15 obstacles and their prevalence in the data set for all economies and for the 13 in the Asian subsample. Generally, Asian firms declare that they face lower obstacles than their counterparts in other regions, especially in terms of informal competitors, corruption, and access to finance. The exceptions are in customs regulations and access to land.

2.2.5 Institutional obstacles by firm

Description	% of firms declaring an obstacle[a]	
How much of an obstacle are the following?	**All**	**Asia**
Electricity supply	38.7	35.3
Transportation of goods, supplies, and inputs	17.1	13.8
Customs and trade regulations	11.4	13.3
Informal competitors	24.4	17.4
Access to land	17.0	19.2
Theft and other crime	16.5	9.6
Tax rates	31.5	24.2
Tax administration	20.8	15.3
Business licensing and permits	14.6	11.1
Political instability	30.2	26.6
Corruption	36.5	25.6
Courts	12.2	10.8
Access to finance	24.9	19.8
Labor regulations	12.8	8.1
Inadequately educated workforce	19.9	16.7

[a] Percentage of firms that declare that the obstacle is "major" or "severe." The total number of firms is 21,539, of which 10,593 are in Asia.

Source: ADB estimates based on data from the Standardized Data 2006–2014, World Bank Enterprise Survey.

Do these declared obstacles explain output distortion, factor market distortion, or both? Are there differences between the firms that declare these obstacles to be major or severe and those that declare them only moderate or minor? To answer these questions, the empirical strategy summarized in Box 2.2.2 is carried out.

Regression coefficients of the obstacle dummy variables, together with their 95% confidence intervals, are plotted for each of the 15 obstacles in Figures 2.2.7 and 2.2.8. Results in blue correspond to the regressions using firms in all economies, and results in orange refer to Asian firms. Each regression coefficient times 100 indicates the differential, as percentage change in the distortion, between a firm that declares that an obstacle is major or very severe and a firm that declares that it is not important, minor, or moderate. A statistically insignificant coefficient should be interpreted as evidence that the obstacle is not a significant determinant of misallocation. Conversely, a statistically significant coefficient on a given obstacle means that firms that declare it as major or severe are different from those that do not. In other words, the obstacle is a good predictor of distortion.

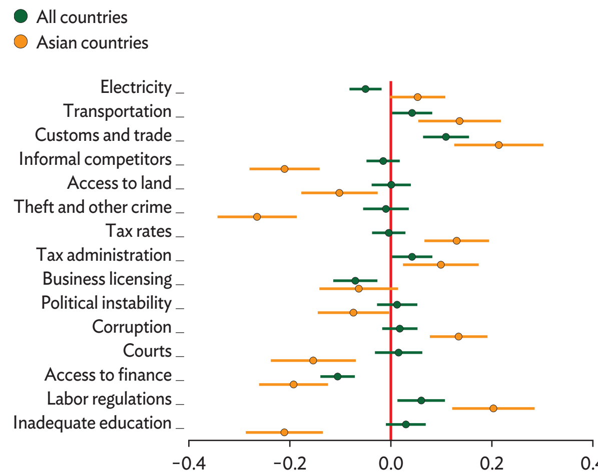
A positive coefficient in the regressions for the output distortion implies that firms that declare the obstacle as serious have a larger labor share than the average. Therefore, these firms are larger than they would be if both factors were not misallocated. This is the case for infrastructure obstacles such as poor electricity and transportation, and for customs and trade regulations. This indicates that firms are forced to grow beyond their optimal size to overcome the negative effects of lack of infrastructure. A similar result was obtained for tax rates, the efficiency of tax administration, corruption, and labor regulations. Overall, the largest coefficients are those of customs and trade and labor regulations, at approximately 0.2. This can be interpreted to mean that firms that declare these two obstacles as major or severe have a labor share that is 20% higher than firms that declare these two obstacles not important.

Meanwhile, a negative coefficient in these regressions indicates that the labor share of the firms that declare an obstacle as major or severe is smaller than the average. Therefore, these firms are smaller than they would be without the distortion. This is the case for informal sector competitors, access to land, theft and other crime, courts, access to finance, and poor education. These obstacles act as a tax that holds firm size below optimal. Firms that declare these two obstacles to be major or severe have a labor share 20%–30% less than those firms that declare that these obstacles are not important.

For the factor market distortion regressions, a positive coefficient implies that the share of labor relative to capital is higher than the economy average and that firms are therefore more labor intensive than they would be without the distortion. This is the case for courts, access to finance, labor regulations, and inadequate education. For these obstacles, the difference in the share of labor relative to capital between firms that are affected and those that are not is approximately 10%. On the other hand, a negative coefficient implies that the share of labor relative to capital is lower than the average and that firms are therefore more capital intensive than they would be without the distortion. This is the case for electricity and corruption, with coefficients also at about 10%.

These results lead to the conclusion that the institutional obstacles predict both output and factor market distortions. In aggregate, these factors are key determinants of productivity differences across economies. The evidence shows clear dispersion in the distortions faced by firms in the sample of 62 developing economies. These distortions strongly correlate with institutional obstacles that prevent the efficient allocation of resources between firms. Removing these obstacles would facilitate substantial factor reallocation at the micro level.

2.2.7 Coefficients of output distortion regressions

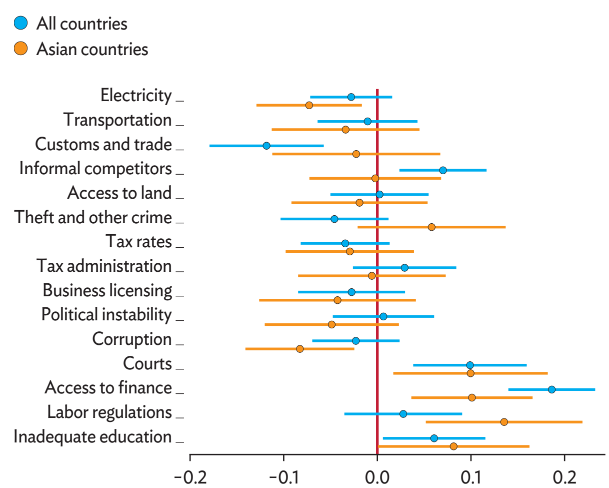


Note: Estimated coefficients on the horizontal axis show the differential as a percentage change in the distortion between a firm that declares that an obstacle is major or very severe and one that declares it not important, a minor obstacle, or moderate. Statistically significant coefficients are good predictors of the output distortion.

Source: ADB estimates.

Click here for figure data

2.2.8 Coefficients of the factor market distortions regressions



Note: Estimated coefficients on the horizontal axis show the differential as a percentage change in the distortion between a firm that declares that an obstacle is major or very severe and one that declares it not important, a minor obstacle, or moderate. Statistically significant coefficients are good predictors of the factor-market distortion.

Source: ADB estimates.

Click here for figure data

The analysis indicates that most of the 15 obstacles appear to affect distortions that influence the optimal size of firms. On the other hand, many of the obstacles appear to be statistically insignificant in the analysis of factor market distortions. Only courts, access to finance, labor regulations, inadequate education, electricity, and corruption are significant.

The top three obstacles mentioned by the Asian firms are generally significant determinants of distortions in the regressions discussed above. Electricity, corruption, labor laws, access to finance, education, and courts are significant drivers of distortions affecting both output and factor markets. Policy aiming to alleviate misallocation should prioritize addressing these obstacles. For instance, infrastructure obstacles such as electricity appear to be very important drivers of misallocation in the poorest countries. In the PRC, fewer obstacles are declared major or severe. However, tax rates appear to be an important determinant of misallocation by acting as a subsidy on size. In Indonesia, Bangladesh, and Pakistan, access to electricity, which distorts both output and factor markets, is a priority area to reduce misallocation and enhance potential growth through productivity gains.

Asia's aggregate productivity growth would increase through the efficient reallocation of resources at the firm level. This could be achieved through reform to policy on financial and labor markets and on land access, as well as from infrastructure improvements. Such reform could offset part of the natural decline in potential growth that arises as Asian economies become more developed.

A "new normal" for potential growth?

Potential growth since the global financial crisis of 2008–2009 differs sharply from before it. Is this a new normal for Asia? The macro model in the previous section (Table 2.2.2) gives some indication that the period since the global financial crisis has turned less favorable for potential growth. The model includes a binary variable equal to 1 for the period 2008–2014 and 0 otherwise. The statistically significant coefficient on this variable in both the benchmark model and the macro stability model indicates that potential growth in the global sample was lower in the post-crisis period than its historical trend. Even after controlling for changes in the other determinants of potential growth, it was down 2.7 percentage points in the benchmark model. The decline is less for Asia at about 2.2 percentage points, but this too is a sizeable drop.[9]

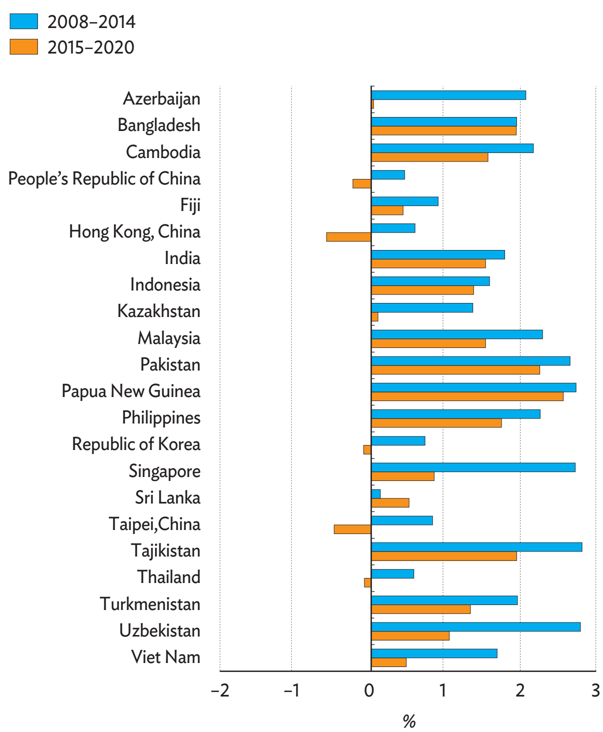
While the region's potential remains above the trough hit during the Asian financial crisis of 1997–1998, internal factors suggest that the current moderation has yet to run its course. An important implication drawn from the analysis of the determinants of potential growth is that the region's potential has started to decline because the factors that allowed Asia to grow quickly in earlier decades have started to fade. This is true of both the demographic dividend (at least in some economies) and factors that affect labor productivity, such as education, trade, and financial capital integration. As a result, without structural reform, potential growth in many regional economies will slide further because of unfavorable demographics, convergence with advanced economies, and spillover from growth moderation in the PRC.

The fading demographic dividend

Economic theory and the evidence presented in this chapter indicate that the growth rate of the working-age population has a direct proportional impact on the potential growth rate. Recalling the definition of the potential growth rate as the sum of labor productivity growth and labor force growth, and using World Bank projections of the growth rate of the Asian working-age population in 2015–2020, the contribution of this element of potential growth can be assessed as either increasing or decreasing relative to 2008–2014. Figure 2.3.1 shows that, in most Asian economies under consideration, working-age population growth is projected to be lower in 2015–2020 than in 2008–2014. The average annual decline between the two periods is projected at 0.43 percentage points.[10]

These growth forecasts of working-age population can be used to forecast potential output growth. The potential

2.3.1 Working-age population growth rates *(%)*



Source: ADB estimates based on World Bank, World Development Indicators online database. Data for Taipei,China are from http://eng.stat.gov.tw/lp.asp?ctNode=2265&CtUnit=1072&BaseDSD=36

Click here for figure data

2.3.1 Annual potential growth rate in 2015–2020 adjusted for the effects of working-age population trends

	Forecast based on the 2008–2014 average	Forecast based on the 2014 estimate
Azerbaijan	3.25	1.02
Bangladesh	5.96	6.11
Cambodia	6.81	6.48
People's Republic of China	8.11	7.23
Fiji	1.25	3.27
Hong Kong, China	1.84	1.08
India	6.72	6.04
Indonesia	5.59	4.79
Kazakhstan	5.56	3.80
Republic of Korea	2.68	2.52
Malaysia	4.27	5.06
Pakistan	4.53	5.00
Papua New Guinea	7.14	5.74
Philippines	6.55	7.39
Singapore	3.25	2.24
Sri Lanka	5.96	7.22
Taipei,China	2.04	1.76
Tajikistan	6.06	5.88
Thailand	2.62	2.25
Turkmenistan	10.40	9.65
Uzbekistan	6.60	6.40
Viet Nam	4.81	4.86
Average	**6.40**	**6.01**

Note: The first estimate is the sum of each economy's estimated average potential growth rate in 2008–2014 plus the change in working-age population growth rate between 2015–2020 and 2008–2014. The second estimate is the sum of each country's estimated average potential growth rate in 2014 plus the change in working-age population growth rate between 2008–2014 and 2015–2020.

Source: ADB estimates.

growth rate projections are shown economy-by-economy in Table 2.3.1. Two forecasts of potential output growth are constructed: one based on the estimated potential growth rate over 2008–2014 and the other based on the estimated potential growth rate in 2014. Both can be considered good proxies for the current potential growth rate. The impact of the projected change in working-age population growth between 2008–2014 and 2015–2020 is then incorporated by adding the change in working-age population growth to the current potential growth rate. Depending on the assumption made about the starting potential output growth value, developing Asia's 2015–2020 potential output growth varies from 6.01% to 6.40%.

To evaluate how this average decline in potential growth will affect living standards in Asia, measures of potential growth per capita for 2015–2020 are calculated, relying on the potential growth rate estimates and World Bank projections for population growth.

2.3.2 Potential growth per capita estimated for 2015–2020

Economy	(1) Population growth rate difference between 2015–2020 and 2008–2014	(2) Potential growth per capita in 2008–2014	(3) Based on the 2008–2014 average	(4) (3) – (2)	(5) Based on the 2014 estimate	(6) (5) – (2)
Azerbaijan	–0.72	3.74	2.45	–1.29	0.22	–3.52
Bangladesh	–0.02	4.80	4.80	0.01	4.95	0.16
Cambodia	–0.04	5.83	5.26	–0.57	4.93	–0.90
People's Republic of China	–0.08	8.30	7.70	–0.61	6.82	–1.49
Hong Kong, China	–0.33	2.35	1.28	–1.07	0.52	–1.83
Fiji	–0.10	0.85	0.72	–0.13	2.74	1.89
India	–0.18	5.63	5.55	–0.07	4.87	–0.75
Indonesia	–0.20	4.50	4.48	–0.02	3.68	–0.82
Kazakhstan	–0.64	5.22	4.61	–0.61	2.85	–2.37
Republic of Korea	–0.13	2.96	2.28	–0.68	2.12	–0.84
Malaysia	–0.28	3.41	2.94	–0.47	3.73	0.32
Pakistan	–0.12	2.81	2.53	–0.28	3.00	0.19
Papua New Guinea	–0.23	5.06	5.12	0.06	3.72	–1.34
Philippines	–0.05	5.50	5.04	–0.46	5.88	0.38
Singapore	–1.15	2.56	1.85	–0.71	0.84	–1.72
Sri Lanka	0.20	5.15	5.33	0.18	6.59	1.44
Taipei,China	–0.19	3.05	1.94	–1.11	1.66	–1.39
Tajikistan	–0.11	4.68	3.92	–0.76	3.74	–0.94
Thailand	–0.08	2.98	2.41	–0.57	2.04	–0.94
Turkmenistan	–0.12	9.76	9.25	–0.51	8.50	–1.26
Uzbekistan	–0.76	6.40	5.42	–0.98	5.22	–1.18
Viet Nam	–0.32	4.94	4.06	–0.88	4.11	–0.83
Average	**–0.24**	**5.89**	**5.72**	**–0.17**	**5.31**	**–0.58**

Source: ADB estimates.

Column 1 of Table 2.3.2 reports the population growth rate differential between 2015–2020 and 2008–2014. It shows that, with the exception of Sri Lanka, average population growth is expected to be lower in 2015–2020 than in 2008–2014 in all developing economies in Asia.

Also reported in Table 2.3.2 are estimates of potential growth per capita for 2015–2020. Using the estimated average potential growth rate and actual population growth in 2008–2014, an estimate of potential growth per capita in this period is first constructed and shown in column 2. Next, based on the two projected estimates of potential growth in 2015–2020 combined with population growth projections, measures of potential growth rate per capita in 2015–2020 are constructed. These estimates are based on the 2008–2014 average value of the estimated potential growth rate (column 3) and on the 2014 estimated potential growth rate (column 5). Results indicate that the average potential growth rate per capita will be between 5.31% and 5.72%. Columns 4 and 6 show the difference with respect to average potential growth in 2008–2014, with negative values indicating that annual potential growth per capita is projected to be lower in 2015–2020 than in 2008–2014.

The results in Table 2.3.2 suggest that, notwithstanding the projected slowing of population growth in 2015–2020, potential growth per capita in Asia is expected to fall relative to 2008–2014 by an average of 0.17–0.58 percentage points annually. This is because the fall in working-age population growth over the period outstrips the fall in total population growth. Living standards will rise more slowly over the next few years than in 2008–2014.

Fading advantage of backwardness

Developing Asia's past success has narrowed the gap with the advanced economies. The econometric results in the previous section show that a smaller technological gap relative to the US will reduce potential growth. The so-called advantage of backwardness, which allowed developing economies in Asia to grow by adopting existing technologies, is fading as they converge in sophistication with the advanced economies. With less scope for playing catch-up with the advanced economies, growth in many Asian economies will depend more on some other determinants of potential growth, such as tertiary education and trade. On the other hand, low- and middle-income economies still have scope to benefit from the convergence effect.

Spillover from PRC growth moderation

Actual growth in the PRC is forecast to moderate further, from 6.9% in 2015 to 6.5% in 2016 and 6.3% the year after. The trend is an adjustment to several important structural changes, notably the end of the stage in development during which less productive labor can be drawn from rural areas into more productive manufacturing. This kept wages down in the past and helped the PRC attract considerable foreign direct investment, but now wages have begun to rise. A legacy of past population policies is particularly unfavorable demographics, as the benefits from a relatively youthful population turn rapidly into a burden as the population ages. Moreover, the economy is shifting its growth model from a heavy reliance on investment to one in which consumption is the primary driver.

As Asia's largest economy, and the second largest in the world, the PRC exerts a significant role as an engine of global growth, so concerns about slowdown in the PRC are certainly warranted. However, whether the consequences of the slowdown persist for years or decades will depend critically on its relationship with potential output growth and, in particular, with productivity growth in other economies. It is thus important to understand whether natural rates of growth in other Asian economies move significantly in tandem with the PRC. Theoretically, there are several possible channels that can underpin such a relationship. Trade relations with the PRC could foster productivity-enhancing structural change in other economies, accelerate technological transfer, and foster competition-driven efficiency gains, for example. Change could also reflect the global demand effects.

The benchmark model is augmented to test whether actual growth in the PRC has an effect on potential growth in the global sample.

Similarly, actual growth in the US is included as the world's largest economy may have an even bigger impact on growth than the PRC. The estimate of the model including these spillovers is shown in Table 2.3.3.

The results shown in Table 2.3.3 can be interpreted as estimates of the degree of co-movement between actual growth rates in the PRC and the US and potential growth rates in the rest of the world.[11] PRC and US growth rates both turn out to be positive and significant. Results from the model indicate that each 1 percent of actual growth in the PRC is associated with a rise of about 0.2 percentage points in average potential growth in the global sample. The corresponding effect from the US is nearly twice as great, at 0.39 percentage points.

2.3.3 Modeling the impact of slower growth in the PRC and the US

	Spillover
Initial GDP per capita	−0.00034
Working-age population growth	1.0228**
Gap with the US	0.081924^
US gap x political stability	−0.00395
Tertiary enrollment ratio	0.08522
Tertiary enrollment squared	−0.00109^
Labor market rigidity	−3.0915**
Voice and accountability	1.6002
Government effectiveness	1.55105**
Trade ratio	0.057578**
Trade ratio squared	−0.00005*
Financial capital integration	0.00099
Financial capital x regulatory quality	−0.00206^
Break in 2008–2014	−1.93914**
PRC growth	0.20185**
US growth	0.39016*
Number of economies	59
Number of observations	411

PRC = People's Republic of China, US = United States.

Notes: ** indicates significance at 1%, * at 5%, and ^ at 10%. The PRC and the US are excluded from the panel used for the estimations. Variables, including the PRC and US growth, instrumented with first lag. Driscoll and Kraay (1998) standard errors.

Source: ADB estimates.

Concluding remarks

It is important to emphasize that the natural rate of growth is contingent on policies that affect the mobilization and reallocation of resources in the economy. As the regression results show, policies can change an economy's potential growth rate, possibly counterbalancing the effects of factors that lead to a decline in equilibrium growth. Thus, the "new normal" should not be taken as a natural constant but one that can reflect policy decisions, for better or worse. As the organization of markets and governments changes over time, potential growth may move closer to the frontier potential growth rate.

The empirical evidence shows, however, that deviations of actual from potential growth do not significantly affect the latter. This implies that policies that aim to raise the actual growth rate above the potential have only a temporary effect. Demand-side policies are less effective than supply-side policies in restoring potential output. Policy decisions that affect factor reallocation and productivity gains can reactivate growth for long periods, thus offsetting any potential growth losses from the exhaustion of growth patterns typical of the initial stages of economic development.

Policies to invigorate potential growth

Simulations to evaluate the implications of changes in the determinants of potential growth can provide a quantitative basis for policy recommendations. In the previous section, the effect of demographics on potential output growth was calculated (Table 2.3.2). The effects of the other determinants are assessed by way of a simulation that uses the estimates of the determinants of potential output growth reported in the two models in Table 2.2.2.

Future potential growth: a simulation

This section builds on the intuition that, for most of the determinants of potential growth that were found to be significant, it is possible to define a *frontier value*—that is, a particular value for which the impact on potential growth is maximized or, as in the case of the technological gap, has been completely exhausted.[12] Building on this and a number of additional assumptions, a scenario for a 10-year period is considered over which the effects of the assumed changes in the determinants of potential growth are evaluated. Specifically, for each one of the relevant variables included in the exercise, the frontier values and specific assumptions are as follows:

Initial income per capita. This variable remains constant.

Gap with the US. The technological gap with respect to the US is assumed to remain stable over the period considered. This is consistent with a scenario in which the pace of technological innovation in the US is fairly similar to the rate of technological spillover into Asian economies.[13]

Tertiary enrollment ratio. The frontier value is a ratio of 51%, i.e., the threshold beyond which any additional increase in the share of population with tertiary education has a negative effect on potential growth.

Labor market rigidity. The frontier value of this index is 0, which corresponds to the most flexible labor market regulatory framework.

Voice and accountability. The frontier value of this index is 2.5, at which people's perceptions about political freedoms and accountability are most favorable.

Government effectiveness. The frontier value for this index is 2.5, at which people's perceptions about the quality and effectiveness of the public sector are most favorable.

Trade ratio. The frontier value is 443%, beyond which the effects of trade on potential growth become negative. It is assumed that the value of the trade ratio increases by 25 percentage points over 10 years.

Integration index. Because of the interaction with regulatory quality, the frontier value of the integration index cannot be uniquely defined. It is assumed that the value of the financial integration index increases by 25 percentage points over 10 years.

Based on these assumptions and definitions, the simulation is conducted as follows:

1. For each variable the difference between the latest available value and the respective frontier value as defined above is calculated, and the distance from the frontier (DfF) is calculated.
2. It is assumed that countries close half of the DfF for each variable over a 10-year period.
3. For the tertiary enrollment ratio, labor market rigidity, voice and accountability, government effectiveness, and the trade ratio, the impact on potential growth is constructed as the product of the respective values of half of the DfF times the corresponding coefficients in the benchmark model (Table 2.2.2). For the tertiary enrollment ratio and the trade ratio, nonlinearities are taken into account by setting to zero the potential gain if the economy has already achieved the frontier value.
4. As mentioned above, it is assumed that the gap with the US remains constant for the 10-year period, so its impact in the simulation is set at zero.
5. For the trade ratio and the integration index, the assumption is a 25% increase over the initial value. The impact of this change on potential growth is calculated using the relevant coefficient estimates from the benchmark model (Table 2.2.2), holding constant the regulatory quality indicator for the integration index and taking into account nonlinearities in the case of trade.

Two additional channels are considered, through which policy intervention can affect the potential growth rate. The first is the possible effects of policies to counteract the slowdown in working-age population growth, such as postponing retirement age and relaxing immigration restrictions. Specifically, a scenario is considered in which policy is able to halve the projected annual decline in working-age population growth. The effect of this is reported in the line labeled "Demographics" in Table 2.4.1. (Among the sampled Asian economies, only Sri Lanka shows positive demographic changes.)

The other channel incorporates the expected gains from macroeconomic stabilization policies, the proxy for which in the framework is lower volatility of actual growth with respect to potential growth. Specifically, it is assumed that the 5-year standard deviation of actual growth with respect to the potential growth rate (i.e., variable growth gap volatility introduced in the macro stability model) declines by 25% with respect to its mean value over the 1960–2014 period, as a consequence of better macro-management policies. The impact of this change is reported in the line labeled "Stable macroeconomy" in Table 2.4.1, and for each economy is constructed as the product of the 25% fall in growth gap volatility times the relevant coefficient in the macro stability model in Table 2.2.3.[14]

The simulation is conducted to answer this question: By how much would potential output growth increase over the 10-year period if economies could close through reform half of the distance between their

2.4.1 Simulated future contributions to potential growth, percentage points

Item	Contribution
Demographics	−0.33
Reform	0.98
Stable macroeconomy	0.09
Total	0.73

Note: The table shows the weighted average annual contribution of each determinant of potential growth to the increase in potential growth over a decade, as calculated in a simulation for 22 Asian economies in the sample.

Source: ADB estimates.

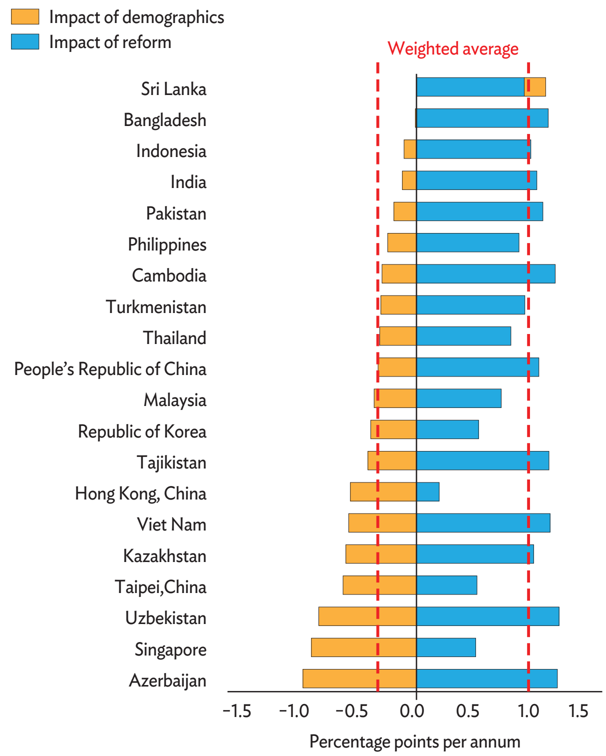
current values for each determinant and the highest possible value, and thereby reduce macroeconomic volatility? It is assumed that governments introduce policies that mitigate the negative effect of lower working-age population growth.

Simulation results are shown in Table 2.4.1, which provides the results of the three effects discussed earlier: the effect of reducing the negative impact of working-age population growth by half, the positive effect of supply-side reform, and the positive effect of demand-management policies to stabilize actual growth around potential, effectively reducing volatility. If governments manage to successfully introduce policies that reduce the projected decline in working-age population, then the negative impact of this effect could be as small as −0.33 percentage points on average.[15]

Reform could add about 0.98 percentage points per annum to developing Asia's growth. The largest increases—experienced by Uzbekistan, Azerbaijan, and Cambodia—exceed 1.2 percentage point per annum (Figure 2.4.1). The reforms that seem to provide the largest boost to potential output growth address the labor market and institutional quality.

Finally, demand-management policies could reduce the volatility of actual versus potential growth and boost developing Asia's potential growth by about 0.1 percentage points per annum on average. The sum of all these reforms and policies is shown in Table 2.4.1 in the line "Total." The average estimated impact on developing Asia's potential growth is 0.73 percentage points per annum.

2.4.1 Impact on potential growth



Source: ADB estimates.
Click here for figure data

Policy implications

Economies with a particularly negative demographic outlook should aim to enlarge their labor force and working-age population by adopting more flexible immigration policies or incentives to increase the fertility rate. In the short to medium term, measures to increase female participation in the workforce and to postpone retirement age can be effective as well.

Since the long-term growth rate of the labor force is largely determined by demographic factors, the focus of policy interventions to increase potential growth should be on productivity enhancement. Indeed, the evidence presented in this chapter indicates that whether the projected decline in potential growth actually materializes hinges not alone on working-age population growth, but also on the implementation of effective economic policies and institutional transformation, as well as on changes to other determinants of potential growth that affect potential labor productivity growth.

The estimates of the determinants of potential output growth indicate that closing the technological gap with respect to the US, boosting the gross enrollment ratio in tertiary education up to about 51%, raising labor market flexibility, strengthening voice and accountability and government effectiveness, opening up to trade to about 443% of GDP, and advancing financial integration into the world economy can raise potential growth. These are fundamental pillars of a successful growth strategy. Naturally, larger improvements in these factors will support more substantial positive effects, so the straightforward policy recommendation for Asian economies is to focus on devising the most efficient and effective measures to bring about economic and institutional change that enhances potential growth.

As stated in the first section of this chapter, the estimate of an economy's potential growth depends on its institutions and structure. Frontier potential growth was defined as the growth rate that the economy could achieve if all institutional barriers and distortions that obstruct factor mobility were removed. The analysis indicates that the removal of firm-level obstacles that affect firm size and the efficient allocation of capital and labor can move developing Asia's economies closer to their frontier potential growth. Particular attention should be paid to correcting deficient judicial systems, unequal access to finance, excessive labor regulation, inadequate education, poor electricity supply, and corruption, which can cause distortions within firms and in factor markets. For example, tax system reform that is neutral with respect to firm size can improve productivity. Deepening the development and outreach of the financial system can advance productivity growth through the efficient allocation of capital.

During the transition to improved allocation, economies will already enjoy a higher potential growth rate. Benefits will derive from structural reforms to financial and labor markets, policies to improve access to land, strengthened governance, an improved business environment, and significant infrastructure investments to secure basic needs such as electricity and water supply.

Infrastructure should remain a priority for Asian policy makers. As the needs are large, governments must find creative financing solutions such as public–private partnership. Toward facilitating private investment, policy can incentivize companies to purchase new assets by, for example, accelerating depreciation.

Likewise, higher potential and frontier potential growth can be achieved by relaxing government policies and addressing market imperfections that impede the more efficient allocation of labor, especially where agricultural employment remains above a high 30%: Azerbaijan, Bangladesh, the PRC, India, Indonesia, the Philippines, Sri Lanka, Thailand, and Viet Nam.

While increasing potential growth might seem to be an objective exclusive to economic policy, an appropriate policy mix can be deployed to correct imbalances between actual and potential growth, and to avoid them where they threaten to emerge. The existence of a significant gap between actual and potential growth, and the resulting economic performance that is other than optimal, create either inflationary pressures or unemployment. Indeed, inappropriate policy interventions may widen gaps or make them more persistent, exacerbating the associated problems. Moreover, wider gaps are bound to bring about greater growth volatility that, as indicated by empirical evidence presented in this chapter, negatively affects potential growth.

This reinforces the view that effective demand management and stabilization policies may have significant positive effects.

The analysis indicates that such measures, and economic policy more generally, can play a growing role in boosting long-term growth in developing Asia. As developing Asia continues its convergence with the advanced economies, the advantages of backwardness will fade until they are finally extinguished. The potential for technological spillover from economies on the technological frontier will decline as the technology gap narrows, and the demographic dividend will turn into a demographic debt as growth in working-age population slows. For long-term growth to continue in Asia, and for living standards to improve at rates similar to the past, effective policy measures and improvements in the quality of institutions will have to compensate for the lost advantages of yesterday. In the aftermath of the global financial crisis, developing Asia's progress toward high-income status will increasingly depend on how fast it can close the gap in policy and institutions with respect to the advanced economies.

Asia's new normal today need not be its future normal. To ensure a healthy future for potential growth, Asia must employ the full range of policy responses to augment labor supply, improve labor productivity, and maintain macroeconomic stability.

Endnotes

1 A first reason, Rodrik argued, was that industrialization in the style of the Republic of Korea seemed to be impossible in today's world because technological change was rendering manufacturing more capital and skill intensive. Second, some Asian economies would experience declining labor force growth rates (e.g., the PRC and Japan), though others would still enjoy a demographic dividend (e.g., India). In the former group, productivity growth would have to accelerate to compensate for the shift in demographics (McKinsey Global Institute 2015). Third, the World Trade Organization has begun to disallow many industrial policies widely used in the past to push growth (Felipe 2015), and developed countries would not be as willing in the years ahead to run current account deficits so that the developing world could run surpluses. In the Asian context, Lin and Zhang (2015) has argued in reference to the PRC that the GFC would not have long-lasting effects and that the decline in growth was only transitory.

2 Two versions of the model are available: closed economy and open economy augmented with the ratio of imports to GDP, the latter following Romer (1993). In total, three different versions are estimated: (i) actual inflation (equation [6]) and closed economy for the PRC, Fiji, Japan, the Philippines, Sri Lanka, and Viet Nam; (ii) adaptive expectations (equation [8]) and open economy augmented for Azerbaijan, India, and Taipei,China; and (iii) adaptive expectations (equation [8]) and closed economy for Bangladesh, Cambodia, Indonesia, Kazakhstan, the Republic of Korea, Malaysia, Pakistan, Papua New Guinea, Tajikistan, Turkmenistan, Uzbekistan,

Viet Nam, and Hong Kong, China. The model with actual inflation and open economy did not fit any of the economies well. The results shown for Singapore and Thailand are derived from a different model that includes financial factors (Felipe et al. 2015).

3 This estimate is derived by dividing the percentage point change in potential growth by the percentage point change in actual growth for the 22 developing Asian economies, and then taking the average.

4 It should be noted that the statistical procedure used to generate a time-varying estimate of potential output growth (the Kalman smoother) updates the complete series every time a new estimate is added—see details in Lanzafame et al. (2016). After adding the PRC growth rate estimate for 2015, which is 6.9%, the estimates since 2010 become lower, with a potential growth rate of 7.69% for 2014 (instead of 7.91%) and 7.29% for 2015.

5 India released an updated GDP series that contains very few years, so the old series was used in the model estimates. Adjusting up the growth rate based on the years where the two series overlap (2012–2014) yields a slightly higher potential growth rate of 6.94% in 2014.

6 The direct impact of reducing the gap with the US, as indicated by the coefficient of this variable, shows that a country with a gap that is narrower by 1 percentage point has potential growth that is slower by 0.07 percentage points. However, the gap with the US is also interacted with the index of political stability in the model, and this interaction term needs to be taken into account to fully quantify the impact of the gap on potential growth. Ignoring the effects of all other variables in the model, potential output growth is computed as $g^n = 0.07 \times \text{gap} - 0.006 \times \text{gap} \times \text{political stability}$. Recall that the index of political stability ranges from –2.5 to 2.5, with higher positive numbers indicating greater political stability. The total effect of reducing the gap by 1 percentage point is therefore calculated as $0.07 + (0.006 \times 2.5) = 0.085$ percentage points for the least politically stable and $0.07 - (0.006 \times 2.5) = 0.055$ percentage points for the most politically stable economies.

7 This is calculated as $0.004 + (0.003 \times 2.5) = 0.0115$ for the lowest regulatory quality. For values of regulatory quality above –0.41 the impact is not statistically significant. Note that this is the impact of financial integration through regulatory quality. The direct impact of financial capital integration is simply given by the coefficient of this variable (0.004), which means that countries with financial integration 1 percentage point higher will have potential growth higher by 0.004 percentage points.

8 This is approach is similar to that of León-Ledesma and Thirlwall (2002).

9 Regressions for the Asian economies alone (not shown for reasons of space) are less reliable since the sample size is significantly smaller. Nevertheless, the Asian dummy for the 2008–2014 structural break is always negative, with values that oscillate between –2.0 and –2.3.

10 This is the difference between the average growth rate of the actual working-age population growth rate in 2008–2014 and the projected growth rate for 2015–2020. This weighted average is computed using population shares as weights.

11 The spillover model for the subpanel of Asian economies is estimated as well, but the results are not as reliable because the sample size is small.

12 The methodology and terminology employed in this section are akin to those used by the World Bank in its Distance to Frontier exercise (http://www.doingbusiness.org/data/distance-to-frontier).

13 This is a plausible assumption for the purposes of this simulation. Obviously, it cannot be assumed for the longer term, over which many Asian economies should continue to enjoy the so-called advantage of backwardness.

14 This means that coefficients from two different regressions are being used. Even if all coefficients from the macro stability model were used, results would be very similar.

15 This is the reduction in the region's potential output growth solely due to a lower projected trend growth rate in working-age population growth during 2015–2020, and assuming that countries implement measures (e.g., increase fertility rates, increase females labor participation, etc.) to reduce the negative impact of declining working-age population growth rates by 50%. It is computed using individual countries' trend growth rates of working-age population (not actual growth rates as in endnote 10), weighted by their respective GDP shares.

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