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Resilience and Escaping Development Traps

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Resilience and Escaping Development Traps

Lessons for Asia-Pacific Economies

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Escaping traps - whether low income, middle income, or secular stagnation in advanced economies - requires building resilience (staying in positive growth states and minimizing negative growth states). Less attention has been paid in the academic literature or policy discourse to this aspect of convergence compared to the attention paid to boosting potential growth. This paper studies the determinants of resilience in a cross-country sample of 105 economies over 1960-2010. Factors associated with building resilience are – the investment share of GDP, average years of schooling, the industrial share of employment, FDI and portfolio flows as share of GDP, lower external (REER) volatility, fiscal prudence and better quality of governance. Frontier and developing countries looking to sustain convergence to higher levels of income will need to direct policy efforts toward these factors.

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I. INTRODUCTION

Sustaining growth and escaping traps – low income, middle income, or even advanced economy secular stagnation – are once again top priority at all levels of the world income distribution. In Asia, as growth in China slows, policy-makers are increasingly asking what this means for their economies. Some prominent commentators and academics outside the region have raised the prospects of a middle income trap (Eichengreen et al. 2013), while others have argued that high growth rates in Asia are due for reversion to a more modest global mean (Pritchett and Summers, 2014). Against this backdrop, the key question now for Asia's emerging and frontier economies is what can be done to maintain the pace of convergence to higher per capita income.

This paper has a simple message. Rather than focusing exclusively on boosting average growth rates, Asia – Pacific economies should also focus on building 'resilience' - staying in positive per capita income growth states and minimizing negative growth states. This message isn't meant to minimize the importance of boosting average growth. Rather, our sense is that there has been a comparative neglect in the academic literature and policy discourse of the importance of resilience itself (*regardless of the actual magnitude of the positive growth*).

Average growth and resilience are two different concepts. While measures that boost growth may often also boost resilience, sometimes they could work in different directions. Take steps to boost credit growth, for example. Financial deepening and extending credit to those not previously able to access the formal financial system could raise average growth by transferring resources to factors with higher marginal productivity. But very rapid credit growth without adequate prudential oversight could also lead to misallocation and souring of loans, with the potential for adverse feedback to real activity.

We document a positive long-run association between average per capita income growth and resilience. Countries that stay in positive per capita income growth states for larger fractions of time also tend to have higher average growth rates of per capita income over the long run. We document that this is true not just in the broader global sample, but also within sub-groups by continent and by income level. We show with a simple example that the positive association isn't simply tautological and one does not automatically imply the other. In line with previous studies (North et al. 2009; Winters et al. 2010), we establish that a big difference separating currently rich from currently poor countries is that the former group has stayed in positive

growth states for a larger fraction of time and, when they experience negative growth, the magnitude of the decline is relatively small compared to the poor countries. Finally, based on cross-country evidence, we establish some 'universals' – determinants of resilience that apply regardless of the level of income per capita.

Staying in positive growth in per capita terms for a larger fraction of time will arithmetically translate into sustained increases in income per capita (and, for the most part, better living standards for an ever wider cross-section of society). Along the way, it will mean escapes from the so-called development traps – low income and middle income. Very few countries have actually managed to do this since the Industrial Revolution fundamentally altered the nature of a small set of European economies and set them on the path of sustained growth. But increasingly now, especially in Asia and Latin America, a widening set of economies appears to be on its way to breaking out of the development traps. It is important to ascertain if there are any general attributes – for example, production and employment structure, outward orientation, financial development – which allow them to do so.

Our main findings are

- In terms of proximate factors, both investment in physical capital and the accumulated stock of human capital (proxied by years of schooling) are positively associated with higher resilience.
- The structure of the economy also matters for resilience. We find evidence of a positive association between industrial employment share and fraction of time spent in positive growth.
- Openness matters for resilience, but more along the dimension of capital flows (FDI and portfolio investment) rather than trade flows.
- Financial deepening is important for resilience to the extent that it supports investment in physical capital and supports education spending. Once these channels are accounted for, we find evidence of a negative direct impact of higher leverage on resilience. We also document that higher external (REER) volatility is negatively associated with resilience.

- Fiscal policy prudence (represented by positive average cyclically-adjusted and structural balances) and low debt ratios help raise resilience.
- Finally, on 'fundamental factors' underlying economic performance, our results indicate that improvements in the quality of governance are associated with higher resilience.

The paper is organized as follows. The next section presents the data on resilience and patterns of growth. Section III looks at the determinants of resilience. Section IV discusses the policy implications. Section V concludes.

II. RESILIENCE AND GROWTH

A. Resilience and long run average growth rates across countries

Going back at least to the early 1990s, much attention has been focused on the question of differences in long run average growth rates across countries (Mankiw, Romer, Weil 1992; Levine and Renelt, 1992; Barro 1997). Far less light has been shed on the question of differences across countries in time spent in positive growth.

At the outset, it is important to clarify that these are not the same thing. We might be tempted to say that one automatically follows the other – higher average growth over a long interval necessarily implies that a country has spent a larger fraction of time in positive growth. And, in the other direction, the longer a country spends in positive growth, the higher its average growth will be. But a simple example illustrates that there need not be a simple mapping in this way.

Suppose that in a ten-year interval, a country experiences 6 years of growth at 5 percent per year and 4 years of negative 5 percent growth per year. Its average growth over the 10 years is 1 percent. In that same ten-year interval, suppose another country experiences 8 years of positive growth at 2 percent per year and 2 years of negative growth at negative 10 percent per year. The average growth rate for this country will be -0.4 percent.

The simple example illustrates that it isn't obvious that spending more years in positive growth immediately translates into higher average growth over the long run. Put differently, a positive association between average growth and years spent in positive growth isn't necessarily a given and we shouldn't

automatically expect it to hold over a large sample of countries. The fact that it does suggests that understanding sources of resilience can help advance our understanding of how to break out of traps, be they low income or middle income.

To appreciate the importance of resilience, consider the example of Malaya (later Malaysia) and Nigeria. The Federation of Malaya became independent from the United Kingdom in 1957. The Federation of Nigeria became independent from the United Kingdom in 1960.

These two countries emerged from the colonial rule of a common colonizer at roughly the same time, with their economies both heavily dependent on commodities. At the time of Nigeria's independence, the country's income per capita was slightly *above* that of the part of Malaya which later became Malaysia.

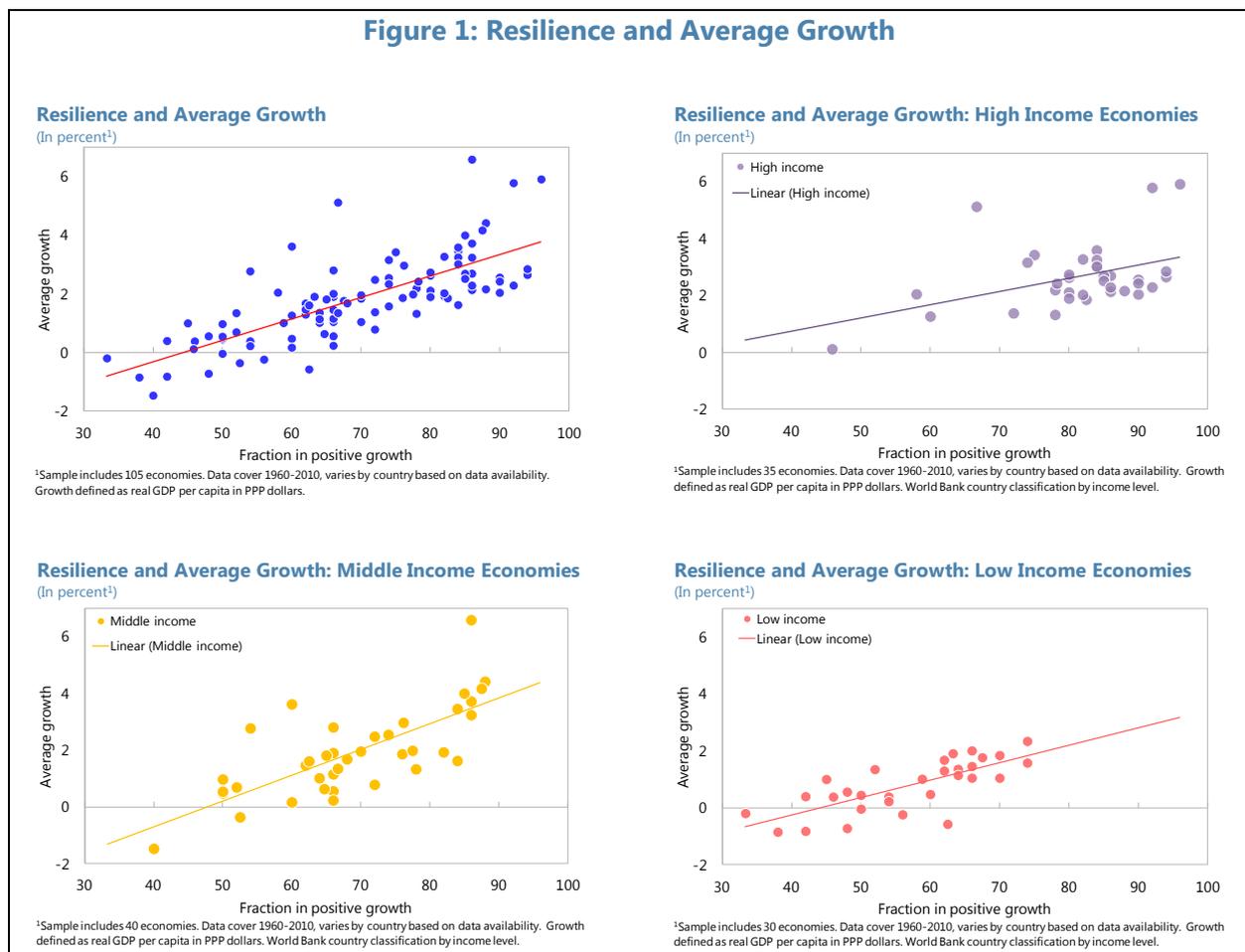
Over the next fifty years, they took vastly different paths. After starting off slightly below Nigeria in terms of per capita income, by 1980 Malaysia's income per capita was almost three times as large as Nigeria's; by 2010, it was seven times as large.

It is of course straightforward to surmise that behind this divergence in levels is a large gap in the average growth rates of the two countries. Perhaps what is less well known is that in the 50 years from 1960 to 2010, Malaysia experienced only 6 years of negative growth in per capita income, at well-spaced intervals. Nigeria, on the other hand, experienced 25 years of negative growth in per capita income, often in multi-year spells. Not only has Nigeria been more vulnerable to negative growth episodes, but it has also found it more difficult to bounce out of phases of negative growth. By contrast, Malaysia has proven more resilient to shocks and quicker at bouncing back off its feet.

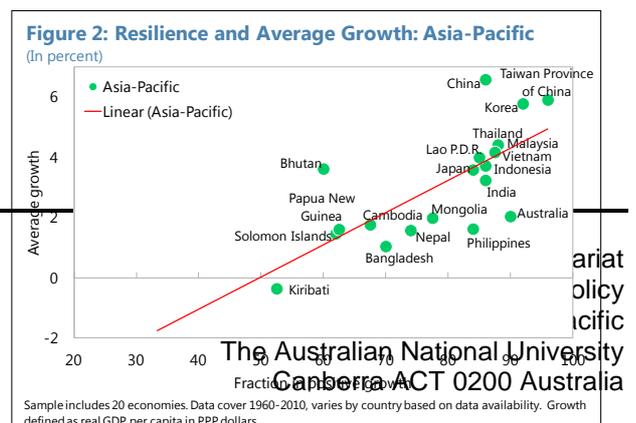
What is true in bilateral comparisons also holds more generally - there is a positive association between average per capita income growth and years spent in positive growth. Countries that pull away from the pack and rise up the income ladder have tended to do so in sustained fashion, experiencing more years in positive growth than countries that have not. And when they experience growth reversals, they tend to bounce back more quickly as well. North, Wallis and Weingast (2009) point out that rich countries are differentiated from poor countries not so much by the average growth rates

during periods of positive growth, but that the richer economies spend less time in negative growth and also experience higher average growth during negative growth periods than the poor countries do during their negative growth intervals.

Figure 1 plots fraction of years spent in positive growth against the average growth rate for large cross sections of countries over the period 1960-2010. The upper left chart covers the entire sample, whereas the other three are sub-samples by income level. All four charts display positive correlations: high average growth countries also tend to spend larger fractions of time in positive growth.



This correlation holds within a sample of Asian economies as well (Fig 2). Comparing the Asian plot with the one above for the general sample, clear



differences emerge from the extremes of the distribution. More familiar, at the top end, Asian fast growing economies such as China, Korea, Taiwan Province of China have experienced much faster average growth rates than the world average and have also spent longer fractions of time in positive growth. Perhaps less familiar is that at the bottom end of the distribution, the weaker performing Asian economies have not experienced as negative an average growth rate as the weaker performing economies for the broader world sample. At the same time, Asian weak performers have spent more time in positive growth than for the world sample as a whole.

While these scatter plots are not intended to make any statements about causality from time spent in positive growth to average growth rates, clearly the positive association in the data points to a key attribute of economies that maintain positive growth and build resilience: such economies also tend to have higher average growth rates of per capita income over the long run. Two economies (such as Nigeria and Malaysia, cited in the example above) starting from the same initial level of income per capita will end up with very different levels of income if one manages to stay in positive growth for long and the other doesn't. A useful illustration of this feature is a simulation by Winters et al. (2010), which shows that the mechanical impact of reducing negative growth states over a period of time is to double (and in some cases nearly triple) the period-end level of income per capita.

More broadly, the data on growth experiences over 1960-2010 indicate that currently rich countries are distinguished from currently poor countries along two important dimensions. The rich countries have tended to stay in positive growth states for a larger fraction of the time than poor countries. And the rich countries' experience of negative growth has been less damaging than that of poor countries – average growth rates during negative states tend to be *less* negative in magnitude for the currently rich countries than for the currently poor.

The accompanying text table summarizes growth experiences in the overall sample of 105 countries over 1960-2010 (with countries classified into groups using the World Bank income classification of high, middle, and low income) as well as three sub-groups: Asia-Pacific, Africa, and the rest of the world.

For each group shown, the table calculates the fraction of positive growth years by adding the number of years of positive growth across all countries in that group and dividing by the total number of country-years spanning 1960-2010 for which data are available. The average growth rates shown within

each category are simple arithmetic averages of growth for all years of that category.

For the world sample (top panel, final column), 70 percent of the country-year observations recorded positive growth in income per capita. During those years, the average growth rate of per capita income was 4.5 percent per annum. In the remaining 30 percent of country-year observations with negative growth, the average growth rate of per capita income was -4.4 percent per annum. Breaking the world sample into income groups, we see that the high income countries (column 1) spent more time in positive growth than those belonging to the other two groups (83 percent for high income versus 70 and 57 percent respectively for the other two). We also see that the high income countries, when they experienced negative growth, incurred smaller losses compared to the other two groups: in years with negative growth, the average growth rate was -3.1 percent per annum for the high income countries compared to -4.5 for middle income and -4.9 for the low income.

As shown in the second and third panels, similar patterns emerge in Asia-Pacific and Middle East and Africa: within each group, the high income countries spend more years in positive growth than countries in the other two groups and their average growth rate in negative growth years isn't as weak as the average growth rate in negative growth years for the other two groups.

Comparing Asia-Pacific economies (panel 2) with Middle East and Africa (panel 3) – the Asia-Pacific economies have spent more time in positive growth than the countries from the latter group (79 percent versus 59 percent), and their average growth rate in negative growth years is not as weak (-4.4 percent per annum in Asia-Pacific versus -4.7 percent for Middle East and Africa). The average growth rate in positive growth years is broadly similar across the two groups (5.0 percent per annum for Asia-Pacific, 5.1 for Middle East and Africa). The big difference across the two groups of economies is that Asia-Pacific economies have proven more resilient.

What is interesting about the correlation shown in Figures 1 and 2 and the data presented in the text table is that the pattern holds across the distribution of world income, covering all ranges of income. It is not a feature only of low income economies or of middle income economies, or, for that matter, of high income economies. As such, understanding sources of resilience will be key for all countries, not just those trying to break out of low or middle income traps.

Years in Positive/Negative Growth and Average Growth over 1960-2010

(In per capita terms)

	Income level ¹			Total
	High	Middle	Low	
World				
Number of countries	35	40	30	105
Years in positive growth (percent of total)	83	70	57	70
Average growth rate, percent	2.7	2.0	0.8	1.9
<i>In years with positive growth</i>	3.9	4.8	5.0	4.5
<i>In years with negative growth</i>	-3.1	-4.5	-4.9	-4.4
Asia-Pacific				
Number of countries	5	13	3	21
Years in positive growth (percent of total)	87	78	71	79
Average growth rate, percent	3.7	3.2	1.4	3.1
<i>In years with positive growth</i>	4.7	5.5	3.8	5.0
<i>In years with negative growth</i>	-2.5	-4.9	-4.3	-4.4
Middle East and Africa²				
Number of countries	3	15	25	43
Years in positive growth (percent of total)	68	62	56	59
Average growth rate, percent	2.7	1.3	0.7	1.0
<i>In years with positive growth</i>	5.4	5.0	5.1	5.1
<i>In years with negative growth</i>	-3.1	-4.6	-4.9	-4.7
Rest				
Number of countries	27	12	2	41
Years in positive growth (percent of total)	83	72	52	78
Average growth rate, percent	2.5	1.6	0.2	2.1
<i>In years with positive growth</i>	3.6	3.8	5.3	3.7
<i>In years with negative growth</i>	-3.2	-3.9	-5.4	-3.7

Sources: IMF staff estimates and calculations.

¹ Based on World Bank country classification for 2015FY.

² Include Middle East and North Africa and Subsaharan Africa categories.

B. Features of resilient economies

What are some of the features of more resilient economies? As a first cut, consider a simple comparison of economies with above-median level of resilience (Group A) versus those with below median level (Group B), where

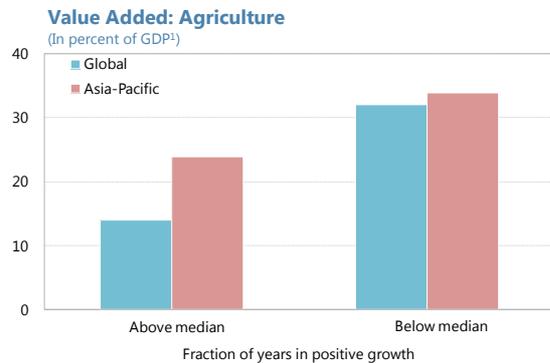
the median is calculated for the world distribution of resilience across countries during 1960-2010. Clearly, there are selection issues involved if we slice the sample this way and look for differences after separating countries based on resilience or growth rates. Nevertheless, the simple comparison can shed some light on how attributes accumulate over time if we look back over the entire sample 1960-2010 to tease out differences across these two groups of economies.

Figure 3 shows the panel charts for the world and Asia samples split by median resilience. In both samples, the more resilient economies have been those with output shares concentrated more in services and industry than in agriculture. Less resilient economies are those with higher output shares concentrated in agriculture. In terms of employment shares, more resilient economies tend to employ the largest fraction of their workforce in services, followed by industry and agriculture in that order. Less resilient economies tend to employ their largest fraction of workers in agriculture, followed by services and industry, in that order.

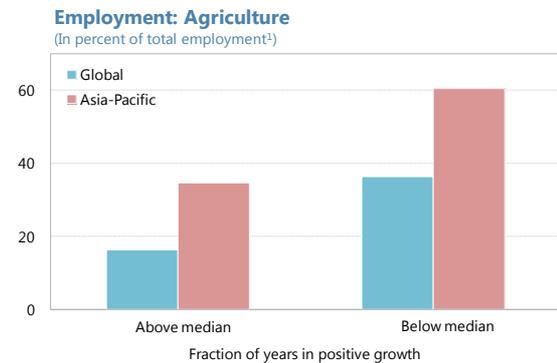
Comparing the Asian sample with the world sample, some key differences are:

- Agriculture value added share of GDP is higher among Asian high resilience economies than in the world sample, while the reverse is true when comparing the services value added share of GDP. Industry value added share is similar across the high resilience economies in the two samples.
- Asian high resilience economies have a smaller share of workforce employed in industry and services compared to the high resilience economies in the world sample, whereas they have a higher share of the workforce in agriculture compared to world high resilience economies.
- Similarly, comparing the low resilience economies in the two samples, Asian low resilience economies employ a smaller fraction of workers in services and industry compared to low resilience economies in the overall world sample.

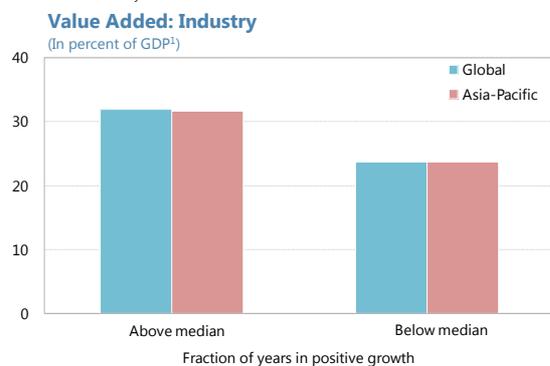
**Figure 3: Comparison of Economic Structures:
Above Median Resilience Versus Below Median Resilience**



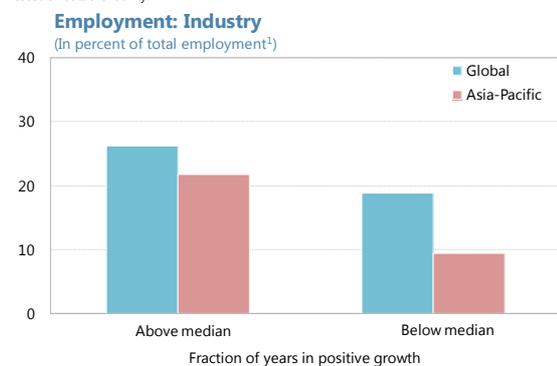
Source: IMF staff estimates and calculations.
¹Sample covers 105 economies, of which 20 are in Asia-Pacific. Data cover 1960-2010, varies by country based on data availability.



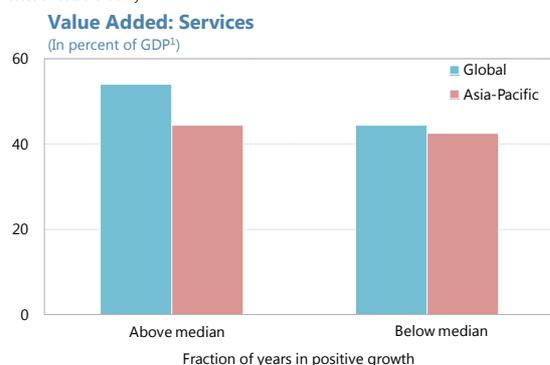
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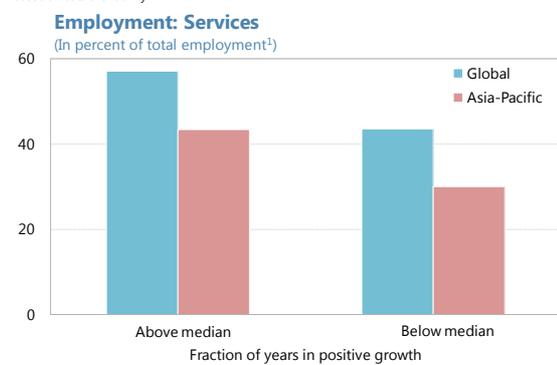
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III. RESULTS

We draw our data from World Bank WDI and World Governance Indicators, IMF WEO and IFS, Polity IV dataset, and Barro-Lee data on years of schooling. We construct a panel data set from annual data on 105 countries over 1960-2010 by taking five year averages for all variables to smooth out business cycle fluctuations. Volatility indicators are taken as standard deviations within five year intervals. Our measure of resilience is the fraction of the five year interval spent in positive growth. Data sources are summarized in Table 1 in the appendix.

One immediate question is, why not use as the dependent variable growth spells as in Hausmann, Pritchett, and Rodrik (2005) or regimes of growth as in Jerzmanowski (2006)? For one, this approach has been studied extensively. Second, the measures of growth spells in these studies are usually subject to some minimum average growth threshold (average growth rate of x percent over minimum z years). Our view is that regardless of the magnitude of growth, understanding why some countries spend a larger fraction of years in positive growth than others (separate from the cross-country differences in propensity to experience long spells of high average growth), is important.

At the outset, we don't want to pre-judge and restrict ourselves only to countries at certain ranges of the income distribution; rather we want to include countries at all levels of income and all continents to the extent possible to achieve as broad a sample as we are able to. Indeed, focusing only on middle or low income countries to understand differences in resilience leaves the exercise vulnerable to missing relevant information.

Our objective is to identify 'universals' that underpin resilience. The determining variables included in the regression are therefore based on inputs in the aggregate production function (investment, schooling); the structure of output (services and industry share of gross value added); structure of the labor market (employment shares of services and industry); the degree of openness (gross trade and capital flows); financial development and net dependence on foreign financing; aggregate volatility (proxied by variability in the real effective exchange rate and in the terms of trade); and, finally, fundamentals (governance). Descriptive statistics for the variables used in this analysis are summarized in Table 2 in the appendix.

Results: physical and human capital, basic structure of output and employment

Table 3 reports results of fixed effects panel regressions that examine whether proximate factors (inputs in the production function) and the structure of the economy has an impact on resilience. The regressions control for initial income and for unobserved country-specific time-invariant factors (such as topography, disease environment, location, soil quality, deep historical legacies).

Column 1 reports the basic specification with investment in physical capital and years of schooling (to proxy for human capital). The investment share of GDP is significant, with a 1 percentage point increase in investment associated with a $\frac{3}{4}$ percentage point increase in the fraction of time spent in positive growth.

Column 2 examines whether the structure of output matters for resilience by adding shares of value added in industry and value added in services to the basic specification. A higher value added share of services is positively associated with resilience, while investment continues to be significant.

The third column studies the impact of labor market structure on resilience. The specification includes a split by labor income shares across industry and services. Here, the employment share in industry is associated positively with resilience whereas employment share in services is not. One possible interpretation is that since services includes both high and low value added activities (high-end / low end), simply boosting the overall share of service sector employment may not have any impact on resilience if the bulk of the increase is at the low value added end. Industrial share of employment, on the other hand, represents activities that include manufacturing, construction etc – which may contribute more by way of value added while also raising the demand for higher value added services.

Indeed, in the final column, where we include both the structure of output and the structure of employment, the industrial share of employment remains significant whereas the value added in services loses significance. Furthermore, the finding that the industrial share of employment matters for resilience, whereas industrial share of output does not appear to, is consistent with Felipe, Mehta, and Rhee (2014) who establish a similar pattern with regard to countries eventually achieving high income status.

Across all specifications, the level of initial income is not significant, suggesting no systematic relationship between level of income and degree of resilience, once the unobservable time invariant factors are controlled for.

Investment / GDP is significant across all specifications, suggesting that higher investment spending is associated with more resilience – possibly indicating that an environment that facilitates higher investment spending and guides long-term decision making by firms (mobilizes the funding, matches funding to projects) also fosters greater resilience.

Finally, average years of schooling is statistically significant in the final column when both the structure of output and structure of employment are included as additional controls. Raising the average years of schooling by 1 unit increases the fraction of time spent in positive growth by 3 ½ percentage points.

Since resilience (or lack thereof) may be persistent over time, the regressions in Table 4 include lagged fraction of time spent in positive growth, i.e. over the preceding 5-year interval. The introduction of the lagged dependent variable biases fixed effects estimates. Instead, the specification used in Table 4 is Arellano-Bond panel GMM estimation which allows for the inclusion of the lagged resilience measure along with other regressors. By using lagged levels of the right hand side variables as instruments, the GMM method corrects the bias in estimates introduced by endogeneity, measurement error, and omitted variables.

The sample size drops because of insufficient data on some countries to generate enough lags as instruments. The results in Table 4 indicate that years of schooling and investment are positively associated with resilience. Industrial share of employment is positively associated with resilience when only the structure of the labor market is included as additional controls (column 3).

Degree of openness

Tables 5 and 6 examine whether the degree of openness matters for resilience. We study three dimensions of openness – to trade flows, to FDI, and to portfolio flows.

Across both the fixed effects regressions (Table 5) and the GMM (Table 6), we find no evidence of a systematic relationship between trade openness and resilience. By contrast, the evidence suggests openness to capital flows is associated positively with resilience. The fixed effects specification (Table 5, column 2 and column 4) indicates that openness to FDI is statistically significant – with a one percentage point increase in the ratio of FDI/ GDP associated with an increase in fraction of time spent in positive growth ranging between ½ to 0.6 percentage points.

The GMM specifications reported in Table 6 indicate that portfolio flows are positively associated with a larger fraction of time spent in positive growth. An immediate concern is that this may simply reflect reverse causality – more resilient economies attract higher portfolio flows. To the extent that the GMM method corrects for this through the use of relevant lags as instruments, the reported coefficients are purged of any bias introduced by reverse causality.

As in the basic specifications reported earlier, the investment share of GDP continues to remain positively associated with resilience while the level of initial income is not statistically significant.

Financing

Tables 7 and 8 examine the relationship between resilience and financing, including the impact of the current account balance (to proxy for reliance on foreign funding).

The results in Table 7 (fixed effects) indicate that investment spending remains statistically significant and positively associated with resilience.

Table 8 reports results of the GMM specifications. As seen across all three columns, both investment spending and years of schooling are statistically significant. We also find that financial deepening (proxied by the ratio of credit / GDP) is negatively associated with resilience. One interpretation of this finding is that once the degree of financing needed to support investment and education spending is accounted for, any further direct impact of higher leverage tends to be associated with rising fragilities and lower resilience.

The current account balance itself is not statistically significant in any of the specifications across Tables 7 and 8.

Volatility

Table 9 looks at the relationship between volatility and persistence. Volatility is measured using REER and Terms of Trade Volatility. We focus only on fixed

effects specifications since we don't have enough lagged data for several countries to do this with GMM.

In the fixed effects, we find a negative association between volatility (REER and TOT) and resilience when each is included as a separate regressor. When both are included together, only REER volatility matters (Table 9, column 3). The coefficient indicates that a one percentage point increase in the standard deviation of REER growth is associated with a 1.7 percentage point decrease in the fraction of time spent in positive per capita income growth.

Investment continues to be positively associated with resilience across these specifications.

Fiscal policy and space

Table 10 reports regression results using different indicators of fiscal policy stance – net lending and borrowing as percent of GDP; cyclically adjusted balance and structural balance, both as percent of GDP; and gross general government debt as percent of GDP to reflect fiscal space. All fiscal variables are averaged over five year intervals.

As Table 10 indicates, greater fiscal prudence (represented by more positive net lending and borrowing, cyclically-adjusted and structural balances) and higher fiscal space (reflected in low debt ratios), are associated with higher resilience.

Governance

Table 11 looks at deeper determinants of economic performance by including governance indicators in the regression. The particular measures used here are from the Worldwide Governance Indicators (WGI) project of the World Bank (Kaufmann et al., 2010). The WGI reports governance indicators for 215 economies over the period 1996–2013, based on multiple individual data sources compiled by survey institutes, think tanks, non-governmental organizations, international organizations, and private sector firms.

The evidence suggests that a higher degree of corruption control and greater government effectiveness are associated with higher resilience. The interpretation of magnitude is difficult since the indicators run on a scale of -2.5 (weak) to +2.5 (strong), but the signs on the coefficients point toward a positive association.

Results: summary

Although we examine the impact of factors usually considered in cross-country growth regressions, and some of our findings on their relevance for resilience are similar to what has been found by researchers studying drivers of cross-country variation in growth, there are a couple of important nuances.

First, our result on credit / GDP suggests that financial deepening is important for boosting resilience to the extent that its influence works through physical and human capital accumulation. Beyond this, we find a negative association between leverage and resilience.

Second, while the growth literature has typically found that openness to trade is positively associated with growth (Frankel and Romer, 1999), here we do not see a similar association between trade flows and resilience.

These distinctions are not intended as statements about the benefits or costs of leverage or trade openness, but rather to point out that policy implications for growth and for resilience are not always fully overlapping. The next section turns to a more detailed discussion of policy implications that follow from the regression results.

IV. POLICY IMPLICATIONS

The results in the previous section indicated that factors such as the investment share of GDP, schooling, industrial share of employment, lower volatility, and greater openness to FDI and portfolio flows, fiscal prudence, are all positively associated with higher resilience. From Asia's perspective, what policies will help?

Past IMF work (Nabar and Syed 2011) documented that the investment share of GDP for emerging and developing Asia (outside China) is relatively low, while in China, Japan and the NIEs investment is directed toward export-oriented manufacturing and less toward services and nontradables.

A number of policies would help raise **investment** in areas where it is relatively low and shift its composition toward nontradables where it is currently skewed toward export-oriented manufacturing, including: lowering uncertainty related to the corporate tax code and providing cyclically-appropriate macro policy support; further improvements in the ease of doing business (echoing the positive association in the current empirical exercise between, on the one hand, two dimensions of governance - control of corruption and government effectiveness – and, on the other, resilience);

raising infrastructure spending (the Asian Development Bank estimated emerging Asia's total infrastructure needs at approximately US\$ 7.5 trillion for this current decade - AsDB, 2009).

Besides boosting the investment share of GDP, these measures could also help attract **FDI and portfolio flows**– factors positively associated with resilience.

Our results also indicate that the structure of the economy matters for resilience – specifically, a higher **share of industrial employment** is positively associated with spending longer fractions of time in positive growth. The policy recommendations listed above for boosting investment as a share of GDP would carry over to raising the industrial share of employment. We deliberately avoid getting into a discussion of which specific industries matter for resilience since the formula that worked in a particular set of countries at a particular point in time need not necessarily carry over to the next generation of frontier and developing economies attempting to boost resilience. Rather, doing the small things right such as reducing search and matching costs through job agencies and credit registries - to increase the efficiency of pairing up vacancies with job-seekers, financiers with projects, and manufacturers with distributors – would reduce hold-up costs and incentivize industrial growth.

The measure we have in mind is industrial employment (as defined by the World Bank WDI database, the category includes manufacturing, construction, mining, and utilities such as electricity, water and gas), not the narrower category of manufacturing employment. As Rodrik (2014) has pointed out, manufacturing is becoming increasingly capital intensive and automated so that countries' shares of manufacturing employment are peaking at lower levels than used to be the case before. The lesson for Asia's frontier and developing economies is clear in this regard. Pursuing a larger manufacturing base itself (without also considering broader development objectives, including making conditions conducive for construction, utilities provision, and services in general) may not be the optimal strategy to pursue, given the risks of wasteful overcapacity creation, potential weakening of asset quality, and the diminished scope for manufacturing to absorb labor (see Choi and Rhee, eds., 2014, for detailed studies of future growth areas for "Factory Asia").

The other proximate factor in the production function, **human capital** (as proxied by the years of schooling) has increasingly become an object of policy interest in recent years. The obvious macro policy implication is redirecting

public expenditure from wasteful areas (such as poorly targeted subsidies) to financing education infrastructure and teacher training. But attention will also need to be paid to the demand side and take-up, especially for frontier and developing economies. As the World Bank (World Development Report 2015, p.88) has documented, the timing of conditional cash transfers over the course of the year can affect school re-enrollment rates and therefore, over time, the educational attainment of the workforce.

Our results also indicate that **fiscal prudence** and maintaining low debt to GDP ratios helps raise resilience. With larger fiscal buffers to work with, governments can provide counter-cyclical support to activity as needed and help maintain positive growth in per capita income for a larger fraction of the time.

Finally, from a long horizon perspective, reforming **institutions of economic and political governance** to enhance control of corruption and boost government effectiveness, will have a first order impact on raising resilience. In the terminology of Acemoglu and Robinson (2012), this involves shifting from extractive to inclusive institutions. In the terminology of North, Wallis, and Weingast (2009), this means moving from 'natural order / limited access' states to 'open access' states. These transitions from a governance system that favors a narrow elite at the expense of others to a more meritocratic, equal opportunity system take a very long time and are rare. But to the extent that incremental steps can be taken by changes to the legal framework so as to introduce more checks and balances, while reducing barriers to entry into protected sectors, our empirical results suggest they will contribute to raising resilience.

V. CONCLUSION

Escaping traps – be they middle income, low income, or advanced economy secular stagnation - is ultimately about boosting resilience, sustaining growth and maintaining improvements in living standards over time. As countries have made these transitions in the past, they have faced different challenges at various stages of history and have therefore been offered different policy prescriptions – tight controls over capital flows versus liberalization; import-substituting versus export-oriented manufacturing; promoting heavy industry versus lighter consumer-oriented industry and services. One common thread that runs through all of these phases over the years is that more resilient countries have also tended to end up with higher levels of income per capita over the long run.

For Asian economies looking to sustain convergence, achieving a larger fraction of years spent in positive growth (remaining resilient) will play an important role in the process. Based on estimates from a broad cross-country sample of 105 economies over the period 1960-2010, the factors associated with greater resilience include the investment share of GDP, years of schooling, FDI and portfolio flows as percent of GDP, lower external volatility, fiscal prudence, and better governance. We also find evidence of a positive association between industrial employment share and resilience. Financial deepening (increasing credit as a share of GDP) is found to have no direct influence on resilience beyond its impact through the channels of facilitating physical and human capital accumulation. Indeed a challenge for the region's economies will be to ensure a 'safe' financial deepening that limits vulnerabilities by matching the risk appetite of investors with the risk profile of underlying projects. Policy efforts directed toward the factors identified here as contributing to resilience would benefit countries across the income distribution seeking to avoid stagnation at their particular levels of development – regardless of whether they have low, middle, or high income status.

VI. APPENDIX

The data sources for the variables used in the empirical analysis are listed in Table 1 and descriptive statistics are summarized in Table 2.

The World Bank WDI database defines industry as corresponding to ISIC divisions 10-45, including manufacturing (ISIC divisions 15-37), mining, construction, electricity, water, and gas. The value added for a sector is calculated as aggregate output for that sector, net of intermediate inputs. No deductions are made for depreciation of machinery or loss of non-renewable natural resources.

Table 1. Data Sources

Variable	Definition	Scale	Unit	Source
PPP GDP per capita	PPP GDP per capita at 2005 constant prices		PPP dollars per person	Penn World Tables
Investment	Gross fixed capital formation, current prices	Billion	National currency	IMF, World Economic Outlook
GDP	GDP, current prices	Billion	National currency	IMF, World Economic Outlook and IFS
GDP	GDP, current prices	Billion	US dollars	IMF, World Economic Outlook
Exports	Exports of goods and services, current prices	Billion	National currency	IMF, World Economic Outlook
Imports	Imports of goods and services, current prices	Billion	National currency	IMF, World Economic Outlook
Current account	Balance on current account	Billion	National currency	IMF, World Economic Outlook and IFS
FDI inflows	FDI inflows	Billion	US dollars	IMF, World Economic Outlook
FDI outflows	FDI outflows	Billion	US dollars	IMF, World Economic Outlook
Portfolio investment assets	Portfolio investment assets	Billion	US dollars	IMF, World Economic Outlook
Portfolio investment liabilities	Portfolio investment liabilities	Billion	US dollars	IMF, World Economic Outlook
Terms of trade	Terms of trade	Index	2010=100	IMF, World Economic Outlook
Years of schooling	Average years of total schooling		Years	Barrow and Lee dataset
REER	Real effective exchange rate, CPI based	Index	2005=100	GDS
Credit to private sector	Domestic credit to private sector		percent of GDP	World Bank, World Development Indicators
Value added in agriculture	Agriculture, value added (% GDP)		percent of GDP	World Bank, World Development Indicators
Value added in industry	Industry, value added (% GDP)		percent of GDP	World Bank, World Development Indicators
Value added in services	Services, value added (% GDP)		percent of GDP	World Bank, World Development Indicators
Employment share of agriculture	Employment in agriculture (% of total employment)		percent of total employment	World Bank, World Development Indicators
Employment share of industry	Employment in industry (% of total employment)		percent of total employment	World Bank, World Development Indicators
Employment share services	Employment in services (% of total employment)		percent of total employment	World Bank, World Development Indicators
Rule of law	Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.	Index	Estimate ranges from approximately -2.5 (weak) to 2.5 (strong)	World Bank, World Governance Indicators
Regulatory quality	Reflects perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.	Index	Estimate ranges from approximately -2.5 (weak) to 2.5 (strong)	World Bank, World Governance Indicators
Control of corruption	Reflects perceptions of the extent to which public power is exercised for private gain, including both petty and grand forms of corruption, as well as "capture" of the state by elites and private interests.	Index	Estimate ranges from approximately -2.5 (weak) to 2.5 (strong)	World Bank, World Governance Indicators
Government effectiveness	Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Index	Estimate ranges from approximately -2.5 (weak) to 2.5 (strong)	World Bank, World Governance Indicators
Polity indicator	Combined polity score	Index	Estimate ranges from -10 to 10	Polity IV: Regime authority Characteristics and transitions dataset
Binomial variables				
High income economies	World bank classification			
Middle income economies	World bank classification			
Low income economies	World bank classification			
Advanced economies	IMF, World Economic Outlook classification			
Emerging and developing economies	IMF, World Economic Outlook classification			
Asia Pacific economies	IMF, World Economic Outlook classification			

Table 2. Descriptive Statistics

	Units	Average	Standard deviation
Log of initial income	Level	8.1	1.5
Investment-to-GDP	percent of GDP	21.3	9.1
Years of schooling	years	5.8	3.4
Value added in agriculture	percent of GDP	23.1	17.4
Value added in industry	percent of GDP	27.7	10.8
Value added in services	percent of GDP	49.3	13.2
Employment share of agriculture	percent of employment	20.3	20.7
Employment share of industry	percent of employment	24.8	7.9
Employment share services	percent of employment	54.4	16.4
Trade openness	percent GDP	70.2	45.7
FDI openness	percent GDP	7.3	52.2
Portfo investment openness	percent GDP	9.8	62.9
Current account	percent GDP	-3.4	10.6
REER volatility	Index	6.4	5.2
Terms of trade volatility	Index	11.5	38.3
Government effectiveness 1/	Index	0.0	1.1
Regulatory quality 1/	Index	0.0	1.1
Rule of law 1/	Index	-0.1	1.1
Control of corruption 1/	Index	0.0	1.1
Share in positive growth (%)	percent	69.8	14.9
Average real growth (PPP terms)	percent	1.9	1.5

Source: IMF staff estimates and calculations.

1/ Scale ranges from -2.5 (weak) to +2.5 (strong).

Regression output referred to in the main text is reported in Tables 3 – 10 below.

Table 3: Structure of Economy

Log Initial Income	-0.303 (1.997)	-1.042 (2.261)	1.615 (3.011)	1.444 (2.961)
Investment / GDP	0.746*** (0.194)	0.814*** (0.198)	0.845** (0.361)	0.877** (0.401)
Years of Schooling	0.860 (0.756)	-1.592 (1.191)	2.932 (1.866)	3.519* (1.948)
Value Added in Industry		0.0623 (0.305)		-0.646 (0.490)
Value Added in Services		0.760** (0.297)		0.264 (0.413)
Employment Share in Industry			0.847* (0.432)	1.244*** (0.451)
Employment Share in Services			0.150 (0.386)	-0.389 (0.361)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010	1965-2010
Number of countries	84	78	75	70
Observations	518	465	281	260
R-Squared	0.055	0.090	0.09	0.1

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Fixed Effects Estimation

Table 4. Structure of Economy (GMM)

Lagged Fraction of Positive Growth Years	0.0263 (0.0917)	0.000150 (0.0934)	-0.252** (0.107)	-0.442*** (0.110)
Log Initial Income	0.774 (2.469)	-0.266 (2.502)	1.745 (2.471)	2.493 (2.311)
Investment / GDP	0.726*** (0.244)	0.858*** (0.281)	0.264 (0.367)	1.057** (0.464)
Years of Schooling	2.961* (1.566)	0.689 (1.827)	7.585*** (2.926)	9.489*** (3.531)
Value Added in Industry		0.554 (0.441)		-0.229 (0.990)
Value Added in Services		0.728 (0.474)		-1.096 (0.726)
Employment Share in Industry			1.196** (0.466)	0.597 (0.623)
Employment Share in Services			-0.630 (0.597)	-0.497 (0.694)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010	1965-2010
Number of countries	74	68	53	48
Observations	332	302	176	163
Arellano Bond test of no second order autocorrelation in first-differenced errors (p-value)	0.88	0.86	0.15	0.08

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Panel GMM Estimation

Table 5. Openness

Log Initial Income	-0.101 (2.155)	-0.320 (2.104)	0.461 (2.344)	0.376 (2.374)
Investment / GDP	0.735*** (0.200)	0.726*** (0.206)	0.947*** (0.180)	0.908*** (0.200)
Years of Schooling	1.018 (0.867)	-0.0509 (0.897)	1.114 (0.923)	0.620 (1.086)
Trade Openness: (X+M)/GDP	0.0221 (0.0400)			0.0377 (0.0442)
FDI Openness: (Inflow +Outflow)/GDP		0.634** (0.274)		0.512* (0.284)
Portfolio Flows Openness: (Inflow+Outflow)/GDP			0.0776 (0.0609)	0.0408 (0.0885)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010	1965-2010
Number of countries	82	83	78	76
Observations	494	487	443	421
R-Squared	0.06	0.07	0.07	0.08

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Fixed Effects Estimation

Table 6. Openness (GMM)

Lagged Fraction of Positive Growth Years	0.0260 (0.0901)	0.0202 (0.0898)	-0.0392 (0.0969)	-0.0378 (0.0958)
Log Initial Income	0.998 (2.527)	0.671 (2.580)	1.831 (2.425)	1.999 (2.487)
Investment / GDP	0.755*** (0.245)	0.708*** (0.262)	0.862** (0.354)	0.834** (0.379)
Years of Schooling	3.208* (1.682)	2.021 (1.654)	2.868* (1.688)	2.175 (1.902)
Trade Openness: (X+M)/GDP	0.0528 (0.0698)			0.131 (0.0823)
FDI Openness: (Inflow +Outflow)/GDP		0.481* (0.285)		0.325 (0.225)
Portfolio Flows Openness: (Inflow+Outflow)/GDP			0.198*** (0.0434)	0.195*** (0.0543)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010	1965-2010
Number of countries	73	72	68	67
Observations	322	312	288	278
Arellano Bond test of no second order autocorrelation in first-differenced errors (p-value)	0.79	0.83	0.53	0.64

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Panel GMM Estimation

Table 7. Financing

Log Initial Income	-0.202 (2.313)	-0.327 (2.042)	-0.0986 (2.363)
Investment / GDP	0.867*** (0.183)	0.758*** (0.206)	0.891*** (0.191)
Years of Schooling	0.826 (0.811)	0.797 (0.801)	0.819 (0.854)
Credit to private sector / GDP	0.00216 (0.00327)		0.00215 (0.00325)
CA / GDP		0.0691 (0.205)	0.112 (0.226)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010
Number of countries	82	84	82
Observations	483	511	478
R-Squared	0.06	0.05	0.06

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Fixed Effects Estimation

Table 8. Financing (GMM)

Lagged Fraction of Positive Growth Years	-0.0272 (0.0939)	0.0393 (0.0920)	-0.0230 (0.0944)
Log Initial Income	-0.550 (2.163)	1.094 (2.553)	-0.455 (2.312)
Investment / GDP	0.908*** (0.295)	0.838*** (0.312)	0.955*** (0.361)
Years of Schooling	8.292*** (1.913)	2.688* (1.581)	8.073*** (1.951)
Credit to private sector / GDP	-0.378*** (0.0777)		-0.376*** (0.0778)
CA / GDP		0.385 (0.338)	0.153 (0.338)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010
Number of countries	312	327	308
Observations	71	74	71
Arellano Bond test of no second order autocorrelation in first-differenced errors (p-value)	0.76	0.99	0.68

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Panel GMM Estimation

Table 9. Volatility

Log Initial Income	-0.682 (4.102)	-0.753 (2.054)	-1.219 (4.101)
Investment / GDP	0.759* (0.407)	0.767*** (0.230)	0.628* (0.377)
Years of Schooling	-4.193 (2.874)	0.387 (0.801)	-4.707 (2.865)
REER Volatility	-1.464*** (0.485)		-1.667*** (0.463)
Terms of Trade Volatility		-0.293* (0.147)	0.0831 (0.222)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010
Number of countries	78	81	77
Observations	187	472	184
R-Squared	0.12	0.06	0.13

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Fixed Effects Estimation

Table 10. Fiscal Policy and Space

Log Initial Income	1.898 (2.919)	-0.399 (3.261)	-0.200 (3.162)	-1.459 (3.402)
Investment / GDP	1.211*** (0.388)	1.280*** (0.475)	0.924* (0.466)	0.830** (0.387)
Years of Schooling	0.460 (1.299)	-3.488** (1.627)	-3.268* (1.796)	-0.330 (1.092)
Net Lending and Borrowing (percent of GDP)	1.398*** (0.376)			
General Government Cyclically Adjusted Balance (percent of potential GDP)		1.796*** (0.556)		
General Government Structural Balance (percent of potential GDP)			2.080*** (0.614)	
General Government Gross Debt (percent of GDP)				-0.1000* (0.0547)
SAMPLE YEARS	1965-2010	1965-2010	1965-2010	1965-2010
Number of countries	75	46	46	79
Observations	265	146	149	258
R-Squared	0.151	0.153	0.179	0.083

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Fixed Effects Estimation

Table 11. Governance

Log Initial Income	-1.224 (4.458)	-1.011 (4.408)	-1.328 (4.568)	-2.497 (4.226)
Investment / GDP	0.905** (0.365)	1.037*** (0.368)	0.798** (0.347)	0.718** (0.346)
Years of Schooling	-3.027 (3.216)	-3.123 (3.160)	-2.042 (3.188)	-2.520 (2.850)
Rule of Law	9.233 (13.93)			
Regulatory Quality		-6.108 (11.44)		
Control of Corruption			18.92** (9.405)	
Government Effectiveness				34.23*** (9.949)
SAMPLE YEARS	1996-2010	1996-2010	1996-2010	1996-2010
Number of countries	80	80	80	80
Observations	189	189	189	189
R-Squared	0.05	0.05	0.08	0.13

Sources: IMF staff estimates and calculations.

Notes: Dependent Variable: Fraction of positive growth states

Robust Standard Errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Fixed Effects Estimation

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