

# Asiaphoria Meet Regression to the Mean

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Abstract: There are two common failures in economic forecasting. One is excessive extrapolation of the (recent) past into the (distant) future, particularly susceptibility to “irrational exuberance” (Schiller). The second is excessive subjective certainty that relies on confidence in continuity and hence consistently under predicts discontinuities—even relative to their known past probabilities. While the more bullish attitudes towards growth in China and India have been softening, the official forecasts in the IMF World Economic Outlook and the general discussions about the future of the global economy are often premised on the continuation of perhaps slower but growth that is super-rapid (more than two standard deviations above the cross-national average) in both China and India. We make three points. First, the single most robust empirical finding about economic growth is low persistence of growth rates. Extrapolation of current growth rates into the future is at odds with all empirical evidence about the strength of regression to the mean in growth rates. Second, especially outside of the OECD countries, the process of economic growth is not at all well characterized by business cycle variations around a (relatively) stable mean. Developing country growth rates are strongly episodic and large (and apparently discrete) shifts in medium-term growth rates of 4 ppa or more common—and particularly prominent are large slowdowns. Episodes of super-rapid growth tend to be of short duration and end in decelerations back to the world average growth rate. Both China and India are already in the midst of episodes that are historically long and fast. Third, while we are not predicting sharp decelerations in either economy, there are plausible scenarios based on identifiable fissures in existing growth processes that could lead to sharp and sustained periods of slow growth. We are not arguing that one can predict with any degree of accuracy or confidence a slowdown but certainly policy makers need to be prepared for a wider range of extended slow-growth outcomes in these Asian giants that those that currently dominate the discourse. Hitching the cart of the future global economy to the horse of the Asian giants carries substantial risks.

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## *Introduction*<sup>1</sup>

The rise of Asia is a story in at least four parts, with the fourth not yet known. The first is the dramatic rise of Japan from the aftermath of World War II to a prosperous and productive economy and global leader by the 1980s. The second is the rise of the East Asian Dragons—led by the four “Asian Tigers” of Korea, Taiwan, Singapore and Hong Kong and followed by the larger economies of South-East Asia: Malaysia, Indonesia, and Thailand. The third is the rise of the Asian Giants, with populations of over one billion China and India each have more than twice the population of the other eight East Asian economies combined.

As least since the 1980s growth accelerated in both China and India and then, surprisingly, given historical patterns, accelerated again in both countries the 1990s followed by acceleration in India in the 2000s. The power of compound interest over long periods at high rates plus their sheer scale in population have led both economies to become global economic powerhouses. In the PWT8.0 data at PPP the three largest economies in the world in 2011 are the USA, China and India, with China now, at PPP, roughly three times Japan and four times Germany<sup>2</sup>.

The fourth stage, the future, is unknown. Extrapolation of the current growth rate differentials between China and India and the more modest growth of US and even more modest recent growth in Europe for another decade or two into the future produces an Asiaphoria—the view that the global economy will increasingly be shaped and lifted by the trajectory of the Giants. Combined with continued growth in the other large and still low and middle income Asian economies—e.g. Vietnam, Indonesia, Thailand—the vision of the global economic center of gravity shifting decisively to Asia, already a reality, becomes future’s destiny.

However, predicting future levels of output by the extrapolating the current growth rate into even the near, much less the distant, future is on very weak scientific footing. The single most robust and striking fact about cross-national growth rates is *regression to the mean*. There is very little persistence in country growth rates over time and hence current growth has very little predictive power for future growth. Hence, while it *might* be the case that China continues for another two decades at 9 percent per capita growth, given the regression to the mean present in the cross-national data this would be a 3 standard error anomaly. While it *might* be the case that India continues at 6 percent this would require that India’s already rare persistence of growth persist.

It is argued that one of the reasons why developing country growth has been more volatile, and in particular that the slowdowns in growth have been more dramatic (often to zero or negative growth rates) and extended (North, Weingast, Wallis 2009) is that they do not yet have

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<sup>1</sup> We would like to thank David Yang for his able assistance.

<sup>2</sup> There is of course the question of whether PPP, which is appropriate for comparisons of living standards is the right metric for global influence, as trade obviously happens at actual, not PPP, exchange rates.

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robust institutions (like neutrally enforced rule of law) for providing long-run stability of investor expectations. Both China and India have obvious major issues in this regard.

## **Part I: Regression to the Mean Would Imply Slowdown for China and India**

### *1) Regression to the Mean: The Single Most Robust Fact About Economic Growth*

The 1990s saw an explosion of “growth regressions”<sup>3</sup> which placed growth of GDPPC (over some period of time) on the left hand side and everything but the kitchen sink on the right (Wacziarg 2002). Sala-i-Martin (1997) alone takes credit for four million growth regressions. We are hardly going to characterize what was “learned” from all of that as nearly every assertion about correlates (or causes) of growth emerging from any one study has been challenged as not robust in another. The sensitivity of growth regression findings about particular variables was an issue early (Levine and Renelt 1992) and often.

One fact about the growth process that emerged early in the growth research—including a paper of ours (with Bill Easterly and Michael Kremer) in 1993 (Easterly et al 1993)—is a fact that has stood the test of time and new data. There is very strong regression to the mean in the growth process and hence very little persistence country growth rate differences over time. While one might think that most of the variation in growth rates over longer than business cycle periods (e.g. 10 years or more) is due to relatively persistent cross-national differences in growth performance, the opposite is true. In growth rates countries look less like themselves over time and more like the average growth rate. In most developing countries there is more variation in growth rates over time within the same country than in the cross-national distribution across countries.

Table 2 presents four measures of persistence: the correlation, the rank correlation (to reduce influence of outliers), the regression coefficient of current on lagged growth, and the R-Squared of the regression (which is of course the square of the correlation coefficient). We use the Penn World Tables 8.0 (Feenstra, Inklaar, Timmer 2013) data on local currency real GDP numbers from national accounts (since we are not (yet) comparing levels) and population to compute real GDPPC. We compute least squares growth rates of natural log GDPPC for 10 and for 20 year periods for all countries with sufficient data<sup>4</sup>. The results show that the low persistence of growth is a robust fact about growth processes that has been consistent across all decades—if anything there is less persistence in the recent growth rates (1990-2000 to 2000-2010) than in

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<sup>3</sup> Barro’s 1991 paper alone has over 10,000 citations in Google Scholar.

<sup>4</sup> We exclude entirely countries with less than 25 years of data—which excludes all of the former Soviet Union. We calculate a growth rate if there is more than 7 years of data for the 10 year growth rates and 14 for for the 20 year period (e.g. we include a 10 year growth rate for the 1950s for countries with data starting in 1953). We also exclude Equatorial Guinea just because it is a small outlier.

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previous decades<sup>5</sup>. Not surprisingly the persistence declines over longer periods so that using current growth rates to predict two decades ahead has even less predictive power than predicting two decades ahead.

Table 2: There is little persistence of cross-national growth rates across decades						
Period 1	Period 2	Correlation	rank correlation	regression coefficient	R-squared	N
Adjacent decades						
1950-60	1960-70	0.363	0.381	0.378	0.132	66
1960-70	1970-80	0.339	0.342	0.382	0.115	108
1970-80	1980-90	0.337	0.321	0.323	0.114	142
1980-90	1990-00	0.361	0.413	0.288	0.130	142
1990-00	2000-10	0.237	0.289	0.205	0.056	142
One decade apart						
1950-60	1970-80	0.079	0.192	0.095	0.006	66
1960-70	1980-90	0.279	0.312	0.306	0.078	108
1970-80	1990-00	0.214	0.214	0.163	0.046	142
1980-90	2000-10	0.206	0.137	0.143	0.043	142
Two decades apart						
1960-70	1990-2000	0.152	0.177	0.152	0.023	108
1970-80	2000-2010	-0.022	0.005	-0.015	0.001	142
Source: Author's calculations with PWT8.0 data (Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2013))						

The results using growth rates over 20 year periods—which presumably smooth even more of the “business cycle” fluctuations and hence are even more “long-run” growth—in Table 3 are similar in showing strong regression to the mean, low persistence and low predictive power of current for future growth.

<sup>5</sup> The basic findings in Easterly et al (1993) Table 1 was a correlation of .313 for 100 countries 1970s to 1980s (compare .337 in the current results) and .212 from 1960s to 1970s (compare .339 for 108 countries in the current results).

Table 3: Twenty year periods similarly show only modest persistence and hence current growth is of little value in predicting future growth						
Period 1	Period 2	Correlation	Rank correlation	Regression coefficient	R-squared	N
Adjacent two decade periods						
1950-70	1970-1990	0.258	0.318	0.343	0.067	70
1960-80	1980-2000	0.459	0.454	0.494	0.211	108
1970-90	1990-2010	0.327	0.325	0.215	0.107	142
Gap of two decades						
1950-70	1990-2010	0.047	0.015	0.047	0.002	70

For the question at hand—“will the rapid growth rates of the Asian giants continue into coming decades as an engine of global growth?”—the most relevant summary statistics are the regressions. If we didn’t know anything about a country other than its past growth rate then there are two facts.

First, knowing the current growth rate only modestly improves the prediction of future growth rates over just guessing it will be the (future realized) world average. The R-Squared of decade ahead predictions varies from .056 (for the most recent decade) to .13. In general, past growth is just not that informative about future growth.

Second, if all we know is a country’s current growth rate then the best prediction of the future is that the country’s growth will be the world average plus its current growth rate scaled by a number between .2 and .3.

*II) A 42 Trillion dollar question: Will China’s and India’s Growth Regress to the Mean?*

In this section we just work out the mechanical implications for the growth of dollar GDP of China and India comparing scenarios of “continuation of current growth” versus regression to the mean. By “mechanical” we just mean, what we would “expect” to happen if we did not know anything about China or India and just treated them as if they are to follow the statistical regularities that apply to other countries.

We create predictions of growth rates in future decades by taking regressions that predict countries’ growth rates based on their past decades growth (and their initial levels of income in PPP to allow for convergence). Predictions then just plug China’s and India’s current growth rates and levels of income into that equation and roll these predictions forward for two decades. The basic idea (on which we experiment with many variants) is to estimate equation 1:

$$1) g_{00-10}^i = \alpha + \beta * g_{90-00}^i + \gamma * \ln(y_{00}^i) + \varepsilon^i$$

And then predict growth ahead for two decades using the estimated coefficients and the actual values for China and India for the first decade and the predicted for the first decade in predicting the second.

$$gp_{13-23}^{China} = \hat{\alpha} + \hat{\beta} * g_{00-10}^{China} + \hat{\gamma} * \ln(y_{2010}^{China})$$

$$g_{23-33}^{China} = \hat{\alpha} + \hat{\beta} * gp_{13-23}^{China} + \hat{\gamma} * \ln(yp_{2023}^{China})$$

Table 4 shows the results of a variety of “regression to the mean” regressions, with and without convergence terms, with and without two decades of lags and for 10 versus 20 year time periods. Not surprisingly given the robustness of weak persistence as a feature of growth rates all regressions produce coefficient on lagged growth between .20 and .32.

Table 4: Regressions of current growth rates on past growth rates, allowing for income convergence							
Dependent variable		Constant	Lagged growth	Second lag of growth	Initial Level of GDPPC	R-Squared	N
Growth 2000-2010	Coefficient	0.023	<b>0.205</b>			0.056	142
	t-stat	10.758	2.887				
Growth 2000-2010	Coefficient	0.068	<b>0.329</b>		-0.006	0.177	142
	t-stat	6.632	4.572		-4.519		
Growth 2000-2010	Coefficient	0.074	<b>0.274</b>	<b>0.161</b>	-0.006	0.222	142
	t-stat	7.227	3.749	2.812	-5.135		
Growth 1990-2000	Coefficient	-0.009	<b>0.240</b>	<b>0.045</b>	0.003	0.157	142
	t-stat	-0.665	3.561	0.683	1.679		
Growth 1990-2010	Coefficient	0.031	<b>0.241</b>		-0.001	0.117	142
	t-stat	3.164	4.272		-1.243		

Source: Authors' calculations with PWT8.0 data.

We use these regressions to predict total GDP in dollars (not PPP adjusted) of China and India over the next two decades. We use the UN Medium Fertility projections of total population. These show China's population growth near zero while India's continues at about 1 ppa over the next decade and then slowing. We start the scenarios using the IMF WEO 2013 US dollar GDP (which is somewhat a forecast, but, for instance, already includes the depreciation of the rupee in 2013). We compute total dollar GDP for 2023 and 2033 by simply using an assumed growth rate of GDP per capita and then multiplying by population.

Table 5: Scenarios predicting future growth rates using regressions allowing for regression to the mean and convergence at 10 or 20 year horizons					
Scenarios		China	China	India	India
		2023	2033	2023	2033
Continuation of 2000-2010 growth	Growth GDPPC	9.74%	9.74%	6.01%	6.01%
	Total GDP	\$23,592	\$60,034	\$3,508	\$6,804
Falls to 2 percent (full regression to mean)	Growth GDPPC	2.00%	2.00%	2.00%	2.00%
	Total GDP	\$11,358	\$13,915	\$2,385	\$3,144
Predicted growth, 10 years, one lag, convergence term	Growth GDPPC	5.01%	3.28%	4.24%	3.92%
	Total GDP	\$15,198	\$21,100	\$2,963	\$4,708
Predicted growth, 20 years, convergence term	Growth GDPPC		3.89%		3.00%
	Total GDP		\$20,077		\$3,820
<i>Source:</i> IMF WEO dollar GDP for 2013 base case, PWT8.0 for 2000-2010 growth, UN Medium variant for population in 2023 and 2033, author's regressions for predicted growth rates 2013-2023 and 2023-2033 (or 2013-2033).					

The results are both obvious and striking. The total 20 year gain 2013 to 2033 in GDP in China if one assumes a continuation of current growth rates is \$51 trillion, which would be a *gain* in GDP more than three times as large as the current US economy, to a level of \$60 trillion. It is striking and obvious that the continuation of current growth rates would make China far and away the world's dominant economy. The gain in India would be smaller (as it begins from a lower base and at 6 percent growth) but still a substantial 6.8 trillion.

However, it is also obvious that regression to the mean of the ordinary type would reduce these gains massively. Under any of the empirical estimates "regression to the mean" the level of China's GDP in 2033 falls to around 20 trillion—which still implies a 20 year increase in GDP of around 11 trillion. Similarly, the gains in India fall from 5 trillion to between 2.4 to 3.3 trillion.

Table 6 shows that whether or not China and India will maintain their current growth or be subject to regression to the global mean growth rate is a 42 trillion dollar question. The difference between the "continuation" scenario in 2033 in which GDP of China+India *gains* 56 trillion and the average of the "regression to the mean" scenarios (which are all quite similar, with total China+India 2033 GDP between 12 and 15.5 trillion) is 42 trillion dollars.

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Table 6: The difference in cumulative GDP gains over 20 years is 42 trillion between the “continuation of current growth” and estimated “regression to the mean” estimates			
Scenarios	Gain in 2033 over 2013		
	China	India	Total
<b>Continuation of current rates (Zero regression to mean)</b>	<b>\$51,095</b>	<b>\$5,046</b>	<b>\$56,140</b>
Regression to 2 ppa	\$4,976	\$1,386	\$6,362
Predicted regression to the mean 10 years, no convergence	\$10,382	\$2,591	\$12,973
Predicted regression to the mean, 10 years, with convergence	\$12,160	\$3,304	\$15,464
Predicted regression to the mean, 20 years, with convergence	\$11,137	\$2,416	\$13,553
<b>Average of three predicted regression to mean scenarios</b>	<b>\$11,227</b>	<b>\$2,770</b>	<b>\$13,997</b>
<b>Difference in gains to dollar GDP of China and India between the “continuation” and “regression to mean” scenarios</b>	<b>\$39,868</b>	<b>\$2,275</b>	<b>\$42,144</b>

This obviously affects the world growth rate substantially—even in the absence of any feedback effects on the rest of the world’s economies. Table 7 shows the evolution of the world total GDP assuming the ‘rest of the world’ grows steadily at 2 percent, reaching 93 trillion in 2033. If China and India continue at their current rate they reach over 66 trillion and hence just mechanically the growth rate of world GDP is 3.5 ppa and then 4.45 ppa in the next two decades (accelerating just because India and China mechanically have a larger share of the total). Conversely, with regression to the mean scenarios for China and India the global growth rate is 2.48 ppa and 2.27 ppa.

Of course this underestimates the role of China and India as growth engines by assuming that other country growth rates are not raised by faster growth in the Giants. To the extent there are positive linkages then this mechanical calculation underestimates (perhaps substantially) the impact on global growth of regression to the mean.



Table 7: Mechanically, if the world grows as 2 ppa and China and India continue they are a larger and larger share of global GDP and growth of global GDP is higher			
Growth	2013	2023	2033
World GDP in Dollars	73,454.49		
Less India and China, 2 percent growth	\$62,757	\$76500	\$93254
China and India GDP at current growth rates		\$27,100	\$66,838
World with China and India at current growth rates		\$103,601	\$160,091
Growth rate of global GDP		3.50%	4.45%
China and India level of output with growth rates that show typical regression to the mean		\$17,325	\$24,224
World with slower China and India (no linkages)		\$93,825	\$117,478
Growth		2.48%	2.27%

We are trying to reverse the default assumptions often made in forecasting GDP which is that, in the absence of any reason to think otherwise, the current growth rate persists. In this view what has to be justified with argumentation is why the growth rate would decelerate. However, this mode of forecasting or projection or even formulation of scenarios is counter-factual to the single most robust fact about growth rates, which is strong reversion to the mean.

Our argument is that the default prediction/projection/forecast should be that a country's growth rate will be subject to regression to the mean. What has to be justified is why the growth rate would persist at rates higher (or lower) than the world mean growth rate.

For instance, in addressing the current question of whether Asia—and necessarily China and India as part of that—will be an engine of global growth over the future (not the short run of one to three years but the longer run of 5 to 20 years) our guess is that growth will slow, substantially, in those countries. Why will growth slow? Mainly, because that is what rapid growth does. Our confidence in the prediction that growth will slow is much larger than our confidence in our being able to specify why or how exactly it will slow.

But this is like all other regression to the mean phenomena. If a hitter has a hot streak and his/her batting average is 50 points up over the last 20 at bats then we would forecast a return to the average batting average over the next 20 at bats (perhaps not exactly to the mean, but substantial regression). If pressed to say *why* the batting average will be lower one could speculate about why it currently is so high and predict those factors will diminish but mainly or predict future events that will causally explain the lowering, but mainly, that is just what happens.

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Taking this stance implies that anything like the continuation of the rapid growth rates in China is unlikely. In our simple regressions the prediction of the continuation of the 9.74 ppa growth of GDPPC in China is 2.5 and 3.0 standard error of estimates from the predicted value. This isn't to say it isn't going to happen as that China has had those growth rates is already improbable and perhaps the improbability will persist, but we argue strong justifications have to be produced to predict such an outcome, rather than just assume that continuation of growth is the "natural" phenomena.

One might, at this stage, suspect us of attacking a straw man, on two levels. First, that no one really ignores regression to the mean in making forecast. Second, the bullish views of growth in China and India have already softened considerably.

While few agencies explicitly engage in very long run forecasting, the October 2013 IMF World Economic Outlook provides forecasts of GDP per capita in constant prices out to 2018. These forecasts reflecting the current view of some "softening" of China's growth rate, but still a growth rate that is more than two standard deviations above the historical cross national averages. Compared to the regression to the mean in the data this is still substantially higher. In the case of India the IMF WEO forecast shows almost no regression to the mean.

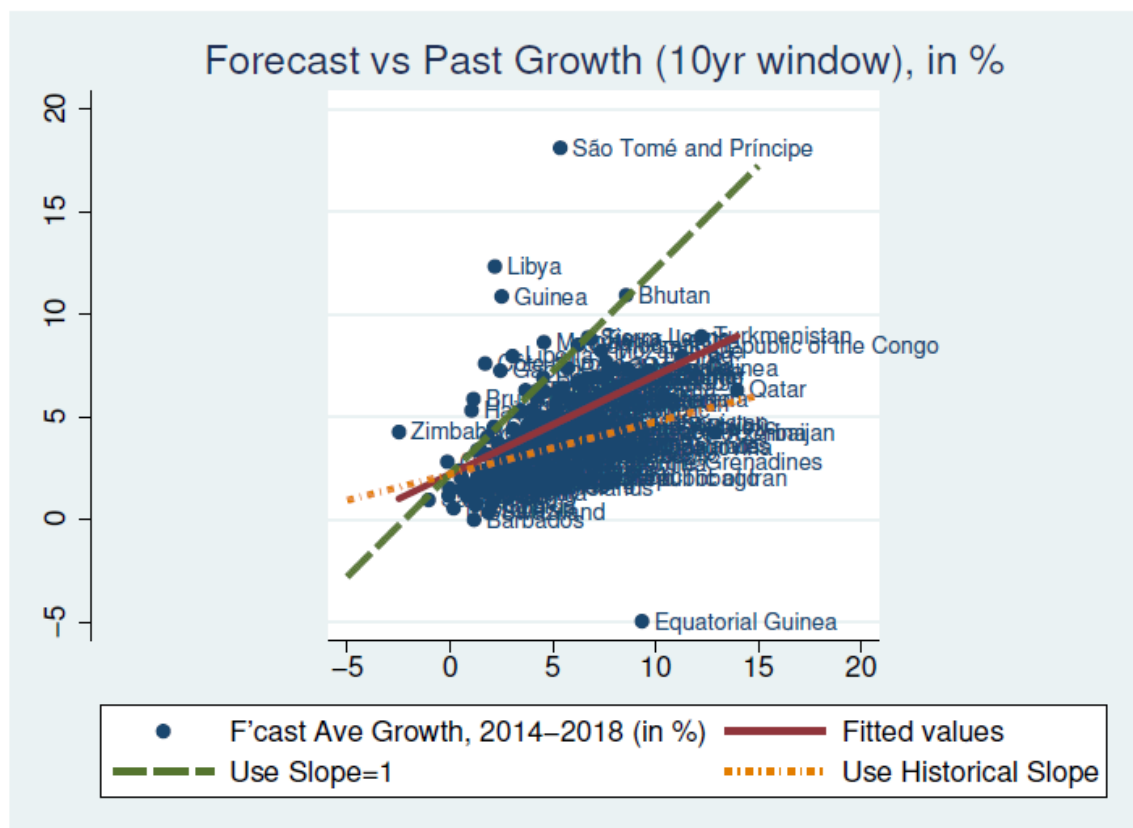
Table 8: IMF October 2013 WEO forecasts of growth of GDPPC growth for Asian countries predicts the continuation of rapid growth until the end of the forecast period		
	2000-2011	2014-2018
China	9.76%	6.47%
India	5.93%	5.14%
Indonesia	3.87%	4.51%
Vietnam	5.58%	4.38%

Source: Download of data from <http://www.imf.org/external/pubs/ft/weo/2013/02/weodata/> of GDP per capita constant prices, national currency. Calculation of geometric growth rate over the periods.

Of course these are not long-run forecasts as they are only 5 (calendar) years ahead but they reflect substantially more regression to the mean and predictability than actual outturns. Figure 1 shows the scatter plot across all countries of the 185 countries in the IMF WEO data of the geometric average of their reported 2014-2018 growth rates on the actual growth rates previous. The lines show no regression to the mean, the actual in the forecasts and the "historical" actual regression to the mean. Not at all surprisingly the forecasts tend to show substantially more persistence and predictability of growth than the historical data over similar periods. The regression of actual growth 2004-2008 on actual growth 1993-2002 gives a coefficient of .255 (std err of .128) and R2 of .04 (similar of course to the results of above, just adjusted to comparable periods of the forecast for comparison). The forecasts 2014-2018 on growth 2003-2012 has a slope of .481 (std err .072) and R-squared of .263.

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**Figure 1: The IMF WEO forecasts show substantially more persistence in growth rates than present in the historical data**



Source: Author's calculations using data from <http://www.imf.org/external/pubs/ft/weo/2013/02/weodata/> on October 30 2013.

Private actors have also produced predictions that rely on substantial amounts of persistence of current super rapid growth rates. A Goldman Sachs report (2011, Global Economics Paper No: 208) that forecasts growth rates to 2050 shows deceleration in China but continued rapid growth in India so that predicted dollar GDP in 2030 was 25.5 trillion in China and 7.17 trillion in India. Our simple extrapolations of current growth rates would show 60 trillion in China and 6.8 trillion in India in 2033 (Table 2) while historical degrees of regression to the mean show total GDP around 20 trillion in China and 4 trillion in India, so these forecasts are higher than even current trends for India while much lower than current trends (or extrapolation of IMF WEO) for China<sup>6</sup>.

<sup>6</sup> What is striking about the this report is the extent to which it softens on China but extrapolates extraordinarily high growth rates for the "N-11" based on their recent past. For instance, their forecast (which comes with the Conference version, still preliminary). Comments welcome.

We are by no means singling out the IMF or Goldman Sachs forecasts for criticism as these are at least explicit and have some articulated method. The recent World Bank and UN reports articulating the goal of “eradicating extreme poverty” contain statements to the effect that if current trends persist then poverty will be reduced to X as if current trends persisting was the “default” scenario rather than “if current growth regresses to mean growth as has been present in every historical period for which we have data.”<sup>7</sup> Moreover, there are even more optimistic country specific forecasts out there, such as Fogel’s (2010) claim that GDP will reach 123 trillion by 2040.

*III) How long to episodes of rapid growth usually last? How do they end?*

A conceptually distinct aspect of forecasting is, over and above whether the mean or central tendency of the forecast fully reflects all available information in an optimal way, is the distribution of likelihoods of alternative outcomes around the central tendency. This relates to the classic distinction between “risk” and Knightian “uncertainty.” As a profession we have become more attuned to that distinction by the recent crisis (e.g. Greenspan 2013). As Silver (2013) argues, the models being used by the risk rating agencies mis-predicted the default risk not by percentage points or even a single order of magnitude, but by a factor of 200.

From 1967 to 1980 Brazil’s economy grew at 5.2 ppa. While many people might have identified macroeconomic and structural imbalances putting that growth at risk of a recession or slow-down, no one was predicting that for the next 22 years--from 1980 to 2002—per capita growth would be exactly zero. We conjecture that nearly any assessment of the “risk” of such an extended slowdown using existing statistical methods for forecasting growth would have found this an extremely improbable outcome.

In this section we examine episodes of growth to argue that, while not our modal forecast, the likelihood of a slow-down even larger than the “regression to the mean” above is not improbable and has to at least be considered as a contingency.

The second main point of the Easterly et al (1993) paper was that while growth rates have low inter-temporal persistence the “right hand side” variables of the then popular growth regressions tended to have high persistence. The obvious consequence is that at most a small part of the observed variation in growth rates could, even in principle, be explained by a linear relationship with an established set of “determinants” of growth and constant coefficients.

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nice caveat that it “should not be interpreted strictly as forecasts” was that growth rates (not per capita) would be above 6 in the next two decades for Egypt and Bangladesh would have growth above 6 for the next two decades and that Nigeria would have growth rates above 7 ppa from now until 2050.

<sup>7</sup> This obviously matters for global calculations as global totals of numbers of poor are (implicitly) weighted by absolute numbers so if growth slows in high absolute number of poor countries (e.g. India) and accelerates in smaller countries (e.g. El Salvador) this obviously will not have the same forecast

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Hausmann, Pritchett and Rodrik (2005) document the existence of frequent growth accelerations of substantial magnitude (more than 2.5 ppa) to rapid growth. They show the timing of these “growth accelerations” are typically not well-explained by standard growth determinants (e.g. “good policy”) or changes in the standard growth determinants (e.g. “policy reform”)<sup>8</sup>.

An alternative to characterizing growth as a smoothly evolving function of linear determinants is to characterize the growth process as episodic, characterized by discrete shifts—accelerations and decelerations—from one growth “state” to another (Pritchett 2000, Olken and Jones 2006). These discrete shifts in growth “states” produce large and then persistent changes in growth rates.

A recent set of papers have extended the growth accelerations and decelerations approach to a complete characterization of the growth process of each country into a set of growth episodes (e.g. Pritchett, Sen, Kar and Raihan 2013). The basic procedure was to use the Bai-Perron approach to identify the years that best divided the GDP per capita into distinct growth episodes each of minimum length of 8 years. Then a filter was applied to the *magnitude* of each potential Bai-Perron break year to eliminate the potential breaks that were empirically small changes in growth that did not represent substantial change in the growth process<sup>9</sup>. The filter was a 2 ppa difference in growth rates for the first potential break and then for each subsequent break if an acceleration followed an acceleration or deceleration followed deceleration then 1 ppa was deemed a break and if an acceleration followed a deceleration (or vice versa) then a 3 ppa change was deemed a break. This procedure divides each country’s growth experience into a set of episodes from as few as zero (if the country experiences no growth breaks, as is the case for several OECD countries such as France and the USA) to as many as five, if all four possible BP candidate breaks pass the filter (as it does for say, Argentina).

Figure 2 shows a graph summarizing growth of India’s real GDP per capita according to Penn World Table 7.1 data<sup>10</sup>. This characterization of India’s growth regime is a growth rate of 2.09 ppa from 1950 to 1993, quite near the world average of 2.15 ppa. This is followed by an acceleration of growth to 4.23 ppa from 1993 to 2002 and then a second acceleration of growth

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<sup>8</sup> Although Rodrik (2000) does a better job of explaining growth decelerations as a product of negative shocks and weak social capability to cope with shocks. McDermott and Breuer (2013) recently argue that the onset and timing of depressions are better empirically explained by “bad” policies than growth accelerations are by good (which is consistent with the argument of Easterly that many of the “robust” findings of the first generation of growth regressions were actually due to non-linearities of sufficiently bad policy (e.g. high black market premium) producing very bad growth outcomes).

<sup>9</sup> That is, we did not use the Bai-Perron tests of statistical significance to identify which potential breaks were “true” breaks as the

<sup>10</sup> The PWT8.0 was only recently available and the entire procedure has not been repeated with the new data, either using national accounts or PPP adjusted data from the 8.0 data.

Conference version, still preliminary.

Comments welcome.

from 4.23 to 6.29 from 2002 to 2010. In this set of episodes India has been a period of accelerated growth for 17 years (1993-2010) at a pace of 4 ppa or higher<sup>11</sup>.

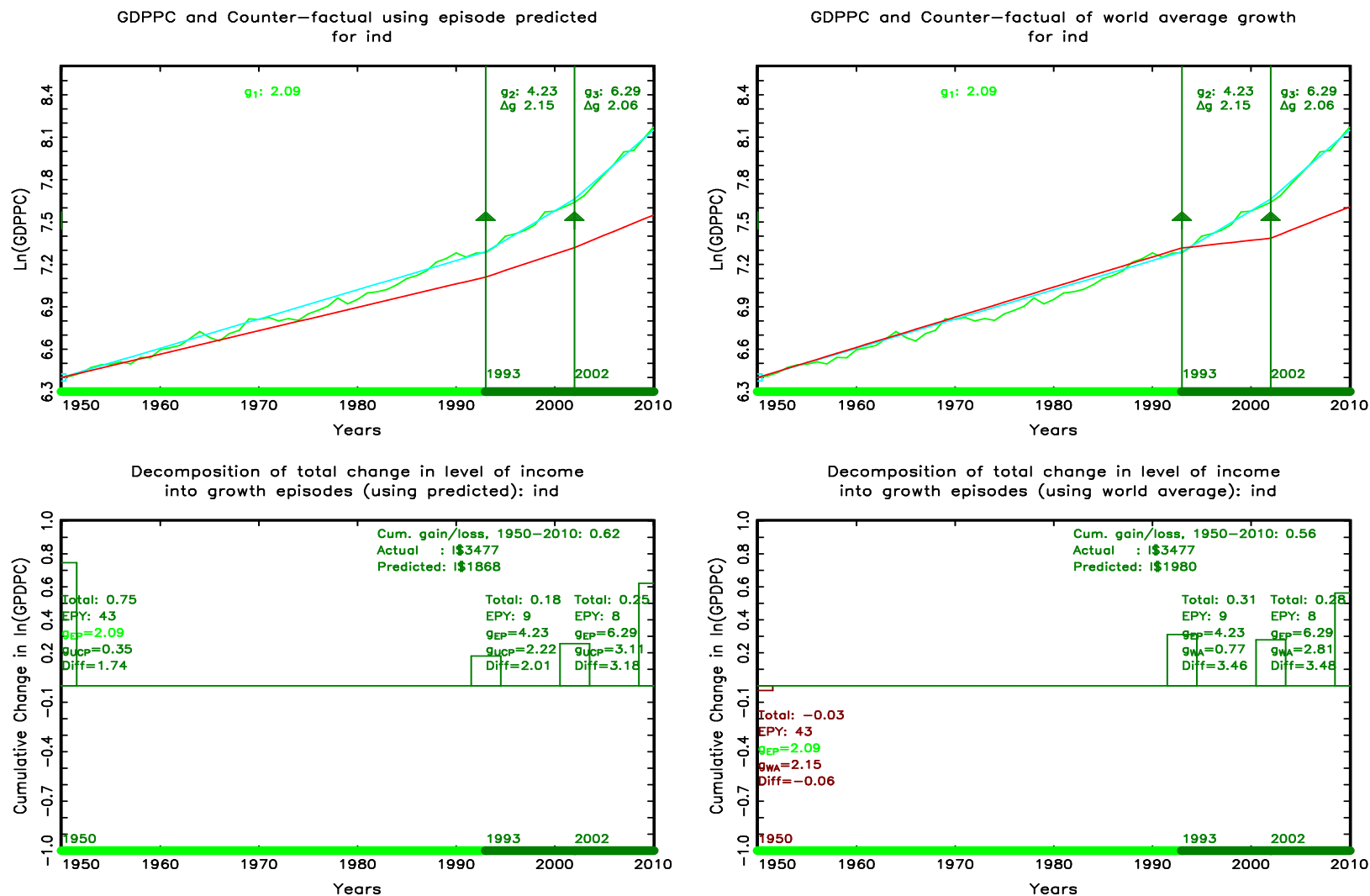
In the graphs the green line is the actual data, the turquoise line is the predicted growth allowing for splines at each of the identified growth episode transitions and the red line is the growth if the country had grown at the “predicted” rate over each episode. In the left hand panel the “predicted” growth is from a country/episode specific regression that allows for regression to the mean and (unconditional) convergence. For example, India’s growth 1993-2002 is predicted from a regression of all other countries growth 2002 to 1993 regressed on their growth over the previous episode of 1950 to 1993 and the level of GDPPC in 1993 and then plugging in India’s values of growth and level of GDPPC into that regression. This allows for shifts in global growth, duration and period specific regression to the mean and convergence (unconditional on anything except past growth). The right hand panel just uses unweighted world average growth over the episode period as the “predicted” growth.

The same procedure applied to China in Figure 3 produces three accelerations in a row. Growth from 1968 to 1977 was 4.33 ppa, accelerating to 7.61 ppa from 1977 to 1991 and accelerating yet again in 1991 to 8.63 ppa until 2010. (The graph goes off the top scale as these figures are produced for a large number of countries with a common vertical axis range in order to allow visual comparability). China has had growth rates of over 6 ppa for 33 years starting in 1977 and this data set ends in 2010.

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<sup>11</sup> There has been a great deal of debate over the dating of India’s growth acceleration and the results are sensitive to the data and method used (in particular the choice of the length of an episode determines how a recent growth acceleration will affect the dates as no acceleration can be near than the fixed length from the end of the coverage of the data). While many date the acceleration near the adoption of the liberalizing reforms during and after the incipient macroeconomic crisis of 1990/1991. Rodrik and Subramanian (2004) date the growth acceleration to the early 1980s—well before the onset of those reforms. For our purposes the question is whether the recent acceleration to super high growth rates, which clearly took place in the 2000s--will persist. Conference version, still preliminary. Comments welcome.

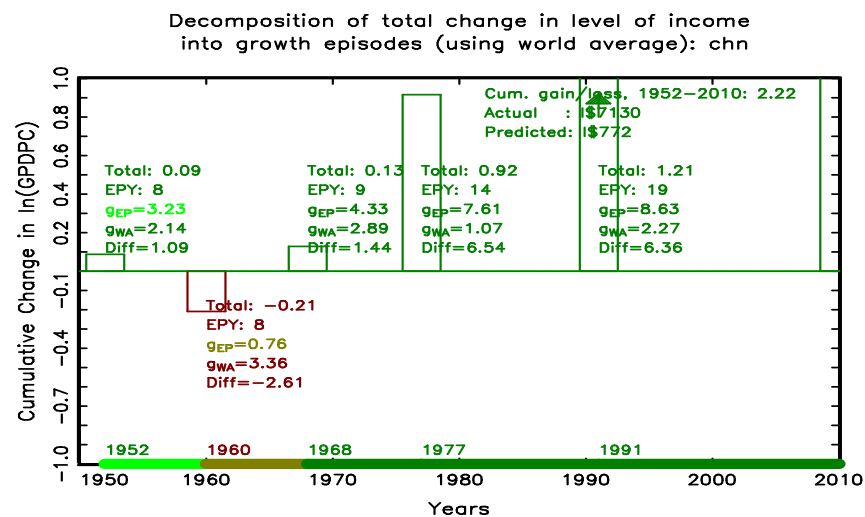
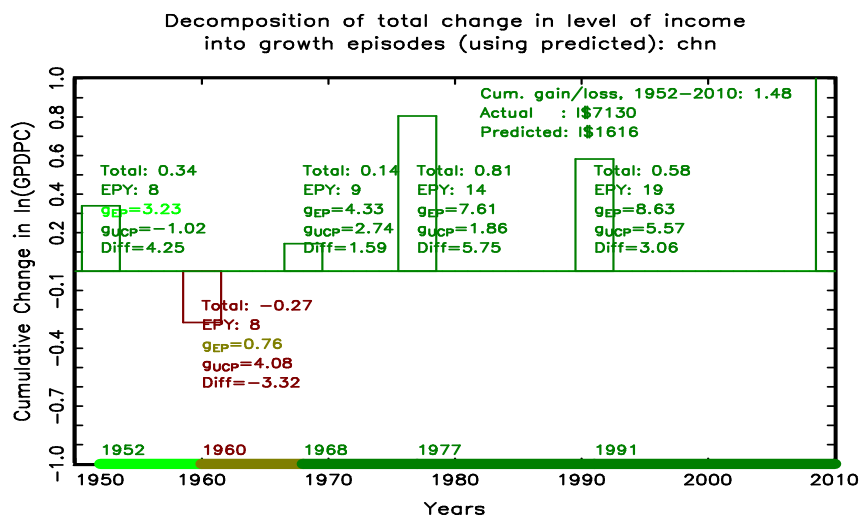
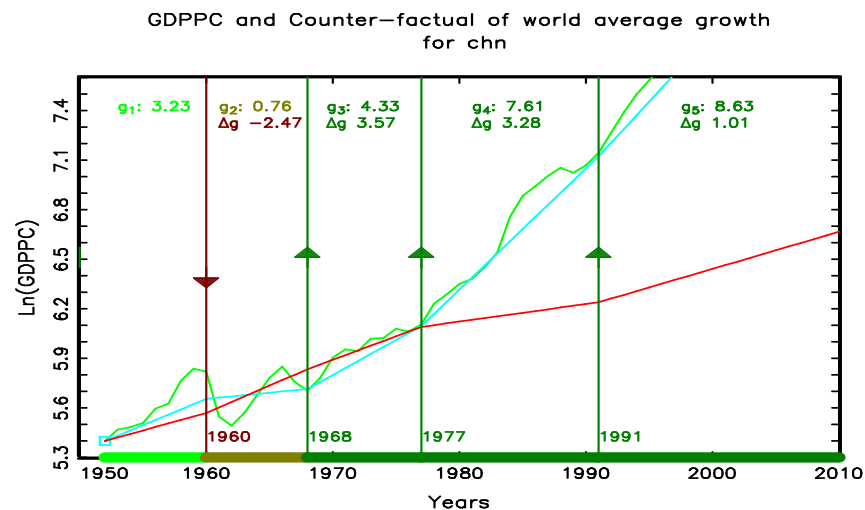
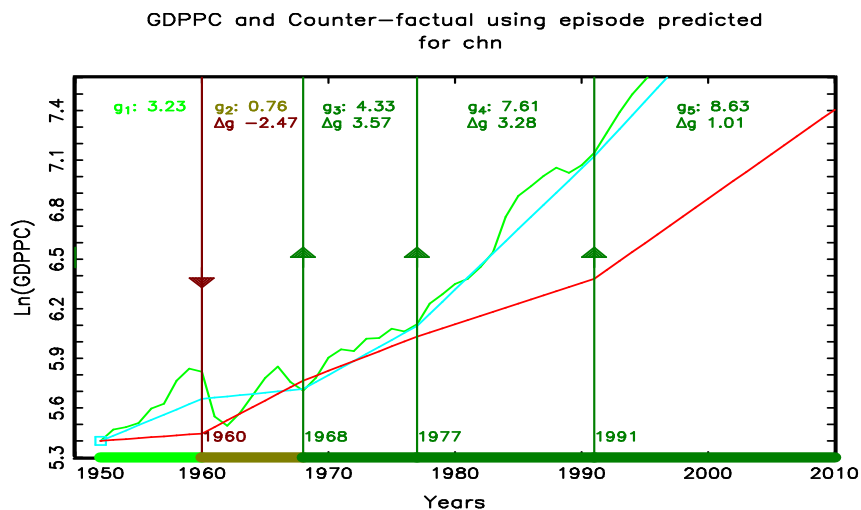
**Figure 2: Decomposing India's growth experience into discrete episodes**



Source: Pritchett, Sen, Kar and Raihan 2013.

Conference version, still preliminary.  
 Comments welcome.

**Figure 3: China's episodes of growth**



Source: Pritchett, Sen, Kar and Raihan 2013.

Conference version, still preliminary.  
Comments welcome.



If one is speculating about how much longer China and India's current episodes of rapid growth might last and what might happen after those episodes, a comparison with all other accelerations into rapid growth is worthwhile. Table 9 shows all 28 growth accelerations that resulted in episodes of growth higher than 6 ppa (which is roughly 2 standard deviations above the cross national mean). This table reveals how unusual China's (and to a lesser extent India's) current growth is, in three senses.

First, episodes of super-rapid (>6 ppa) growth tend to be extremely short-lived. The method of dating growth episodes doesn't allow an episode of less than 8 years. The median duration of a super-rapid growth episode is 9 years, only one year longer than its possible minimum. There are essentially only two countries with episodes even approaching China's current duration. Taiwan had a growth episode from 1962 to 1994 of 6.77 ppa (decelerating to 3.48 from 1992 to 2010). Korea had an acceleration in 1962 to 1982 followed by an acceleration in 1982 until 1991 when growth decelerated to 4.48 ppa so a total of 29 years of super-rapid growth (followed by rapid growth). So China already holds the distinction of being the *only country*, quite possibly in the history of mankind but certainly in the data, to have sustained an episode of super-rapid growth for more than 32 years.

Second, the end of an episode of super-rapid growth is nearly always a growth deceleration. Of the 28 episodes of super-rapid growth there are only two that ended with a shift to higher growth: Korea in 1982 and China in 1991.

Third, the typical (median) end of an episode of super-rapid growth is near complete regression to the mean. The median growth of the episode that follows an episode of super-rapid growth is 2.1 ppa. So the "unconditional" expectation (or central tendency) of what will happen following an episode of rapid growth is a reversion to not just somewhat slower growth but massive deceleration of 4.65 points (more than twice the cross-national standard deviation). A deceleration of that magnitude takes growth in India from 6.29 to 1.64 and in China from 8.63 to 3.98.

**Table 9: All growth episodes above 6 ppa, with their duration and growth in the episode following**

Country	Year of acceleration to high growth episode (>6)	Year of end of Episode	Duration of episode (so far)	Growth during high growth episode	Growth after end of Episode	Deceleration (negative)/ Acceleration (positive) to next episode
tto	2002	Continuing	8	9.80%		Continuing
gab	1968	1976	8	9.26%	-2.66%	-11.92%
ago	2001	Continuing	9	9.24%		Continuing
jpn	1959	1970	11	8.99%	3.40%	-5.59%
chn	1991	Continuing	19	8.63%		Continuing
kor	1982	1991	9	8.40%	4.42%	-3.99%
jor	1974	1982	8	8.18%	-4.35%	-12.54%
sgp	1968	1980	12	7.94%	4.17%	-3.78%
mys	1970	1979	9	7.66%	1.52%	-6.14%
chn	1977	1991	14	7.61%	8.63%	1.01%
lao	2002	Continuing	8	7.59%		Continuing
mar	1960	1968	8	7.25%	3.85%	-3.40%
prt	1964	1973	9	7.10%	1.73%	-5.36%
grc	1960	1973	13	6.98%	1.50%	-5.48%
twm	1962	1994	32	6.77%	3.48%	-3.29%
mys	1987	1996	9	6.69%	2.10%	-4.59%
bwa	1982	1990	8	6.65%	2.80%	-3.85%
ecu	1970	1978	8	6.55%	-0.39%	-6.94%
tha	1987	1995	8	6.51%	1.85%	-4.65%
irl	1987	2002	15	6.40%	0.37%	-6.03%
khm	1998	Continuing	12	6.35%		Continuing
ind	2002	Continuing	8	6.29%		Continuing
dom	1968	1976	8	6.29%	1.01%	-5.28%
kor	1962	1982	20	6.27%	8.40%	2.14%
chl	1986	1997	11	6.16%	2.79%	-3.37%
pry	1971	1980	9	6.16%	0.66%	-5.50%
sle	1999	Continuing	11	6.11%		Continuing
cyp	1975	1984	9	6.04%	3.81%	-2.24%
Median			9	6.87%	2.10%	-4.65%

*Source: Pritchett et al (2013)*

The results in Table 9 is not an artifact of classifying just “super-rapid” growth. If we look at all episodes of growth greater than 4 ppa (one standard deviation above mean) we find many more episodes but similar results about duration and deceleration in all three regards.

The 70 episodes of growth above 4 ppa (inclusive of those above 6 ppa) also have a median duration of 9 years. One does find more examples of extended rapid growth at greater than 4 ppa—Singapore at 30 years at 4.17 ppa from 1980 to 2010, Indonesia for 29 years from 1967 to 1996 at 4.71 ppa, Thailand from 1958 to 1987 at 4.91 (followed by an acceleration), Vietnam at 21 years (and ongoing) at 5.54. But still, other than the combination of Thailand’s episodes (the first of which at much lower rates than China’s and the end of which, as we all know, precipitated the East Asian crisis of 1997), none is of longer duration than China’s.

In the seventy episodes of rapid growth (>4 ppa) there are only four cases in which it was followed by an acceleration (China in 1991, Korea in 1982, Thailand in 1987 and Botswana in 1982).

Finally, the median growth in the episode following the rapid growth episode is 1.85 ppa—again, full regression to the mean.

Those of the author’s age or older remember well at least two previous periods of Asiaphoria. Japan’s rapid growth from the 1960s (though decelerated already by the 1970s) led to a popular and academic literature explaining why Japan succeeded and would continue to succeed. While there were some concerns raised about a bubble in Japanese real estate, we remember almost no one predicting in 1991 that Japan’s real GDP per capita would be only 12 percent higher in 2011 than twenty years earlier (a growth rate of only .6 ppa) and that TFP in Japan which *doubled* from 1961 to 1991 would be 6 percent *lower* in 2011 than 1991 (data and calculations from PWT8.0).

The second Asiaphoria was the growth in the 1990s when the much larger (in population) than the four Dragons South East Asian countries—Indonesia, Malaysia, Thailand appeared to be booming as well. A financial and economic crisis spread across East Asia in the late 1990s with sharp contractions in nearly all the booming economies. While most recovered quickly, the growth rates for the most recent episode of growth (dated as in the method above) has been only 1.42 ppa for Indonesia, 2.1 ppa for Malaysia and 1.85 ppa for Thailand (which is a relatively rapid growth from a quite steep contraction). Korea and Taiwan had shorter crisis and quicker recovery but their growth rates in their more recent growth episode are 3.48 and 3.29 ppa respectively, which is rapid growth, but nothing like the current growth of China or India.

One argument against the predictability of long-run growth is that it has in fact been possible to predict output far ahead. That is, suppose all you knew was that Denmark’s GDPPC measured in 1990 Geary-Khanis dollars was in 1910 GK\$3,891 and that its per capita rate of growth during the pre World War I period of 1890-1916 was 1.90 ppa and someone asked you to forecast

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Comments welcome.

GDPPC in Denmark almost 100 years ahead using only pre-World War I information in 2010. While this might seem pointless, you could venture the guess that it was the simple extrapolation of exponential growth at that exact rate:

$$\text{Prediction: GK\$23,302} = \exp(\ln(3891.25) + (.0190 * (2010 - 1916))).$$

Turns out, you would be right, exactly right—Figure 4. Actual GDPPC was GK\$23,513 so the 94 year ahead forecast of GDPPC was off by about two hundred dollars—less than one percent.

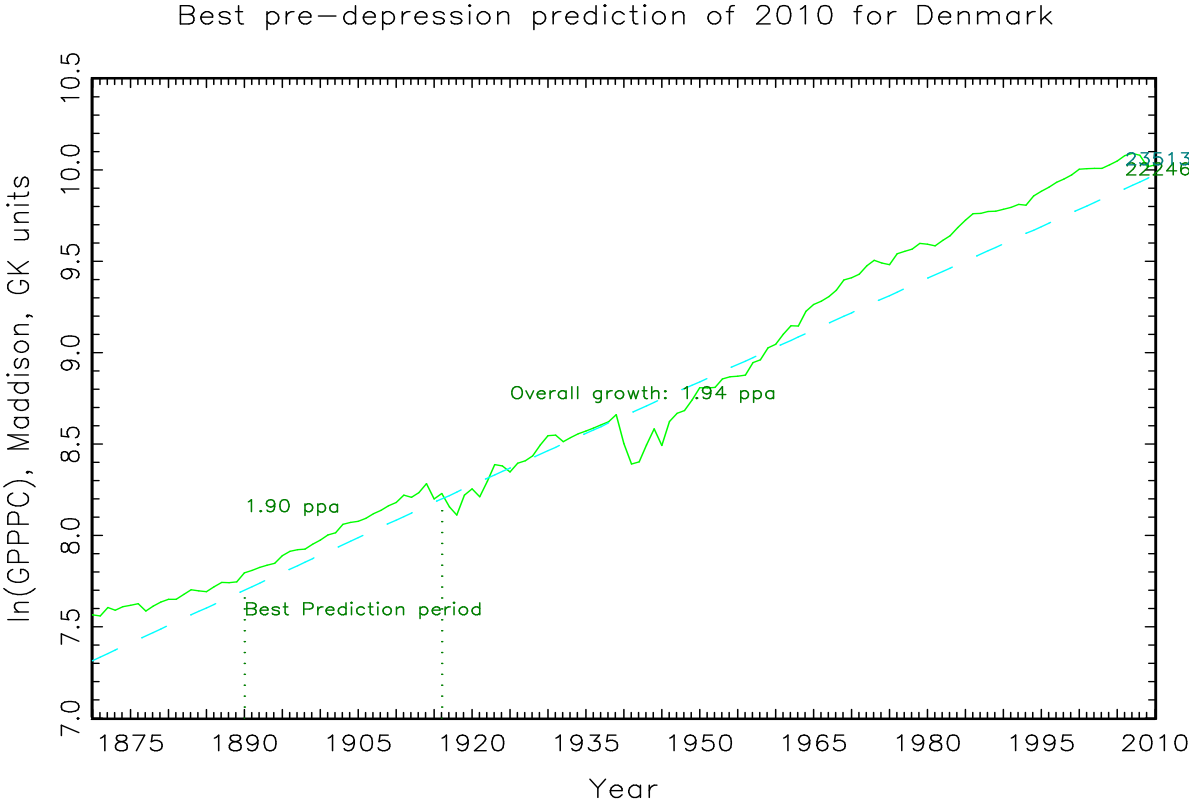
The long-run stability of growth in OECD countries is a fact that are well-known<sup>12</sup> to all economists, so well known in fact that they may cause habits of thought that are misleading. The leading countries have very stable growth rates (averaged over long periods) for a very long time<sup>13</sup>. The high levels of income of the USA and others are the power of compound interest of a modest growth rate sustained over a very long-time. However, the apparently reliable prediction of the future is an artifact of the fact that they were growing at the mean growth rate so that extrapolations into the future and “regression to the mean” worked together. Where one extrapolates growth rates going against regression to the mean—regression to the mean almost always wins.

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<sup>12</sup> The figure like Figure 1 for the USA is the cover to Chad Jones’s textbook on economic growth.

<sup>13</sup> Of course, as also known as least since De Long’s critique of Baumol’s assertions of “convergence” this is somewhat circular what it *means* to be a leading country is that one maintained a high growth rate. Argentina’s GDPPC in 1890 was about that of Austria, France or Germany and much higher than Italy, Norway, Sweden, or Spain.

**Figure 4: Using pre World War I data GDP per capita one can forecast 2010 GDP per capita in Denmark to within a few percent.**



Conference version, still preliminary.  
Comments welcome.

## Part II: Country Specific Considerations

So far our discussion of the Asian Giants as an engine of global growth has been remarkably free of any discussion of the specifics of the Asian Giants. One might have expected the question “Can Asia be the engine of global growth?” which necessitates predicting growth in Asia into the extended future to have been addressed by specifying some relationship between growth and its proximal or causal determinants of the type:

$$g = f(x)$$

and then making the case for continued rapid growth or deceleration based on that model and the likely trajectories of the “x” variables. While we will engage in some country specific discussion along those lines below, we deliberately chose not to go that direction for three reasons.

First, conditional forecasting of this type is only of course as good as the forecasts of the conditioning variables. Imagine dividing the potential x’s into two types. Those easy to forecast because they have high persistence (e.g. size of the country, geography, latitude, nearness to ports) and those with low persistence. Obviously the former are also quite easy to forecast, but are also those that cannot be the usual causes of super-rapid growth and hence would be only good at predicting the “mean” to which super rapid growth is likely to regress to, which may or may not be higher or lower than the global mean—but empirically not by much as these variables must, by definition as high persistence variables, have fairly low explanatory power for changes in growth.

The growth determinants of the latter type, those with low persistence, may be good at forecasting growth but then the problem becomes forecasting those. Again, by construction, extrapolation of those variables is a bad forecast of these Xs making a conditional forecast conditional on these a bad forecast. To use this forecast continued rapid growth would then require that we somehow have a good forecast that some important growth determinant is going to change—in such a way that growth that otherwise would have decelerated remain rapid. We cannot think of such a thing and, as we argue below, there are several prominent possibilities of just the opposite dynamic.

Second, even if we could reliably forecast the Xs we would also have to imagine we had identified a reasonably accurate and long-term stable empirical relationship. This just has not been true to any extent in the domain of economic growth, nor is this unique to economic growth. We have lived through a series of major events in our lifetime none of which were widely predicted by experts in the appropriate domain. Not just the obvious example of the financial crisis or perhaps idiosyncratic individual events like the attacks of 9/11 but major geopolitical shifts like the collapse of the Soviet Union and the Arab Spring (and its seasonal sequae) have not been anticipated.

We are of course still living in the shadow of the financial crisis in the USA (and others). It is worth pointing out that the depth and severity of the crisis was not just not predicted by academic economists on the sidelines nor in their assessments of the riskiness of classes of assets by raters (Silver 2013) or by policy makers but that people with incredibly high stakes on correct forecasts by having most of their financial wealth at stake (and, unfortunately, leveraged) misforecast the outcomes in the housing market, badly—for them. This is not because there was ignorance that there as a housing bubble, there were mainstream economists (particularly Shiller but many others) pointing out the magnitude of the deviation of housing prices from their long run trends early (at least by 2005) and often. But what was missed was how this would translated into the financial sector and the economy as a whole. Leamer's (2010) demonstration of how the evolution of prices and quantities of the housing market in Los Angeles produced enormously different dynamics in different periods, such that the “confidence intervals” based on past data for future predictions substantially understate the true range of possibility is just one, but well-articulated, example of the instability of models.

Third, super-rapid growth is due in part to a large residual or unexplained component, which we rarely admit as we overexplain the current reality. While perhaps too much can be made of Taleb's *Black Swan* like arguments that we overpredict reality—that is, we concoct reasons *ex post* to make it seem as if we understand what we really don't—conventionally too little is made of it. Taleb's obvious and poignant example that while Lebanon remained an oasis of multi-religious peaceful coexistence and institutional success (aka “the Switzerland of the Middle East”) there were many powerful theories as to why Lebanon's success was over-determined by observable factors. After Lebanon was engulfed into the general regional instability it quickly became equally obvious that Lebanon was doomed to instability.

Imagine that in a conference in 2023 we know *ex post* that in 2014 China's GDP growth was 8 percent for the calendar year 2014 but in March of 2015 China experienced sudden sharp slowdown in economic growth that persisted and that caused growth to be only 2 percent from 2015 to 2023. Here is the question. In that scenario, what do we think the the forecast of growth 2015-2023 was in the IMF World Economic Outlook for China in October 2014 six months before the slowdown? Our guess is that the 2014 forecast was 8 percent growth. What was the “standard error” on that forecast? Our guess is that it was 2 ppa.

All that said, we suspect that the reason for slowdown that will come in China and India is for a similar reason but which will manifest differently given the very different politics. That is, in neither country does investor confidence rely on rule of law. In both countries there are plausible scenarios in which disruptions of the current “political settlement” that is providing a climate for “ordered deals” (Hallward-Driemeier and Pritchett 2011) will be disrupted. This disruption of the arrangements that provide settled expectations of investors can easily create processes with non-linear sudden stops.

As North, Weingast and Wallis (2009) show the reason for the low growth *on average* of developing versus developed countries is not the lack of rapid growth—it is the lack of the *persistence* of that growth and the very low growth rates during their periods of negative growth. As we saw with Denmark the rich industrial countries are rich because they grew at modest rates for very long periods, which little variation and few disastrous downturns—e.g. 84 percent of years in positive growth and growth of only -2.33 when negative. In contrast, current poor countries have failed to converge because, while they growth much faster when they are growing (e.g. 5.39 ppa for those in the 2,000 to 5,000 range) then spend a third of their time with negative growth and growth, when negative, is -4.75.

<b>Table 10: The “developing” countries spend more time in negative growth states than the advanced industrial countries</b>				
Per capita income in 2000 (PPP)	Number of countries	Percent of Years with positive growth	Growth rate, when positive	Growth rate, when negative
>20,000 (non-oil)	27	84%	3.88%	-2.33%
“Developing” countries				
15,000 to 20,000	12	76%	5.59%	-4.25%
10,000 to 15,000	14	71%	5.27%	-4.07%
5,000 to 10,000	37	73%	5.25%	-4.59%
2,000 to 5,000	46	66%	5.39%	-4.75%
300 to 2,000	44	56%	5.37%	-5.38%
Average of <20,000			5.37%	-4.61%

*Source: Adapted from North, Wallis, Weingast, 2009, table 1.2*

There has been powerful evidence generated that high *levels* of output per capita are associated with high *levels* of institutional quality (e.g. Hall and Jones 1999, Acemoglu, Johnson and Robinson 2002, North, Wallis and Weingast 2009) and that, over very long levels of time, this association is sustained so that institutional arrangement can have very long-lasting effects (including regional evidence within countries as in Dell (2010) showing the persistence on levels of income and well-being today in Peru and Bolivia of the *mita* arrangements in Spanish Colonial times). This view can accommodate short-run growth booms and busts driven by exogenous factors like terms of trade or new opportunities that do not challenge existing economic and political interests. However, it is very difficult (but perhaps not impossible) to explain the location, onset, or timing of extended growth episodes in terms of “institutions” as naturally that component of income explained by events centuries ago (whether that is *mita* or crop endowments or settler mortality or social capital) should not be expected to handle large and rapid *changes* in income.



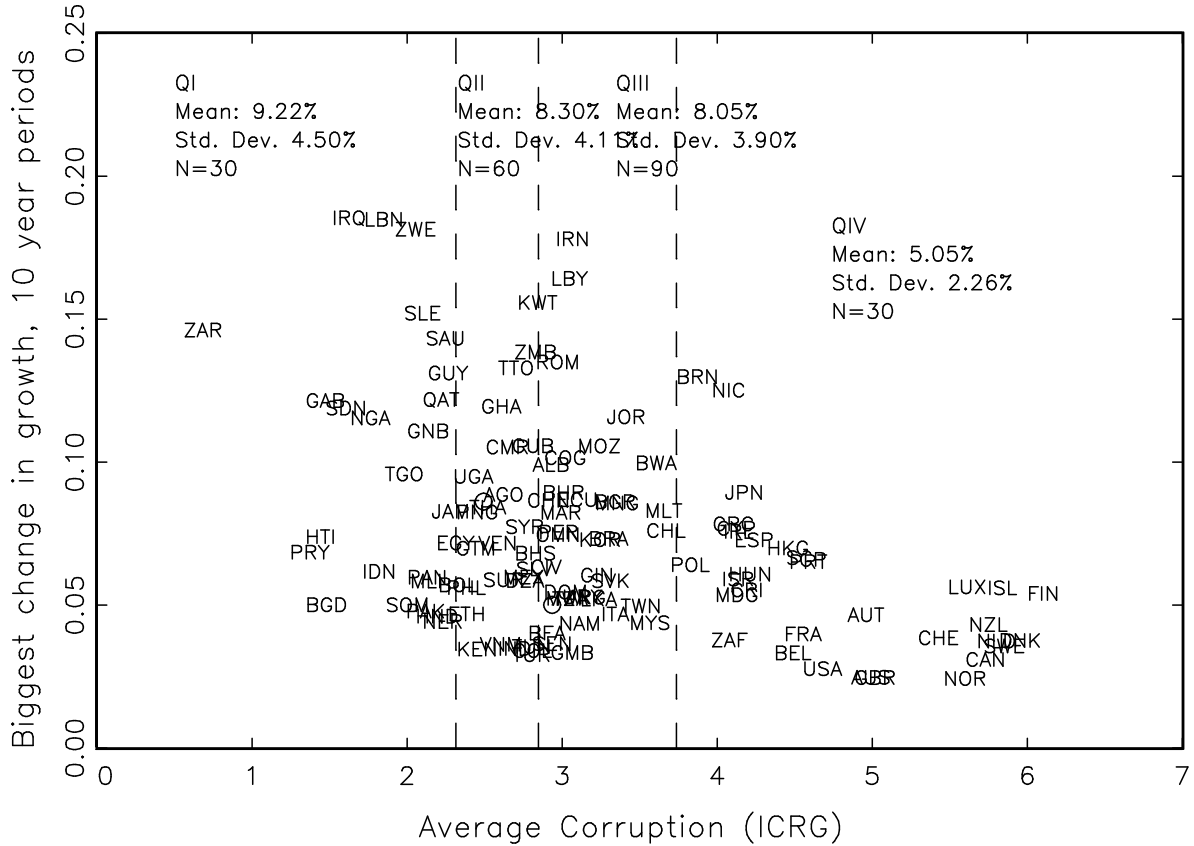
One conjecture about the source of growth slow-downs is that in countries with weak capability for implementation of policies there is a large divergence between the *de jure* laws and regulations and the *de facto* outcomes for specific firms. This can come in the form of arrangements that allow for high and secure profitability for firms without the neutral enforcement of the rule of law. It can even be the case that “closed order deals” (Hallward-Dreimeier and Pritchett 2010) provided for the favored firms not a good “investment climate” for doing business but a vertiable greenhouse—that is an environment specific to the firm (and its connections to existing power structures) that is much *better* than the existing *de jure* regulatory environment and in fact better than the *de facto* environment with good regulations. That is, the favored firms in a “closed order deals” environment have higher and more secure profitability than the typical firm in an OECD country. As firms either “Sieze the State” (Hellmann, Jones and Kaufmann 2000) or firms *are* the state or firms are chosen by the state (Fisman 2001) the official legal and regulatory environment—or more particularly its implementation—are bended to provide great, if super-local and specific, conditions for growth. That is, growth in “closed order deals” can be much higher than in an institutionally “good” investment climate.

But, the difficulty is the transition. Since investor expectations (both domestic and foreign) are grounded in specific relationships to specific power-bases shifts in power can occasion very sudden stops as investor expectations have to realign onto new realities. This can create sudden stops than can resume is new conditions are established or can persist for a very long time if new institutions have to emerge and have credibility.

This can lead measures of “institutions” to be associated with the *range* of growth outcomes, not necessarily the *level* of growth over medium run periods. Figure 5 shows the largest *difference* in growth rates over 10 year periods of countries at various quintiles of control of corruption (as just one indicator, this is not specific to corruption but is reflected in most institutional measures). High levels of control of corruption are associated with very low ranges of growth outcomes

**Figure 5: “Control of corruption” is associated with a lower range of growth rates over time**

Figure 6c: Biggest range of growth and average Corruption



Source: Pritchett and Werker (2012).

IV) *China’s challenge: stable rule of power into rule of law*

There is a strong cross-national relationship between the extent to which a country is (or is rated as) a “democracy” and GDP per capita. This relationship in and of itself of course reveals nothing about cause and effect and certainly we are not going to assert some strong, mono-causal, linear dynamic whereby richer countries “naturally” become more democratic. That said, Figure 4 shows the relationship between a stock like measure of “democratic capital index” that cumulates the POLITY score into a stock (to smooth the transitory fluctuations) which is then scaled scaled from “most democratic country”=100 to “least democratic country”=0<sup>14</sup>.

<sup>14</sup> One commonly used indicator of the degree of democracy is a measure called Polity, used to rate countries on a scale of ‘autocracy’ from zero to negative 10 and on a scale of ‘democracy’

The obvious point is that there are, extremely few exceptions to the tendency that all countries with high levels of GDP per capita (also expressed here as an index from 0 to 100) also have high levels of (measured) democracy. The only two exceptions for a country with GDPPC more than a third of the leader (33 on the index) not having a “democracy capital” score above 80 are Oman (an oil producer)<sup>15</sup> and Singapore. As can be seen, for countries in China’s current range of output (between 10 and 25 on a scale of 0 to 100) the complete range of democracy outcomes exist. However, the average for this group is a democracy capital index of 71 with a standard deviation of 25. Already at a score of 14 China is much less democratic than the “typical” country of its level of output.

For China to continue to have rapid economic growth while maintaining its current level of democracy (as proxied, however crudely, by its POLITY score)—a trajectory moving rapidly due east in Figure 4—would make it more and more anomalous. Which is again not to say it isn’t possible. Singapore (granted, a small city-state of only 5 million people) has managed to be nearly the richest country in the world while only have a POLITY based democracy capital index of 40. But even 40 is more than twice China’s current level of 14.

An empirical question is what, if any, impact might we expect an “democratizing” period to have on China’s growth?

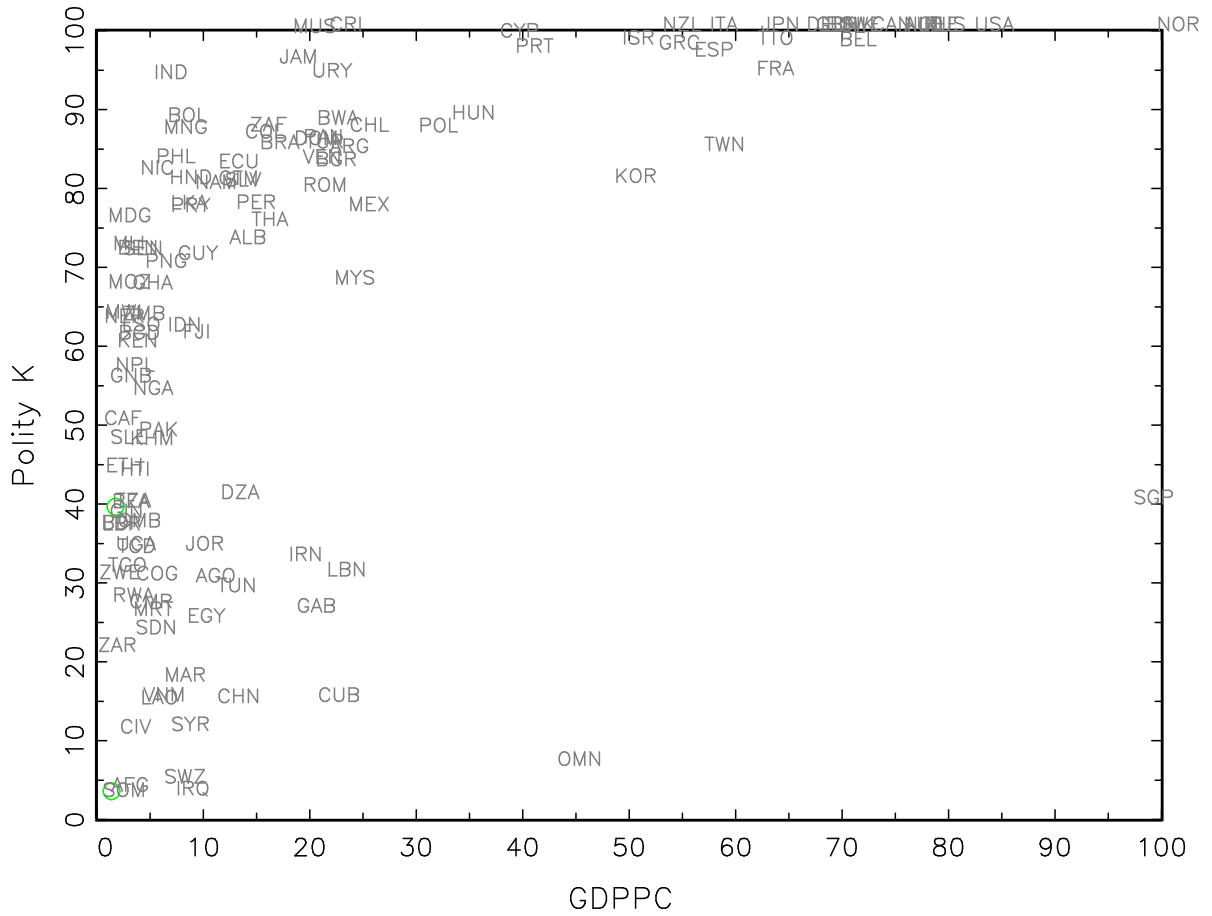
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from zero to positive 10.<sup>14</sup> The simple sum of these two indicators gives an empirical rating that ranges from –10 (completely autocratic) to +10 (completely democratic).

<sup>15</sup> The nature of the data selection process used also excluded other oil countries that would have had high income but low democratic capital as they lacked sufficient data.

<sup>16</sup> Even for the poorest counties at a GDPPC less than 10 the average democracy capital index is 47 and hence China is well below the average of the poorest countries.

**Figure 4: Relationship between GDP per capita and a Democracy Capital Index in 2008**



Source: Kenny and Pritchett 2013.

There is of course a huge literature that examines the association between democracy and growth, which generally finds only a weak association between the level of democracy and the pace of growth but that less democratic countries tend to have much higher volatility of growth. Figure 5 plots countries' average Polity scores over the 1980-2008 period against their growth rates of GDP per capita 1980 to 2011. There is no strong association between growth and Polity score. There are countries with a wide range of economic growth rates in each Polity category, particularly striking in the lowest (which includes China) and lowest in the top (where the industrialized countries cluster near 10).<sup>17</sup>

A simple analysis of whether democracies grow faster or slower than non-democracies does not capture the possibility that large political transitions may themselves have impacts. In this case, while democracies may be capable of sustaining rapid growth in the long run, the transition period itself may create an adjustment period of slow growth. To examine this question, we need to compare countries' growth rates before and after large, rapid political transitions from autocracy to democracy. For this, we need to identify 'large' democratizing transitions.

First, we searched the Polity combined democracy indicator to identify all instances in which a country's index had increased by more than five units in a single year. These were the candidates for a 'large' democratic transition. I then used a decision tree to classify and date these potential transitions, addressing in particular the treatment of countries with multiple transitions. This classification scheme resulted in 52 episodes of large democratic transition.

Once large democratic transitions had been identified, the next step was to calculate growth rates before and after the transition.<sup>18</sup> Because I wanted to capture the medium to long-run dynamics term, I calculated the growth rate for the 10-year period ending three years before the transition and that for the 10-year period beginning one year after the transition (or, if 10 years of data were

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<sup>17</sup> There is a substantial literature by economists on whether democracies tend to have higher or lower economic growth rates than non-democracies (and what causes what). My reading of the current conventional wisdom is that there is very little connection between the *average* growth of democracies and non-democracies as distinct groups, but that there is much higher *variance* in growth rates among non-democracies, with some experiencing rapid growth (China, Vietnam, Indonesia under Suharto) but others experiencing very slow growth or even growth implosions. That said, one can find specifications in which being a democracy appears to matter (see, for instance, Persson and Tabellini 2006).

<sup>18</sup> The comparative data on PPP-adjusted real GDP per capita are taken from Version 6.3 of the Penn World Tables, compiled by the Center for International Comparisons at the University of Pennsylvania. See [http://pwt.econ.upenn.edu/php\\_site/pwt63/pwt63\\_form.php](http://pwt.econ.upenn.edu/php_site/pwt63/pwt63_form.php).

not available, until the data ended). For instance, in the case of Indonesia, the two 10-year periods would be 1986–96 (the period ending three years before the democratic transition in 1999) and 2000–2007 (the period beginning one year after the transition and ending where the PWT6.3 data stop in 2007).<sup>19</sup>

The first result evident in Table 11 is that nearly every country that experienced a large democratic transition after a period of above-average growth (more than the cross-country average of 2 per cent) experienced a sharp deceleration in growth in the 10 years following the democratizing transition.

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<sup>19</sup> These timing assumptions are not innocuous. Often a political transition is preceded by a large fall in GDP per capita, sometimes as the result of the chaos surrounding the transition itself. If one then calculated the growth before the transition to include this fall (which could be the result of the transition itself), then it would look as though the political transition had accelerated growth. That is why I go back some years before the transition, so that the pure disruption effects are not counted as part of the pre-democratic period. Rodrik and Wacziarg (2005) obtain similar results overall: of the nine countries they identify with democratising transitions begun from above 2 per cent growth, the average deceleration is 3.53 per cent, which is *exactly* what we find in Table 9. But in some countries timing differences produce different results.

Table 11: Countries with large democratic transitions starting from above-average (2 ppa) growth in GDP per capita <sup>a</sup>

Country	Year of transition	Magnitude of Polity increase	Growth in 10-year period ending three years before democratizing transition (%)	Growth in 10-year period beginning one year after the transition (%)	Change in pre-/post-transition growth rates (%)
Greece	1975	7	7.19	0.02	-7.17
Iran	1979	10	7.11	0.11	-7.01
Portugal	1976	6	7.11	1.48	-5.63
Taiwan	1992	8	6.47	3.95	-2.52
Taiwan	1987	6	6.42	5.78	-0.64
Nigeria	1979	7	5.81	-2.44	-8.25
Ecuador	1979	14	5.69	-1.66	-7.36
Congo	1992	6	5.68	0.57	-5.11
Indonesia	1999	11	5.54	3.28	-2.26
Dominican Republic	1978	9	5.50	1.35	-4.14
South Korea	1987	6	5.36	5.57	0.22
Thailand	1992	10	4.67	0.82	-3.85
Mongolia	1990	9	4.39	2.09	-2.30
Bulgaria	1990	15	4.02	-0.10	-4.12
Panama	1989	16	3.91	1.68	-2.23
Benin	1990	7	3.62	1.30	-2.32
Pakistan	1988	12	3.50	1.32	-2.18
Uruguay	1985	16	3.44	3.16	-0.27
Brazil	1985	10	3.31	-0.34	-3.65
Paraguay	1989	10	2.70	-0.75	-3.45
Bolivia	1982	15	2.37	0.27	-2.09
Romania	1989	6	2.14	0.85	-1.28
Median			5.01	1.08	-2.99
Average			4.82	1.29	-3.53

Source: Pritchett (2010).

First, of the 22 countries with episodes of large democratic transition from above-average growth, all but one (Korea in 1987 with an acceleration of only 0.22 per cent) experienced a growth deceleration. The combination of high initial growth and democratic transition seems to

make some deceleration all but inevitable. Second, the magnitude of the decelerations was very large: the median deceleration across the 22 countries was 2.99 per cent and the average deceleration was 3.53 per cent. If Indonesia had experienced the typical (median) or average (mean) deceleration of this group of countries, its growth rate would have been either 2.55 per cent (5.54 less 2.99) or 2.01 per cent (5.54 less 3.53) rather than the 3.3 per cent growth it actually experienced. There is no evidence to suggest that zero deceleration is a reasonable expectation for growth after a large democratic transition in a country with above average growth.

The next step was to calculate the 10-year growth rates of countries that had not experienced a large democratising transition. The problem was to identify an appropriate year for the before and after comparisons of growth in ‘no transition’ countries; choosing an arbitrary year (say, 1999) for the calculation would be misleading, because the countries that *had* experienced political transitions had done so in many different years, and because the before and after growth rates for the ‘no transition’ countries could be affected by secular differences in growth rates. Instead, I picked a random year for each of the countries and calculated its growth rate in the same way as I had done for the countries with political transitions.<sup>20</sup> I then calculated the average for the countries with no political transition. Again, I found that countries with above-average growth experienced a deceleration in growth and those with below-zero growth experienced an acceleration in growth. That is, there was regression to the mean even around some arbitrarily chosen year. The average deceleration was 1.8 per cent for the countries with growth above 2 per cent, returning them roughly to the cross-country average. The average *acceleration* for the countries with below-zero growth was larger, 4.6 per cent. In part this was because their growth rates were further from the cross-country average than those of the high-growth countries (being not just below the average, but below zero).

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<sup>20</sup> Since I was choosing a ‘break’ point randomly, I iterated this procedure 25 times, so that in each iteration each country had a different year around which the growth difference was calculated. The results reported in Table 2.4 are the average over all iterations.



Table 12: Difference in growth rates of countries with large democratic transitions versus countries with no large democratic transition (%) <sup>a</sup>					
Growth in 10-year period ending three years before transition	Growth rate in countries with a transition			Difference in before and after growth rates of countries with no transition	Difference in growth rates of countries with, versus countries without, a transition (3 – 4)
	Before transition	After transition	Difference ((2) – (1))		
	(1)	(2)	(3)	(4)	(5)
High (>2% above average)	4.8	1.3	-3.5	-1.8	-1.76
Medium (0–2% above average)	1.3	2.0	0.7	0.3	0.43
Negative (<0%)	-2.2	1.5	3.8	4.6	-0.87
a A large democratic transition is an increase in Polity rating of more than 5.					
<i>Source:</i> Author’s calculations.					

The deceleration of growth among countries that (a) started with above-average growth and (b) had a large democratising transition, of 3.5 per cent, is substantially larger than the counterfactual of deceleration among countries with no such democratizing political transition, of 1.8 per cent (Table 12). That is, countries with large democratising transitions, on average, decelerated by 1.76 per cent more than countries with no political transition. So, about half the deceleration among rapidly growing economies following a large democratising transition seems to be due to ‘natural’ regression to the mean, and about half due to the large democratising episode itself.

This mechanism has been explored in the case of Indonesia. As Fisman (2001) has shown the stock market value of firms connected to Soeharto was associated with news about Soeharto’s health, implying that a substantial amount of their value was related to his personal control of the levers of power. While power in China is obviously controlled by much larger and broader and regionally competing forces, it nevertheless is not exercised in what one would typically call a “democratic” fashion nor according to “rule of law” nor are traditionally conceived human rights protected. That said, the fact that China is rated by most indicators as having very low ‘control over corruption’ and as not having improved over the previous decade, this has

obviously not been an obstacle to rapid growth. This is not surprising as Shleifer and Vishny (1993) have long argued that “organized” corruption need not be inimical to growth. However it is difficult for corruption to remain organized as political power makes a transition.

We are not “forecasting” that China will move towards democracy nor that this will be what causes China’s growth to slow. But we are pointing out the very dangerous shoals in which the Chinese economy is current sailing very rapidly. While it is possible to envision the transition not happening for some extended time and while it is possible to envision the transition being made smoothly, neither of these are the outcome typically observed in the data.

V) *India’s challenge: add stable rule of law to democracy [completely incomplete]*

### *Conclusion*

The recovery in the USA currently slow relative to expectations and the recovery in Europe is even weaker. Yet, the post-crisis fall-out on the global economy has been much less than feared, certainly in large part due to sustained growth in China and India that likely have positive spillovers (e.g. through high commodity prices and trade linkages) with other economies. The hopeful view is that this represents a decisive shift and that rapid global growth will continue and perhaps even OECD growth recover, based on Asia, both via the Giants and the others, as the engine.

This is certainly one scenario.

Regression to the mean is the single most robust finding of the growth literature and the typical degrees of regression to the mean imply substantial slow-downs in China and India relative even to the currently more cautious and less bullish forecasts.

India and even more so China are into essentially historically unprecedented episodes of growth. China’s super-rapid growth has already lasted three times longer than a typical episode and is the longest ever. The ends of episodes tend to see full regression to the mean, abruptly.

It is impossible to argue that either China or India have the kinds of “quality institutions” that have been associated with the steady dynamic of growth in the currently high productivity countries. The risks of “sudden stops” are much higher with weak institutions and organizations for policy implementation. China and India have very different modalities of this risk, but both have tricky paths to continued prosperity.

References [not yet]