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Formula for Economic Success – Part 2

As discussed yesterday, it seems intuitively obvious to us, and is in keeping with our experiences, that four factors drive relative economic growth – competitiveness, indebtedness, culture and luck. These are not independent influences so we could configure them in different ways. For example, "culture" certainly affects competitiveness, so we could either wrap the "culture" measures in with the competitiveness gauge or keep them separate. At the end of the day, it doesn't matter much because:

1) We can look at each measure separately by country to see a) how they differ from country to country and b) how these differences between countries would have predicted differences in the subsequent 10-year growth rates, and

2) We can put these measures in whatever batches we like to represent whatever "factors" we think that they collectively measure. We believe however you do that will paint basically the same picture. Test if that's true. Drop, add, and/or reconfigure them to see what you get. That is the purpose of this exercise.

More important than how we choose to juggle these indicators is how we define the cause/effect relationships that they reflect. If we never looked at the data, we should be able to describe the cause/effect relationships and the logic behind them. Only after doing that should we look at the data to see how well our descriptions squared with what happened. That is what we did. We described "The Really Big Picture" (see attached) and, after doing that, we gathered this data to see how it looked. Of course, over many years we have built many similar conceptual indicators that we have used, they have worked for us and have influenced our perspective. In any case, the logic we lay out is for you to assess, so we would appreciate you reviewing our described cause/effect relationships to see what you agree and disagree with. That way we can figure this out together. At the end of the day, we might disagree. In fact, it would be odd if we didn't find something to disagree about. That's fine. Our goal isn't to convince you of anything; rather, it is explain how we see things, help you figure out what you think is true for yourself, and have a quality exchange to see if we can help each other better understand what is true.

In yesterday's *Observations* we discussed one of the important elements of culture, "self-sufficiency". Today we will continue our discussion by turning to **competitiveness** and **indebtedness**, which are the two most important factors. But before we do, we want to repeat the very broad brush template for explaining growth differences between countries through time (that we described in "The Really Big Picture"). To repeat, this is a very broad brush template. As such, we believe that it is largely true, though not always perfectly true. How well it works will be reflected in the measures and gauges that we created that we are showing to you.

Our Very Broad Brush Template

While many influences contribute to shifts in relative income and power, we believe that the two most powerful of these are 1) the psychology that drives people's desires to work, borrow and consume and 2) war (which we measure in the "luck" gauge). Throughout history, these two influences have changed countries' **competitiveness** and **indebtedness** which have caused changes in their relative wealth and power. Since different experiences lead to different psychological biases that lead to different experiences, etc., certain common cause-effect linkages drive the typical cycle. While we will describe what we believe is the typical cycle, of course no cycle is exactly typical.

To summarize, we believe that countries typically evolve through **five stages** of the cycle:

1) In the first stage **countries are poor and think that they are poor**.

   In this stage they have very low incomes and most people have subsistence lifestyles, they don't waste money because they value it a lot and they don't have any debt to speak of because savings are short and nobody wants to lend to them. They are undeveloped.

2) In the second stage **countries are getting rich quickly but still think they are poor**.

   At this stage they behave pretty much the same as they did when they were in the prior stage but, because they have more money and still want to save, the amount of this saving and investment rises rapidly. Because they are typically the same people who experienced the more deprived conditions in the first stage, and because people who grew up with financial insecurity typically don't lose their financial cautiousness, they still a) work hard, b) have export-led economies, c) have pegged exchange rates, d) save a lot, and e) invest efficiently in their means of production, in real assets like gold and apartments, and in bonds of the reserve countries.

3) In the third stage **countries are rich and think of themselves as rich**.

   At this stage, their per capita incomes approach the highest in the world as their prior investments in infrastructure, capital goods and R&D are paying off by producing productivity gains. At the same time, the prevailing psychology changes from a) putting the emphasis on working and saving to protect oneself from the bad times to b) easing up in order to savor the fruits of life. This change in the prevailing psychology occurs primarily because a new generation of people who did not experience the bad times replaces those who lived through them. Signs of this change in mindset are reflected in statistics that show reduced work hours (e.g., typically there is a reduction in the average workweek from six days to five) and big increases in expenditures on leisure and luxury goods relative to necessities.

4) In the fourth stage countries **become poorer and still think of themselves as rich**.

   This is the leveraging up phase – i.e., debts rise relative to incomes until they can't any more. The psychological shift behind this leveraging up occurs because the people who lived through the first two stages have died off or become irrelevant and those whose behavior matters most are used to living well and not worrying about the pain of not having enough money. Because the people in these countries earn and spend a lot, they become expensive, and because they are expensive they experience slower real income growth rates. Since they are reluctant to constrain their spending in line with their reduced income growth rate, they lower their savings rates, increase their debts and cut corners. Because their spending continues to be strong, they continue to appear rich, even though their balance sheets deteriorate. The reduced level of efficient investments in infrastructure, capital goods and R&D slow their productivity gains. Their cities and infrastructures become older and less efficient than those in the two earlier stages. Their balance of payments positions

deteriorate, reflecting their reduced competitiveness. They increasingly rely on their reputations rather than on their competitiveness to fund their deficits. They typically spend a lot of money on the military at this stage, sometimes very large amounts because of wars, in order to protect their global interests. Often, though not always, at the advanced stages of this phase, countries run "twin deficits" – i.e., both balance of payments and government deficits.

5) In the last stage of the cycle they typically go through **deleveraging and relative decline, which they are slow to accept.**

   After bubbles burst and when deleveragings occur, private debt growth, private sector spending, asset values and net worths decline in a self-reinforcing negative cycle. To compensate, government debt growth, government deficits and central bank "printing" of money typically increase. In this way, their central banks and central governments cut real interest rates and increase nominal GDP growth so that it is comfortably above nominal interest rates in order to ease debt burdens. As a result of these low real interest rates, weak currencies and poor economic conditions, their debt and equity assets are poor performing and increasingly these countries have to compete with less expensive countries that are in the earlier stages of development. Their currencies depreciate and they like it. As an extension of these economic and financial trends, countries in this stage see their power in the world decline.

In this series, in which we show various stats and their correlations with future growth, we are trying to look at the extent to which that template is true. In this part we look at competitiveness and indebtedness.

Competitiveness and Indebtedness

For reasons that we believe are both logical and empirical (and explained here), we believe that competitiveness and indebtedness are the most important drivers of relative growth. Like the people and companies that make them up, countries which offer the most value for money (i.e., are most competitive) do better than those that don't. On the other hand, countries that finance their growth in spending and production by raising their debts faster than their incomes (i.e. are essentially borrowing their growth from the future) are destined to have lower growth. Countries that are both most competitive and least indebted will grow faster than those that are not.

In this report we will show simple indices of competitiveness and indebtedness and how these have correlated with the subsequent 10 year growth rates in GDP per capita for 22 countries over 160 periods observed during the last century. We will explain how we created these simple indices and their correlations with subsequent growth in order to encourage a more thoughtful discussion about what really matters.

People are the largest cost of production so it follows that those countries that offer the best "value" (i.e. the most productive workers per dollar of cost) will, all else being equal, have the most demand for their people. As mentioned in yesterday's report, everyone knows that having a more educated population is better than having a less educated population, but measurements of the value of an educated person are lacking. If we simply educate people without considering the costs and paybacks of that education, we will waste resources and become less competitive even though we will become more educated. So the productive value of the education in relation to its costs is a more sensible way of measuring it. As we will show, while there is, if anything, a negative relationship between a country's level of education and its level of future growth, there is a high correlation between the relative cheapness of a country's educated people and that country's subsequent growth rate.

Other factors that influence **competitiveness** also matter. The cost of uneducated people, raw materials, capital and everything else that goes into the cost of production matter in proportion to their shares of the total cost of production. In other words, there is a world market for productive resources that increases the demand, hence the growth rates, for the countries that are most competitive because of "the cost-of production arbitrage". That cost of production arbitrage has been a big driver of growth – in fact overwhelmingly the largest. The magnitude of this competitiveness arbitrage is substantially driven by the cost of the workers relative to how hard they work, their education, investment levels, and influence of corruption. Of course, barriers to this arbitrage (like China's closed door policies until the early 1980s, geographic isolation, etc.) can stand in the way of people, companies and countries being allowed to compete. As these barriers breakdown (e.g., transportation becomes cheaper and quicker, telecommunications reduces impediments to intellectual competition, etc.) or increase (e.g. trade barriers are put up), the ability to arbitrage the costs of production, and in turn the relative growth rates, are affected. And changes in what people are competing for also matter – for example, when oil was less important than coal, different sellers did better and worse than they did when the reverse was the case.

Additionally, long term **indebtedness** cycles play a big role in driving these cycles. When debt levels are low relative to income levels and are rising, the upward cycle is self-reinforcing on the upside because rising spending generates rising incomes and rising net worths, which raise borrowers' capacity to borrow which allows more buying and spending, etc. However, since debts can't rise faster than money and income forever there are limits to debt growth. Think of debt growth that is faster than income growth as being like air in a scuba bottle – there is a limited amount of it that you can use to get an extra boost, but you can't live on it forever. In the case of debt, you can take it out before you put it in (i.e., if you don't have any debt, you can take it out), but you are expected to return what you took out. When you are taking it out, you can spend more than is sustainable, which will give you the appearance of being prosperous. At such times, you and those who are lending to you might mistake you as being creditworthy and not pay enough attention to what paying back will look like. When debts can no longer be raised relative to incomes and the time of paying back comes, the process works in reverse. We can get a picture of where countries stand in the long-term debt cycle and the likelihood of debt being a support or detriment to future growth by assessing the past reliance on debt to support incomes and the attractiveness of taking on new debt. Countries which have very low debt levels and prior borrowing, along with attractive borrowing conditions from easy monetary policy, are the most likely to experience support to future growth from debt creation, whereas countries with a high past reliance on borrowing to support incomes and tight money are likely to grow least.

Formulas for Future Growth

While we can and do create very complex measures of countries' future growth by measuring their current competitiveness and indebtedness, to make our point here, we did the opposite. We created 1) a simple logic-weighted index of competitiveness and 2) a simple logic-weighted index of indebtedness. We used the same set of factors weighed the same way for each gauge across all the countries and across all timeframes. That way there was no fitting the data and our measures for competitiveness and indebtedness are timeless and universal. After creating these indices, we observed how each predicted the subsequent 10 years' growth rates for each country (which we measure every 5 years). In other words, we observed rather than fit the data. Then we combined the competitiveness gauge and the indebtedness gauge, weighing each 50%, just to keep the process very de-optimized and observed how these two measures combined would have predicted each country's subsequent 10 year real growth rate of GDP per capita.

Our competitiveness indicator is a simple average of what you pay for a country's labor relative to what you get in terms of how hard the people work, how educated they are, how much they invest, the degree of corruption in the country's institutions, along with the relative cost of their goods. Our indebtedness indicator is made up of two main components: 1) the past reliance of the economy on debt creation for spending (by looking at the debt level and flow), and 2) monetary policy relative to conditions, which is a function of how easy or tight rates are relative to conditions, whether the central bank has the capacity to ease in a deleveraging, and how much money is created relative to debt. We consider the interaction of these two components during different stages of the long-term debt cycle, as well. For example, when an economy has been highly reliant on debt to finance spending, as is the case at the top of the long-term debt cycle, tightening by the central bank will have a bigger impact on slowing the economy than during times when the economy has lower debt burdens and credit creation has been more moderate. Finally, we take into consideration the impact of very volatile inflation or income on a country's likelihood of experiencing a support to growth from debt creation because high inflation and income volatility reduce would be creditors' desire to lend because of concerns about the value of their investment. We will show the pieces of each of these indicators below, but first we summarize some of the highlights for how well these pieces explain future growth when you put them together. In brief, here are the highlights:

1) The competitiveness and indebtedness combined into one indicator is 73% correlated to subsequent 10 year real GDP per capita growth across all countries.

2) The aggregate indicator predicted the next decade's average real growth rate within +/- 1% of actual realized growth for 50% of the 160 periods and within +/- 2% for 80% of the periods.

3) The competitiveness indicator on its own is 58% correlated to subsequent 10 year real GDP per capita growth.

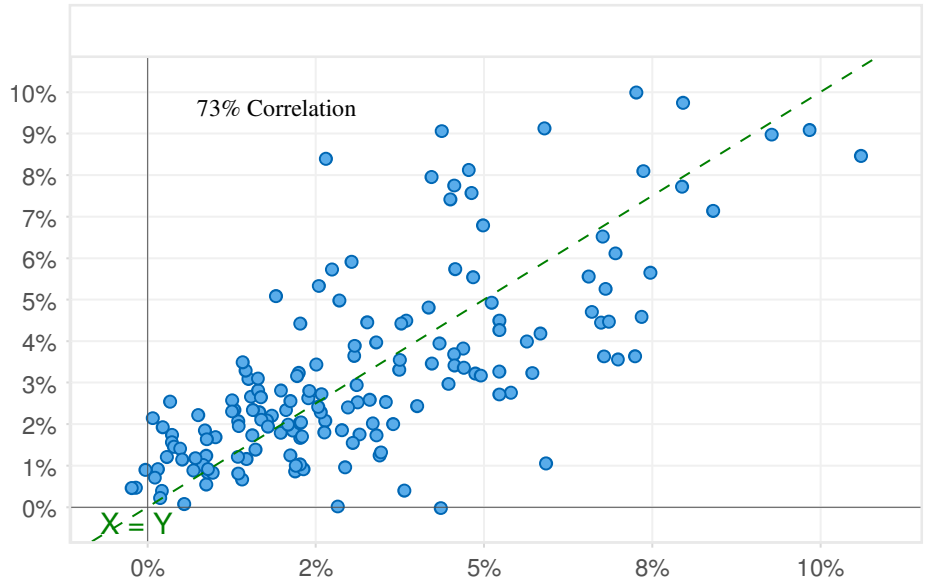
4) The indebtedness indicator is 50% correlated to subsequent 10 year real GDP per capita growth

The table below summarizes the components of our competitiveness and indebtedness indicators, how we weight them, and how correlated the pieces and overall aggregates are to future growth.

Future Growth Estimate			
Indicator	**Weights**	**Correlation**	**Explanatory Power**
Aggregate Estimate	**100%**	**73%**	**53%**
Competitiveness	**50%**	**58%**	**34%**
Working Hard Relative to Income	10%	64%	41%
Avg. Hours Worked Rel. Inc.	*7%*	*63%*	*40%*
Dependency Ratio Rel. Inc.	*3%*	*58%*	*34%*
Corruption Rel. Inc.	10%	52%	27%
Investing Rel Inc.	10%	66%	44%
Fixed Investment %NGDP Rel. Inc.	*5%*	*51%*	*26%*
Household Savings Rate Rel Inc.	*5%*	*64%*	*41%*
Education Rel Inc.	10%	48%	23%
Purchasing Power Parity	10%	40%	16%
Indebtedness	**50%**	**50%**	**25%**
Debt and Debt Service Levels	17%	32%	10%
Debt Flow	8%	6%	0%
Monetary Policy	25%	37%	14%

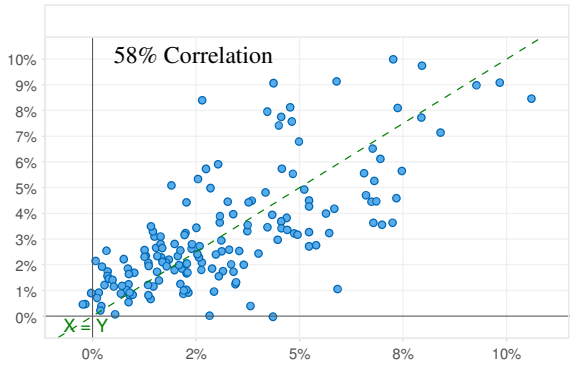
Before looking at the picture today we show how our aggregate indicator would have predicted growth vs. what actually occurred. These tests of the indicator described above against future growth of real GDP per capita include 160 separate observations across 22 different countries over the last 100 years, which provides a wide range of different environments to test our indicator. While staring at the observations helps us ground ourselves in reality and test our logic, we know there is no precision in the specific numbers and what matters most to us is whether our logic is strong.

Aggregate Indicator of Future Growth Against Subsequent 10yr Growth

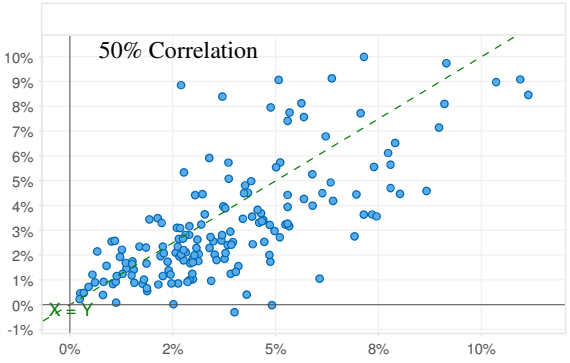


Next we show the same picture for the two gauges, competitiveness and indebtedness, and what each would have implied for growth on their own relative to what transpired.

Competitiveness v. Fut. Growth



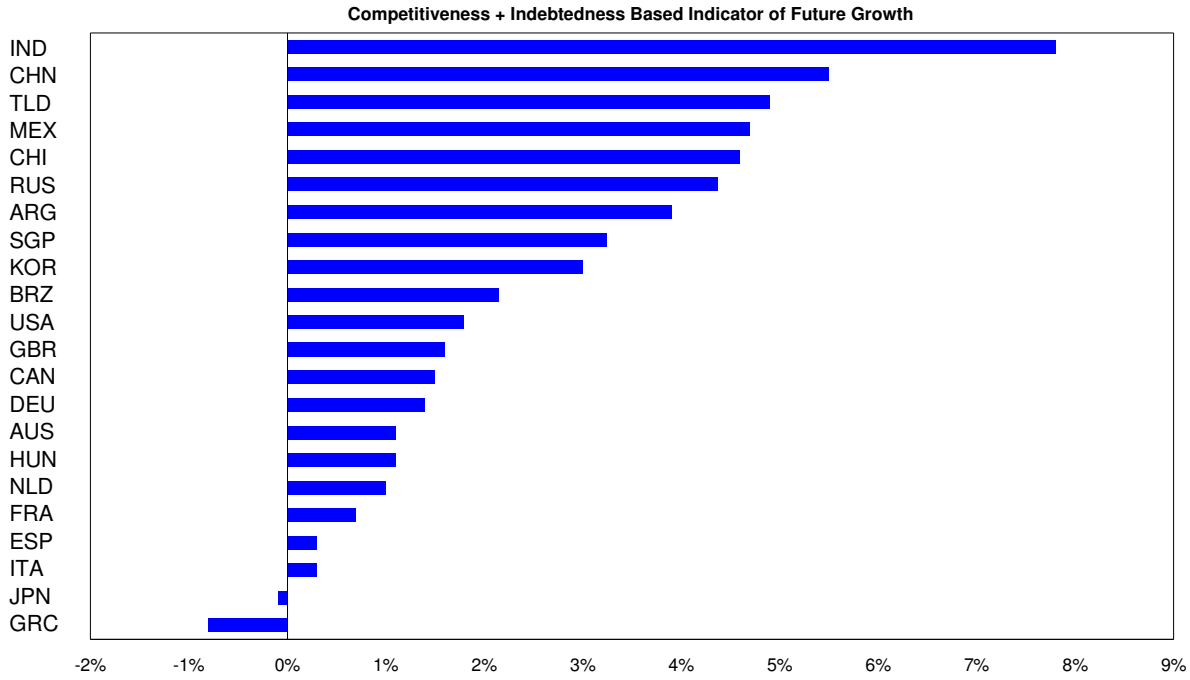
Indebtedness v. Future Growth



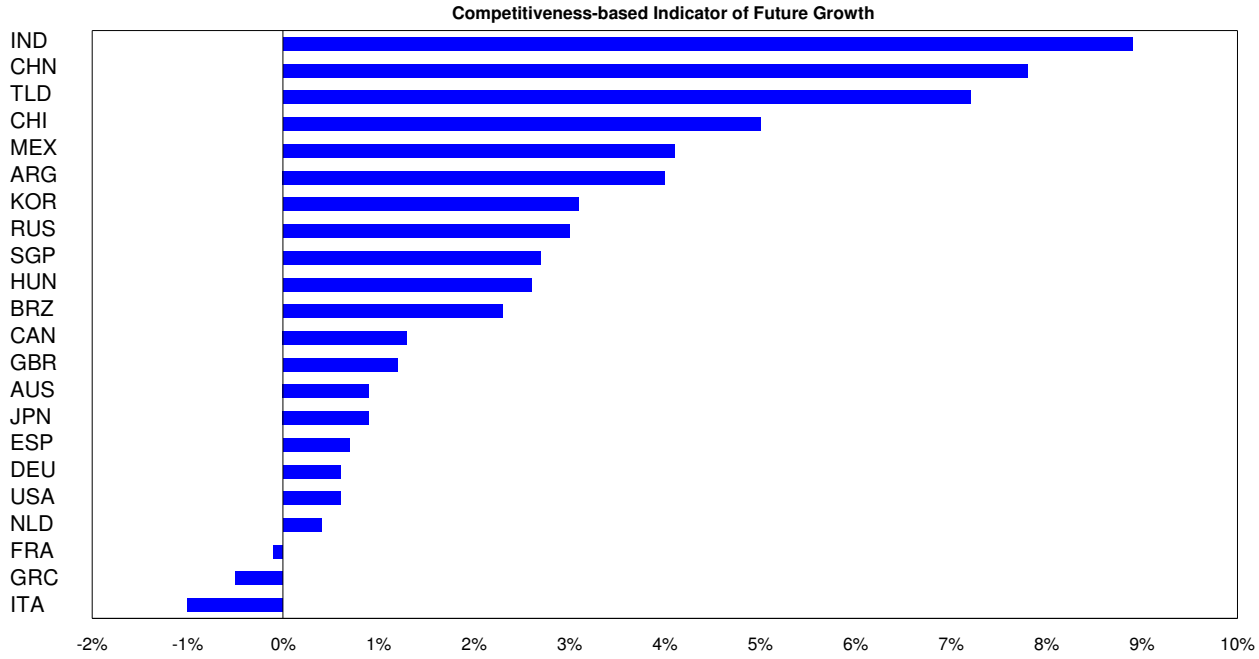
Current Indications of Future Growth

The chart below gives a picture of what we would project growth to be over the next 10 years if we apply the same logic as described above to construct an estimate of future growth today.

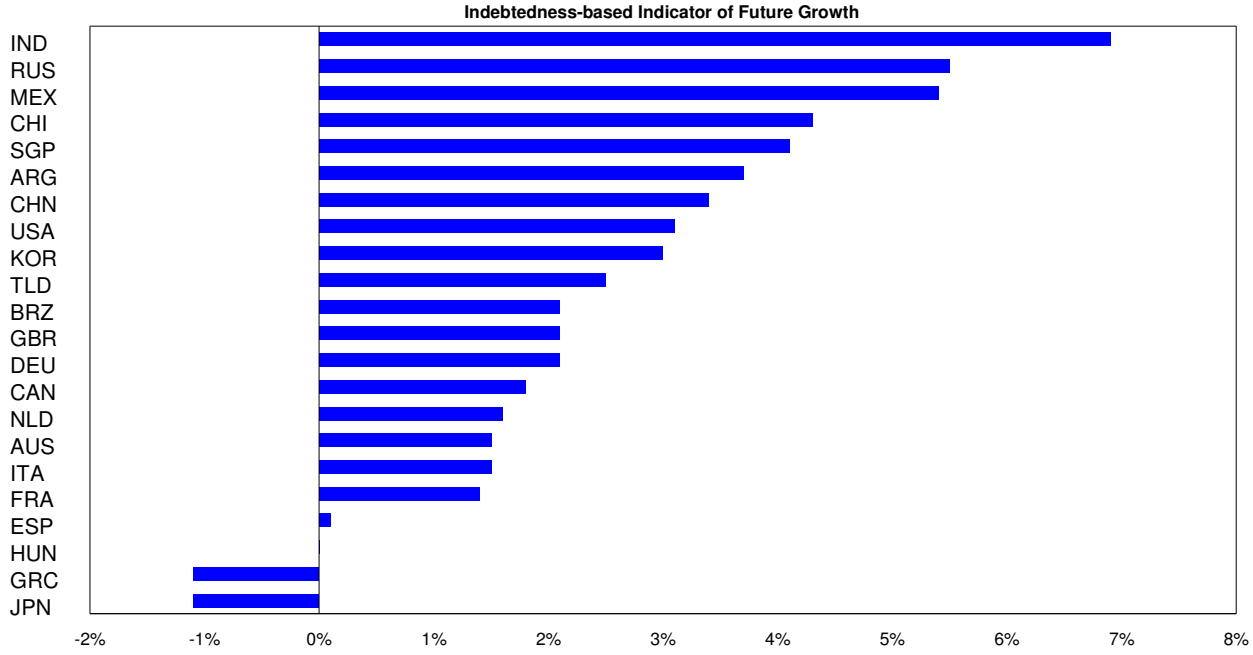
On the basis of competitiveness and indebtedness alone (i.e. without consideration given to the influences of "culture" and "luck" such as the direction of the prices of natural resources that they happen to have), the countries which have the elements to grow fastest are India, China, Mexico and Russia. Based on these elements, European countries and Japan are expected to grow slowest. You will see why. However, in brief, our expectation that India will grow strongly is driven by India's low indebtedness and significant cost advantage relative to the rest of the world (a per capita income of a bit over USD$1000) even accounting for its poor education. China, on the other hand, has become considerably more expensive, with a GDP per capita now around 4x that of India and has been quite reliant on debt growth in recent years, but relatively strong investment rates, high education and a culture of very hard work offset much of this downward pressure on secular growth rates. We see US growth more in the middle of the pack with growth projected to be around 2% in coming years – while the US remains uncompetitive (with an expensive workforce, weak work hours and low savings) and highly indebted, US monetary policy is consistently stimulative through ongoing money printing and reliance on credit growth has been minimal for some time. We expect growth in Germany to be close to trend as well, but a bit lower than in the US. German goods are expensive relative to the US, hours worked shorter, and central bank printing has been less aggressive. Still, Germany has not been reliant on credit expansion for its growth and monetary policy is stimulative relative to conditions. On the lowest end we see France, Spain, Italy, and Japan, all of which are globally uncompetitive, highly indebted, and experiencing monetary policy that is that is tight relative to economic conditions. To reiterate, while we believe that these measures are really good measures of the competitiveness and indebtedness in the countries shown below, what they don't adequately convey is the cultural and luck factors that play a role. For example, in India the bureaucracy and the social system are important impediments to growth that, when considered, imply that it is likely that the actual growth rate will be below that estimated on the basis of just competitiveness and indebtedness. We encourage you to look through the list to see what the expected growth rates are for each country so that you can then better follow how they were derived.



Below are the current competitiveness and indebtedness indices converted into their expected growth rates. Our competitiveness indicators highlight the general attractiveness of the labor arbitrage between most emerging countries relative to the developed world. According to our measures, India is the most competitive country at this point – driven by a very cheap labor force, even accounting for low poor education. China is the next most competitive country by our measures, with a growth rate implied by its competitiveness of above 8%, driven by quality education, hard work and high investment for a country of its income level. Nearly all developed world countries are measured to be uncompetitive, with Italy, France and Greece uniquely uncompetitive as a result of a weak work ethic, even among developed countries. Spain also measures as being uncompetitive, with an expensive workforce, relatively weak work ethic and levels of education. While its measure is not as bad as the rest of the periphery, it would be even more negative and closer to what makes sense to us if we differentiated productive vs. unproductive investment (just looking at the high investment rates can be misleading). Japan, Germany and the US are in the middle of the pack among developed countries, with their high incomes making them uncompetitive, but other attributes, like low corruption and/or relative hard work offset their expense compared with their peers, particularly in the rest of Europe.



Our indebtedness readings suggest that debt conditions will be a drag for many economies over the next ten years relative to the normal growth rates these economies have come to expect. The notable exceptions are India, Russia and Mexico where debt levels are relatively low, debt has not been an important source of recent growth and monetary policy conditions are easy in comparison to domestic conditions (excluding Mexico). China's debt conditions would imply a bit more than 3% growth rate over the next 10 years, which is considerably lower than early in the 2000s – while monetary policy is still relatively easy compared to domestic growth conditions, debt growth in recent years has been significant leading to levels of indebtedness which are now in line with the average of similar-income countries through time. The pressures on growth in the US from the total indebtedness picture would indicate modestly above trend growth as significant printing by the Fed has been sufficient to offset the ongoing deleveraging pressures, unlike in much of the rest of the developed world. Some of the worst debt conditions are projected to be in Japan, Greece, and Spain where aggregate debt levels are very high and monetary policy is quite tight relative to conditions.

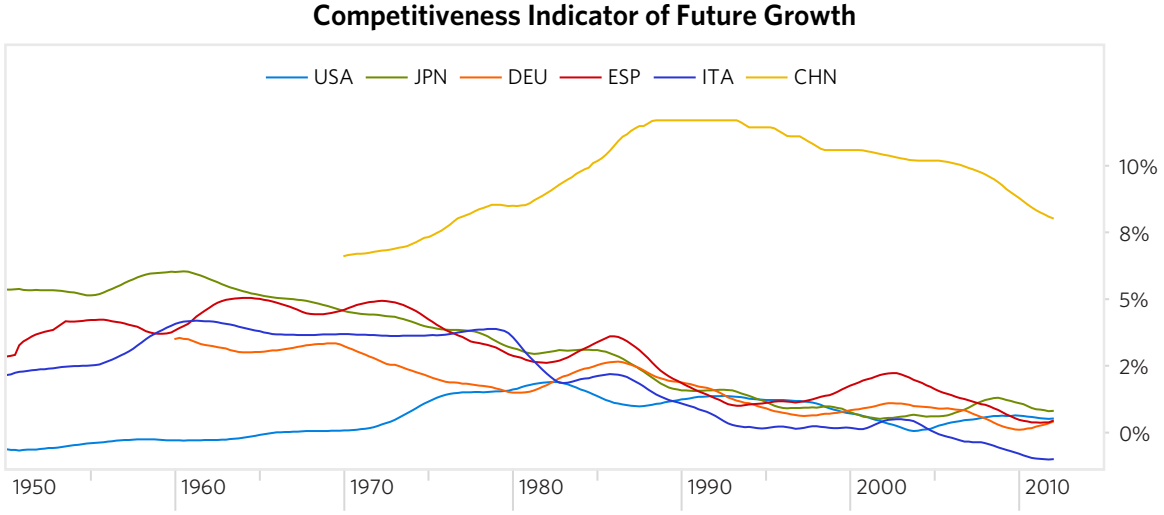


Influence of Competitiveness and Indebtedness on Growth through Time

These indications of competitiveness and indebtedness help paint a picture of countries' experience through the longer-term development cycle discussed above.

China for instance, massively improved its competitive position starting in 1980 when it began to open its markets. Over the next two decades, literacy and overall education levels improved markedly, and savings and investment rates increased as incomes rose. By 1990, the improved education, investment and hard working culture combined with an extremely cheap labor force to produce the most competitive economy in the world. China was cheap and on the path to getting rich quickly – but still invested and saved a lot. Since that time Chinese competitiveness has moderated as its workforce has become substantially more expensive faster than other supports to competitiveness that have improved like education. While not as extreme as China in the 1990s, Japan followed a similar path starting in the 50s, where they held a distinct competitiveness advantage against most of the developed world for nearly 20 years. This advantage has slipped as Japanese workers got more expensive and worked less hard through time.

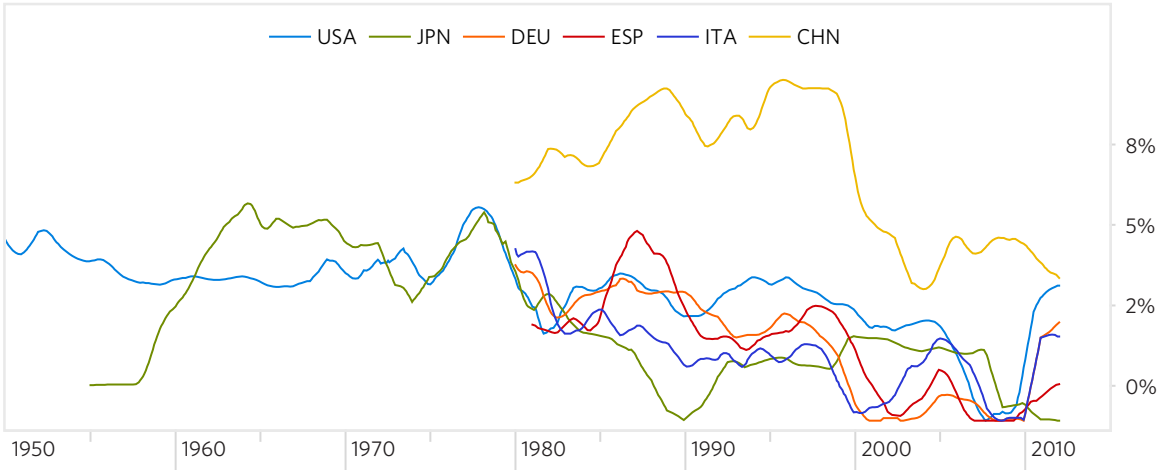
The rest of the developed world is relatively similar through time, though there is a notable convergence of the US from looking uncompetitive relative to the world in the 1950s to looking more like the rest of the developed world more recently. The US became less expensive on a relative basis and US workers' educational attainment and hard work made them more competitive relative to the rest of the developed world. European economies have become less competitive through time, particularly Italy, as they have gotten both more expensive and worked less.



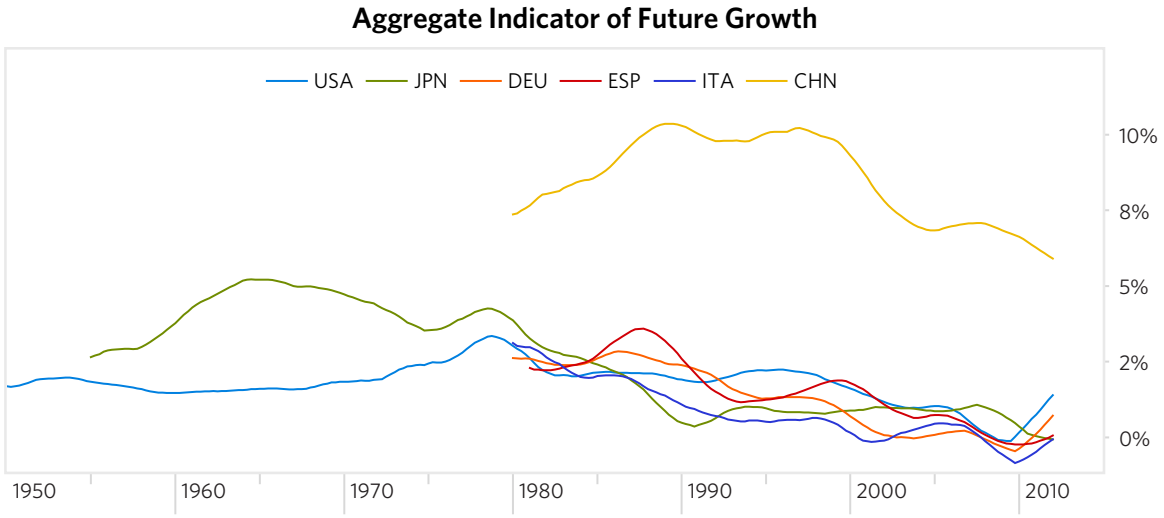
The secular leveraging up in the developed world starting in the 1950s is apparent in our indicator of indebtedness through time. Japan's debt-fueled boom notably peaks right before the start of the deleveraging of the 1990s by our measures. By the 2000s, nearly all other countries in the developed world had reached extremely high levels of debt and there were risks of monetary policy constraints from rates hitting zero, which materialized at the start of the deleveraging in 2008. The different responses by each central bank in the developed world during this deleveraging period drive our relative indications of the influence of indebtedness on future growth. The US has been most aggressive, now producing stimulation through risky asset buying that is sufficient to create a beautiful deleveraging, while monetary stimulation in Europe has been insufficient to stimulate growth, and has been even more limited in Japan relative to conditions.

Turning away from the developed world, China has seen a notable deterioration in its debt dynamics in recent years. At the turn of the century, nominal growth came down relative to rates, and while the attractiveness of borrowing was high it was less extremely so. Income growth was still primarily driven by competitiveness, but debt levels were creeping up (still healthy) and the flow was increasingly stronger than in the past (though not extreme). However, starting with the global credit crisis in 2008, the Chinese economy has become increasingly reliant on debt growth to finance incomes. Debt creation in recent years has been significant and the current level of indebtedness is now on par with countries of a similar income level. As a result, the current indebtedness situation would imply future growth rates that are notably below more recent growth.

Indebtedness Indicator of Future Growth



The combination of these two indicators gives a picture of the evolution of our view through time of each country's prospects for future growth based on their competitiveness and indebtedness. Extremely low debt levels and a very highly competitive economy for China in the late 1980s through to the early 2000s combined to create a perfect mix of conditions that drove very high per-capita growth rates for decades. As described above, the supports from competitiveness and the recent increasing indebtedness in China now indicate a more moderate picture of future growth conditions than over the last 20 years or so, though still high relative to most other countries. Japan's story starting in the 1950s is similar although less extreme. Low debt levels combined with a competitive economy to drive very strong per capita GDP growth for many decades. By the late 1980s, however, Japan became one of the least attractive developed world economies as their competitive position declined and their debt burdens, particularly in the private sector, reached extremes. In rest of the developed world, the low-indebtedness of the post-war period allowed for a significant leveraging up to occur that supported growth through time, despite their uncompetitive economies. As these economies' indebtedness reached relatively extreme levels, their future growth prospects deteriorated substantially, with the worst conditions in the European economies which were both highly uncompetitive and indebted. As noted, the relative recent improvement in future growth prospects in the developed world has been reliant on the responsiveness of each central bank to domestic conditions. Below we show our combined competitiveness and indebtedness indicator of future growth through time.



More Detail on the Individual Measures of Future Growth

Below we provide more perspective on the particular indicators of future growth which are used to construct our measures, and show what those measures look like for individual countries today.

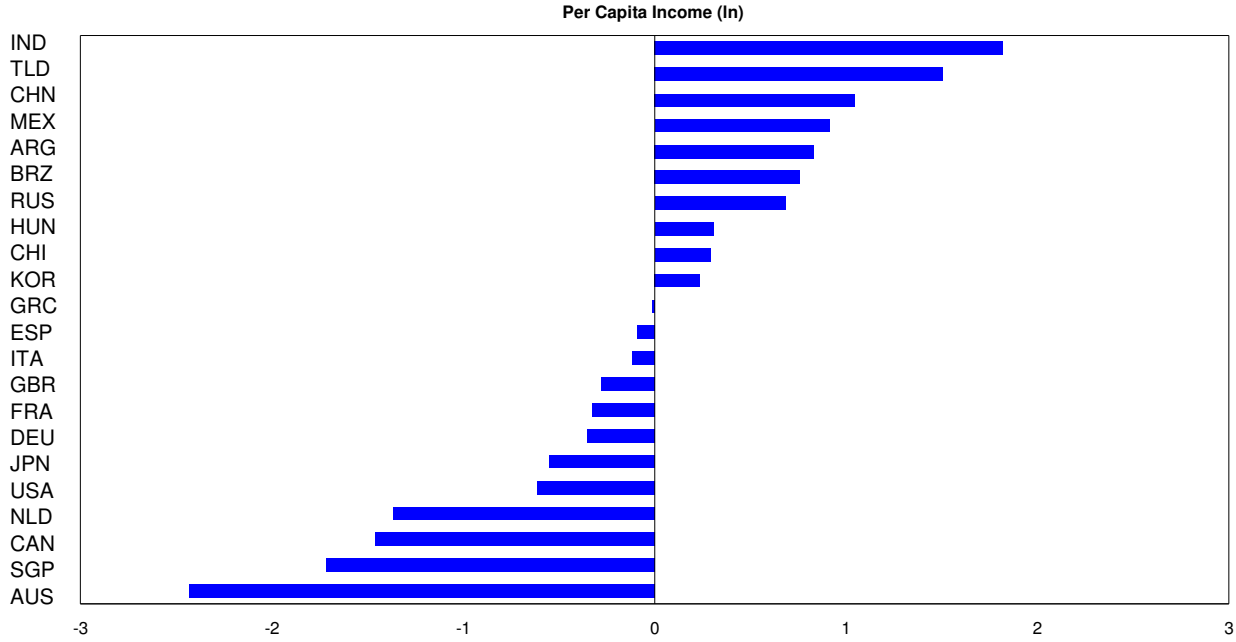
Competitiveness

As discussed, all of our competitiveness indicators are built along the intuition that the competitiveness of any country can be determined by what any company gets (i.e., educational skill of the people) relative to what a company pays its workers. To construct this simple indication of competitiveness we compare relative hard work, corruption levels, education and investment to relative income levels. These combined measures are shown to be more effective measures of future growth than income alone. In addition, we use a PPP measurement, which captures (albeit imperfectly) the relative amount of a similar basket goods and services received per dollar spent in each country – a direct measure of what you get for what you pay.

Per Capita Income Level

A key input into our measure of competitiveness is the relative income level of each country, which we then combined with various indications of what you get for the workers in each country. Absent other indications of competitiveness or indications of what you get for workers, we'd expect that relative income levels alone are a reasonable indication of relative future growth. Through time, countries with cheap workers and low skills have been able to leverage new technology to increase their productive ability. Similarly the richest countries generally do not continue to outperform the rest of the world, as their competitive advantages are eaten away by technology transfers to less competitive economies, and the normal behavior of most economies is to increasingly savor the fruits of success by working and investing less. Empirically just using relative income levels has had a 39% correlation to future per capita GDP growth.

Today, India has by-far the lowest per-capita GDP measures of the countries we include in our sample. Indian per capita GDP remains just over USD$1000, which is much lower than that of much of the major developing world countries like China, Mexico, Brazil, Russia, or Korea. Even with its significant increase in cost in recent years, China's per capita income remains depressed relative to many other countries at a mere USD$6000 per capita. While developed world countries in general have relatively high incomes, it's worth noting some differentiation between those countries – for example GDP per capita in the poorest European countries like Spain and Greece is only about 2/3 as high as that in the richest developed countries like the US and Japan. The chart below shows our relative measure of per-capita income across countries, which is constructed by using a log of the per capita GDP figures, which we believe is more reflective of the impact of differences in income levels.



Adjusting Per Capita Income with Indications of "What You Get" Improves Prediction of Future Growth

While relative per capita incomes are intuitively a reasonable indication of future growth, adjusting the relative cost of labor by factors which give insight into what you get with that labor yields to a considerably more accurate assessment of future growth for a given country. The value of any labor to a company is dependent on what that worker produces for their cost – and at the country level the picture is no different. We'd expect countries with very low labor cost and highly educated workforces supported by significant ongoing investment to be the most competitive labor forces in the world (like China). Countries that have cheap labor forces without this commensurate skill or infrastructure are likely to grow significantly slower (for example Russia, given their low capital investment rates). Similarly the cost difference of the developed world relative to the emerging world is cushioned by the skill of their domestic workforces.

Before going into the specific adjustments that we do to income per capita, the table below gives a picture of the quality of estimated future growth using income alone, and adjusting it for the various factors that we consider (education, working hard, etc.). Adding each of our indicators of what you get with the relative labor cost improves the prediction of future growth relative to income alone. That complementary relationship occurs despite the fact that most of these indicators do not predict future growth conditions on their own as effectively as relative income by itself. Assessing whether an economy's workers are generally hard working and whether investment rates are high are the two

most correlated indicators with growth when adjusted for income, though all add value. Education quality and corruption benefit the most from income adjusting. Overall, adding in a combination of these adjustments doubles the explanatory power of our future growth estimate versus using income alone. While many of the factors described above are fundamental causes of a country's competitiveness, incorporating purchasing power parity (PPP) also gives us a direct measure (not without its flaws) of what you get relative to its cost (in this case the measure is of the cost of a similar basket of goods). Below we show the indicators for competitiveness where we make an adjustment for income and how they are related to growth before and after the adjustment.

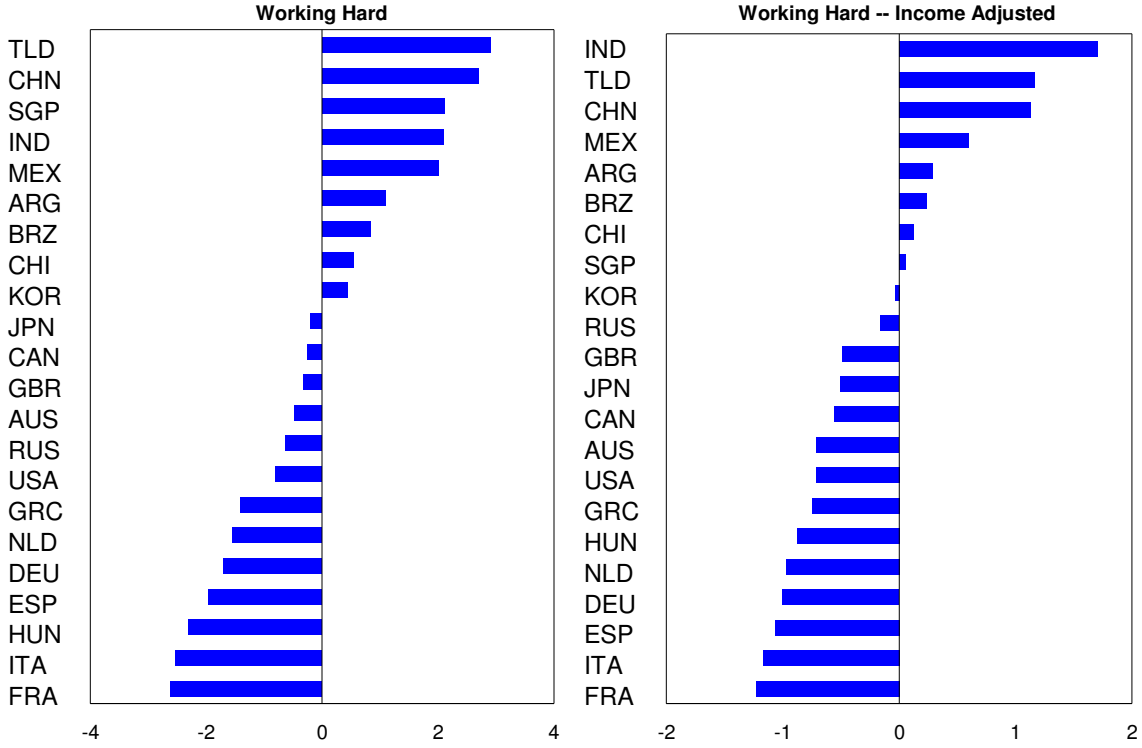
Indicator	Correlation on Own	Correlation Combined with Income
Income	*39%*	---
Working Hard	*53%*	64%
Investing	*20%*	66%
Education Quality	*-17%*	48%
Corruption	*-26%*	52%

Next we go through the logic of the individual adjustment measures to show what we are specfically looking at to measure this dimension of competitiveness. We then show how countries measure on the aggregate gauge, and its components, before and after adjusting for income, so you can see the impact of weighing the costs with the benefits.

Working Hard

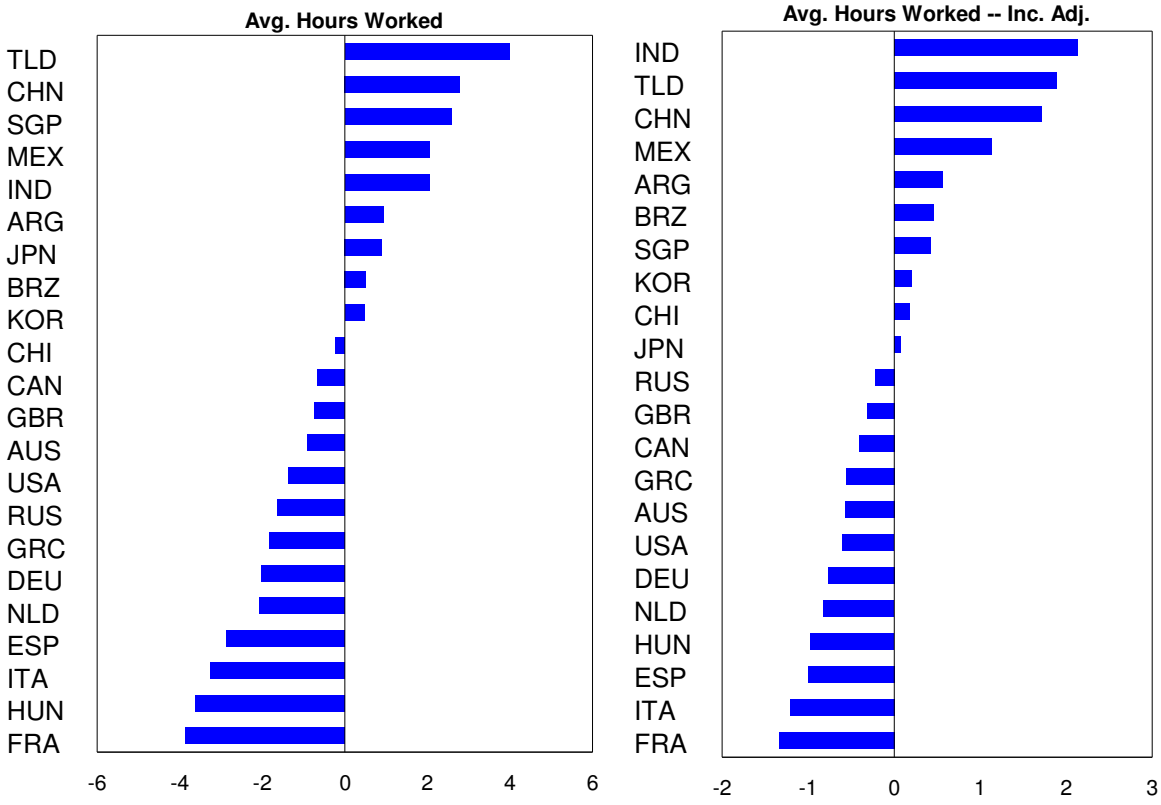
For our measure of working hard we look at two pieces, the 1) average weekly hours of actual work by men in the labor force adjusting for things like vacation time and holidays and 2) shifts in the amount of the population as a whole that is working. People who work hard both produce more in the near-term and generally grow faster through time than those who opt more for leisure (i.e. it impacts the rate of change not just the level of difference today). Increases in the share of workers relative to dependents in a country is also intuitively good for per capita incomes because it leads to increased productive output relative to the population as a whole. In addition, because people of working age save at higher rates than those who are retired, having a high ratio of workers to dependents also helps increase investment in an economy (which we measure more directly below). Just using this gauge on its own yields a 53% correlation with future growth, but when combined with income indications, it is 64% correlated with subsequent 10 year growth.

We look at our aggregate measure below first, followed by components. Emerging Asian workers are generally the hardest workers in the world, including China, India and Thailand. Among the richer countries, Singapore is by far the hardest working (competitive with much poorer countries), and Japanese workers are some of the most hardworking of developed countries, followed by the English-speaking developed countries. Continental European workers are generally the least hard working in the world. Adjusting for income largely keeps these divergences in place, though India's relative cheapness makes it look more attractive.



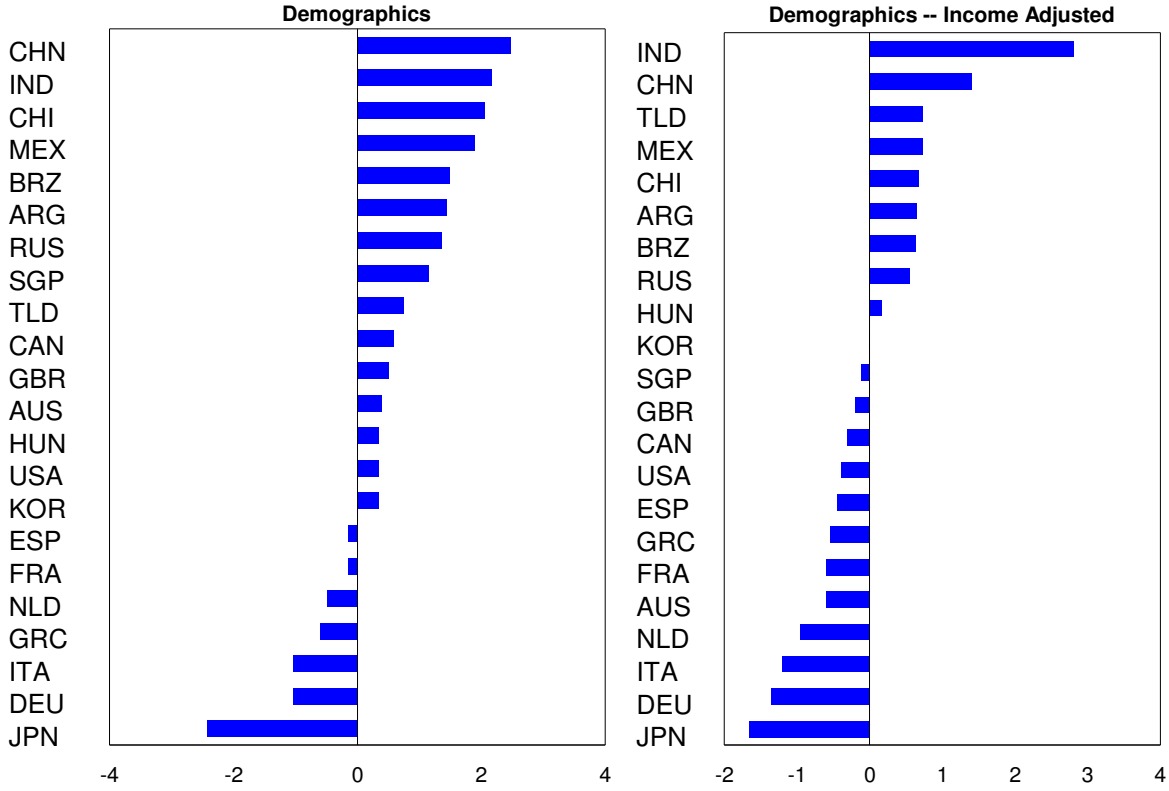
To measure how hard different labor forces work, we measured the amount actually worked in aggregate by the society. Regrettably, we must look at this measure for just men in the labor force because different social norms across countries around women in the workforce distort the numbers, and we must adjust for things like labor force participation, vacation time and holidays. While the correlation of hours worked on its own is about 40% to subsequent growth, the correlation of hours worked relative to income is 63% for this sample of countries.

When we look at hours worked on its own, Thailand and China are at the top, with Singapore by far the hardest working of the wealthier countries. The Europeans work the least. Japanese workers, who used to be among the very hardest working in the world, are now more toward the middle of the pack, but ahead of the US and other developed countries. When we look at this measure of working hard adjusted for income, we see some countries really stand out on either ends – the dollar cost of effort, if you will, is particularly attractive in India (which moves ahead of China and Thailand when considering income), and really bad in the European periphery.



For our measure of the change in percentage of a country's population that is working, we look at the change in the aggregate dependency ratio over the past 10 years. The impact of demographic shifts take time to flow through to impacting growth and these types of demographics shifts also trend some. Through time the change in dependency ratio adjusted for income is 58% correlated with future growth (and only 31% on its own).

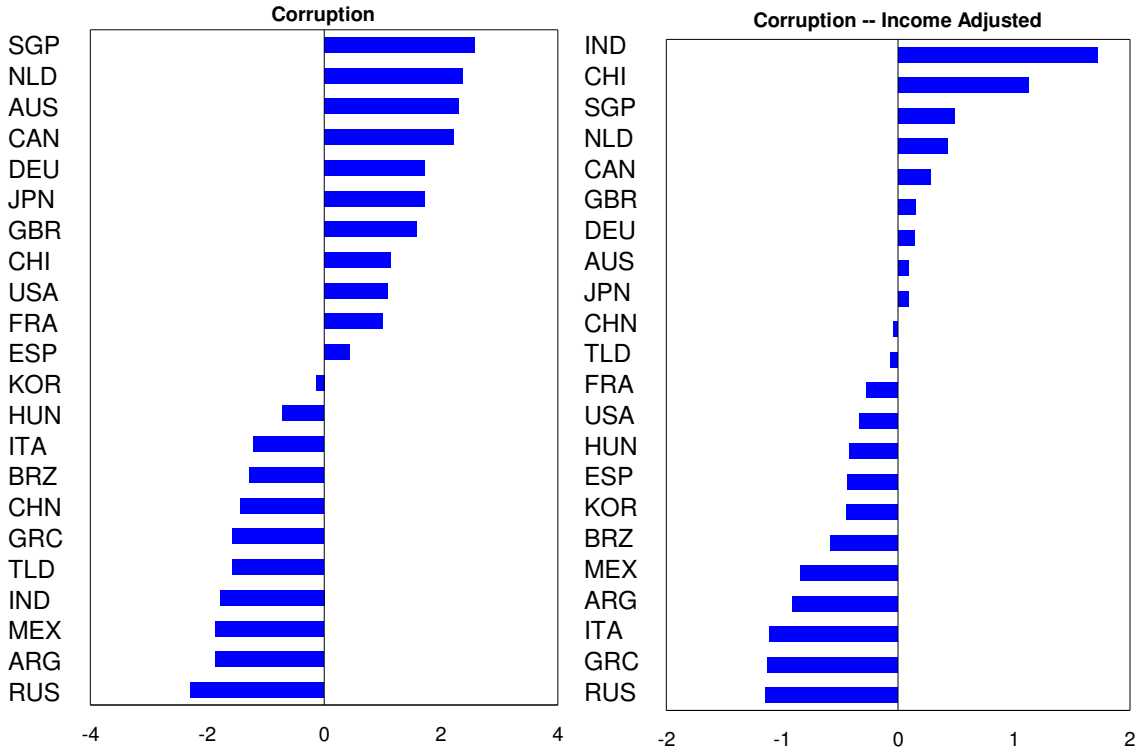
In general, many major developed countries in the world today are seeing a drag in their future growth from these demographic shifts, due to increasingly aging populations. This impact is particularly acute for Japan and European countries. The emerging world, on the other hand, is still experiencing an increase in the proportion of the population that is working, though this is less signficant a suppport now than it has been in prior decades. China and India are both among the emerging countries benefitting the most from this trend; that said, in both the proportion of the elderly is just starting to turn up, though this is currently more than offset by a continued decline in the proportion of young people to those of working age. While the change in dependency ratios are still a very modest positive in the US, they are on a path to becoming a drag soon as the baby boomer generation retires. Adjusting for income levels exacerbates the negative picture for the developed world, particularly Europe.



Corruption

To measure corruption, we use Transparency International's measures of corruption across countries. Countries that have lower levels of corruption should be more attractive places to do business and win market share because the costs and uncertainty associated with doing business are lower. Normalizing for income allows us to take into account the fact that lower income countries typically have less developed institutions and naturally a higher level of corruption. It's logical that businesses would be more willing to operate in countries that are relatively corrupt if the labor is sufficiently cheap. Corruption, when adjusting for income has a 52% correlation with future growth whereas on its own it has a roughly -26% correlation.

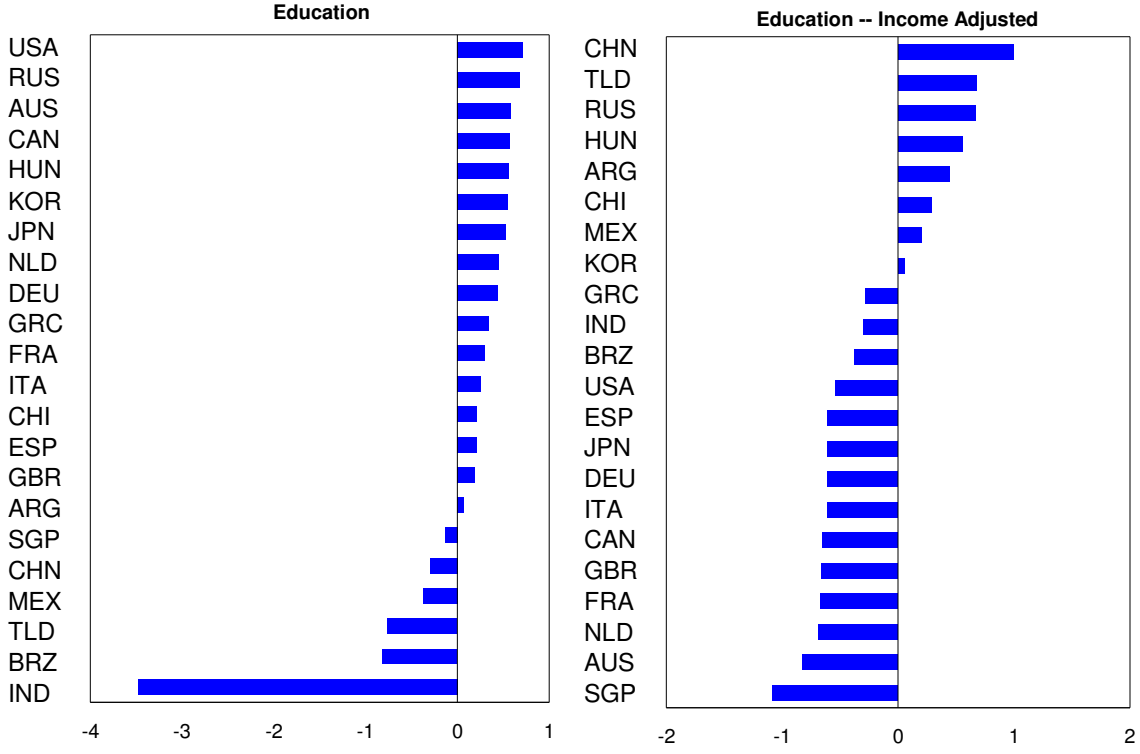
Just looking at the measure of corruption on its own, most developed countries come out on top and most emerging countries plus Greece are near the bottom (with Italy not far behind). India has one of the highest levels of corruption in the world, but after adjusting for its extremely low income it tops the list. Among richer countries, corruption indications adjusted for income are best in Singapore and Germany, more moderate in the US, and weakest in Italy and Greece. Russia remains at the bottom having adjusted for income as the magnitude of measured corruption is very high, even for a country of its income level.



Education

To get a sense of the aggregate level of education in a country, we look at the proportions of the population that are literate and have gone through primary, secondary and tertiary schooling. Workers of similar education but lower cost should win market share and attract businesses from other countries through the labor arbitrage discussed above. In order to measure the effect of education on future growth we also weigh the increase in lower levels of education higher than those of increases in higher education. The intuition is that the move from a significantly illiterate society to a literate one is more impactful to productivity and future growth than the marginal increase in productive capacity that comes from achieving higher levels of education (i.e., learning to write is a more impactful change than achieving a PhD following a Masters degree). Across time, there is, if anything, a negative relationship between the outright education of a country's workforce (-17%), but when combined with income the relationship is 48% correlated, and notably better than income on its own.

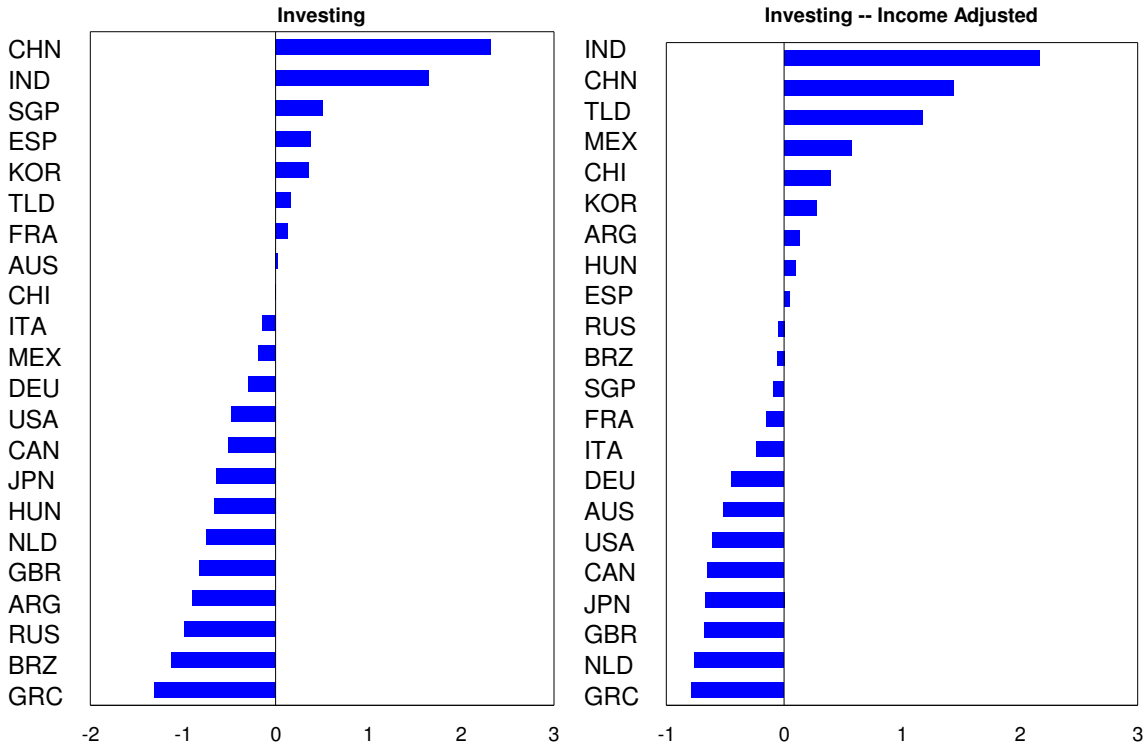
Our outright measures of education highlight the high education levels in the developed world relative to the emerging world. Within the developed world, the US is the most highly educated, which has supported US competitiveness. Germany, France, Italy, and Spain are less well educated than the US and Japan. Within the emerging world, China has relatively high rates of education in comparison to many countries and particularly relative to India (with literacy rates as one of the biggest gaps between the two). Once adjusted for income, the picture changes considerably. China has the best educated workforce relative to cost of any country, with Russia not far behind. Most developed countries have minimal differences in their levels of education once adjusted for income levels. India remains the weakest emerging country, though measures are more in the middle globally when its education is adjusted for its low-income level.



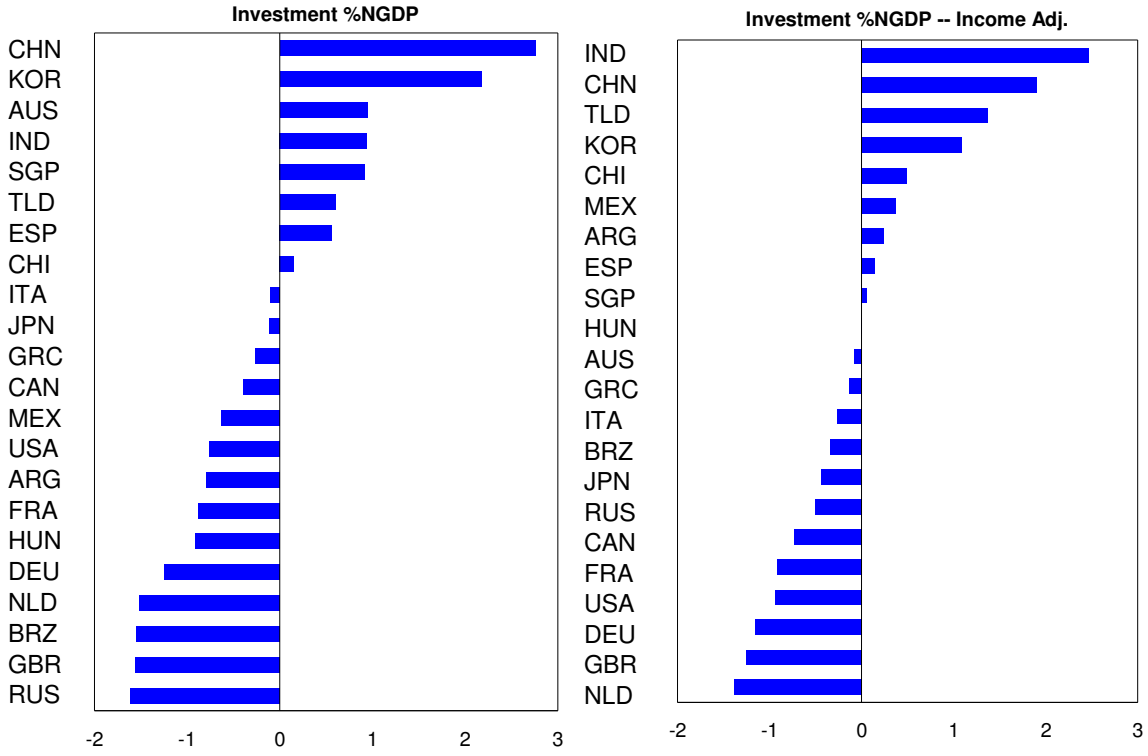
Investing

Investing is measured by looking at 1) the rate of total fixed investment in a given economy and 2) the household savings rate. Countries that save and invest in their future tend to grow faster by creating capital equipment and infrastructure that helps improve the productivity of their workforce relative to other countries with more limited investment rates. Further, high rates of savings provide capital for the most innovative companies in an economy to grow further. Of course, there are always risks that this investment is unproductive – particularly in situations like real estate bubbles where increased residential fixed investment doesn't necessarily lead to improved productivity. Looking at investment on its own has historically had a 20% correlation with future growth, but when combined with income it has had a 66% correlation with future growth.

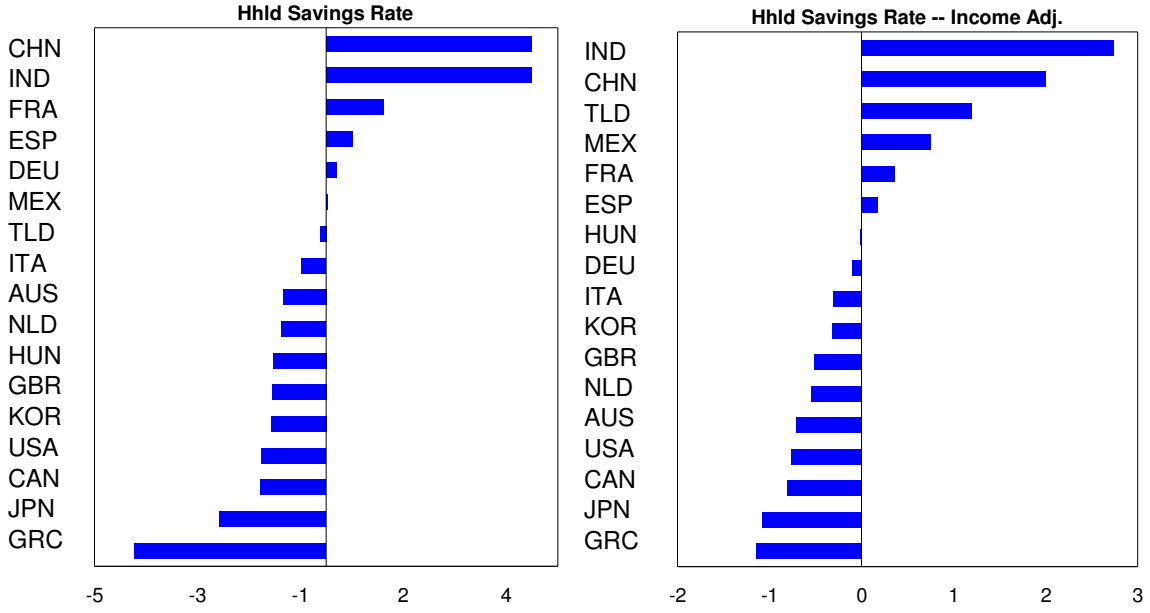
The rate of Chinese investment and savings is the highest in the world. The development of modern infrastructure and increasing business investment has been an important part contributing to the competitiveness of the Chinese workforce over the last few decades – though as we have noted there are risks that this investment may be going to less productive uses more recently. Spanish investment has been fairly high, though much of it has gone to the residential sector during the recent housing bubble, so the positive benefit is likely overstated. Germany, the US and Japan are about in the middle of the developed world in investing on an outright basis. Adjusting for income, both India and China continue to have very high rates of investment, and nearly all developed world countries are near the bottom. Within the developed world, major European countries generally are higher than other developed countries on a income-adjusted basis due to their high household savings rates.



We measure the rate of fixed investment for a given country by looking at the average fixed investment as a percentage of GDP in the economy over the last 7 years. Through time the correlation of fixed investment rates adjusting for incomes and future growth is 51% (vs. just 26% for fixed investment rates on their own). As highlighted above, on this measure China and India are at ranked among the top countries when it comes to fixed investment. Spain is relatively high as a result of the sizable housing boom, though the value of the investment may be overstated in this simple measure. Japan is further down, and Germany and the US are near the bottom. All three have had persistently weak fixed investment for some time. The impact of adjusting for income mostly just exacerbates these same differences, leaving India and China at the top, Germany and the US at the bottom, and Japan not far behind.



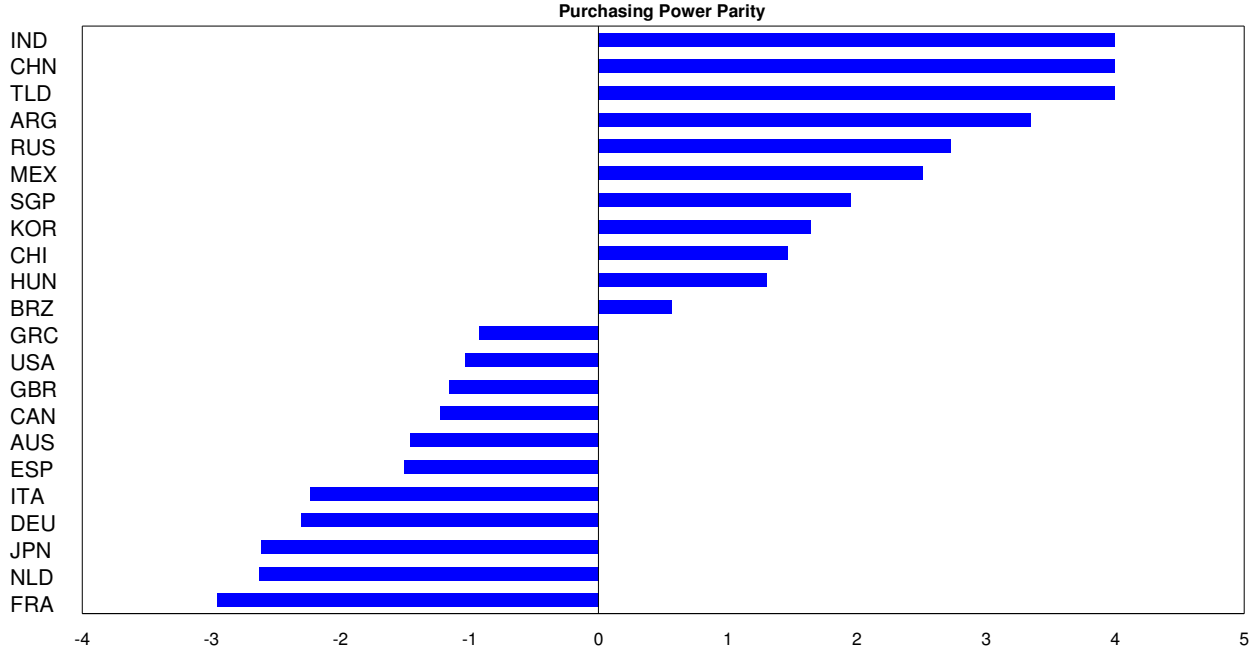
We measure the propensity for households to save by looking at the average household savings as a percentage of household income over the last seven years. Through time the correlation of savings rates adjusting for incomes and future growth is 64% (vs. just 27% for savings rates on their own), though our sample size is smaller for this indicator. Once again, China ranks at the top for household savings, along with India and South Korea. Major European countries measure as having fairly high houshold savings rates relative to other developed countries, while household savings rates in the US are notably lower. Adjusting for income levels again exacerbates the differences between the emerigng and developed world along this dimension, with the high level of Indian and Chinese savings standing out and savings rates in the US and Japan quite low.



Purchasing Power Parity

In addition to the adjustments to the level of income described above, we also include a measure of purchasing power parity (PPP) to our competitiveness indicator. While many of the factors described above are fundamental causes of a country's competitiveness, measures of PPP are somewhat direct, albeit imperfect, measures of what you get for what you pay for over a similar basket of goods around the world. Since this is the intersection of both what you pay for and what you get, there is no need to income adjust this measure. To the extent that a country's labor cost is low relative to its producitivity, PPP measures should highlight the relative cheapness of the economy – because the unit labor cost of producing the same basket of goods is cheaper in one place than another. Using PPP measures predict future growth with a 40% correlation through time.

Indian and Chinese PPP measures suggest these economies continue to be the most competitive in the world. Within the developed world, the United States is measured as one of the least expensive countries on this basis, higher than Spain, Italy, Germany and Japan. Of the major developed countries, Japan and France are the least competitive by these measures.



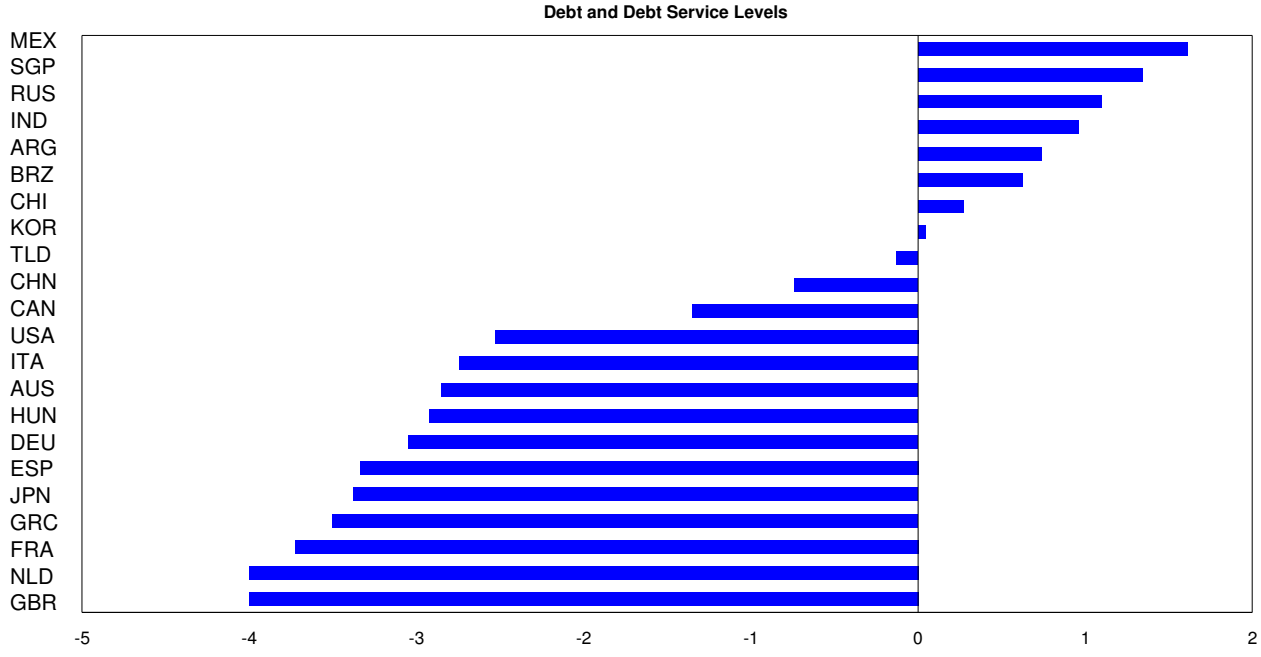
Indebtedness

To construct our measures of indebtedness we combine an indication of how reliant an economy has previously been on debt creation to support spending and income growth (as measured by both the existing debt and debt service levels and the recent size of the flow of debt for the economy) and the attractiveness of taking on new debt given existing interest rates, growth, capacity for monetary stimulation, and money creation. When these indications align in one direction – i.e., if debt levels are low, recent debt growth has been low and monetary policy is easy – we reflect the particularly attractive conditions in our estimate process. The worst conditions are when there are high debt levels and debt service, high recent credit growth rates, and low attractiveness to take on new debt as a result of tight monetary policy relative to conditions.

Debt and Debt Service Levels

We determine existing debt burdens based on both the stock of debt and the level of debt service relative to income. Countries with low debt burdens have more capacity to lever up and finance spending growth than countries near the top of their-long term debt cycle, where debt service costs become too large and deleveraging must occur. Therefore, we expect countries that have lower debt burdens to grow faster because they have a greater capacity to borrow. To measure debt burdens we take into account the mix of external debt relative to total debt, since countries can have different capacities for each. We also adjust for income in measuring the level of debt burden since a sustainable level of debt is typically higher for wealthier countries that have deeper debt and capital markets, and therefore naturally have higher debt to income ratios than those of lower income countries. Over time, our measure of debt levels is by itself 32% correlated with future growth.

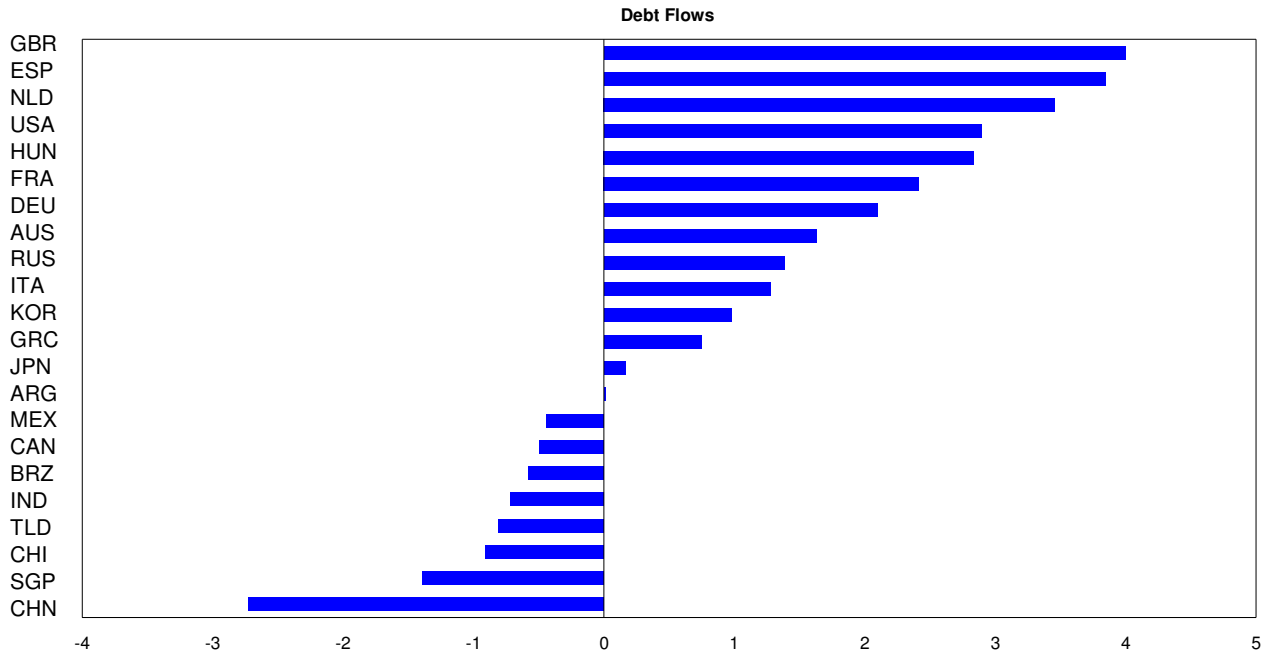
When we combine these measures, we see that Mexico, Singapore and Russia have low debt burdens, as they have been least reliant on debt as a driver of income and spending growth through time. While much of the emerging world has relatively low debt levels, China's debt levels are now about in line with its level of income (or a bit higher). China still has low household borrowing and underdeveloped capital markets, but corporate debt is relatively high for China's income, about 180% GDP. Almost every developed country is overly indebted. The US is of course no exception, but since 2008 debt service rates have fallen and debt levels have been reduced through a mix of nominal growth above interest rates, restructuring and debt paydowns. As a result, the US has a lower debt burden than Spain and Italy, where the reverse is true and debt burdens have risen. Japan's debt burden is one of the highest in the world, after two decades where monetary policy has been insufficient to bring nominal growth rates above interest rates and net borrowing has continued in large part to fund debt service payments and government deficits, leading to an accumulation of debt on top of an already high debt stock.



Debt Flow

The flow of debt matters because ultimately it is the change in the rate of debt growth that will cause spurts and declines in growth. For example, if a country is increasing the rate of debt growth by a very fast rate of 10% and the rate of debt growth falls to 0%, the country will experience a depression. If debts grow faster than incomes for some period, they will have to grow slower than incomes for another period. That produces pain. So we expect slower relative growth for countries that have recently relied on a large flow of debt in order to finance spending growth, and the reverse for countries whose recent debt flow is weak relative to trend. When we measure the debt flow, we consider both the flow in total debt and in external debt and take into account the proportion of each type of debt in the economy, similar to how we look at debt levels. Over time, our measure of debt flows is 6% correlated with future growth (thought it adds more value than that number implies when considered with our other indicators in the context of the long-term debt cycle).

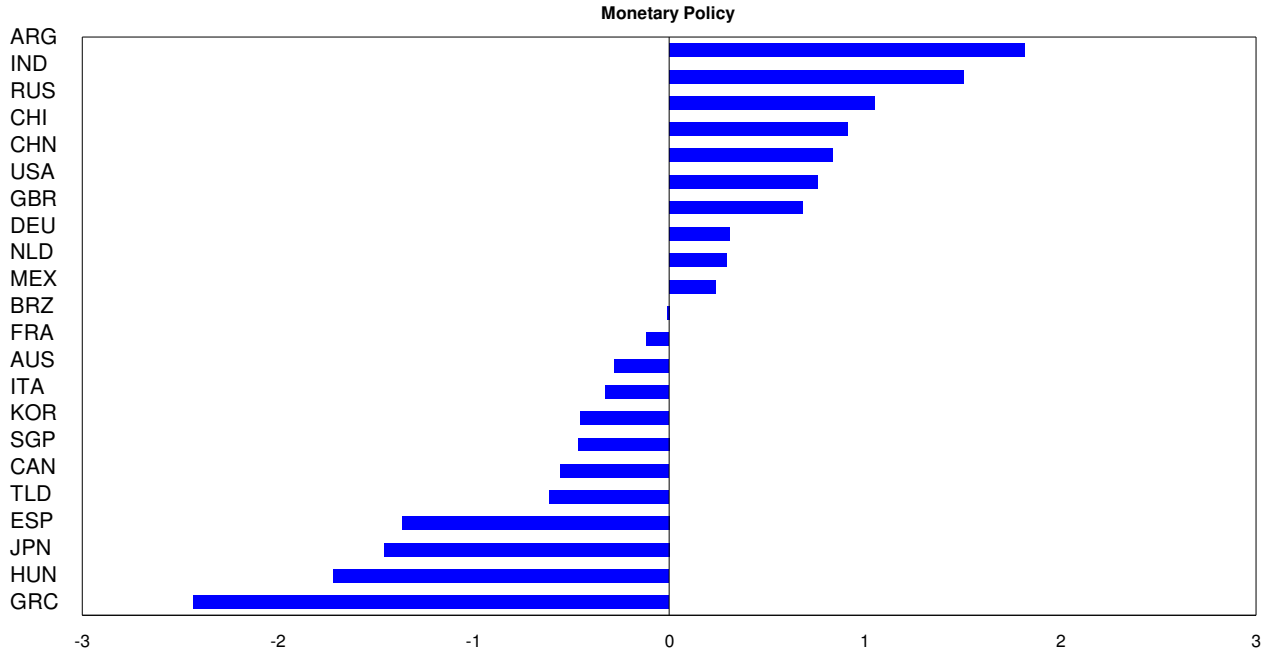
On this dimension Spain is near the top of the list. There has been such a collapse in Spanish credit creation in recent years, from massive borrowing to now paying down debt, that even a return to flat net credit creation would be positive for growth. This reading dampens a bit the bearish picture of Spanish indebtedness we see from just looking at debt levels, but by no means offsets it. The picture is similar but less extreme for Italy. China is on the other end of the spectrum. In response to the credit crisis in 2008, there was a massive levering up in the private sector in 2009 and 2010, with credit creation running 35%-45% GDP per year. This is some of the strongest credit growth of any country in history. The current pace is around 30% GDP even though the flow in the years prior to 2008 was in the range of 15% to 20%. We expect that going forward the pace of credit creation will have to be slower than recent past and so we see this dynamic as a drag for China's growth. The US has a positive reading from a flow perspective – credit creation collapsed in the crisis but now the US is in a position to benefit from even modest credit growth. The flow picture in Germany is also bullish, though to a lesser degree than in the US because German businesses and households have shown to be less prone to take on new credit, reflected in lower trend credit creation. We are neutral on this measure for Japan, where credit growth is moderate and close to trend.



Monetary Policy

The attractiveness of taking on new debt is another consideration for whether the different players in a country are likely to lever up in the future, and this is in large part a function of monetary policy relative to conditions. To measure monetary policy, we look at 1) how easy or tight rates are relative to conditions, 2) the central bank's capacity to ease rates and 3) the amount of money printing relative to debt. For the first measure, we look at how stimulative the yield curve is (whether it's steep or flat) and nominal growth vs. nominal rates. When the yield curve is steep and nominal growth is high relative to rates the incentives to borrow and invest are high. If rates hit zero, as they are prone to do during a deleveraging, the central bank loses its capacity to ease through this mechanism. So we also measure the probability of rates hitting zero, with a higher probability as a future expected drag on growth. While central banks might lose this lever, they can also print money to stimulate spending and alleviate debt burdens, which is why money printing relative to debt is the third piece of our measure of monetary policy. Over time, our measure of monetary policy relative to conditions alone is 37% correlated with future growth.

India and China have some of the most stimulative monetary policy globally. India's yield curve and growth vs. rates are both very stimulative. In China, the bullish picture comes from the very high nominal growth relative to nominal rates. The yield curve is more neutral. The US and the UK are not that far behind, and have the most stimulative policies in the developed world, due in large part to the massive amount of monetization by the Fed and BoE. Both central banks have also engineered steep yield curves and kept nominal rates below nominal growth. In contrast, monetary policy remains tight in Italy and extremely tight in Spain and Japan relative to conditions. Nominal growth is below interest rates in each of these countries, rates are close to zero, and printing is insufficient to alleviate debt burdens and stimulate spending. German monetary policy is moderately stimulative relative to conditions, with a steep yield curve, a significant amount of money printing by the ECB flowing through the eurosystem into German banks, and nominal growth a bit above rates.



In Conclusion

Those, in a nutshell, are our measures of competitiveness and indebtedness, how they would have correlated with subsequent growth and what they imply for each country's future growth rate. We'd love you to reflect on them for a bit before we go on to show similar measures for "culture" and "luck" and then combine them into an overall "formula for economic success".

We know that trying to come up with a "formula for success" is a bit audacious. However, we believe it is important to help us resolve differences in our "beliefs". Hopefully we can have a quality exchange about how the economic machine works in order to use that as a foundation for figuring out what is likely and what should be done about it.

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