CHAPTER 1.1

The Growth Competitiveness Index: Analyzing Key Underpinnings of Sustained Economic Growth

JENNIFER BLANKE, World Economic Forum
FIONA PAUA, World Economic Forum
XAVIER SALA-I-MARTIN, Columbia University and Universitat Pompeu Fabra

Few things matter more for the welfare of a country's citizens than the aggregate growth rate of the economy. For rich countries, positive growth rates tend to mean higher wages, larger profits, more employment, and expanded business opportunities. For poor countries, positive growth rates tend to lift people out of poverty as their incomes tend to rise along with average GDP. Indeed, a 1 percent increase in per capita GDP tends to be associated with a 1 percent increase in the incomes of the poorest 20 percent of the population.[1] Moreover, positive growth rates in the developing world tend to be associated with improvements in other dimensions: reductions in infant mortality, longer life expectancy, increased access to water and sanitation, expanded education, reduced female discrimination, declines in child labor (especially child prostitution and child soldiers), and improvement in freedom, civil liberties, and democracy. Thus, the aggregate growth rate of a nation is important, perhaps one of the most important factors affecting human welfare.

Despite its enormous importance, the determinants of the growth rate of a country remain one of economics' biggest mysteries. This is true even though the greatest economic minds of the last two centuries have tried hard to explain what can be done to increase a country's growth rate. Adam Smith thought that specialization and the division of labor was the engine of growth. The great classical economists of the 19th century (such as Thomas Malthus or David Ricardo) thought that natural resources imposed a binding limit on the growth opportunities of a nation. The law of diminishing returns to land meant that population growth would eventually require the use of low-quality land, and this would reduce production per capita and cap the potential for economic growth.

During the 20th century, economists thought that the ultimate force driving economic growth was investment in physical capital and infrastructures. This belief underlay the many plans that governed the economy of the Soviet Union and the countries under its political or intellectual influence. It was also the foundation upon which the international aid packages of institutions such as the World Bank operated for decades. The idea was that the growth rate of a country depended only on the fraction of its GDP that it invested. If the savings generated by its citizens were not enough to finance the investment required to achieve the desired growth rate, the World Bank would finance the difference (this is why this line of thought was, and still is, called the "financing gap"). The collapse of the Soviet model and the failure of many developing countries to grow, despite the aid of the Bretton Woods institutions, showed economists that investing in physical capital was not enough to improve the growth opportunities of a country. We had to look for other mechanisms. Education and training (or "human capital," as modern economists call it) became the center of economic research for a

couple of decades. During this time, developing countries were advised to educate their children and to invest in the expansion of their human capital. They did . . . but economic growth failed to materialize in most of them.

Technological progress (whether created by the country or copied from the leading economies) was then thought to be a central determinant of economic growth.[2] Few people today disagree with this idea, although this merely shifts the question from "what determines the growth rate of GDP?" to "what determines the rate of technological progress?" This is why economists kept searching. Many answers have been proposed: openness, macroeconomic stability, governance, the rule of law, institutions, lack of corruption, market orientation, government waste, and many other factors have been found, at least partially, to affect the aggregate growth rate of a nation. Having confronted many failures through the years, it is increasingly clear that there is no magic solution to the problem of economic growth. The process of economic growth is rather complex and many factors are needed if a country is to succeed. It is this complexity that the World Economic Forum tried to capture when it started estimating the Growth Competitiveness Index (GCI) a few years ago.

Indeed, one of the fundamental objectives of the *Global Competitiveness Report* is to evaluate the potential for the world's economies to attain sustained economic growth over the medium and long term. With this goal in mind, the World Economic Forum developed the GCI. The index is based on economists' understanding of the determinants of the complex process of economic growth and development. Again, our understanding is far from perfect. In fact, we learn new things every year as new development experiences teach us new lessons and as new data become available.[3] But our existing knowledge can be used to evaluate the growth potential of a country by combining available data and the Executive Opinion Survey conducted annually by the WEF into an index that we call the GCI. The GCI was developed by Jeffrey Sachs and John McArthur two years ago, and it was first presented in *The Global Competitiveness Report 2001–2002*. The index summarizes the set of institutions, policies, and structures driving the growth process of many countries—102 this year—from every corner of the world.

The three pillars

The GCI is founded on three central ideas. The first one is that the process of economic growth can be summarized with three important broad mechanisms: the macroeconomic environment, the quality of public institutions, and technology. These three mechanisms are what Sachs and McArthur called the "three pillars" on which the process of economic growth rests.

Macroeconomic environment

Macroeconomic stability is important for growth. Although it is certainly not true that macroeconomic stability alone can increase the growth rate of a nation, it is no less true that macroeconomic disarray kills its growth prospects. Firms cannot make informed decisions in environments where the inflation rate is in the hundreds, typically as a result of public finances being out of control. The banking system (which is essential if an economy is to grow in the medium and long run) cannot function if the government runs gigantic deficits (especially if, as a result, it forces banks to lend it money at below-market interest rates). The government cannot provide services efficiently if it has to make enormous interest payments on its past debts. And the business sector suffers unnecessarily if the taxes they pay are wasted away by the government. In sum, the economy cannot grow unless the macro environment is favorable. This is the idea that the first pillar of the GCI is meant to capture.

Institutions

The second pillar of the GCI relates to public institutions. Although, in a market economy, wealth is largely created by private businesses, these businesses have to operate within a country and have to deal with the institutions created and maintained by the government. It is important, for example, that property rights are guaranteed by a legal and judicial system. Private companies cannot operate efficiently in environments where contracts cannot be enforced or where the rule of law is weak or nonexistent. Firms may find it too expensive (maybe prohibitive) to do business in countries where corruption is rampant. One of the most exciting areas of economic research today tries to quantify the importance of institutions for long-run economic growth.[4] As a result, the GCI measures the soundness of the public institutions and it introduces it as one of the three pillars of economic growth and development.

Technology

Finally, the third pillar is technological progress. One of the main lessons of neoclassical growth theory[5] is that, in the long run, an economy cannot grow unless technological progress occurs. The key difference between rich and poor countries is not that the citizens of rich countries have more rice, more meat, or more milk (which they do) but that they have more and better things. If we sit in a rich country and simply look around, we will notice that most of the products we see did not exist just a few years ago: from the computer to color TV to genetically modified food to the latest designer drugs. Moreover, the products that did exist are much cheaper now than they were in the past[6] or their quality has improved dramatically.[7] Technological progress is, therefore, at the heart of economic growth. And the reason for thinking that, in the

long run, no growth is possible without technological improvements is that the other potential determinants of growth must run into diminishing returns. For example, institutions and the macroeconomic environment can have important consequences for growth in countries with terrible environments. But once institutions are more or less right, and once the macroeconomy is more or less stable, additional improvements along these lines will probably have little or no effect on economic growth. This contrasts with technological progress since there do not seem to be good arguments that would suggest that there are diminishing returns to ideas. And if there were, they would certainly not be empirically acceptable since worldwide technological progress does not seem to be decelerating. In fact, the contrary appears to be true.

We should note that three "pillars of growth" are not independent. In fact, they interact to support or to hinder sustained growth, as noted by Sachs and McArthur:

> ". . . these three factors are interwoven—strong institutions, for example, are needed for technological development to occur; a sophisticated technology base will contribute greatly to macroeconomic stability—but they do each have close and statistically distinct relationships with recent trends in economic growth" (p 39).

Empirically, the GCI uses both hard (publicly available) data, and data from the World Economic Forum's Executive Opinion Survey to estimate three component indexes that capture the three pillars of growth. The three components are called the "technology index", the "public institutions index", and the "macroeconomic environment index." The three components are then combined to calculate the overall GCI.

Innovation versus imitation

The second idea underlying the GCI is that, although technological advance is generally seen as the most critical factor in driving sustained high growth for all countries (and certainly the only factor that can sustain growth in the long run), these advances may have different sources for different countries. In particular, for economies that are already close to the technological frontier, the only way to improve technology is to innovate. For countries that are far away from the frontier, on the other hand, technological improvements can be achieved partly through innovation and partly by copying or adopting the knowledge previously developed in one of the leading economies through technology transfers.

To capture this idea, the GCI separates the countries into two groups: the "core" innovators (which are those whose growth is largely driven by their capacity to innovate because they are close to the technological frontier), and "non-core" innovators (that is, those that depend more on technological adoption from abroad). In order to make this distinction, we used "an objective measure of their level of technological sophistication" as measured by the number of registered US utility patents (patents for innovation) per capita, per year. Based on an analysis of the data, the threshold of 15 patents per million population was chosen to separate the countries into two groups. Countries above this threshold are defined as the core group, and all others as non-core (see table 1 for a list of the core innovators).

As stressed by Sachs and McArthur, the distinction between core and non-core is for purely analytical purposes and "is not meant as a value judgment in any way. It is meant only as a useful shorthand to describe the critical division in today's world economy between the innovating and the non-innovating economies" (p 30).

More generally, the aim here is simply to acknowledge that the role of technology in the growth process differs between these two groups, and that this should be integrated into the analysis.

To reflect the fact that innovation is more important than adoption for core innovators, the technology index of the GCI puts a larger weight on innovation for the core innovators than for the non-core innovators. Technological adoption, on the other hand, receives a

Table 1: Core technology-innovating economies, 2002

Country	Average annual US utility patents granted per million population	Rank
United States	301.48	1
Japan	273.40	2
Taiwan	241.38	3
Sweden	190.34	4
Switzerland	189.44	5
Israel	165.08	6
Finland	155.58	7
Germany	137.52	8
Canada	109.62	9
Singapore	97.62	10
Netherlands	86.94	11
Luxembourg	82.59	12
Denmark	80.38	13
Korea	79.87	14
Belgium	70.10	15
France	67.59	16
Austria	65.43	17
United Kingdom	64.29	18
Norway	53.78	19
Iceland	45.94	20
Australia	44.00	21
New Zealand	36.84	22
Ireland	33.85	23
Hong Kong SAR	33.29	24
Italy	30.49	25

Source: US Patent and Trademark Office, February 2003

positive weight for non-core innovators and zero weight for core innovators. Technological adoption is captured by the *technology transfer subindex*.

Different countries are affected by different factors

The third central idea underlying the GCI is that the importance of the determinants of economic competitiveness varies for core and non-core innovators.

Sachs and McArthur argue that getting the fundamentals right in terms of the macroeconomic environment and institutions is still extremely critical for the non-core countries, whereas countries in the core will have these fundamentals largely in place, and for these countries technological innovation has become the deciding factor for growth. As the authors explained:

> "Our research has suggested that public institutions, for instance, play a more crucial role at low and middle levels of development than they do at high levels, where economies tend to have less variation in institutional quality and a satisfactory threshold of organizational efficiency has already been met. Likewise, once overall macroeconomic stability is achieved, including sustainable fiscal balances and a healthy banking system with broad access to credit, 'increased' stability becomes difficult to measure and its benefits become less pronounced" (p 38).

To capture this idea, the GCI assigns a heavier weight to the technology index for core innovators than it does to the public institutions index and the macroeconomic environment index. On the other hand, equal weights are assigned to these three indexes for noncore countries:

> "Just as the challenges of growth differ according to the stage of economic development, we have found that the explanatory power of our Growth Competitiveness Index is improved if we allow for different weightings of factors depending on the stage of development. . . . We verify through regression analysis that, as the stage of economic development changes, the relative importance of various sub-components of the GCI also changes" (p 31).

The precise weights given by Sachs and McArthur to each of the component indexes and its various subindexes can be summarized as follows:

For the core innovators:

Core GCI = 1/2 technology index
+ 1/4 public institutions index
+ 1/4 macroeconomic environment index

For the non-core innovators:

Non-core GCI = 1/3 technology index
+ 1/3 public institutions index
+ 1/3 macroeconomic environment index[8]

Specific details on the composition and construction of the GCI are found in the appendix to this chapter.

Changes to the GCI from last year

Increased coverage

The most important change to the GCI this year is the significant increase in the number of countries included in this year's analysis, from 80 to 102. An important point is that the countries added this year are mainly from the developing world, especially Africa. The coverage in that region of the world has increased from 8 to 25, and now includes Algeria, Angola, Cameroon, Chad, Egypt, Ethiopia, Gambia, Ghana, Kenya, Madagascar, Malawi, Mali, Mozambique, Senegal, Tanzania, Uganda, and Zambia. Newly added countries also include non-African nations such as Luxembourg, Macedonia, Malta, Pakistan, and Serbia. The countries included in this year's report account for 97.8 percent of world's GDP. The 2003 GCI index, therefore, analyzes almost all of the world's economic activity.

Changes to the model: innovative capacity and government waste

This year we have maintained the basic structure and overall logic of the GCI as developed by Sachs and McArthur, and as described above. However, we have made two changes to the methodology: one of these changes is minor and the other more important.

The minor change has been made to the innovation component of the technology index. We have replaced a Survey variable aimed at measuring the extent of innovative capacity in the economy with what we have found to be a better proxy. The original question was worded as follows: "Does continuous innovation play a major role in generating revenue for your business?" An analysis of the data demonstrated that this question was capturing *company*-specific, rather than *country*-specific, data, and further that the concept of "continuous innovation" was subject to a wide variety of interpretations. The Survey variable was therefore replaced with one that asks whether companies in the country are aggressive in absorbing new technology. The latter gets more to the heart of country-level technological innovation.

The second, more significant, change was made to the macroeconomic environment index. In this index we have replaced the previously used variable "government expen-

diture as a percentage of GDP" with a composite subindex aimed at capturing government spending waste.

According to Sachs and McArthur, the original logic behind including government expenditure was that a number of studies "have shown that high levels of government expenditure relative to GNP are associated with low economic growth" (p 48). But they acknowledged that there were fundamental problems with the use of this variable, which called for further examination:

> "We recognize that the optimal level of government expenditures is a much more complex issue than suggested by our approach. It certainly would not be correct to infer that economic growth would be maximized at zero government expenditures (though our equation has that perverse property). When government spending is too low, then governments do not meet even the core needs for education, health, and public services needed to underpin economic growth. . . . Higher levels of government spending . . . may be justified by the services provided or by the benefits for social equality even if they come at some price in terms of economic growth. . . . We hope in future studies to develop a more sophisticated evaluation of different types of government spending and their effects on competitiveness" (p 48).

This is what we have endeavored to do this year. We chose to replace government expenditure in the model precisely because it is not capturing what it was meant to capture. This became apparent upon looking at the ranking of countries for this particular variable. Since low spending is seen as a "good," the countries at the top of the ranking were those spending almost nothing, while those at the bottom spent high percentages of GDP. But this provides no indication of how well or poorly the resources are managed. One type of spending that must have a negative impact on growth is wasteful spending (or perhaps unproductive spending), as this type of spending may need to be financed with distortionary taxes (which hurt growth) while it does not provide the productive services that may enhance private productivity and, therefore, aggregate economic growth. With this in mind, we set out to find a good proxy for wasteful government spending.

Our goal, therefore, is to capture government waste. But within government expenditure, wasteful and productive spending are bundled together. The goal would therefore be to separate out public productive spending from wasteful spending in order to capture just the "bad" part. We have looked at a number of ways of doing this.

A first option considered was to introduce government expenditure into the GCI in a different way. One possibility would be to take both very low and very high spending as "bad" and moderate spending as "good": both extremes are bad for growth. The idea is that useful public spending tends to increase the productivity of private firms, which leads to larger aggregate economic growth. The down side is that public expenditures need to be financed with distortionary taxation. These distortions tend to lower the private after-tax productivity of firms, which, in turn, lowers the rate of economic growth. If the size of the government is too small, taxes are low, but the beneficial side of public spending is insufficient (for example, property rights are not well protected, infrastructures are inadequate, and so on). For the countries with governments that are "too small," an increase in the size of the government would lead to a larger growth rate as the benefits from more productive public spending would more than offset the extra costs of taxation. At the other extreme, if the size of the government is "too large," public spending may be very beneficial, but the distortions caused by all the taxes needed to finance it would more than offset the benefits. These countries could increase their growth rate by reducing overall spending. This leads to the idea that there is an "optimal size" of the government. In other words, there is a size of public spending (as a fraction of GDP) for which the growth rate of the economy is the largest.

The problem is that, in order to implement these ideas empirically, we would need to know what this "optimal size" is. And we do not. Perhaps more importantly, the optimal size may be different across countries, since a citizen's attitude toward government taxation and evasion depends on how well the government has performed historically and also on other social, structural, and cultural attributes that differ across countries. For these reasons, we decided not to try to include government spending in this year's GCI in a nonlinear fashion.

We also considered separating government consumption from government "investment." The idea here was that government consumption tends not to be productive (so it does not really increase the productivity of private firms), whereas it still needs to be financed. Thus, public consumption does not have the "positive" (productive) characteristics of public investment whereas it retains the negative effects of distortionary taxation. This solution was finally discarded because some parts of public consumption may be seen as productive by private firms, as it buys social peace and helps ease social tensions that tend to have negative effects on the overall business environment.

After having examined the potential hard data solutions above, we turned to the possibility of using data from the Executive Opinion Survey. This made intuitive sense, as what we aim to capture is a textured and qualitative measure of government spending. The idea was to replace the hard data on government expenditure with Survey data that would better capture the concept of

Box 1: Changes to last year's rankings

Of course, altering the model as described in the section above necessarily has an impact on the rankings of the index. In order to allow for better comparability between last year's and this year's rankings, this section will look at how last year's rankings would have changed if we had implemented the two changes described in the section above. Table A compares last year's published rankings with those that would have been obtained using the current formula. The section that follows will then concentrate on the changes in the rankings between last year and this year, using the current formula for both periods.

We see that there would have been a number of differences in last year's rankings if we had made the two substitutions described in the section above. Almost all of the variation can be traced to the replacement of the government spending variable by the government waste variable, since this variable is heavily weighted in the macroeconomic environment index, and thus on the overall rankings. Replacing the innovation variable, which has a relatively low weight in the technology index, has a comparatively muted impact on the rankings. The changes can thus be primarily traced to the fact that government spending is not correlated with the new composite variable, government waste. This is as we would expect, since the two variables are in fact capturing very different things, as explained in the section above.

Turning to the rankings that would have been obtained last year using this year's formula, a first notable point is that Finland, rather than the United States, would have topped the rankings. This can be traced to the fact that the US government spends a relatively low percentage of GDP compared with Finland. And although US spending is not seen as particularly wasteful, Finland's is seen as even less so. The combined effect of these two forces is that Finland is ranked ahead of the United States once government expenditure is replaced by government waste.

Table A: GCI 2002 comparison

Country	GCI 2002 rank (revised)	GCI 2002 rank (published)
Finland	1	2
United States	2	1
Sweden	3	5
Denmark	4	10
Switzerland	5	6
Taiwan	6	3
Singapore	7	4
Norway	8	9
Canada	9	8
Australia	10	7
United Kingdom	11	11
Iceland	12	12
Netherlands	13	15
Germany	14	14
New Zealand	15	16
Japan	16	13
Israel	17	19
Austria	18	18
Portugal	19	23
Spain	20	22
Belgium	21	25
Hong Kong SAR	22	17
Ireland	23	24
Chile	24	20
Korea	25	21
Slovenia	26	28
Estonia	27	26
France	28	30
Hungary	29	29
Malaysia	30	27
Greece	31	38
Tunisia	32	34
Italy	33	39
South Africa	34	32
Botswana	35	41
Czech Republic	36	40
Thailand	37	31
China	38	33
Lithuania	39	36
Uruguay	40	42
Mauritius	41	35
Trinidad and Tobago	42	37
Latvia	43	44
Jordan	44	47
Brazil	45	46
Slovak Republic	46	49
Namibia	47	53
Croatia	48	58
Costa Rica	49	43
Poland	50	51
Panama	51	50
Morocco	52	55
Mexico	53	45
India	54	48
Peru	55	54
Dominican Republic	56	52
Jamaica	57	60
Bulgaria	58	62
Sri Lanka	59	59
El Salvador	60	57
Colombia	61	56
Vietnam	62	65
Philippines	63	61
Argentina	64	63
Turkey	65	69
Russian Federation	66	64
Romania	67	66
Venezuela	68	68
Indonesia	69	67
Nicaragua	70	75
Bolivia	71	78
Nigeria	72	71
Ecuador	73	73
Ukraine	74	77
Guatemala	75	70
Paraguay	76	72
Bangladesh	77	74
Honduras	78	76
Zimbabwe	79	79
Haiti	80	80

(cont'd.)

Box 1: Changes to last year's rankings *(cont'd.)*

Finland's relative improvement is indicative of a more general trend we see in the data: many western European countries would have been higher in the rankings last year using the new formula. These countries have governments that spend a high proportion of GDP (which was "penalized" by last year's formula), but that as captured by the waste composite, are not seen as spending wastefully. In fact, all western European countries have either the same or higher rankings following the introduction of government waste to the index: not one of them is lower following this change.

To reiterate, Europe's better performance can be traced to the fact that on the whole European governments spend high percentages of their GDP, which often pulled them down in the original model. However, by introducing the new waste variable, in which they are seen as spending relatively efficiently, they have necessarily been pushed higher in the rankings.

And since these are relative rankings, when some countries are higher, other countries must necessarily be lower. Turning again to Table A, we see that there are two regions particularly affected on the downside: many countries in Asia and Latin America would have had lower ranks last year if we had been using the waste variable rather than government expenditure. These are countries that have relatively low overall government spending, which pushed them higher in the rankings last year. However, once the wastefulness of the spending is taken into account, many of these countries do less well, therefore coming in lower in the rankings.[1]

It is important to note one additional point with regard to relative rankings. It is possible for a country to do better on the government waste variable than the government expenditure variable, and to still have a lower overall ranking due to the movement of other countries in the index. This is simply due to the fact that other countries are doing even better, displacing the country in the overall rankings. Similarly, it is possible for a country to do worse in the waste variable than the government expenditure variable, but to see an improvement in their overall ranking due to the relative shifts of other countries in the index.

public waste. After testing a number of candidate variables, three were selected:

- Extent of distortive government subsidies
- Diversion of public funds
- Public trust in the financial honesty of politicians

The idea of this "composite waste subindex" is to capture waste through government favoritism and corruption. This should account for a large part of overall government wasteful spending. Statistical analysis of these variables indeed showed that they have strong explanatory power with regards to medium- to long-term growth. This solution was thus retained.

Competitiveness rankings 2003–2004

An immediate overview of the results of this year's 2003 Global Competitiveness Index rankings reveals striking similarities with last year's top 10 rankings. The first four ranks are identical, with Finland in the first place, followed by the United States, Sweden, and Denmark, respectively. Taiwan and Singapore maintain their rankings relative to each other, but both moved higher by one position, to 5th and 6th positions, respectively, sliding Switzerland from the 5th position to the 7th position. Norway declined by rank to 9th place, making way for Iceland in 8th place. Canada, previously in 9th place, falls off the top 10 list while Australia stays in 10th place.

A closer study of the results, however, reflects remarkable changes underlying each country's competitive position, both in absolute as well as relative terms. Tables 2 through 7 are relevant to the rest of this chapter. **Finland**, for instance, posted improvements in its overall macroeconomic stability characterized by an increase in the government fiscal surplus, an increase in its national savings rate, and further reduction of its inflation rate and interest rate spread. Yet despite generally stable economic indicators, Finland posted the fourth worst deterioration in recession expectations (rank #69) as negative sentiment deepened over the economy's prospects in the immediate 12-month period.

Unlike Finland, which performed consistently well on the three components of the Global Competitiveness Index, the **United States** maintained its position in the second place of the GCI amid varying levels of achievement in the different components. For instance, the country's overall performance is weakened by the quality of its public institutions. Specifically, there is deterioration in the perceptions of favoritism in the decisions of government officials (rank #19) and of the extent of organized crime (rank #29). Another component that serves as a source of weakness is the macroeconomic environment characterized by a widening of the government budget deficit to 3.4 percent of GDP (rank #50) and a further decline of the

national savings rate to 10.5 percent of GDP (rank #93). And although the United States still leads in the technology index, its overall score dropped, reflecting a reduction in the tertiary enrollment rate and a decline in the number of patents granted.

Significantly, **Sweden's** position in third place is unchanged, but underlying its ranking is one of the most striking improvements in scores, particularly in the area of public institutions. Sweden posted increases in the scores pertaining to the extent of organized crime and the perception of favoritism in the decisions of government officials. But like the United States, Sweden's continued leadership in the technology index (rank #4) belies a notable decline in patents granted. And like Finland, Sweden's high ranking in the macroeconomic environment (rank #8) appears in stark contrast to the heightening of recession expectations in the country (rank #68).

That **Denmark** stays in the fourth place masks notable improvements over last year's scores. Denmark, already in the top position in the quality of public institutions and the extent of government waste, achieved one of the largest gains in the perception of the extent of distortive subsidies (rank #7). Denmark's position in technology also received a boost from dramatic gains in the scores for government prioritization of ICT (rank #10) and government success in ICT promotion (rank #10).

Taiwan's ascent to the 5th place in the overall rankings also received a boost from higher scores in the quality of public institutions. The most evident improvements include more favorable perceptions of the independence of the judiciary, less favoritism in the decisions of government officials, better control of corruption and greater public trust of politicians. Taiwan's leadership in technology (rank #3) also received a further boost from increased patent activity. But the country's macroeconomic performance deteriorated, marked by a widening of the government deficit to 6.7 percent of GDP (rank #79) and an overall worsening of recession expectations (rank #57).

Moreover, **Singapore** may be ranked first in terms of the macroeconomic environment but behind the top ranking are notably lower scores in several areas: government deficit, inflation rate, savings rate and interest rate spread. In contrast, Singapore's ranking in the technology index (rank #12) may obscure the fact that the country consistently holds the number one position in terms of government prioritization of ICT and government success in ICT promotion. This year, Singapore also posted the highest increase in number of patents per capita.

Like Singapore, **Switzerland** enjoys high ranking of its macroeconomic environment (rank #6), particularly its credit rating (rank #1). Closer examination, however, reveals deterioration in the access to credit (rank #58) and a worsening of recession expectations (rank #76). Similarly, Switzerland scores quite favorably in terms of government waste (rank #13) but its overall score is weighed down by strikingly negative perceptions of the extent of distortive government subsidies (rank #72).

Iceland, a new entrant to the top 10 rankings, received its boost from an improvement in its macroeconomic performance. Looking in further detail, however, reveals that Iceland's performance in this area is quite mixed. Indeed, the country scored well in terms of access to credit (rank #2) and recession expectations (rank #5). But its interest rate spread remained high at 10.1 percent (rank #73) while the national savings rate remains relatively low at 19.1 percent (rank #61). Similarly, in the area of technology, Iceland experienced a decline in the number of patents granted but its impact on the rankings was partly offset by the improvement in the tertiary enrollment rate.

That **Australia** stays at the 10th place in the overall rankings underplays significant improvements in the public trust in politicians and perceptions of the extent of distortive government subsidies, as well as overall quality of public institutions. What did decline is the tertiary enrollment rate from 79.8 percent to 63.3 percent, which by itself accounts for a drop of 7 positions in the technology index and 2 positions in the overall Growth Competitiveness Index.

Another notable drop is that of **Canada** (rank #16), which fell off the top 10 list. In contrast to Australia, however, Canada's fall is driven mostly by a perceived deterioration in the quality of public institutions ranging from the independence of the judiciary to the control of corruption, to a variable that captures public trust of politicians. Canada's macroeconomic environment did show improvements in some areas, with the country remaining the top performer among G-7 partners in terms of the overall stability of the macroeconomic environment. In the area of technology, Canada continues to post improvements in the diffusion of technologies, but it is significant to note that patent activity has declined.

Like Canada, the **United Kingdom** posted a significant drop in the rankings, from the 11th position to 15th, largely due to shifts in a number of variables which assess the quality of public institutions. The decline was evident across the board, particularly in the area of crime (rank #23) and business sector perceptions about possible favoritism in the decisions of government officials (rank #12). The country's macroeconomic environment showed some signs of weakness as reflected in a worsening of recession expectations (rank #73) and some erosion in the relative ranks of variables measuring the strength of the public finances and inflation. Performance in technology was mixed: there was a decline in government subsidies for R&D as well as a drop in the number of patents granted, but there were also more favorable assessments of government prioritization of ICT and government success in ICT promotion.

Table 2: Growth Competitiveness Index rankings and 2002 comparisons

Country	GCI 2003 rank (among 2003 countries)	GCI 2003 rank (among 2002 countries)	GCI 2002 rank (revised)*	GCI 2002 rank (original)
Finland	1	1	1	2
United States	2	2	2	1
Sweden	3	3	3	5
Denmark	4	4	4	10
Taiwan	5	5	6	3
Singapore	6	6	7	4
Switzerland	7	7	5	6
Iceland	8	8	12	12
Norway	9	9	8	9
Australia	10	10	10	7
Japan	11	11	16	13
Netherlands	12	12	13	15
Germany	13	13	14	14
New Zealand	14	14	15	16
United Kingdom	15	15	11	11
Canada	16	16	9	8
Austria	17	17	18	18
Korea	18	18	25	21
Malta	19	—	—	—
Israel	20	19	17	19
Luxembourg	21	—	—	—
Estonia	22	20	27	26
Spain	23	21	20	22
Hong Kong SAR	24	22	22	17
Portugal	25	23	19	23
France	26	24	28	30
Belgium	27	25	21	25
Chile	28	26	24	20
Malaysia	29	27	30	27
Ireland	30	28	23	24
Slovenia	31	29	26	28
Thailand	32	30	37	31
Hungary	33	31	29	29
Jordan	34	32	44	47
Greece	35	33	31	38
Botswana	36	34	35	41
Latvia	37	35	43	44
Tunisia	38	36	32	34
Czech Republic	39	37	36	40
Lithuania	40	38	39	36
Italy	41	39	33	39
South Africa	42	40	34	32
Slovak Republic	43	41	46	49
China	44	42	38	33
Poland	45	43	50	51
Mauritius	46	44	41	35
Mexico	47	45	53	45
El Salvador	48	46	60	57
Trinidad and Tobago	49	47	42	37
Uruguay	50	48	40	42
Costa Rica	51	49	49	43
Namibia	52	50	47	53
Croatia	53	51	48	58
Brazil	54	52	45	46
Gambia	55	—	—	—
India	56	53	54	48
Peru	57	54	55	54
Egypt	58	—	—	—
Panama	59	55	51	50
Vietnam	60	56	62	65
Morocco	61	57	52	55
Dominican Republic	62	58	56	52
Colombia	63	59	61	56
Bulgaria	64	60	58	62
Turkey	65	61	65	69
Philippines	66	62	63	61
Jamaica	67	63	57	60
Sri Lanka	68	64	59	59
Tanzania	69	—	—	—
Russian Federation	70	65	66	64
Ghana	71	—	—	—
Indonesia	72	66	69	67
Pakistan	73	—	—	—
Algeria	74	—	—	—
Romania	75	67	67	66
Malawi	76	—	—	—
Serbia	77	—	—	—
Argentina	78	68	64	63
Senegal	79	—	—	—
Uganda	80	—	—	—
Macedonia, FYR	81	—	—	—
Venezuela	82	69	68	68
Kenya	83	—	—	—
Ukraine	84	70	74	77
Bolivia	85	71	71	78
Ecuador	86	72	73	73
Nigeria	87	73	72	71
Zambia	88	—	—	—
Guatemala	89	74	75	70
Nicaragua	90	75	70	75
Cameroon	91	—	—	—
Ethiopia	92	—	—	—
Mozambique	93	—	—	—
Honduras	94	76	78	76
Paraguay	95	77	76	72
Madagascar	96	—	—	—
Zimbabwe	97	78	79	79
Bangladesh	98	79	77	74
Mali	99	—	—	—
Angola	100	—	—	—
Chad	101	—	—	—
Haiti	102	80	80	80

*Applying the 2003 formula
Source: World Economic Forum

(cont'd.)

Table 3: Growth Competitiveness Index components

Growth Competitiveness Index (GCI)			Macroeconomic environment index			Public institutions index			Technology index		
Country	Rank	Score	Country	Rank	Score	Country	Rank	Score	Country	Rank	Score
Finland	1	6.01	Singapore	1	5.69	Denmark	1	6.56	United States	1	6.30
United States	2	5.81	Finland	2	5.54	Finland	2	6.52	Finland	2	6.00
Sweden	3	5.80	Luxembourg	3	5.44	Iceland	3	6.44	Taiwan	3	5.97
Denmark	4	5.61	Norway	4	5.43	Australia	4	6.36	Sweden	4	5.90
Taiwan	5	5.58	Denmark	5	5.38	New Zealand	5	6.36	Japan	5	5.56
Singapore	6	5.54	Switzerland	6	5.31	Singapore	6	6.28	Korea	6	5.28
Switzerland	7	5.51	Australia	7	5.15	Sweden	7	6.28	Switzerland	7	5.26
Iceland	8	5.34	Sweden	8	5.13	Switzerland	8	6.20	Denmark	8	5.25
Norway	9	5.33	Netherlands	9	5.07	Germany	9	6.10	Israel	9	5.17
Australia	10	5.33	Austria	10	5.07	Hong Kong SAR	10	6.03	Estonia	10	5.16
Japan	11	5.25	Canada	11	5.04	Netherlands	11	6.02	Canada	11	5.15
Netherlands	12	5.24	United Kingdom	12	4.99	United Kingdom	12	6.01	Singapore	12	5.09
Germany	13	5.24	New Zealand	13	4.98	Luxembourg	13	5.92	Norway	13	5.08
New Zealand	14	5.23	United States	14	4.94	Austria	14	5.83	Germany	14	5.03
United Kingdom	15	5.23	Hong Kong SAR	15	4.91	Israel	15	5.82	Iceland	15	5.01
Canada	16	5.21	Iceland	16	4.90	Norway	16	5.73	United Kingdom	16	4.96
Austria	17	5.07	Spain	17	4.83	United States	17	5.71	Malta	17	4.95
Korea	18	5.07	Taiwan	18	4.82	Malta	18	5.68	Netherlands	18	4.93
Malta	19	5.03	Belgium	19	4.82	Chile	19	5.62	Australia	19	4.90
Israel	20	5.02	France	20	4.80	Jordan	20	5.58	Malaysia	20	4.89
Luxembourg	21	4.99	Germany	21	4.78	Taiwan	21	5.55	Czech Republic	21	4.84
Estonia	22	4.96	Ireland	22	4.74	Portugal	22	5.52	Portugal	22	4.82
Spain	23	4.94	Korea	23	4.67	France	23	5.50	New Zealand	23	4.80
Hong Kong SAR	24	4.93	Japan	24	4.57	Canada	24	5.48	Slovenia	24	4.73
Portugal	25	4.92	China	25	4.56	Ireland	25	5.46	Spain	25	4.72
France	26	4.91	Thailand	26	4.54	Botswana	26	5.45	Latvia	26	4.71
Belgium	27	4.88	Malaysia	27	4.49	Belgium	27	5.41	Austria	27	4.69
Chile	28	4.86	Italy	28	4.48	Estonia	28	5.36	France	28	4.67
Malaysia	29	4.83	Malta	29	4.47	Uruguay	29	5.31	Belgium	29	4.65
Ireland	30	4.73	Botswana	30	4.44	Japan	30	5.30	Greece	30	4.64
Slovenia	31	4.70	Portugal	31	4.41	Spain	31	5.28	Chile	31	4.60
Thailand	32	4.63	Tunisia	32	4.38	Tunisia	32	5.19	Hungary	32	4.57
Hungary	33	4.61	Greece	33	4.38	Hungary	33	5.18	Slovak Republic	33	4.55
Jordan	34	4.58	Estonia	34	4.37	Malaysia	34	5.12	Poland	34	4.44
Greece	35	4.58	Chile	35	4.36	Slovenia	35	5.11	Brazil	35	4.44
Botswana	36	4.56	Latvia	36	4.31	Korea	36	5.03	Lithuania	36	4.43
Latvia	37	4.54	Slovenia	37	4.27	Thailand	37	4.97	Hong Kong SAR	37	4.40
Tunisia	38	4.49	Hungary	38	4.09	Malawi	38	4.79	Ireland	38	4.37
Czech Republic	39	4.48	Czech Republic	39	4.08	Gambia	39	4.73	Thailand	39	4.37
Lithuania	40	4.39	South Africa	40	4.08	El Salvador	40	4.72	South Africa	40	4.35
Italy	41	4.38	Lithuania	41	4.04	Lithuania	41	4.71	Croatia	41	4.32
South Africa	42	4.37	Jordan	42	4.03	Greece	42	4.71	Luxembourg	42	4.30
Slovak Republic	43	4.23	Morocco	43	3.95	South Africa	43	4.69	Mexico	43	4.26
China	44	4.19	Israel	44	3.93	Mauritius	44	4.61	Italy	44	4.24
Poland	45	4.15	Vietnam	45	3.87	Latvia	45	4.61	Argentina	45	4.22
Mauritius	46	4.12	Gambia	46	3.85	Italy	46	4.56	Costa Rica	46	4.19
Mexico	47	4.12	Trinidad and Tobago	47	3.85	Czech Republic	47	4.51	Trinidad and Tobago	47	4.13
El Salvador	48	4.07	El Salvador	48	3.84	Namibia	48	4.50	Jordan	48	4.13
Trinidad and Tobago	49	4.07	Poland	49	3.83	Costa Rica	49	4.49	Mauritius	49	4.10
Uruguay	50	4.03	Slovak Republic	50	3.82	Mexico	50	4.35	Panama	50	4.10
Costa Rica	51	4.02	Algeria	51	3.78	Slovak Republic	51	4.33	Uruguay	51	4.04
Namibia	52	3.99	India	52	3.75	China	52	4.33	Dominican Republic	52	3.98
Croatia	53	3.97	Namibia	53	3.75	Brazil	53	4.27	Jamaica	53	3.97
Brazil	54	3.95	Mexico	54	3.74	Peru	54	4.27	Turkey	54	3.96
Gambia	55	3.93	Croatia	55	3.71	India	55	4.26	Romania	55	3.93
India	56	3.90	Egypt	56	3.70	Trinidad and Tobago	56	4.21	Philippines	56	3.92
Peru	57	3.88	Mauritius	57	3.66	Egypt	57	4.18	Tunisia	57	3.90
Egypt	58	3.84	Peru	58	3.61	Poland	58	4.17	Venezuela	58	3.84
Panama	59	3.81	Panama	59	3.59	Tanzania	59	4.15	Botswana	59	3.78
Vietnam	60	3.80	Philippines	60	3.52	Colombia	60	4.13	Colombia	60	3.76
Morocco	61	3.77	Russian Federation	61	3.44	Vietnam	61	4.11	Peru	61	3.75
Dominican Republic	62	3.77	Pakistan	62	3.40	Bulgaria	62	4.10	Namibia	62	3.72
Colombia	63	3.74	Costa Rica	63	3.38	Turkey	63	4.07	Bulgaria	63	3.72
Bulgaria	64	3.67	Indonesia	64	3.37	Dominican Republic	64	4.05	India	64	3.68
Turkey	65	3.65	Sri Lanka	65	3.35	Ghana	65	3.97	China	65	3.67
Philippines	66	3.58	Colombia	66	3.33	Algeria	66	3.92	Serbia	66	3.66
Jamaica	67	3.52	Senegal	67	3.33	Croatia	67	3.87	El Salvador	67	3.64
Sri Lanka	68	3.51	Ghana	68	3.29	Morocco	68	3.86	Egypt	68	3.64
Tanzania	69	3.49	Dominican Republic	69	3.27	Zambia	69	3.86	Russian Federation	69	3.61
Russian Federation	70	3.46	Ukraine	70	3.27	Jamaica	70	3.77	Macedonia, FYR	70	3.53
Ghana	71	3.46	Uganda	71	3.20	Panama	71	3.75	Morocco	71	3.50
Indonesia	72	3.42	Bangladesh	72	3.20	Sri Lanka	72	3.70	Sri Lanka	72	3.47

(cont'd.) *(cont'd.)* *(cont'd.)* *(cont'd.)*

Table 3: Growth Competitiveness Index components *(cont'd.)*

Growth Competitiveness Index (GCI)			Macroeconomic environment index			Public institutions index			Technology index		
Country	Rank	Score	Country	Rank	Score	Country	Rank	Score	Country	Rank	Score
Pakistan	73	3.41	Bulgaria	73	3.18	Ethiopia	73	3.69	Vietnam	73	3.41
Algeria	74	3.39	Nigeria	74	3.16	Pakistan	74	3.67	Kenya	74	3.36
Romania	75	3.38	Brazil	75	3.16	Senegal	75	3.64	Zimbabwe	75	3.34
Malawi	76	3.36	Tanzania	76	3.12	Indonesia	76	3.63	Ecuador	76	3.27
Serbia	77	3.36	Kenya	77	3.10	Serbia	77	3.58	Uganda	77	3.25
Argentina	78	3.35	Cameroon	78	3.10	Nicaragua	78	3.57	Indonesia	78	3.25
Senegal	79	3.34	Madagascar	79	3.04	Bolivia	79	3.51	Guatemala	79	3.23
Uganda	80	3.25	Macedonia	80	3.01	Ecuador	80	3.48	Gambia	80	3.22
Macedonia	81	3.22	Romania	81	2.93	Russian Federation	81	3.34	Tanzania	81	3.22
Venezuela	82	3.21	Turkey	82	2.93	Mozambique	82	3.33	Nigeria	82	3.16
Kenya	83	3.21	Bolivia	83	2.90	Mali	83	3.33	Pakistan	83	3.16
Ukraine	84	3.17	Ethiopia	84	2.89	Uganda	84	3.30	Ukraine	84	3.15
Bolivia	85	3.16	Guatemala	85	2.85	Philippines	85	3.29	Nicaragua	85	3.12
Ecuador	86	3.16	Jamaica	86	2.83	Romania	86	3.27	Ghana	86	3.10
Nigeria	87	3.10	Serbia	87	2.83	Guatemala	87	3.22	Honduras	87	3.08
Zambia	88	3.10	Honduras	88	2.77	Argentina	88	3.22	Bolivia	88	3.06
Guatemala	89	3.10	Uruguay	89	2.75	Venezuela	89	3.21	Senegal	89	3.04
Nicaragua	90	3.05	Ecuador	90	2.72	Zimbabwe	90	3.21	Zambia	90	2.96
Cameroon	91	2.98	Mali	91	2.67	Angola	91	3.16	Paraguay	91	2.96
Ethiopia	92	2.92	Paraguay	92	2.65	Kenya	92	3.16	Mozambique	92	2.84
Mozambique	93	2.91	Argentina	93	2.61	Macedonia	93	3.11	Cameroon	93	2.80
Honduras	94	2.90	Venezuela	94	2.59	Ukraine	94	3.09	Malawi	94	2.79
Paraguay	95	2.87	Mozambique	95	2.57	Cameroon	95	3.04	Bangladesh	95	2.68
Madagascar	96	2.85	Chad	96	2.50	Madagascar	96	3.04	Algeria	96	2.48
Zimbabwe	97	2.84	Zambia	97	2.49	Paraguay	97	3.01	Madagascar	97	2.47
Bangladesh	98	2.79	Malawi	98	2.49	Nigeria	98	2.99	Angola	98	2.43
Mali	99	2.79	Haiti	99	2.45	Honduras	99	2.85	Mali	99	2.36
Angola	100	2.60	Nicaragua	100	2.45	Bangladesh	100	2.48	Ethiopia	100	2.17
Chad	101	2.31	Angola	101	2.22	Chad	101	2.36	Haiti	101	2.17
Haiti	102	2.30	Zimbabwe	102	1.98	Haiti	102	2.28	Chad	102	2.06

Source: World Economic Forum

Table 4: GCI Component Indexes ranking comparison

Country	GCI ranking			Macroeconomic environment ranking			Public institutions ranking			Technology ranking		
	2003 rank (among 2002 countires)	2002 rank (revised)	Change	2003 rank (among 2002 countires)	2002 rank (revised)	Change	2003 rank (among 2002 countires)	2002 rank (revised)	Change	2003 rank (among 2002 countires)	2002 rank (revised)	Change
Algeria	—	—	—	—	—	—	—	—	—	—	—	—
Angola	—	—	—	—	—	—	—	—	—	—	—	—
Argentina	68	64	–4	76	70	–6	72	66	–6	43	44	1
Australia	10	10	0	6	12	6	4	5	1	18	9	–9
Austria	17	18	1	9	6	–3	13	11	–2	26	24	–2
Bangladesh	79	77	–2	63	62	–1	79	79	0	79	79	0
Belgium	25	21	–4	18	14	–4	25	22	–3	28	22	–6
Bolivia	71	71	0	69	67	–2	66	69	3	77	77	0
Botswana	34	35	1	28	27	–1	24	31	7	57	61	4
Brazil	52	45	–7	66	56	–10	49	45	–4	34	35	1
Bulgaria	60	58	–2	64	64	0	56	47	–9	61	56	–5
Cameroon	—	—	—	—	—	—	—	—	—	—	—	—
Canada	16	9	–7	10	7	–3	22	9	–13	11	8	–3
Chad	—	—	—	—	—	—	—	—	—	—	—	—
Chile	26	24	–2	33	26	–7	17	19	2	30	33	3
China	42	38	–4	24	24	0	48	38	–10	63	63	0
Colombia	59	61	2	60	63	3	54	54	0	58	58	0
Costa Rica	49	49	0	57	59	2	45	46	1	44	37	–7
Croatia	51	48	–3	51	47	–4	59	57	–2	40	42	2
Czech Republic	37	36	–1	37	38	1	43	50	7	20	20	0
Denmark	4	4	0	4	5	1	1	2	1	8	11	3
Dominican Republic	58	56	–2	61	60	–1	58	60	2	50	48	–2
Ecuador	72	73	1	74	75	1	67	75	8	70	70	0
Egypt	—	—	—	—	—	—	—	—	—	—	—	—
El Salvador	46	60	14	45	51	6	36	48	12	64	69	5
Estonia	20	27	7	32	36	4	26	28	2	10	14	4
Ethiopia	—	—	—	—	—	—	—	—	—	—	—	—
Finland	1	1	0	2	2	0	2	1	–1	2	3	1
France	24	28	4	19	18	–1	21	29	8	27	28	1
Gambia	—	—	—	—	—	—	—	—	—	—	—	—
Germany	13	14	1	20	13	–7	9	14	5	14	12	–2
Ghana	—	—	—	—	—	—	—	—	—	—	—	—
Greece	33	31	–2	31	29	–2	38	44	6	29	31	2
Guatemala	74	75	1	70	74	4	71	74	3	72	74	2
Haiti	80	80	0	78	79	1	80	80	0	80	80	0
Honduras	76	78	2	72	72	0	78	76	–2	76	78	2
Hong Kong SAR	22	22	0	14	15	1	10	13	3	36	32	–4
Hungary	31	29	–2	36	35	–1	31	30	–1	31	21	–10
Iceland	8	12	4	15	22	7	3	3	0	15	13	–2
India	53	54	1	48	45	–3	51	59	8	62	57	–5
Indonesia	66	69	3	58	65	7	64	77	13	71	65	–6
Ireland	28	23	–5	21	19	–2	23	18	–5	37	30	–7
Israel	19	17	–2	42	33	–9	14	17	3	9	7	–2
Italy	39	33	–6	27	21	–6	42	37	–5	42	39	–3
Jamaica	63	57	–6	71	66	–5	61	51	–10	51	46	–5
Japan	11	16	5	23	23	0	28	25	–3	5	5	0
Jordan	32	44	12	40	44	4	18	40	22	46	51	5
Kenya	—	—	—	—	—	—	—	—	—	—	—	
Korea	18	25	7	22	30	8	34	32	–2	6	18	12
Latvia	35	43	8	34	42	8	41	52	11	25	29	4
Lithuania	38	39	1	39	43	4	37	36	–1	35	40	5
Luxembourg	—	—	—	—	—	—	—	—	—	—	—	—
Macedonia, FYR	—	—	—	—	—	—	—	—	—	—	—	—
Madagascar	—	—	—	—	—	—	—	—	—	—	—	—
Malawi	—	—	—	—	—	—	—	—	—	—	—	—
Malaysia	27	30	3	26	28	2	32	33	1	19	26	7
Mali	—	—	—	—	—	—	—	—	—	—	—	—
Malta	—	—	—	—	—	—	—	—	—	—	—	—
Mauritius	44	41	–3	52	48	–4	40	35	–5	47	45	–2
Mexico	45	53	8	50	52	2	46	58	12	41	47	6
Morocco	57	52	–5	41	39	–2	60	56	–4	66	62	–4
Mozambique	—	—	—	—	—	—	—	—	—	—	—	—
Namibia	50	47	–3	49	46	–3	44	41	–3	60	60	0
Netherlands	12	13	1	8	8	0	11	10	–1	17	19	2
New Zealand	14	15	1	12	11	–1	5	4	–1	22	27	5
Nicaragua	75	70	–5	79	78	–1	65	64	–1	75	73	–2
Nigeria	73	72	–1	65	69	4	77	78	1	73	71	–2
Norway	9	8	–1	3	3	0	15	12	–3	13	10	–3

(cont'd.)

Table 4: GCI Component Indexes ranking comparison *(cont'd.)*

Country	GCI ranking			Macroeconomic environment ranking			Public institutions ranking			Technology ranking		
	2003 rank (among 2002 countires)	2002 rank (revised)	Change	2003 rank (among 2002 countires)	2002 rank (revised)	Change	2003 rank (among 2002 countires)	2002 rank (revised)	Change	2003 rank (among 2002 countires)	2002 rank (revised)	Change
Pakistan	—	—	—	—	—	—	—	—	—	—	—	—
Panama	55	51	–4	54	50	–4	62	55	–7	48	49	1
Paraguay	77	76	–1	75	73	–2	76	71	–5	78	76	–2
Peru	54	55	1	53	54	1	50	49	–1	59	64	5
Philippines	62	63	1	55	55	0	69	70	1	54	52	–2
Poland	43	50	7	46	49	3	53	61	8	33	36	3
Portugal	23	19	–4	29	25	–4	20	21	1	21	15	–6
Romania	67	67	0	67	71	4	70	67	–3	53	55	2
Russian Federation	65	66	1	56	61	5	68	65	–3	65	66	1
Senegal	—	—	—	—	—	—	—	—	—	—	—	—
Serbia	—	—	—	—	—	—	—	—	—	—	—	—
Singapore	6	7	1	1	1	0	6	7	1	12	17	5
Slovak Republic	41	46	5	47	53	6	47	53	6	32	34	2
Slovenia	29	26	–3	35	32	–3	33	23	–10	23	25	2
South Africa	40	34	–6	38	37	–1	39	34	–5	39	38	–1
Spain	21	20	–1	16	17	1	29	26	–3	24	23	–1
Sri Lanka	64	59	–5	59	58	–1	63	42	–21	67	67	0
Sweden	3	3	0	7	9	2	7	15	8	4	4	0
Switzerland	7	5	–2	5	4	–1	8	8	0	7	6	–1
Taiwan	5	6	1	17	20	3	19	27	8	3	2	–1
Tanzania	—	—	—	—	—	—	—	—	—	—	—	—
Thailand	30	37	7	25	34	9	35	39	4	38	41	3
Trinidad and Tobago	47	42	–5	44	41	–3	52	43	–9	45	43	–2
Tunisia	36	32	–4	30	31	1	30	24	–6	55	59	4
Turkey	61	65	4	68	68	0	57	63	6	52	54	2
Uganda	—	—	—	—	—	—	—	—	—	—	—	—
Ukraine	70	74	4	62	76	14	75	72	–3	74	72	–2
United Kingdom	15	11	–4	11	10	–1	12	6	–6	16	16	0
United States	2	2	0	13	16	3	16	16	0	1	1	0
Uruguay	48	40	–8	73	57	–16	27	20	–7	49	50	1
Venezuela	69	68	–1	77	77	0	73	73	0	56	53	–3
Vietnam	56	62	6	43	40	–3	55	62	7	68	68	0
Zambia	—	—	—	—	—	—	—	—	—	—	—	—
Zimbabwe	78	79	1	80	80	0	74	68	–6	69	75	6

*Applying the 2003 formula
Source: World Economic Forum

Table 5: Macroeconomic environment index components

	Macroeconomic Eenvironment index		Macroeconomic stability subindex						Government waste subindex		Country credit rating	
			OVERALL		HARD DATA		SURVEY DATA					
Country	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Algeria	51	3.78	5	4.91	3	5.32	51	3.88	67	2.68	68	2.60
Angola	101	2.22	100	2.73	102	2.13	33	4.24	92	2.07	95	1.35
Argentina	93	2.61	80	3.58	71	3.98	98	2.58	94	2.03	99	1.26
Australia	7	5.15	17	4.64	39	4.47	8	5.08	6	5.18	19	6.15
Austria	10	5.07	22	4.57	14	4.91	63	3.73	15	4.46	9	6.67
Bangladesh	72	3.20	55	4.19	43	4.42	68	3.62	88	2.18	75	2.24
Belgium	19	4.82	33	4.44	12	5.02	91	3.01	27	3.89	14	6.50
Bolivia	83	2.90	78	3.66	65	4.09	99	2.57	97	1.89	71	2.41
Botswana	30	4.44	23	4.57	37	4.52	13	4.70	17	4.39	38	4.23
Brazil	75	3.16	88	3.38	94	3.16	50	3.92	52	3.07	62	2.80
Bulgaria	73	3.18	76	3.70	74	3.80	77	3.43	86	2.28	57	3.04
Cameroon	78	3.10	59	4.13	50	4.30	65	3.72	74	2.47	87	1.65
Canada	11	5.04	13	4.71	18	4.81	17	4.47	21	4.11	11	6.62
Chad	96	2.50	91	3.31	95	3.14	61	3.73	90	2.08	97	1.31
Chile	35	4.36	28	4.49	24	4.62	37	4.16	36	3.64	31	4.83
China	25	4.56	4	5.05	4	5.30	18	4.44	35	3.66	34	4.49
Colombia	66	3.33	68	3.94	78	3.76	20	4.41	73	2.54	60	2.90
Costa Rica	63	3.38	82	3.50	90	3.38	59	3.78	51	3.19	52	3.36
Croatia	55	3.71	51	4.24	54	4.25	36	4.21	59	2.82	49	3.55
Czech Republic	39	4.08	27	4.49	31	4.57	24	4.31	71	2.58	32	4.76
Denmark	5	5.38	18	4.63	19	4.79	34	4.23	3	5.63	10	6.64
Dominican Republic	69	3.27	72	3.81	72	3.97	76	3.43	61	2.76	63	2.71
Ecuador	90	2.72	83	3.49	84	3.57	81	3.27	95	2.02	81	1.88
Egypt	56	3.70	63	4.02	59	4.21	74	3.53	45	3.44	53	3.34
El Salvador	48	3.84	40	4.40	52	4.29	14	4.67	47	3.40	56	3.18
Estonia	34	4.37	25	4.55	55	4.25	3	5.31	26	3.93	36	4.43
Ethiopia	84	2.89	74	3.79	60	4.18	95	2.82	66	2.71	98	1.28
Finland	2	5.54	7	4.90	7	5.16	32	4.24	2	5.75	11	6.62
France	20	4.80	36	4.43	20	4.77	69	3.58	39	3.58	8	6.78
Gambia	46	3.85	75	3.77	77	3.78	60	3.74	24	4.02	n/a	n/a
Germany	21	4.78	48	4.31	17	4.82	89	3.03	32	3.71	7	6.79
Ghana	68	3.29	70	3.87	75	3.80	40	4.06	46	3.40	79	2.02
Greece	33	4.38	45	4.34	49	4.30	19	4.42	49	3.30	23	5.53
Guatemala	85	2.85	84	3.49	81	3.63	84	3.14	98	1.83	69	2.58
Haiti	99	2.45	93	3.30	89	3.39	87	3.08	99	1.82	94	1.39
Honduras	88	2.77	85	3.49	83	3.62	85	3.14	93	2.05	77	2.07
Hong Kong SAR	15	4.91	8	4.84	8	5.16	44	4.03	9	4.86	26	5.10
Hungary	38	4.09	66	3.97	73	3.82	21	4.34	41	3.54	30	4.88
Iceland	16	4.90	30	4.48	63	4.11	1	5.42	5	5.21	25	5.43
India	52	3.75	43	4.36	69	4.02	5	5.21	72	2.56	48	3.74
Indonesia	64	3.37	65	3.98	66	4.04	56	3.83	42	3.50	80	2.01
Ireland	22	4.74	29	4.49	28	4.58	31	4.25	38	3.58	15	6.40
Israel	44	3.93	77	3.67	67	4.03	97	2.76	19	4.17	39	4.22
Italy	28	4.48	50	4.25	44	4.41	54	3.86	50	3.22	18	6.22
Jamaica	86	2.83	90	3.34	91	3.37	82	3.26	80	2.34	73	2.32
Japan	24	4.57	19	4.61	11	5.10	79	3.40	54	2.98	20	6.06
Jordan	42	4.03	39	4.40	32	4.55	41	4.05	18	4.34	59	2.97
Kenya	77	3.10	60	4.10	64	4.10	38	4.11	77	2.40	82	1.80
Korea	23	4.67	6	4.90	10	5.14	26	4.30	30	3.80	27	5.08
Latvia	36	4.31	12	4.75	27	4.58	6	5.19	28	3.85	44	3.86
Lithuania	41	4.04	14	4.71	35	4.54	7	5.13	57	2.90	46	3.83
Luxembourg	3	5.44	15	4.69	9	5.14	71	3.56	4	5.43	2	6.93
Macedonia, FYR	80	3.01	67	3.94	47	4.31	90	3.03	79	2.35	83	1.80
Madagascar	79	3.04	87	3.39	92	3.27	66	3.68	81	2.33	n/a	n/a
Malawi	98	2.49	99	2.85	99	2.75	86	3.11	68	2.65	90	1.61
Malaysia	27	4.49	11	4.77	13	4.99	35	4.21	25	3.97	35	4.44
Mali	91	2.67	89	3.36	85	3.53	93	2.94	78	2.38	91	1.58
Malta	29	4.47	38	4.41	40	4.45	23	4.32	23	4.04	28	5.01
Mauritius	57	3.66	64	4.00	70	3.99	43	4.03	58	2.83	46	3.83
Mexico	54	3.74	73	3.81	76	3.79	53	3.86	55	2.96	37	4.39
Morocco	43	3.95	37	4.42	38	4.48	28	4.27	44	3.46	50	3.51
Mozambique	95	2.57	97	3.15	98	3.05	78	3.41	82	2.33	89	1.64
Namibia	53	3.75	49	4.29	53	4.29	27	4.29	48	3.37	57	3.04
Netherlands	9	5.07	57	4.18	30	4.57	83	3.19	7	5.08	4	6.85
New Zealand	13	4.98	21	4.58	29	4.58	16	4.59	8	4.86	22	5.91
Nicaragua	100	2.45	98	3.01	97	3.06	94	2.89	87	2.26	92	1.53
Nigeria	74	3.16	32	4.45	22	4.63	45	4.00	91	2.08	87	1.65
Norway	4	5.43	3	5.15	1	5.72	64	3.73	14	4.59	5	6.82
Pakistan	62	3.40	20	4.59	48	4.31	2	5.32	63	2.73	86	1.69
Panama	59	3.59	47	4.32	21	4.73	80	3.29	83	2.32	51	3.41

(cont'd.)

Table 5: Macroeconomic environment index components *(cont'd.)*

	Macroeconomic Eenvironment index		Macroeconomic stability subindex						Government waste subindex		Country credit rating	
			OVERALL		HARD DATA		SURVEY DATA					
Country	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Paraguay	92	2.65	92	3.31	82	3.63	100	2.52	101	1.71	74	2.26
Peru	58	3.61	26	4.52	26	4.60	25	4.31	70	2.60	61	2.81
Philippines	60	3.52	46	4.33	36	4.52	55	3.84	89	2.11	54	3.31
Poland	49	3.83	62	4.04	57	4.24	73	3.53	65	2.71	33	4.54
Portugal	31	4.41	69	3.89	46	4.33	96	2.80	29	3.82	21	6.03
Romania	81	2.93	81	3.57	88	3.46	52	3.87	96	1.95	66	2.64
Russian Federation	61	3.44	61	4.04	68	4.03	39	4.09	76	2.46	55	3.19
Senegal	67	3.33	56	4.19	41	4.44	72	3.56	62	2.74	76	2.19
Serbia	87	2.83	86	3.47	86	3.47	75	3.48	56	2.91	93	1.48
Singapore	1	5.69	2	5.16	2	5.61	42	4.04	1	6.12	17	6.31
Slovak Republic	50	3.82	44	4.35	61	4.17	11	4.78	64	2.72	43	3.87
Slovenia	37	4.27	53	4.20	62	4.15	22	4.33	31	3.71	29	4.95
South Africa	40	4.08	41	4.38	56	4.24	12	4.71	37	3.61	40	3.95
Spain	17	4.83	35	4.44	23	4.62	46	3.99	22	4.11	16	6.35
Sri Lanka	65	3.35	71	3.85	79	3.69	30	4.26	53	2.99	65	2.70
Sweden	8	5.13	24	4.57	16	4.88	57	3.80	10	4.83	13	6.56
Switzerland	6	5.31	10	4.78	6	5.26	70	3.57	13	4.69	1	7.00
Taiwan	18	4.82	9	4.82	15	4.90	15	4.62	20	4.14	24	5.51
Tanzania	76	3.12	79	3.61	87	3.47	48	3.96	43	3.47	83	1.80
Thailand	26	4.54	1	5.28	5	5.28	4	5.30	34	3.67	41	3.94
Trinidad and Tobago	47	3.85	34	4.44	51	4.29	10	4.81	69	2.63	42	3.88
Tunisia	32	4.38	31	4.46	34	4.54	29	4.27	11	4.77	45	3.83
Turkey	82	2.93	94	3.27	96	3.09	62	3.73	75	2.47	63	2.71
Uganda	71	3.20	58	4.14	58	4.22	49	3.93	60	2.79	85	1.75
Ukraine	70	3.27	42	4.37	25	4.60	58	3.78	85	2.30	78	2.04
United Kingdom	12	4.99	54	4.20	42	4.43	67	3.62	12	4.75	5	6.82
United States	14	4.94	52	4.23	45	4.33	47	3.98	16	4.44	3	6.86
Uruguay	89	2.75	102	2.42	100	2.65	102	1.84	33	3.67	70	2.48
Venezuela	94	2.59	95	3.21	80	3.66	101	2.09	102	1.63	72	2.33
Vietnam	45	3.87	16	4.65	33	4.54	9	4.93	40	3.57	67	2.61
Zambia	97	2.49	96	3.16	93	3.20	88	3.05	84	2.32	95	1.35
Zimbabwe	102	1.98	101	2.56	101	2.41	92	2.94	100	1.78	100	1.00

Source: World Economic Forum

Table 6: Public institutions index components

Public institutions index			Contracts and law subindex			Corruption index		
Country	Rank	Score	Country	Rank	Score	Country	Rank	Score
Algeria	66	3.92	Algeria	59	3.85	Algeria	72	3.98
Angola	91	3.16	Angola	90	2.76	Angola	91	3.56
Argentina	88	3.22	Argentina	99	2.28	Argentina	65	4.15
Australia	4	6.36	Australia	3	6.10	Australia	6	6.62
Austria	14	5.83	Austria	14	5.47	Austria	16	6.20
Bangladesh	100	2.48	Bangladesh	86	2.93	Bangladesh	102	2.04
Belgium	27	5.41	Belgium	25	5.00	Belgium	29	5.82
Bolivia	79	3.51	Bolivia	85	2.93	Bolivia	70	4.10
Botswana	26	5.45	Botswana	16	5.43	Botswana	36	5.47
Brazil	53	4.27	Brazil	57	3.92	Brazil	56	4.62
Bulgaria	62	4.10	Bulgaria	92	2.71	Bulgaria	35	5.50
Cameroon	95	3.04	Cameroon	82	3.02	Cameroon	97	3.06
Canada	24	5.48	Canada	26	4.99	Canada	25	5.98
Chad	101	2.36	Chad	101	2.20	Chad	101	2.52
Chile	19	5.62	Chile	29	4.93	Chile	13	6.30
China	52	4.33	China	60	3.81	China	50	4.84
Colombia	60	4.13	Colombia	79	3.16	Colombia	44	5.10
Costa Rica	49	4.49	Costa Rica	48	4.17	Costa Rica	51	4.81
Croatia	67	3.87	Croatia	81	3.06	Croatia	54	4.68
Czech Republic	47	4.51	Czech Republic	61	3.81	Czech Republic	41	5.21
Denmark	1	6.56	Denmark	2	6.30	Denmark	1	6.82
Dominican Republic	64	4.05	Dominican Republic	53	4.02	Dominican Republic	71	4.07
Ecuador	80	3.48	Ecuador	89	2.77	Ecuador	63	4.18
Egypt	57	4.18	Egypt	47	4.23	Egypt	67	4.14
El Salvador	40	4.72	El Salvador	64	3.65	El Salvador	31	5.79
Estonia	28	5.36	Estonia	32	4.85	Estonia	27	5.86
Ethiopia	73	3.69	Ethiopia	68	3.50	Ethiopia	76	3.89
Finland	2	6.52	Finland	1	6.35	Finland	4	6.68
France	23	5.50	France	27	4.96	France	23	6.03
Gambia	39	4.73	Gambia	23	5.05	Gambia	58	4.42
Germany	9	6.10	Germany	9	5.80	Germany	10	6.39
Ghana	65	3.97	Ghana	50	4.07	Ghana	79	3.87
Greece	42	4.71	Greece	37	4.63	Greece	52	4.79
Guatemala	87	3.22	Guatemala	97	2.33	Guatemala	68	4.12
Haiti	102	2.28	Haiti	102	1.91	Haiti	100	2.64
Honduras	99	2.85	Honduras	95	2.50	Honduras	96	3.20
Hong Kong SAR	10	6.03	Hong Kong SAR	12	5.65	Hong Kong SAR	9	6.42
Hungary	33	5.18	Hungary	39	4.52	Hungary	28	5.84
Iceland	3	6.44	Iceland	4	6.08	Iceland	2	6.80
India	55	4.26	India	35	4.65	India	80	3.86
Indonesia	76	3.63	Indonesia	65	3.63	Indonesia	88	3.64
Ireland	25	5.46	Ireland	31	4.88	Ireland	22	6.03
Israel	15	5.82	Israel	19	5.39	Israel	14	6.26
Italy	46	4.56	Italy	49	4.15	Italy	47	4.96
Jamaica	70	3.77	Jamaica	72	3.38	Jamaica	64	4.15
Japan	30	5.30	Japan	38	4.57	Japan	21	6.04
Jordan	20	5.58	Jordan	15	5.44	Jordan	33	5.72
Kenya	92	3.16	Kenya	80	3.09	Kenya	95	3.22
Korea	36	5.03	Korea	34	4.72	Korea	38	5.34
Latvia	45	4.61	Latvia	44	4.37	Latvia	49	4.85
Lithuania	41	4.71	Lithuania	58	3.89	Lithuania	34	5.53
Luxembourg	13	5.92	Luxembourg	13	5.60	Luxembourg	15	6.23
Macedonia, FYR	93	3.11	Macedonia, FYR	96	2.48	Macedonia, FYR	86	3.75
Madagascar	96	3.04	Madagascar	88	2.84	Madagascar	94	3.24
Malawi	38	4.79	Malawi	42	4.44	Malawi	43	5.14
Malaysia	34	5.12	Malaysia	28	4.95	Malaysia	39	5.28
Mali	83	3.33	Mali	62	3.71	Mali	98	2.96
Malta	18	5.68	Malta	20	5.28	Malta	18	6.08
Mauritius	44	4.61	Mauritius	36	4.64	Mauritius	57	4.58
Mexico	50	4.35	Mexico	63	3.70	Mexico	46	5.00
Morocco	68	3.86	Morocco	55	3.96	Morocco	85	3.76
Mozambique	82	3.33	Mozambique	87	2.89	Mozambique	83	3.78
Namibia	48	4.50	Namibia	45	4.33	Namibia	55	4.66
Netherlands	11	6.02	Netherlands	11	5.66	Netherlands	11	6.37
New Zealand	5	6.36	New Zealand	5	6.03	New Zealand	3	6.69
Nicaragua	78	3.57	Nicaragua	84	2.94	Nicaragua	62	4.19
Nigeria	98	2.99	Nigeria	78	3.17	Nigeria	99	2.81
Norway	16	5.73	Norway	18	5.40	Norway	20	6.06
Pakistan	74	3.67	Pakistan	69	3.46	Pakistan	77	3.88
Panama	71	3.75	Panama	74	3.26	Panama	60	4.23

(cont'd)

Table 6: Public institutions index components *(cont'd.)*

Public institutions index			Contracts and law subindex			Corruption index		
Country	Rank	Score	Country	Rank	Score	Country	Rank	Score
Paraguay	97	3.01	Paraguay	98	2.29	Paraguay	87	3.73
Peru	54	4.27	Peru	76	3.19	Peru	37	5.34
Philippines	85	3.29	Philippines	75	3.20	Philippines	92	3.39
Poland	58	4.17	Poland	66	3.59	Poland	53	4.75
Portugal	22	5.52	Portugal	21	5.22	Portugal	30	5.81
Romania	86	3.27	Romania	83	2.97	Romania	90	3.58
Russian Federation	81	3.34	Russian Federation	91	2.74	Russian Federation	75	3.94
Senegal	75	3.64	Senegal	71	3.40	Senegal	78	3.88
Serbia	77	3.58	Serbia	77	3.19	Serbia	74	3.96
Singapore	6	6.28	Singapore	7	5.89	Singapore	5	6.68
Slovak Republic	51	4.33	Slovak Republic	70	3.42	Slovak Republic	40	5.24
Slovenia	35	5.11	Slovenia	43	4.44	Slovenia	32	5.78
South Africa	43	4.69	South Africa	40	4.51	South Africa	48	4.87
Spain	31	5.28	Spain	41	4.46	Spain	17	6.09
Sri Lanka	72	3.70	Sri Lanka	67	3.57	Sri Lanka	81	3.84
Sweden	7	6.28	Sweden	6	6.00	Sweden	7	6.55
Switzerland	8	6.20	Switzerland	8	5.87	Switzerland	8	6.53
Taiwan	21	5.55	Taiwan	24	5.03	Taiwan	19	6.08
Tanzania	59	4.15	Tanzania	46	4.31	Tanzania	73	3.98
Thailand	37	4.97	Thailand	30	4.88	Thailand	45	5.06
Trinidad and Tobago	56	4.21	Trinidad and Tobago	51	4.03	Trinidad and Tobago	59	4.39
Tunisia	32	5.19	Tunisia	22	5.20	Tunisia	42	5.18
Turkey	63	4.07	Turkey	52	4.03	Turkey	69	4.12
Uganda	84	3.30	Uganda	73	3.35	Uganda	93	3.24
Ukraine	94	3.09	Ukraine	94	2.57	Ukraine	89	3.61
United Kingdom	12	6.01	United Kingdom	10	5.67	United Kingdom	12	6.35
United States	17	5.71	United States	17	5.42	United States	24	6.01
Uruguay	29	5.31	Uruguay	33	4.74	Uruguay	26	5.89
Venezuela	89	3.21	Venezuela	100	2.27	Venezuela	66	4.15
Vietnam	61	4.11	Vietnam	54	4.00	Vietnam	61	4.22
Zambia	69	3.86	Zambia	56	3.92	Zambia	82	3.79
Zimbabwe	90	3.21	Zimbabwe	93	2.64	Zimbabwe	84	3.77

Source: World Economic Forum

Table 7: Technology index components

Country	Technology index		Innovation subindex						ICT subindex						Technology transfer subindex	
			OVERALL		HARD DATA		SURVEY DATA		OVERALL		HARD DATA		SURVEY DATA			
	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Algeria	96	2.48	74	1.86	68	1.53	88	2.86	91	2.22	85	2.04	96	2.58	76	3.04
Angola	98	2.43	102	1.34	100	1.01	101	2.34	100	1.68	97	1.33	98	2.36	66	3.80
Argentina	45	4.22	33	2.94	33	2.74	59	3.54	47	3.96	44	4.28	75	3.32	25	5.00
Australia*	19	4.90	18	3.96	18	3.71	19	4.71	14	5.84	13	6.19	14	5.15	—	—
Austria*	27	4.69	20	3.87	17	3.73	26	4.29	22	5.51	20	5.90	26	4.73	—	—
Bangladesh	95	2.68	91	1.58	79	1.23	93	2.65	99	1.86	100	1.27	90	3.03	61	4.14
Belgium*	29	4.65	17	4.00	16	3.75	16	4.78	25	5.29	23	5.76	33	4.34	—	—
Bolivia	88	3.06	52	2.31	41	2.28	98	2.40	79	2.82	73	2.81	92	2.83	68	3.63
Botswana	59	3.78	80	1.73	84	1.16	65	3.46	65	3.37	63	3.30	70	3.49	24	5.00
Brazil	35	4.44	60	2.25	63	1.59	30	4.21	43	4.23	46	4.22	36	4.26	2	5.44
Bulgaria	63	3.72	43	2.59	36	2.47	84	2.98	49	3.94	45	4.25	73	3.33	67	3.79
Cameroon	93	2.80	85	1.68	83	1.17	77	3.22	92	2.20	90	1.70	78	3.20	65	3.97
Canada*	11	5.15	9	4.45	9	4.25	13	5.06	13	5.85	14	6.15	10	5.26	—	—
Chad	102	2.06	101	1.36	98	1.02	100	2.36	102	1.44	101	1.13	102	2.04	75	3.14
Chile	31	4.60	35	2.79	38	2.35	37	4.10	36	4.67	39	4.72	29	4.58	18	5.11
China	65	3.67	70	1.97	78	1.26	36	4.11	62	3.42	67	3.08	43	4.09	47	4.57
Colombia	60	3.76	57	2.28	56	1.83	54	3.63	57	3.63	60	3.52	51	3.85	50	4.42
Costa Rica	46	4.19	61	2.21	65	1.58	35	4.12	52	3.86	47	4.20	79	3.19	8	5.28
Croatia	41	4.32	48	2.44	48	2.06	58	3.56	39	4.54	35	4.93	59	3.76	43	4.64
Czech Republic	21	4.84	45	2.57	47	2.10	40	3.99	30	5.04	29	5.50	41	4.11	5	5.35
Denmark*	8	5.25	11	4.26	12	3.92	9	5.28	4	6.25	3	6.62	5	5.52	—	—
Dominican Republic	52	3.98	55	2.30	57	1.82	50	3.72	61	3.50	61	3.38	61	3.74	13	5.18
Ecuador	76	3.27	72	1.94	62	1.63	87	2.89	72	2.97	66	3.10	93	2.72	62	4.11
Egypt	68	3.64	39	2.71	37	2.40	56	3.62	69	3.13	76	2.63	40	4.12	44	4.63
El Salvador	67	3.64	67	2.05	61	1.65	74	3.26	68	3.20	69	3.00	67	3.59	34	4.77
Estonia	10	5.16	26	3.38	26	3.10	31	4.21	20	5.55	26	5.60	7	5.44	11	5.24
Ethiopia	100	2.17	100	1.36	96	1.05	102	2.31	101	1.50	102	1.12	100	2.27	73	3.34
Finland*	2	6.00	3	5.71	3	5.55	1	6.19	2	6.29	6	6.48	2	5.90	—	—
France*	28	4.67	19	3.92	19	3.60	15	4.89	23	5.42	24	5.74	23	4.77	—	—
Gambia	80	3.22	96	1.48	95	1.06	92	2.76	73	2.94	79	2.43	45	3.95	58	4.17
Germany*	14	5.03	10	4.36	11	4.03	8	5.35	17	5.71	16	6.11	19	4.89	—	—
Ghana	86	3.10	83	1.69	89	1.11	67	3.45	88	2.32	91	1.59	54	3.79	45	4.61
Greece	30	4.64	31	3.02	32	2.81	53	3.64	33	4.82	32	5.31	53	3.83	27	4.95
Guatemala	79	3.23	79	1.74	77	1.29	81	3.08	77	2.84	70	2.93	94	2.65	54	4.25
Haiti	101	2.17	99	1.37	97	1.03	99	2.37	96	1.96	88	1.87	101	2.15	77	2.71
Honduras	87	3.08	77	1.76	69	1.52	97	2.46	85	2.46	80	2.40	97	2.58	53	4.35
Hong Kong SAR*	37	4.40	34	2.86	39	2.31	22	4.51	8	5.94	11	6.33	12	5.15	—	—
Hungary	32	4.57	38	2.76	35	2.48	57	3.58	35	4.68	33	5.08	49	3.88	21	5.04
Iceland*	15	5.01	21	3.70	25	3.20	10	5.20	1	6.32	2	6.71	4	5.53	—	—
India	64	3.68	66	2.06	73	1.37	34	4.13	75	2.87	86	2.02	30	4.58	7	5.31
Indonesia	78	3.25	65	2.08	70	1.52	47	3.76	74	2.91	78	2.53	63	3.66	63	4.09
Ireland*	38	4.37	24	3.48	28	3.04	17	4.77	27	5.26	22	5.79	39	4.20	—	—
Israel*	9	5.17	6	4.80	7	4.54	5	5.58	21	5.54	21	5.81	16	4.99	—	—
Italy*	44	4.24	28	3.33	27	3.10	38	4.05	28	5.14	27	5.59	38	4.22	—	—
Jamaica	53	3.97	64	2.10	64	1.59	55	3.63	53	3.84	53	3.78	46	3.95	36	4.76
Japan*	5	5.56	5	5.49	4	5.43	4	5.65	18	5.63	18	5.98	17	4.94	—	—
Jordan	48	4.13	47	2.44	52	2.03	51	3.70	46	3.98	57	3.60	25	4.74	28	4.89
Kenya	74	3.36	84	1.68	90	1.10	68	3.44	86	2.46	83	2.09	80	3.19	17	5.11
Korea*	6	5.28	7	4.69	6	4.59	14	4.98	11	5.88	17	5.98	3	5.68	—	—
Latvia	26	4.71	22	3.52	22	3.27	27	4.27	34	4.73	36	4.93	32	4.35	19	5.07
Lithuania	36	4.43	30	3.14	30	2.89	42	3.88	38	4.58	37	4.83	44	4.08	42	4.65
Luxembourg*	42	4.30	40	2.68	44	2.15	25	4.30	10	5.92	7	6.43	18	4.90	—	—
Macedonia, FYR	70	3.53	63	2.12	54	1.87	89	2.85	63	3.41	59	3.52	82	3.18	59	4.16
Madagascar	97	2.47	93	1.55	93	1.07	82	3.00	94	1.99	96	1.42	84	3.14	72	3.40
Malawi	94	2.79	95	1.49	102	1.00	85	2.95	98	1.90	98	1.32	88	3.06	52	4.42
Malaysia	20	4.89	41	2.66	51	2.03	21	4.56	32	4.84	41	4.67	11	5.18	1	5.69
Mali	99	2.36	98	1.42	94	1.06	96	2.52	97	1.91	99	1.31	85	3.12	74	3.26
Malta	17	4.95	53	2.31	58	1.79	43	3.86	24	5.37	28	5.52	15	5.08	10	5.25
Mauritius	49	4.10	73	1.90	72	1.40	71	3.39	40	4.37	42	4.51	42	4.09	48	4.47
Mexico	43	4.26	59	2.25	60	1.75	48	3.76	48	3.95	50	3.98	47	3.90	6	5.35
Morocco	71	3.50	71	1.95	74	1.36	49	3.74	71	2.99	75	2.68	66	3.61	40	4.69
Mozambique	92	2.84	97	1.46	101	1.01	91	2.80	95	1.97	95	1.42	87	3.07	49	4.46
Namibia	62	3.72	76	1.82	81	1.20	52	3.66	64	3.40	64	3.24	62	3.73	33	4.78
Netherlands*	18	4.93	14	4.04	14	3.84	20	4.63	15	5.82	8	6.39	27	4.69	—	—
New Zealand*	23	4.80	16	4.02	13	3.86	23	4.49	19	5.58	19	5.97	22	4.80	—	—
Nicaragua	85	3.12	81	1.72	71	1.42	94	2.65	83	2.66	77	2.56	91	2.86	57	4.21
Nigeria	82	3.16	88	1.66	85	1.13	78	3.22	93	2.11	94	1.52	77	3.29	20	5.07
Norway*	13	5.08	12	4.23	10	4.05	18	4.76	9	5.93	4	6.52	24	4.76	—	—
Pakistan	83	3.16	94	1.54	88	1.12	90	2.81	84	2.50	89	1.80	48	3.88	46	4.58
Panama	50	4.10	42	2.64	43	2.25	45	3.80	58	3.59	58	3.56	64	3.65	9	5.26

(cont'd)

Table 7: Technology index components *(cont'd.)*

	Technology index		Innovation subindex						ICT subindex						Technology transfer subindex	
			OVERALL		HARD DATA		SURVEY DATA		OVERALL		HARD DATA		SURVEY DATA			
Country	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score	Rank	Score
Paraguay	91	2.96	89	1.65	75	1.36	95	2.53	76	2.87	65	3.15	99	2.30	70	3.52
Peru	61	3.75	54	2.30	49	2.03	80	3.12	66	3.36	62	3.32	72	3.45	37	4.75
Philippines	56	3.92	49	2.41	45	2.12	72	3.28	67	3.33	68	3.06	50	3.87	12	5.22
Poland	34	4.44	29	3.20	29	3.00	44	3.80	41	4.36	38	4.72	65	3.65	26	4.97
Portugal	22	4.82	32	2.98	31	2.81	63	3.47	29	5.04	30	5.42	35	4.29	15	5.14
Romania	55	3.93	56	2.30	53	1.98	75	3.25	54	3.75	54	3.73	55	3.78	38	4.73
Russian Federation	69	3.61	27	3.36	21	3.32	62	3.47	56	3.66	51	3.84	76	3.31	69	3.62
Senegal	89	3.04	82	1.70	87	1.12	69	3.43	81	2.67	82	2.26	69	3.49	64	3.98
Serbia	66	3.66	62	2.13	55	1.86	86	2.93	55	3.69	52	3.79	71	3.48	60	4.14
Singapore*	12	5.09	15	4.04	20	3.54	6	5.51	6	6.14	12	6.21	1	5.99	—	—
Slovak Republic	33	4.55	44	2.58	46	2.10	39	4.03	37	4.60	34	5.02	57	3.77	16	5.13
Slovenia	24	4.73	23	3.51	23	3.26	28	4.27	26	5.28	25	5.69	31	4.45	51	4.42
South Africa	40	4.35	58	2.27	66	1.57	24	4.37	44	4.09	49	4.00	37	4.26	3	5.39
Spain	25	4.72	25	3.46	24	3.21	32	4.19	31	4.99	31	5.33	34	4.32	35	4.77
Sri Lanka	72	3.47	78	1.76	82	1.18	61	3.48	78	2.83	81	2.37	58	3.76	29	4.89
Sweden*	4	5.90	4	5.52	5	5.41	3	5.85	3	6.28	1	6.76	9	5.32	—	—
Switzerland*	7	5.26	8	4.65	8	4.40	7	5.42	12	5.87	9	6.35	20	4.89	—	—
Taiwan*	3	5.97	2	5.92	2	6.18	11	5.16	7	6.01	10	6.35	8	5.33	—	—
Tanzania	81	3.22	90	1.63	99	1.01	60	3.48	90	2.27	93	1.53	60	3.76	23	5.01
Thailand	39	4.37	37	2.76	42	2.27	29	4.23	45	4.01	56	3.70	28	4.64	4	5.38
Trinidad and Tobago	47	4.13	75	1.86	80	1.22	46	3.76	50	3.93	43	4.37	89	3.05	14	5.16
Tunisia	57	3.90	50	2.38	59	1.77	33	4.19	59	3.57	71	2.92	21	4.86	31	4.85
Turkey	54	3.96	68	2.01	67	1.53	66	3.46	51	3.88	48	4.16	74	3.32	39	4.72
Uganda	77	3.25	86	1.67	91	1.10	70	3.40	89	2.31	92	1.58	56	3.77	22	5.03
Ukraine	84	3.15	36	2.79	34	2.56	64	3.46	70	3.00	72	2.91	81	3.19	71	3.46
United Kingdom*	16	4.96	13	4.11	15	3.78	12	5.08	16	5.81	15	6.15	13	5.15	—	—
United States*	1	6.30	1	6.44	1	6.61	2	5.92	5	6.16	5	6.50	6	5.48	—	—
Uruguay	51	4.04	46	2.51	40	2.30	79	3.12	42	4.30	40	4.68	68	3.53	56	4.22
Venezuela	58	3.84	51	2.34	50	2.03	73	3.27	60	3.51	55	3.71	86	3.10	32	4.78
Vietnam	73	3.41	69	1.98	76	1.34	41	3.90	82	2.67	84	2.09	52	3.83	30	4.87
Zambia	90	2.96	92	1.55	92	1.08	83	2.98	87	2.34	87	1.93	83	3.17	55	4.25
Zimbabwe	75	3.34	87	1.66	86	1.13	76	3.23	80	2.75	74	2.81	95	2.64	41	4.68

*Classified as a core technology-innovating economy
Source: World Economic Forum

Moving in the counter direction, **Japan** rose to the 11th position from the 16th, with varying levels of performance in the different component indexes. Amid a shrinking of the government deficit—to still high levels at 7.1 percent of GDP (rank #81)—the business sector remained in a gloomy mood, as reflected in a worsening of recession expectations (rank #83). Japan's macroeconomic environment performance (rank #24) has also been weakened further by a decline in the country credit rating, as well as lower scores in the area of government waste, specifically, distortive government subsidies (rank #90). Japan got a boost however, from its technology performance, particularly in light of an increase in the number of patents and a more favorable perception of government success in ICT promotion.

Likewise, **Germany's** rise by one position masks more dramatic changes in underlying performance. Notably, Germany posted widespread improvements in the quality of its public institutions, including control of corruption (rank #10) and decline in the favoritism in the decisions of government officials (rank #8). The extent of distortive government subsidies however, continues to be perceived very poorly (rank #100), a rank without peer in the developed world. Improvements in the quality of public institutions were partly offset by deterioration in the macroeconomic environment, characterized by the widening of the government deficit to 3.6 percent of GDP (rank #54) and the heightening of recession expectations (rank #91).

Israel posted one of the more notable declines in the macroeconomic environment component of the index, characterized by heightened recession expectations (rank #100), perceived tightening of access to credit (rank #66), and higher inflation. Israel's worsened macroeconomic situation (rank #44) stands in sharp contrast to its relatively high ranking (rank #15) on a broad range of indicators which reflect the quality of its public institutions. The independence of its judiciary (rank #2) is particularly noteworthy. Although Israel maintains its edge in technology, it is notable that ratings pertaining to government prioritization of ICT (rank #58) and government success in ICT promotion (rank #21) declined. Nevertheless, Israel retains a relatively high rank overall (rank #20), given its high level of technological sophistication (rank #9 in the technology index).

Western Europe

In Western Europe, new entrants **Malta** and Luxembourg hold the 19th and 21st positions, respectively, in the overall index. Malta, which holds the highest ranking among 22 new entrants, fares relatively well in the area of technology (rank #17). Specifically, the government scores highly in its prioritization of ICT (rank #6) and success in ICT promotion (rank #7) although it rates less favorably in terms of innovation (rank #53). Malta also enjoys relatively high ratings of its public institutions (rank #18), but its macroeconomic environment is a source of weakness (rank #29). Malta's overall score in the latter is weighed down by its government deficit at 5.2 percent of GDP (rank #67), and relatively low savings rate of 18.7 percent of GDP (rank #62).

Luxembourg, the second highest new entrant, performs very well in the macroeconomic environment (rank #3) and public institutions (rank #13) indexes. The country rates poorly, however, in the area of technology, and, like Malta, is weak in innovation (rank #40), particularly in terms of university/industry research collaboration (rank #64) and in tertiary enrollment (rank #76). Notably though, the country scores well in the diffusion of ICT.

France, at the 26th place, received a boost in its rankings due to higher scores in public institutions and technology, which offset a decline in the macroeconomic environment. France's macroeconomic stability score had deteriorated, marked by an expansion of government deficit to 3.2 percent of GDP (rank #47) amid heightened recession expectations (rank #80). Nonetheless, France posted significant improvements in the quality of public institutions, including in the incidence of corruption linked to property rights (rank #20) and payments irregularities. Dramatic improvements were also evident in the perceptions of corruption as well as public trust of politicians. Scores also increased in the area of technology, as reflected in the improved ranks in government prioritization of ICT (rank #26) and government success in ICT promotion (rank #26).

Unlike France, **Ireland** posted a significant decline in the rankings, falling to the 30th position due to widespread declines in the different components of the index. Perceptions of government waste deteriorated drastically, marked by lower scores for diversion of public funds (rank #26) and the extent of distortive government subsidies (rank #32). The quality of public institutions also worsened across the board, with the most notable declines evident in the assessments of the independence of the judiciary (rank #26) and favoritism in the decisions of government officials (rank #40). In the area of technology, perceptions also became less favorable toward the quality of competition in the ISP sector (rank #97), government prioritization of ICT (rank #31), and government success in ICT promotion (rank #20).

Italy, at the 41st position, also plummeted in the rankings like Ireland, reflecting across-the-board declines in the major components of the index, particularly its macroeconomic environment. The country posted low scores in macroeconomic stability (rank #50), stemming from a worsening recession expectations (rank #66), a deterioration in the government deficit to 2.5 percent of GDP (rank #39) and a decline in the national savings rate (rank #55). Italy also scored poorly in the area of

government waste (rank #50). Perceptions of the quality of public institutions also deteriorated, as reflected in lower scores in the control of corruption (rank #47) and extent of organized crime (rank #76). In technology, lower scores were also recorded with regard to government prioritization of ICT (rank #65) and government success in ICT promotion (rank #58).

Central and eastern Europe

Among central and eastern European countries and CIS states, **Estonia** maintains its leadership at 22nd place in the overall rankings, enjoying the highest technology, public institutions, and macroeconomic environment scores in the region. The country's overall global rankings received a boost from better performance in technology, marked by higher tertiary enrollment scores, a sharp increase in the number of utility patents filed, and an all-around increase in the diffusion of ICT. Estonia's macroeconomic environment also received higher scores, derived from perceptions of better access to credit (rank #5) and more favorable recession expectations (rank #6). Estonia's public institutions also received higher ratings pertaining to the independence of the judiciary and safeguarding of property rights.

In the region, **Latvia** is most notable for posting one of the most improved performances across the various components. Latvia posted the 3rd most improved score in the GCI, stemming primarily from achieving the 2nd most improved score in macroeconomic environment and the 5th most improved score in public institutions in the world. The former is driven by gains in the rating of government waste, specifically, strengthening of public trust in politicians as well as the perception of a decline in the extent of distortive government subsidies. In the area of public institutions, Latvia posted better ratings pertaining to the independence of the judiciary and favoritism in the decisions of government officials. The country also posted the third highest improvement in enrollment rates in the world, and the second highest improvement in the perceptions of the country's technological sophistication.

Although **Ukraine**, at 84th place, has the lowest rank in Europe, the country has posted improvements in certain areas. The country still has the worst public institutions score in the region, but its macroeconomic environment has shown signs of increasing stability, as reflected also by the rise in its credit rating score. Similarly, **Russia's** overall credit rating has also improved but the quality of public institutions continue to deteriorate particularly in terms of corruption.

Asia

In Asia, **Korea** posted one of the most notable ascents in the GCI rankings from the 25th place to the 18th position. Korea's rise in the rankings was driven by improvements in its macroeconomic environment, specifically a turnaround from a deficit position to a government surplus at 6.0 percent of GDP (rank #2). Equally important, perceptions of government waste improved, marked by increased public trust in politicians and a better score in the area of diversion of public funds. Korea also posted remarkable improvements in its technology performance, boosted by a rise in tertiary enrollment rate from 67.7 percent to 77.6 percent (rank #2) and one of the highest increases in patent activity.

Like Korea, **Thailand** and **Vietnam** registered notable improvements in overall rankings. For Thailand, the boost stemmed from its macroeconomic environment, as reflected in improved recession expectations (rank #2) and better access to credit (rank #7). For Vietnam, the rise was driven by across-the-board improvements in the quality of its public institutions.

Although **Indonesia** declines in the overall rankings, the country posts one of the most significant increases in its actual score. Its macroeconomic environment score is the 5th most improved, marked by dramatically better scores in the area of government waste: extent of distortive subsidies (rank #30), diversion of public funds (rank #45), and public trust of politicians (rank #38). Its scores pertaining to public institutions all posted significant increases, but these are not reflected in the overall rankings given the entry of many new countries to the index.

Malaysia and **India** both derived gains from improvements in the area of technology. Malaysia posted the second largest increase in technology ranks to the 20th position, driven by one of the highest jumps in tertiary enrollment rate, as well as even higher ratings in the perception of government prioritization of ICT (rank #2) and government success in ICT promotion (rank #2). Meanwhile, India posts the highest improvement in the perception of the country's technological sophistication with a decline in the ratings of the government's success in ICT promotion.

There was a notable downward shift in the ranking of **China**. The drop in the ranking was marked by a deterioration in the perceived quality of public institutions. Lower scores were posted in terms of the independence of the judiciary (rank #62) and extent of organized crime (rank #60). Perceptions of corruption worsened particularly with regard to tax collection and for connection to public utilities. Public trust of politicians, while still strong (rank #20), also fell along with scores on diversion of public funds (rank #51). And despite improvements in innovative activity and greater diffusion of Internet use and cellular phone penetration, China posted lower scores in government prioritization of ICT and government success in ICT promotion.

Like China, **Sri Lanka** and **Bangladesh** both experienced a dramatic drop in the rankings due to deterioration in the quality of public institutions. Sri Lanka posted the worst decline in scores relating to various types of corruption, judicial independence, extent of organized crime, and favoritism in the decisions of government officials. Bangladesh experienced similar declines but to a lesser degree; the country still has the worst score in the control of corruption (rank #102).

Latin America

In Latin America, **Chile** continues to have the highest rank in the region followed, with a considerable gap, by Mexico. Although Chile has the highest scores in the region in all three index components, the country has experienced notable deterioration in the area of government waste, posting the worst decline in public trust in politicians, and diversion of public funds.

Brazil and **Argentina** both posted significant declines in the macroeconomic environment. Brazil's drop was precipitated by the worsening of the government deficit to 8.7 percent of GDP in 2002, when inflation rose to 8.4 percent and the interest rate ballooned to 43.5 percent. In the case of Argentina, the government deficit expanded to 10.3 percent of GDP, while the inflation rate rose sharply as well. For both countries, the quality of public institutions also declined: for Brazil the most notable deterioration is in the area of organized crime (rank #84), while for Argentina, corruption deteriorated and the country continues to have the worst rating in terms of property rights (rank #102). But technology offers a bright spot for both countries: tertiary enrollment increased significantly and diffusion of ICT continues at a very fast pace in Brazil; while government prioritization of ICT and success of government ICT promotion both received higher ratings in Argentina.

But among the countries in the region, the biggest declines in the rankings were posted by **Uruguay** and **Jamaica**. Uruguay fell due to drastic deterioration of its macroeconomic environment as evident in the largest decline in credit rating. Lower scores in the macroeconomic environment also pushed Jamaica lower in the rankings, but not to the same extent as the decline in public institutions (rank #70), particularly corruption where the country posted the 2nd largest decline. The country also experienced a deterioration in the extent of organized crime (rank #100).

At the opposite extreme, **Mexico** and **El Salvador** experienced the most notable improvements in performance. Among other gains, Mexico registered one of the most notable improvements in the scores pertaining to independence of the judiciary, diversion of public funds, and other indicators of the quality of public institutions. Mexico's technology position also improved amid deterioration in the macroeconomic environment. El Salvador posted greater gains in all components of the index, with the greatest boost stemming from improvements in the quality of the public institutions.

Ecuador and **Bolivia** are also notable performers—both benefiting from higher ratings of its public institutions. Ecuador posted improvements in contracts and law, particularly in terms of the independence of the judiciary, safeguarding of property rights, and reduction in the extent of organized crime. Meanwhile, Bolivia's gains were in the area of corruption—specifically, irregular payments in export and import permits as well as irregular payments toward connection to public utilities

Middle East and Africa

In the Middle East, **Jordan** and **Turkey** both post major improvements in the quality of public institutions. Jordan, in particular, posted the largest score and rank increase in this area, driven by gains in control of corruption and greater independence of the judiciary. The country also posted better ratings relating to public trust in politicians, diversion of public funds, and the extent of distortive subsidies. Likewise, but to a lesser extent, Turkey also posted significant improvements in the control of corruption and the independence of the judiciary.

Of the countries in Africa, **Botswana** enjoys the highest ranking in the Global Competitiveness Index. Botswana's position in the public institutions index (rank #26), the highest in the Africa region, was buoyed by perceptions of a decline in organized crime and favoritism by government officials. The country also has the highest macroeconomic environment ranking in the region, bolstered by its high savings rate (rank #5) and favorable recession expectations (rank #17). Compared with the other components, Botswana has a lower ranking in technology, where despite increases in ICT diffusion, significant drawbacks remain, including lack of competition in the ISP sector (rank #93).

But in the area of technology, **South Africa** leads the region, particularly in the field of innovation, driven by high scores in patent activity (rank #31), company spending in R&D (rank #21) and university/industry research collaboration. South Africa's overall competitiveness ranking is lower than last year's because of a deterioration in a number of factors which enter the index through its public institutions component. Noteworthy in this regard are the prevalence of crime (rank #81) and irregularities arising in connection with the payment of taxes, including on international trade.

Seventeen of the 22 new entrants to the index are from Africa. Of the region's new entrants, Gambia and Egypt occupy the highest positions at 55th and 58th, respectively. Tanzania follows at 69, while Ghana, Algeria, Malawi, and Senegal are clustered in the 70th ranks.

Box 2: Hyperinflation and deflation

Inflation has long been recognized by economists as a destabilizing factor for an economy, and thus for economic growth, by distorting the behavior of economic actors. For this reason, inflation is included in the macroeconomic stability subindex of the GCI. At present, inflation enters the index in a "linear" fashion. In other words, every increment of inflation erodes a country's overall GCI score in a parallel manner.

However, although this constitutes a good first approach to taking into account the potential destabilizing effects of inflation, it also raises two questions. The first is how to deal with the critical problem of hyperinflation. The second is how to deal with deflation, a topic that has received much attention of late.

Hyperinflation

With regards to hyperinflation, the idea of having the index punish very high inflation countries more than incrementally is very appealing. In principle this might be possible, since it has been suggested in the literature that there is a measurable point after which inflation starts to negatively affect growth strongly.[2]

However, upon further reflection, it is very difficult to actually implement this, since the standard error would have such a large range (say between 6 and 14 percent). In other words, any threshold and slope we choose would be arbitrary.[3] For this reason we have decided to explore the question further before choosing how to punish hyperinflationary countries more strongly in the index. We will come back to this issue in future editions of the GCI.

Deflation

In recent years, a great deal of attention has been paid to the potential problems associated with deflation. Of particular concern is the danger of an economy falling into a deflationary spiral out of which it is difficult to emerge (see Martin Baily's chapter elsewhere in this volume for a more detailed discussion of deflation). The question is important for our analysis, since entering inflation in the GCI where lower inflation is taken as "good" means that, by definition, deflationary countries will find themselves at the top of the ranking.

It would seem logical to somehow punish those countries that actually do become deflationary by allocating them a lower score. However, the actual implementation of any such solution raises similar questions to those related to hyperinflation raised above. If there were theoretical or empirical evidence on the negative relationship between deflation and growth, the idea would be to choose a maximum rate of inflation somewhere above 0 percent, and to punish all countries falling below that level.

However, despite all of the press attention this issue has received, it remains unclear whether deflation really is bad for growth, and to date there is no widely accepted empirical research upon which we could base our decision. This ambiguity means that any threshold selected would be arbitrary. Should the threshold be 1 percent, 0 percent, 2 percent? There would appear to be no basis at this point on which to select this cutoff. Further, even if it were possible to select a threshold inflation rate, how should the deflationary numbers be treated? For example, is –2 percent just the same as 2 percent, or is it the same as 4 percent, or even higher? There are no studies at present on which to base such a decision.

We have therefore taken the decision to leave the deflationary countries as they are for this year. We will continue to study this issue very closely, with an eye to implementing a better solution in the future.

Uganda, Kenya, and Zambia occupy positions around the 80th ranks, while Cameroon, Ethiopia, Mozambique, Madagascar, and Mali are in the 90th ranks. In the region, new entrants Angola and Chad occupy the last ranks, at 100th and 101st positions, respectively.

Conclusion

The main innovation of this year's GCI is the inclusion of 22 new countries. With a total of 102 countries now being surveyed, this year's Growth Competitiveness Index becomes the first index of its sort with such broad country coverage. This broad coverage is especially relevant because most of the additions are from the developing world and, more specifically, from Africa. This should allow readers to compare the scores, the performances, and the experiences of many more developing nations with those of the developed world. These comparisons should deliver lessons as to what can and should be done in order to induce growth and improvements in per capita income in the developing world. As we mentioned in the introduction, a better understanding of the factors underlying successful growth strategies would have far reaching consequences for human welfare.

The process of economic growth and development is a complex one. Many of its underlying mechanisms are still unknown, but economic researchers continue to make progress as new experiences and new data become available. The World Economic Forum will continue to monitor these developments and, with them, will keep improving the GCI so that it can continue to be a useful tool for economists, business leaders, and policymakers around the world.

Notes

1 Dollar and Kraay (2000). At a theoretical level, it is possible that positive growth ends up increasing poverty if the distribution of income deteriorates so much as a consequence of positive growth that the total number of people whose income is below a certain threshold (such as one dollar a day) actually increases. Although this is a theoretical possibility, empirical evidence suggests that this rarely happens in practice. In fact, there is little correlation between the per capita growth rate of an economy and measures of inequality (such as the gini coefficient). If inequality does not increase with aggregate economic growth, it must be the case that positive growth is associated with reductions in poverty rates.

2 Schumpeter (1942) and Solow (1956). See Aghion and Howitt (1992, 1998) for a technical exposition of technology-based growth theories.

3 See Barro (1991), Levine and Renelt (1992), Barro and Sala-i-Martin (1998), and Doppelhofer et al. (2003) for recent examples of cross-country empirical growth research.

4 See, for example, Acemoglu, Johnson, and Robinson (2002).

5 Solow (1956).

6 In an excellent paper, Nordhaus (1994) shows how we can purchase 45.000 times more lighting for an hour of work today than people could buy two centuries ago.

7 The rapid improvement of the quality of computers is only one example of a phenomenon that can be found in transportation, music and entertainment, medicine, drugs, food, and so on.

8 See p 39 of Sachs and McArthur (2001).

Box Notes

1 A good example is provided by Russia, a country with a relatively low expenditure-to-GDP ratio but that otherwise has fairly inefficient patterns of spending. Its overall rank fell, notwithstanding a fairly robust growth performance.

2 Fischer (1993) has established that 8 percent is the relevant threshold

3 The precise slope parameters would depend crucially on ad-hoc econometric specifications.

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Appendix: Composition of the Growth Competitiveness Index

The Growth Competitiveness Index is composed of three component indexes: the technology index, the public institutions index, and the macroeconomic environment index. These indexes are calculated on the basis of both "hard data" and "Survey data."

The responses to the Executive Opinion Survey are what we refer to as *Survey data*, with responses ranging from 1 to 7 (see the chapter at the end of the Report for further information on the Executive Opinion Survey); the hard data were collected from various sources, described in the Technical Notes and Sources at the end of the *Report*. All of the data used in the calculation of the Growth Competitiveness Index can be found in the data tables section of the *Report*.

The standard formula for converting each hard data variable to the 1-to-7 scale is:

$$6 \times \frac{(\text{country value} - \text{sample minimum})}{(\text{sample maximum} - \text{sample minimum})} + 1$$

The sample minimum and sample maximum are the lowest and highest values of the overall sample, respectively. In some instances, adjustments were made to account for extreme outliers in the data.

As explained in the chapter, the sample of countries is divided into two groups: the core innovators and the non-core innovators. Core innovators are countries with more than 15 US utility patents registered per million population in 2002; non-core innovators are all other countries.

For the core innovators, we place extra emphasis on the role of innovation and technology. The weightings for the core innovators are as follows:

Growth Competitiveness Index for core innovators = (1/2 technology index) + (1/4 public institutions index) + (1/4 macroeconomic environment index)

For the non-core innovators, we calculate the Growth Competitiveness Index values as a simple average of the three component indexes:

Growth Competitiveness Index for non-core innovators = (1/3 technology index) + (1/3 public institutions index) + (1/3 macroeconomic environment index)

Technology index components

The technology index is calculated for the core and non-core innovators as follows:

technology index for core innovators = (1/2 innovation subindex) + (1/2 information and communication technology subindex)

technology index for non-core innovators = (1/8 innovation subindex) + (3/8 technology transfer subindex) + (1/2 information and communication technology subindex)

Innovation subindex

innovation subindex = (1/4 Survey data) + (3/4 hard data)

Innovation Survey questions

3.01 What is your country's position in technology relative to world leaders'?
3.02 Companies in your country are not interested/aggressive in absorbing new technology?
3.06 How much do companies in your country spend on R&D relative to other countries?
3.08 What is the extent of business collaboration in R&D with local universities?

Innovation hard data

3.17 US utility patents granted per million population in 2002
3.18 Gross tertiary enrollment rate in 2000 or most recent available year

Technology transfer subindex

technology transfer subindex = unweighted average of two technology transfer Survey questions

3.03 Is foreign direct investment in your country an important source of new technology?
3.04 Is foreign technology licensing in your country a common means of acquiring new technology?

Appendix: Composition of the Growth Competitiveness Index *(cont'd.)*

Information and communication technology (ICT) subindex

information and communication technology subindex = (1/3 information and communication technology Survey data) + (2/3 information and communication technology hard data)

Information and communication technology Survey questions

3.12 How extensive is Internet access in schools?
3.13 Is there sufficient competition among ISPs in your country to ensure high quality, infrequent interruptions and low prices?
3.14 Is ICT an overall priority for the government?
3.15 Are government programs successful in promoting the use of ICT?
3.16 Are laws relating to ICT (electronic commerce, digital signatures, consumer protection) well developed and enforced?

Information and communication technology hard data

3.19 Cellular mobile subscribers per 100 inhabitants, 2002
3.20 Internet users per 10,000 inhabitants, 2002
3.21 Internet hosts per 10,000 inhabitants, 2002
3.22 Main telephone lines per 100 inhabitants, 2002
3.23 Personal computers per 100 inhabitants, 2002

Public institutions index components

public institutions index = (1/2 contracts and law subindex) + (1/2 corruption subindex)

Contracts and law subindex

6.01 Is the judiciary in your country independent from political influences of members of government, citizens or firms?
6.03 Are financial assets and wealth clearly delineated and well protected by law?
6.08 Is your government neutral among bidders when deciding among public contracts?
6.17 Does organized crime impose significant costs on business?

Corruption subindex

7.01 How commonly are bribes paid in connection with import and export permits?
7.02 How commonly are bribes paid when getting connected with public utilities?
7.03 How commonly are bribes paid in connection with annual tax payments?

Macroeconomic environment index components

macroeconomic environment index = 1/2 macroeconomic stability subindex + 1/4 country credit rating in March 2003 + 1/4 government waste in 2003

Macroeconomic stability subindex

macroeconomic stability subindex = (5/7 macroeconomic stability hard data) + (2/7 macroeconomic stability Survey data)

Macroeconomic stability Survey questions

2.01 Is your country's economy likely to be in a recession next year?
2.09 Has obtaining credit for your company become easier or more difficult over the past year?

Macroeconomic stability hard data

2.18 Government surplus/deficit in 2002
2.19 National savings rate in 2002
2.20 Inflation in 2002
2.21 Real exchange rate relative to the United States in 2002
2.22 Lending– borrowing interest rate spread in 2002

2.17 Institutional Investor country credit rating, March 2003

Government waste composite, 2003

2.03 Do government subsidies to business in your country keep uncompetitive industries alive artificially or do they improve the productivity of industries?
7.08 In your country, how common is the diversion of public funds to companies, individuals or groups due to corruption?
7.10 How high is the public trust in the financial honesty of politicians?