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The Global Competitiveness Report 2001–2002

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The term *country* as used in this report does
not in all cases refer to a territorial entity that is
a state as understood by international law and
practice. The term covers well-defined, geo-
graphically self-contained economic areas that
are not states but for which statistical data are
maintained on a separate and independent
basis.

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Preface

KLAUS SCHWAB

President, World Economic Forum

This year's *Global Competitiveness Report* appears at a time of exceptional uncertainty. Global economic activity has slowed substantially, stock markets have shown considerable volatility, and the world's major currencies have experienced significant fluctuations. In Europe, where the final steps toward monetary unification are about to be taken, output has declined considerably below the region's production potential. In Japan, there are serious concerns of a prolonged recession, and in several countries throughout the rest of Asia industrial production has shrunk markedly. Other emerging market economies have been subject to financial turmoil that reminds us of the severe crises in 1997 and 1998.

The greatest uncertainty, however, concerns the United States, whose economy has essentially come to a standstill in the second quarter of 2001. In the highly integrated world economy, the United States remains critical for global economic growth. Yet evidence will emerge only gradually regarding how the horrific tragedies of September 11 will affect this economy that was already experiencing a slowdown. In order to restore confidence, the US Federal Reserve, in concert with other central banks, has continued to lower interest rates while the federal government has developed a package for fiscal stimulus. It is extremely difficult to predict how fast a turnaround can be achieved, but the United States' underlying fundamentals will play the most important role in influencing its return to a sustained growth path. As this *Report* confirms, the United States' fundamentals remain highly competitive.

To be sure, as the global economy experiences this period of economic and political uncertainty, much is at stake. Calls for more protectionism have become louder. Commitments to international efforts urgently required to fight killer diseases as well as global climate change could be undermined. And, more generally, the recent backlash against globalization could gain increased momentum. There can be little doubt that these measures would hurt developing countries most.

Coping with the enormous challenges currently facing the global economy requires pursuing a prudent and proactive macroeconomic policy stance. More importantly, it requires strengthening the cross-border networks that promote private investment, entrepreneurship, and social progress around the world. In this endeavor, the *Global Competitiveness Report* remains an invaluable tool by identifying existing impediments to economic growth and thus

helping in the design of policy measures to remove such obstacles as a precondition for advancing human well-being across the globe.

This year we have added not fewer than 17 countries to our analysis, reflecting the rising integration of developing countries into the global economy and ensuring that the *Global Competitiveness Report* remains the most comprehensive knowledge source for policymakers, the business community, and other key stakeholders. These new entrants are regionally diversified, with one economy from Africa (Nigeria), two from Asia (Bangladesh and Sri Lanka), five from central and eastern Europe (Estonia, Latvia, Lithuania, Romania, and Slovenia), and nine from the Western Hemisphere (Dominican Republic, Guatemala, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Trinidad and Tobago, and Uruguay). As regards the latter, I would like to thank the Inter-American Development Bank for their excellent cooperation.

In the future, we will certainly continue to expand the list of countries covered by the *Global Competitiveness Report*. Although this *Report* remains our flagship publication, we plan to publish supplementary reports on specific regions, including one forthcoming study on Latin America and another on the transition economies in central and eastern Europe and the former Soviet Union.

We remain indebted to Professor Michael E Porter, director of the Institute for Strategy and Competitiveness at the Harvard Business School, and Professor Jeffrey D Sachs, Director of the Center for International Development at Harvard University, for their partnership and for acting as co-directors of the *Global Competitiveness Report*. We would also like to thank John W McArthur of the Center for International Development for managing this project on the Harvard side and for applying the rigorous standards to the data and analyses that ensure the ongoing excellence of the *Report*. Furthermore, heading the Global Competitiveness Program at the World Economic Forum, Dr Peter Cornelius has remained in charge of executing the Survey, coordinating the *Report*, and providing its intellectual driving force. Finally, we extend very special thanks to KPMG, our partner in this *Report*, for their financial support in this important venture.

Introduction

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Slowdown and Uncertainty: International Economic Networks in the Wake of September 11, 2001

October 5, 2001

The terrorist attacks of September 11, 2001, have led to numerous swift reactions in the political and security spheres. In the economic sphere, short-term reactions were severe: Through to September 25, an estimated US\$ 2 trillion were lost in world equity markets, 20 of the world's major stock market indexes dropped by more than 10 percent, and 32 national indexes dropped by at least 8 percent (see Table 1). Over the same period, at least 15 currencies saw their values drop by 4 percent or more relative to the US dollar, a tremendous amount over a short period (see Table 2). But many of these losses were later recouped: Between September 25 and October 3, more than \$500 billion was regained of the \$800 billion lost in US equity markets in the 14 days following September 11, and rebounds in other global markets were similar. Now, a few weeks after the attacks, attention is turning to the medium- and long-term impacts of September 11 on the global economy.

It is with these medium-term (roughly five years) economic trends that the *Global Competitiveness Report* is concerned. In September 2001, the world economy was already in the midst of a cyclical slowdown. In line with our stated objective of projecting countries' economic prospects independent of business cycles, this *Report* makes a key implicit assumption that global economic integration will continue in the years ahead, despite shocks such as the horrendous one of September 11. However, since the events of September 11 were of such potential significance to the world economy and because the *Report* had not yet gone to press at that date, we decided to add the following brief analysis of the post-September 11 world economy.

In the short term, the terrorist attacks have probably worked as a catalyst, pushing the world economy into a recession more quickly and more severely than would have been the case otherwise. Two factors are largely to blame. First, the terrorist attacks and the security precautions taken in their wake have made travel, trade, and communication more costly. Possible disruptions in transport networks threaten the functioning and efficiency of global production chains. Second, and more significant, business and consumer confidence took a significant blow. Before September 11, the resilience of US consumer spending was one of the few positive signs in an overall slowing world economy. Now there is more consumer uncertainty, leaving companies to wait and see what will happen next. Although it is highly probable that these two factors will dissipate over the next year, they could well place a drag on a global economic recovery.

In the longer term, the terrorist attacks will have a lasting negative impact if the policy responses trigger a reversal of the global economic integration that has characterized the past twenty years. The possibility of large-scale global conflict, terrorism, political backlash, and market uncertainty have the potential to raise the costs of cross-border business to levels not seen in decades, and thereby to limit the gains in economic well-being that global economic integration can yield. We therefore hope and believe that the responses to September 11 will be resolute and powerful, but that care will be taken to prevent them from derailing the benefits of global business.

Table 1: Fluctuations in equity markets across selected GCR economies

| Country | Index | Change in value: Jan 1–Sep 10, 2001 | Change in value: Sep 10–Sep 25, 2001 |
|-------------------|--|-------------------------------------|--------------------------------------|
| Argentina | Merval | -31.1% | -15.1% |
| Australia | All Ordinaries | 0.9% | -8.8% |
| Austria | ATX | 8.7% | -9.2% |
| Bangladesh | Bangladesh SE All Share Price Index | 1.2% | -3.1% |
| Belgium | BEL-20 | -9.7% | -9.6% |
| Brazil | Bovespa | -21.9% | -14.2% |
| Bulgaria | Bulgarian SE Sofia | -12.7% | -1.5% |
| Canada | TSE 300 | -17.8% | -8.8% |
| Chile | IPSA | 16.0% | -8.9% |
| China | Shanghai Composite | -10.5% | -3.4% |
| Colombia | Colombia SE Price Index | -0.3% * | -7.3% |
| Costa Rica | Costa Rica SE | 11.4% | 0.0% |
| Czech Rep | PX 50 | -27.7% | -3.9% |
| Denmark | KFX | -13.0% | -12.7% |
| Ecuador | Quito–SE | 6.1% | 4.6% |
| Egypt | CMA | 0.3% | -2.1% |
| Estonia | Talinn Stock Exchange | -16.7% | -3.5% |
| Finland | Helsinki General | -55.4% | 5.4% |
| France | CAC 40 | -26.0% | -11.0% |
| Germany | DAX | -27.4% | -14.2% |
| Greece | General Share | -25.1% | -14.7% |
| Hong Kong | Hang Seng | -31.3% | -11.2% |
| Hungary | Budapest (BUX)–Price Index | -20.6% | -0.2% |
| Iceland | Iceland SE ICEX All Share Price Index | -18.7% | -0.1% |
| India | BSE 30 | -19.9% | -17.8% |
| Indonesia | Jakarta Composite | 6.6% | -7.8% |
| Ireland | Ireland ISEQ | -2.5% | -13.2% |
| Israel | TA–100 | -20.1% | -9.2% |
| Italy | MIBTEL | -24.7% | -15.0% |
| Jamaica | Jamaica SE | 19.7% | -4.9% |
| Japan | Nikkei 225 | -26.0% | -4.9% |
| Jordan | Amman SE Financial Market Price Index | 20.5% | -8.3% |
| Korea | Seoul Composite | 9.1% | -14.3% |
| Latvia | Latvia Dow Jones RIC1 (LVL) Price Index | 9.0% | -4.3% |
| Lithuania | Lithuania Litin Price Index | -34.6% | -2.4% |
| Malaysia | KLSE Composite | 2.3% | -12.8% |
| Mauritius | Mauritius SE SEMDEX Price Index | -6.5% | -2.8% |
| Mexico | IPC | 3.6% | -9.4% |
| Netherlands | AEX General | -24.2% | -11.2% |
| New Zealand | NZSE 40 | 2.6% | -6.7% |
| Norway | Total Share | -14.9% | -15.8% |
| Panama | Panama SE General | -9.2% | -0.1% |
| Peru | Lima General | 7.7% | -7.8% |
| Philippines | PSE Composite | -13.2% | -10.4% |
| Poland | Warsaw General Price Index | -27.9% | -7.5% |
| Portugal | BVL 30 | -28.0% | -2.0% |
| Romania | BET 10 | 39.3% | -7.6% |
| Russia | Moscow Times | 57.0% | -12.8% |
| Singapore | Straits Times | -19.1% | -17.8% |
| Slovak Republic | SAX | 25.0% | 2.4% |
| Slovenia | Slovenian Price Index (PIX) | -0.3% | -0.5% |
| South Africa | Johannesburg SE All Share 40 Price Index | 2.6% | -8.6% |
| Spain | Madrid General | -14.9% | -7.4% |
| Sri Lanka | All Share | -8.9% | -1.7% |
| Sweden | Stockholmsborsen All Share Price Index | -27.8% | 1.6% |
| Switzerland | Swiss Market | -24.7% | -8.3% |
| Taiwan | Taiwan Weighted | -9.6% | -18.5% |
| Thailand | SET | 23.2% | -16.6% |
| Trinidad & Tobago | S&P/IFCF Trinidad & Tobago Price Index | 2.5% | 0.0% |
| Turkey | ISE National–100 | 0.9% | -20.2% |
| UK | FTSE 100 | -19.1% | -7.4% |
| Ukraine | PFTS Index | -9.0% | -2.7% |
| United States | Dow Jones | -11.0% | -9.8% |
| Venezuela | IBC | 9.6% | -5.1% |
| Zimbabwe | Zimbabwe Industrial | 175.5% | -8.6% |

*Since August 3, 2001

Sources: Yahoo Business News, Bloomberg, Datastream

Table 2: Exchange rate fluctuations across GCR economies

| Country | Change in currency value relative to US Dollar: Jan 1–Sep 10, 2001 | Change in currency value relative to US Dollar: Sep 10–Sep 25, 2001 |
|---------------------|--|---|
| Argentina | -0.1% | -0.1% |
| Australia | -7.7% | -5.8% |
| Austria | -3.9% | 1.0% |
| Bangladesh | -5.2% | -3.7% |
| Belgium | -3.9% | 1.0% |
| Bolivia | -5.1% | -4.2% |
| Brazil | -32.4% | -10.5% |
| Bulgaria | -4.2% | 2.7% |
| Canada | -4.6% | -0.2% |
| Chile | -16.3% | -7.6% |
| China | 0.0% | -0.1% |
| Colombia | -3.6% | -4.3% |
| Costa Rica | -4.5% | -4.0% |
| Czech Republic | -0.2% | 0.0% |
| Denmark | -3.6% | 1.1% |
| Dominican Republic | -1.7% | -4.2% |
| Ecuador | 0.0% | 0.8% |
| Egypt | -11.0% | 0.1% |
| El Salvador | 0.0% | 0.1% |
| Estonia | -3.9% | 1.7% |
| Finland | -3.9% | 1.0% |
| France | -3.9% | 1.0% |
| Germany | -3.9% | 1.0% |
| Greece | -3.9% | 1.0% |
| Guatemala | -3.4% | -2.9% |
| Honduras | -3.1% | -4.2% |
| Hong Kong SAR | 0.0% | 0.0% |
| Hungary | 0.5% | -2.1% |
| Iceland | -17.2% | -2.6% |
| India | -1.2% | -1.5% |
| Indonesia | 5.7% | -4.1% |
| Ireland | -3.9% | 1.0% |
| Israel | -6.6% | -1.0% |
| Italy | -3.9% | 1.0% |
| Jamaica | -1.0% | 0.0% |
| Japan | -5.0% | 2.1% |
| Jordan | -0.2% | -0.3% |
| Korea | -1.8% | -1.1% |
| Latvia | -0.8% | 0.8% |
| Lithuania | 0.0% | 0.1% |
| Malaysia | 0.0% | -0.1% |
| Mauritius | -6.4% | -0.5% |
| Mexico | 3.0% | -0.3% |
| Netherlands | -5.5% | 1.0% |
| New Zealand | -2.0% | -8.3% |
| Nicaragua | -5.6% | 0.0% |
| Nigeria | -2.4% | -2.9% |
| Norway | -0.4% | 0.8% |
| Panama | 0.0% | 0.0% |
| Paraguay | -23.5% | -4.0% |
| Peru | 1.3% | -4.8% |
| Philippines | -2.8% | 0.4% |
| Poland | -2.2% | -0.4% |
| Portugal | -3.9% | 1.0% |
| Romania | -16.4% | -2.8% |
| Russia | -3.1% | 0.0% |
| Singapore | -0.8% | -1.4% |
| Slovak Republic | -2.0% | -0.4% |
| Slovenia | -6.9% | -0.3% |
| South Africa | -11.6% | -3.3% |
| Spain | -3.9% | 1.0% |
| Sri Lanka | -9.0% | 0.0% |
| Sweden | -11.5% | -2.6% |
| Switzerland | -3.5% | 4.1% |
| Taiwan | -5.0% | -4.4% |
| Thailand | -2.7% | 0.4% |
| Trinidad and Tobago | 2.9% | 0.0% |
| Turkey | -110.9% | -11.4% |
| Ukraine | 1.6% | 0.1% |
| United Kingdom | -2.2% | 0.1% |
| Uruguay | -17.9% | -1.2% |
| Venezuela | -6.8% | 0.5% |
| Vietnam | -3.3% | -4.2% |
| Zimbabwe | -1.3% | -2.4% |

Source: Oanda.com

Flash survey

To assess the magnitude of the effects of September 11 over the coming six months, between September 26 and October 1 we conducted a “flash survey” of 90 senior executives whose companies are members of the World Economic Forum. We asked them six questions about how their business operations had been affected by the terrorist attacks in the United States, soliciting their views on both their companies’ operations and their general view of the world economy. Although the limited sample size prevents rigorous statistical analysis, the main results—and their consistency across regions and sectors—provide useful insights into the current thinking in global business.

Overall, the survey indicates that the terrorist attack has had a slightly but not overwhelmingly negative effect on business and consumer confidence. It suggests that the global economy is more resilient than many observers would suggest. Interestingly, the survey also revealed consistent business sentiments around the globe. The interconnectedness of the international economy appears to be yielding broadly similar responses to the current cyclical economic downturn and the events of September 11. In this sense, the terrorist attacks of September 11 hit not only the United States but also nations around the globe.

Changes to corporate investment

Of the executives surveyed, fully 64 percent foresaw no change in corporate investment plans due to the events of September 11. Meanwhile, 19 percent foresaw their company’s investment decreasing by only 10 percent or less, and only 15 percent anticipated cutting back more than 10 percent on investment. Only 2 percent foresaw an actual increase in investment. Notably, there was no geographic trend among the companies anticipating large drops in investment. Indeed, those expecting the biggest decreases were companies with global operations spanning several continents. In sectoral terms, more than half of the manufacturing companies anticipated no change in their investment; nor did a full 75 percent of the financial firms. It is of note that these results were collected even before US interest rates dropped to their lowest point in four decades on October 2. Apparently, despite the headline-grabbing stories of massive cutbacks in a few industries, many if not most firms have stable investment plans, relatively robust to the aftereffects of September 11.

Anticipated changes in demand

On a 1-to-7 scale question where 1 = large increase in demand, 4 = no effect, and 7 = large decrease in demand, 20 percent of respondents anticipated no change in demand for their products, while 18 percent looked forward to an increase in demand. Meanwhile 62 percent anticipated a decrease, but more than two-thirds of them anticipated the drop in demand to be only minor (ie, a score of 5). The overall average response was 4.5, with little variation in mean scores across business sectors. Variation was also fairly limited geographically, with average scores ranging from 4.0 for companies operating in Latin America to 4.6 for companies operating in East Asia.

Effects of increased risk and costs of business

Perhaps the most obvious repercussion from the terrorist hijackings involves increased risks, and therefore costs, of doing business. These costs include, for example, increased insurance premia, increased shipping times and expenses, reduced business travel, and general trade disruptions. In a question that asked executives to rate on a 1-to-7 scale the effects and aftermath of terrorist attacks on business costs (1 = small effect, 7 = large effect), the mean response was 4.0. Companies operating in Asia, Sub-Saharan Africa, and the Middle East and North Africa were slightly more pessimistic than their counterparts operating in other regions, rating means responses of 4.3, 4.4, and 4.3, respectively. Interestingly, the average score for executives identifying their companies as being in the information technology (IT) sector was 4.7. In a sector already buffeted by declining demand, pessimism about the effect of the attacks was greater. Of course, the overall short-term impact of trends such as decreases in business travel might have some longer-term benefits. Becoming accustomed to the potential of videoconferencing and Internet-based communication technology could help many companies lower operating costs.

Effects of potential disruptions to supply chains

Anticipated disruptions to supply chains were significant but less severe than expected cost increases. On the same 1-to-7 scale (1 = small effect, 7 = large effect), the mean response across the sample was 3.0. Respondents from firms operating in Asia or the Middle East and North Africa were slightly more pessimistic than their peers, rating mean responses of 3.3 and 3.4 respectively, but there were no other discernible geography-based differences in responses. In sectoral terms, IT producers were again the most concerned about supply chain disruptions, with a mean score of 3.9 for that group.

Effects of potential disruptions in world oil markets

Of great interest to all markets is the possibility that world oil market disruptions will affect businesses' operating environments. The flash survey responses reflected this uncertainty, with the average score among respondents (with 1 = small effect and 7 = large effect) being 3.7. Economies operating in Sub-Saharan Africa had worse expectations, with an average score of 4.6, while companies operating in Latin America were slightly more optimistic, with an average response of 3.4. Across sectors, the average score to this question was quite constant, except for firms involved in IT, who were again slightly more pessimistic with an average score of 4.5.

Overall recession perceptions

Of the executives surveyed, none foresaw strong worldwide economic growth in 2002. Twenty-one percent predicted modest growth, but a full 79 percent predicted recession in the year ahead. Of significant interest, however, is that slightly more than half of those predicting a recession believed that such a downturn was likely even *before* September 11. In our sample, executives with operations in the Middle East and North Africa were slightly more likely to believe that the events of September 11 will cause a recession, while those operating in Latin America were somewhat more likely to believe a recession was already in the offing. Among executives with operations in Asia, Western Europe, and North America, roughly 45 percent believed a recession was already underway, approximately 35 percent perceived September 11 as a major cause of a coming recession, and the remaining 20 percent predicted modest global growth in the year ahead. The breakdown of responses was quite similar across sectors. In most areas of business, a large majority of respondents foresaw a recession in the year ahead and roughly half of those people thought a recession was already underway. The one exception was for firms in the financial industry, where slightly more executives (by a 3 to 2 margin) saw September 11 as a key element in causing a coming recession.

Together, these results paint an intriguing picture of the world economy. Both corporate investment and consumer demand will ebb at least slightly in the near future, but perhaps not by as much as predicted by early fears. The relative stability of planned investment and only minor anticipated drop in consumer and corporate demand suggest that executives do not see the events of September 11 as being cataclysmic for the world economy. The persistence of this sentiment will no doubt depend on future political and military developments.

Countries at greatest risk

The flash survey results provide interesting insights into global business perspectives, but they raise an equally important question. Which countries will be the most affected by the heightened uncertainty? We can identify four main, sometimes overlapping, groups of countries in terms of exposure.

First are those emerging market economies whose growth in output is most closely linked to the US business cycle. These economies were already suffering before September 11 and are likely to bear a heavy burden if the US economy requires an extended period to regain momentum. This is particularly relevant to the East Asian export-oriented economies. As indicated in Table 3, Singapore's exports to the United States in July 2001 were a full 30 percent less than for the same month in the previous year, while Taiwan's decreased by 24 percent. Since Singapore's exports to the United States accounted for 21 percent of its gross domestic product in 2000 and Taiwan's accounted for 13 percent, these drops represent major changes for those economies. Also affected are Korea, Malaysia, the Philippines, and Thailand, all of which saw roughly 20 percent drops in July-on-July exports to the United States. Many of these economies had already expe-

Table 3: July 2001 versus July 2000 exports to United States for selected GCR economies most dependent on US trade

| Country | Exports to United States as % of GDP in 2000 | Change in Exports to United States, July 2000 vs July 2001 |
|--------------------|--|--|
| Canada | 33% | -5% |
| Trinidad & Tobago | 30% | -8% |
| Malaysia | 29% | -19% |
| Nigeria | 26% | -16% |
| Nicaragua | 24% | -8% |
| Mexico | 24% | -6% |
| Dominican Republic | 22% | -7% |
| Costa Rica | 22% | -17% |
| Singapore | 21% | -30% |
| Philippines | 19% | -20% |
| Ecuador | 17% | 15% |
| Ireland | 17% | 37% |
| Venezuela | 15% | -17% |
| El Salvador | 15% | -4% |
| Guatemala | 14% | -2% |
| Thailand | 13% | -16% |
| Taiwan | 13% | -24% |
| Sri Lanka | 12% | 4% |
| Israel | 12% | -22% |
| Estonia | 11% | -49% |
| China | 9% | -6% |
| Korea | 9% | -22% |
| Colombia | 8% | -19% |
| Jamaica | 8% | -27% |
| Hong Kong SAR | 7% | -15% |
| Indonesia | 7% | 4% |
| Mauritius | 7% | 14% |

Sources: US Census Bureau, IMF *World Economic Outlook May 2001*, and authors' calculations

rienced a major slump in demand for their information and communication technology-based exports as US firms continued to recover from the technology market bubble that burst in 2000.

Second are those economies with high levels of sovereign debt, particularly those with high debt-to-export ratios. Although interest rates have been lowered across the G-7 since September 11, 10-year US Treasuries have only decreased approximately 50 basis points, while the risk premia and long-term bond markets have expanded by nearly 100 basis points (and in some instances much more) in the weeks following the attacks. Economies such as Argentina, Bolivia, Brazil, Nicaragua, and Peru that have high debt-to-export ratios could be seriously strained in their ability to finance new debt or refinance old debt in the months ahead. Table 4 indicates some selected fluctuations in bond market risk spreads since September 11.

Third are the economies likely to be disrupted by interruptions to existing trade patterns, caused by increased insurance and freight costs, lengthened shipping times, and extended delays at customs. This will particularly affect economies reliant on ocean shipping and air cargo, again including the highly trade-dependent export-oriented economies of East Asia—notably Singapore, Taiwan, Korea, and Malaysia. But it is also likely to affect Canadian and Mexican firms facing longer delays at United States border crossings.

Fourth are those countries dependent on travel and tourism as significant sources of national income. The World Bank recently estimated that 65 percent of holidays to the Caribbean have been canceled for the short-term. It is difficult to predict how long this reluctance to travel will last and how long it will take for people to regain confidence in flying, but in the short term it will definitely

have an adverse impact for countries such as Jamaica, which had tourism receipts equivalent to nearly 18 percent of its gross domestic product in 1999, the most recent year for which World Bank data are available. Mauritius is similarly exposed to fluctuations in tourism, with tourist earnings equal to 13 percent of its GDP. The Dominican Republic and Costa Rica, two countries heavily dependent on US markets for their exports, are likewise dependent on tourism, with tourist receipts estimated at 9.6 and 6.6 percent of those economies, respectively. As noted in Table 5, tourism receipts account for more than 5 percent of GDP in several European countries as well, but visitors are less likely to stay away from those economies since air travel markets have been less disrupted in Europe than in North America and also because train service is an easier alternative means for travel in Europe.

What can be done?

With short-term real interest rates low, and corporate investment plans so far only mildly affected by September 11, the economic responses should include a set of confidence-building measures to stimulate consumer and corporate demand and help maintain the efficiency of international production networks. Amidst the formidable uncertainty, means are needed to ensure that the networks of the international economy continue to operate efficiently and with minimal disruption.

The main lesson of modern economic history is that we live in a globally networked economy, where major disruptions to global trade, finance, travel, and production have significant effects across the world economy. Even before September 11, this became evident once again. This year's global economic fallout from the bursting of the US financial bubble was already proving to be much sharper than originally predicted because the linkages across markets were stronger than had been commonly understood. Even economies such as Singapore and Taiwan, which rank very highly on our lead competitiveness Indexes, are being severely affected by this fallout. This does not imply that these economies are becoming less competitive, but rather that even the most competitive economies in the world are being affected by a cyclical downturn.

Policymakers must avoid confusing structural, cyclical, and short-term issues. When global demand picks up again, these competitive economies will be well positioned. The key is to ensure the stability of the networks and linkages that allow economies to interact with the greatest efficiency. Any central economic response to September 11, therefore, must involve bolstering the framework of globalization and recommitting governments around the world to making the world economy work for all nations, including the poorest. Without that, confidence in the international economic framework will remain dented.

Table 4: Selected sovereign bond risk spreads, September 10, 2001, versus October 2, 2001

| | SEP 10, 2001 | OCT 2, 2001 |
|------------------------------------|--------------|-------------|
| Sovereign Bond Risk Spreads | | |
| Argentina | 12.96 | 13.39 |
| Brazil | 10.14 | 11.85 |
| Lebanon | 5.31 | 6.72 |
| Mexico | 3.30 | 4.22 |
| Philippines | 6.82 | 8.10 |
| South Africa | 2.54 | 2.96 |
| Brady Bond Risk Spreads | | |
| Argentina | 5.42 | 6.32 |
| Brazil | 7.52 | 9.13 |
| Mexico | 1.69 | 2.12 |
| Venezuela | 4.24 | 4.66 |
| US Long-Term Interest Rates | | |
| 10-Year US Treasuries | 4.84 | 4.51 |

Source: *Financial Times*

Table 5: Selected GCR economies for which tourism receipts represent a large share of national product

| Country | Tourism Receipts as a % of GDP |
|--------------------|-----------------------------------|
| Jamaica | 17.9% |
| Mauritius | 13.1% |
| Dominican Republic | 9.6% |
| Bulgaria | 7.1% |
| Costa Rica | 6.6% |
| Hungary | 6.5% |
| Greece | 6.2% |
| Czech Republic | 5.8% |
| Spain | 5.5% |
| Thailand | 5.4% |
| Austria | 5.3% |
| Lithuania | 5.2% |
| Slovenia | 5.1% |
| Egypt | 4.6% |
| Nicaragua | 4.5% |
| Hong Kong SAR | 4.5% |

Source: World Bank, *World Development Indicators 2001*

Most importantly, policymakers need to continue pursuing the diplomacy needed to avoid large-scale global conflict. Military reprisals are a certainty, but for many reasons the biggest mistake would be to instigate the kind of response that sends the world into a wider military conflict. Although less important than the direct loss of lives, the economic costs would be horrendous.

Second, there needs to be confidence in the basic infrastructure of international trade and transport. Security at airports, seaports, and other nodes of commerce and travel should be enhanced.

Third, OPEC should continue making its supply decisions in a manner that avoids any disruptions in oil supplies or pricing. The OPEC member governments are among the most vulnerable to the current global crisis, and should readily commit to such an international pledge.

Fourth, the leading central banks must continue to ensure the ample supply of liquidity, as they have been doing since the attacks in the United States. With Japan already in recession, the Bank of Japan should take even more aggressive action to stabilize the economy by selling enough yen to prevent any further appreciation of the currency, and even some depreciation, as that is sorely needed for Japanese recovery.

Fifth, the world should launch a new trade round at the WTO Ministerial Meeting in November, to signal the intention of all member countries of the WTO to persevere in the path of free trade. It is time for the rich countries to respect the wishes of the poor in getting such a trade round off the ground. That would require proactive steps by the wealthy economies of the world to ensure that the developing country exporters have improved

access to rich country markets (especially for apparel and agriculture exports) and to negotiate mutually acceptable solutions to poor countries' concerns about access to essential medicines.

Sixth, the United States should comprehensively revamp and expand its assistance efforts for the world's poorest nations. Lack of economic development is a root cause of social unrest and violence, so the United States and other rich countries need to recognize the overwhelming strategic benefits gleaned from supporting poor nations' economic development. Perhaps most crucially, the United States needs to provide more leadership and financing to provide debt relief and financial help for the world's poorest countries so that they can battle the disease epidemics of AIDS, malaria, and tuberculosis that are currently killing millions of poor people each year.

Concluding thoughts

The international economy has recently become characterized by unprecedented levels of interconnectedness in global production, communication, and transportation networks. Even prior to September 11, we were seeing how the linkages in those networks intertwine the fates of economies around the globe. In light of the unimaginable horror of the attacks of September 11, policymakers need to find ways to protect those networks amidst a climate of uncertainty and, in many instances, fear.

The consolidation and expansion of global networks requires ongoing policy attention both within and between borders. While policymakers will understandably focus on the international issues we have highlighted above, they must also continue to focus on the efforts to improve the underlying structures of their domestic economies. There can be little doubt that the continued development of economies around the world will play a pivotal role in reducing the anger and sense of fatalism that ferments terror and armed conflict. Moreover, even amidst the shock and horror we all feel in the aftermath of September 11, we must not forget or ignore the tremendous economic progress that has been made by dozens of countries in recent years, and that must be continued in order to reduce poverty and promote global living standards. To this end, we hope the information contained in this year's *Global Competitiveness Report* will prove useful for policymakers hoping to enhance continuously their economies' long-term capacity to support and promote the economic foundations of human well being. This is the only way to address security concerns successfully in the long run.

Table 1. Overall competitiveness rankings

| GROWTH COMPETITIVENESS INDEX RANKING | | | | CURRENT COMPETITIVENESS INDEX RANKING | | | |
|--------------------------------------|-------------------------------------|--|-------------------------------------|---------------------------------------|--------------------------------------|---|--------------------------------------|
| Country | Growth Competitiveness Ranking 2001 | Growth Competitiveness Ranking 2001 among GCR 2000 countries | Growth Competitiveness Ranking 2000 | Country | Current Competitiveness Ranking 2001 | Current Competitiveness Ranking 2001 among GCR 2000 countries | Current Competitiveness Ranking 2000 |
| Finland | 1 | 1 | 5 | Finland | 1 | 1 | 1 |
| United States | 2 | 2 | 1 | United States | 2 | 2 | 2 |
| Canada | 3 | 3 | 6 | Netherlands | 3 | 3 | 4 |
| Singapore | 4 | 4 | 2 | Germany | 4 | 4 | 3 |
| Australia | 5 | 5 | 11 | Switzerland | 5 | 5 | 5 |
| Norway | 6 | 6 | 15 | Sweden | 6 | 6 | 7 |
| Taiwan | 7 | 7 | 10 | United Kingdom | 7 | 7 | 8 |
| Netherlands | 8 | 8 | 3 | Denmark | 8 | 8 | 6 |
| Sweden | 9 | 9 | 12 | Australia | 9 | 9 | 10 |
| New Zealand | 10 | 10 | 19 | Singapore | 10 | 10 | 9 |
| Ireland | 11 | 11 | 4 | Canada | 11 | 11 | 11 |
| United Kingdom | 12 | 12 | 8 | France | 12 | 12 | 15 |
| Hong Kong SAR | 13 | 13 | 7 | Austria | 13 | 13 | 13 |
| Denmark | 14 | 14 | 13 | Belgium | 14 | 14 | 12 |
| Switzerland | 15 | 15 | 9 | Japan | 15 | 15 | 14 |
| Iceland | 16 | 16 | 23 | Iceland | 16 | 16 | 17 |
| Germany | 17 | 17 | 14 | Israel | 17 | 17 | 18 |
| Austria | 18 | 18 | 17 | Hong Kong SAR | 18 | 18 | 16 |
| Belgium | 19 | 19 | 16 | Norway | 19 | 19 | 20 |
| France | 20 | 20 | 21 | New Zealand | 20 | 20 | 19 |
| Japan | 21 | 21 | 20 | Taiwan | 21 | 21 | 21 |
| Spain | 22 | 22 | 26 | Ireland | 22 | 22 | 22 |
| Korea | 23 | 23 | 28 | Spain | 23 | 23 | 23 |
| Israel | 24 | 24 | 18 | Italy | 24 | 24 | 24 |
| Portugal | 25 | 25 | 22 | South Africa | 25 | 25 | 25 |
| Italy | 26 | 26 | 29 | Hungary | 26 | 26 | 32 |
| Chile | 27 | 27 | 27 | Estonia | 27 | — | — |
| Hungary | 28 | 28 | 25 | Korea | 28 | 27 | 27 |
| Estonia | 29 | — | — | Chile | 29 | 28 | 26 |
| Malaysia | 30 | 29 | 24 | Brazil | 30 | 29 | 31 |
| Slovenia | 31 | — | — | Portugal | 31 | 30 | 28 |
| Mauritius | 32 | 30 | 35 | Slovenia | 32 | — | — |
| Thailand | 33 | 31 | 30 | Turkey | 33 | 31 | 29 |
| South Africa | 34 | 32 | 32 | Trinidad and Tobago | 34 | — | — |
| Costa Rica | 35 | 33 | 37 | Czech Republic | 35 | 32 | 34 |
| Greece | 36 | 34 | 33 | India | 36 | 33 | 37 |
| Czech Republic | 37 | 35 | 31 | Malaysia | 37 | 34 | 30 |
| Trinidad and Tobago | 38 | — | — | Thailand | 38 | 35 | 40 |
| China | 39 | 36 | 40 | Slovak Republic | 39 | 36 | 36 |
| Slovak Republic | 40 | 37 | 38 | Jamaica | 40 | — | — |
| Poland | 41 | 38 | 34 | Poland | 41 | 37 | 41 |
| Mexico | 42 | 39 | 42 | Latvia | 42 | — | — |
| Lithuania | 43 | — | — | Greece | 43 | 38 | 33 |
| Brazil | 44 | 40 | 45 | Jordan | 44 | 39 | 35 |
| Jordan | 45 | 41 | 46 | Egypt | 45 | 40 | 39 |
| Uruguay | 46 | — | — | Uruguay | 46 | — | — |
| Latvia | 47 | — | — | China | 47 | 41 | 44 |
| Philippines | 48 | 42 | 36 | Panama | 48 | — | — |
| Argentina | 49 | 43 | 44 | Lithuania | 49 | — | — |
| Dominican Republic | 50 | — | — | Costa Rica | 50 | 42 | 43 |
| Egypt | 51 | 44 | 41 | Mexico | 51 | 43 | 42 |
| Jamaica | 52 | — | — | Mauritius | 52 | 44 | 38 |
| Panama | 53 | — | — | Argentina | 53 | 45 | 45 |
| Turkey | 54 | 45 | 39 | Philippines | 54 | 46 | 46 |
| Peru | 55 | 46 | 47 | Indonesia | 55 | 47 | 47 |
| Romania | 56 | — | — | Colombia | 56 | 48 | 48 |
| India | 57 | 47 | 48 | Sri Lanka | 57 | — | — |
| El Salvador | 58 | 48 | 49 | Russia | 58 | 49 | 52 |
| Bulgaria | 59 | 49 | 57 | Dominican Republic | 59 | — | — |
| Vietnam | 60 | 50 | 52 | Ukraine | 60 | 50 | 56 |
| Sri Lanka | 61 | — | — | Romania | 61 | — | — |
| Venezuela | 62 | 51 | 53 | Vietnam | 62 | 51 | 53 |
| Russia | 63 | 52 | 54 | Peru | 63 | 52 | 49 |
| Indonesia | 64 | 53 | 43 | El Salvador | 64 | 53 | 51 |
| Colombia | 65 | 54 | 51 | Zimbabwe | 65 | 54 | 50 |
| Guatemala | 66 | — | — | Venezuela | 66 | 55 | 54 |
| Bolivia | 67 | 55 | 50 | Nigeria | 67 | — | — |
| Ecuador | 68 | 56 | 58 | Bulgaria | 68 | 56 | 55 |
| Ukraine | 69 | 57 | 56 | Guatemala | 69 | — | — |
| Honduras | 70 | — | — | Paraguay | 70 | — | — |
| Bangladesh | 71 | — | — | Nicaragua | 71 | — | — |
| Paraguay | 72 | — | — | Ecuador | 72 | 57 | 57 |
| Nicaragua | 73 | — | — | Bangladesh | 73 | — | — |
| Nigeria | 74 | — | — | Honduras | 74 | — | — |
| Zimbabwe | 75 | 58 | 55 | Bolivia | 75 | 58 | 58 |

Executive Summary:

Competitiveness and Stages of Economic Development

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This year's *Global Competitiveness Report* appears in the aftermath of the September 11 terrorist attacks in the United States. Although this *Report* was already at the editor on that watershed date, we felt it important to supplement the medium-term (five-year) analysis that is contained in the annual *Report* with a separate, shorter-term analysis of the world economy, which is included in the new Introduction. The *Report's* underlying medium-term analysis is still relevant in the high likelihood that the world economy and the globalization process continue apace, despite the shock of this tragedy and the short-term uncertainties and dislocations created in its wake. Indeed, we regard the potential gains from globalization, if properly managed, as so vital to world welfare that we urge the international community to do all in its power to preserve the peaceful and deepening economic linkages around the world, and to best ensure that they serve to benefit all countries rich and poor.

The *Global Competitiveness Report* focuses on two distinct but complementary approaches to the analysis of economic competitiveness. The first, led by Professor Jeffrey D Sachs of the Center for International Development at Harvard University, focuses on global competitiveness as “the set of institutions and economic policies supportive of high rates of economic growth in the medium term.” Prior to 2000, the *Report* presented an overall index based on this approach that was known simply as the Competitiveness Index. Starting with the 2000 *Report*, this measure was relabeled the Growth Competitiveness Index, or GCI. Building on the foundations of theoretical and empirical macroeconomics, the GCI represents a best estimate of 75 economies' underlying prospects for growth over the coming five years. This year's *Report* assesses the growth prospects in 17 countries not previously covered, including Bangladesh, Nigeria, Romania, Slovenia, Sri Lanka, and the three Baltic countries, as well as nine economies in Latin America and the Caribbean.

The *Report's* second approach to competitiveness, led by Professor Michael E Porter of the Institute for Strategy and Competitiveness at the Harvard Business School, is embodied in the Current Competitiveness Index, or CCI, as first presented in last year's edition. The CCI uses microeconomic indicators to measure the “set of institutions, market structures, and economic policies supportive of high current levels of prosperity,” referring mainly to an economy's effective utilization of its current stock of resources. This Index thus assesses the current productive potential of the same 75 economies. Together the GCI and CCI present distinct yet highly complementary insights into sources of national competitiveness.

Both the GCI and CCI combine hard data and unique survey data to assess competitiveness in a large sample of countries. Central to both Indexes is the Executive Opinion Survey, conducted annually by the World Economic Forum. The Survey is indispensable to the *Report*, since no reliable hard data sources exist for many of the most important aspects of an economy such as the efficiency of government institutions, the sophistication of local supplier networks, or the nature of competitive practices. Even where hard data are available, the data often do not cover all the countries in our sample. The Executive Opinion Survey records the perspectives of business leaders around the world by asking them to compare aspects of their local business environment with global standards, this year including more than 4,600 respondents. The business leaders surveyed actually make many of the investment and policy decisions that drive economic growth and development, so by recording their perspectives we obtain an incomparable, up-to-date knowledge base concerning the current state of economic affairs in each of the 75 countries assessed.

Transitions in economic development

This year's *Global Competitiveness Report* emphasizes an increasingly important theme confronting many nations: Countries face very different challenges and priorities as they move from resource-based to knowledge-based economies.¹ As an economy develops, so do its structural bases of global competitiveness. At low levels of development, economic growth is determined primarily by the mobilization of primary factors of production: land, primary commodities, and unskilled labor. As economies move from low- to middle-income status, global competitiveness becomes Investment-Driven, as economic growth is increasingly achieved by harnessing global technologies to local production. Foreign direct investment, joint ventures, and outsourcing arrangements help to integrate the national economy into international production systems, thereby facilitating the improvement of technologies and the inflows of foreign capital and technologies that support economic growth. In most economies, the evolution from middle-income to high-income status involves the transition from a technology-importing economy to a technology-generating economy, one that innovates in at least some sectors at the global technological frontier. For high-income economies at this Innovation-Driven stage of economic development, global competitiveness is critically linked to high rates of social learning (especially science-based learning) and the rapid ability to shift to new technologies.

The principal factors that contribute to global competitiveness, and thereby improve living standards, will therefore differ for economies at different levels of development. For some low-income economies, the main challenge is to get the basic factor markets—for land, labor, and capital—working properly. As countries advance, the basic challenge is to make connections with international production systems by attracting sufficient flows of FDI. Once reaching high-income status, the basic challenge facing countries is typically to generate high rates of innovation and commercialization of new technologies. The critical institutions in a country, and its barriers to continued growth, will therefore differ depending on that country's current position.

Successful economic development is thus a process of successive upgrading, in which businesses and their supporting environments co-evolve, to foster increasingly sophisticated ways of producing and competing. Seeing economic development as a sequential process of building not just macroeconomic stability but also interdependent factors such as quality of governance, societal capacity to advance its technological capability, more advanced modes of competition, and evolving forms of firm organizational structure, helps to expose important potential pitfalls in economic policy. To evolve successfully through different levels of development, key parts of the economic environment must change at appropriate times. Lack of improvement in any important area can lead to a plateau in productivity and stalled economic growth.

At low levels of development, government's main job is to provide overall political and macroeconomic stability and sufficiently free markets to permit the effective utilization of primary commodities and unskilled labor both by indigenous firms and through attracting foreign investment. Firms produce commodities or relatively simple products of long-standardized technology designed in other more advanced countries. Technology is assimilated through imports, foreign direct investment, and imitation. In this stage, companies compete on price and often lack direct access to consumers. They have limited roles in the value chain, focused on assembly, labor-intensive manufacturing, and resource extraction. A Factor-Driven economy is highly sensitive to world economic cycles, commodity price trends, and exchange rate fluctuations.

As development proceeds, government priorities need to focus increasingly on improvements in physical infrastructure (ports, telecommunications, roads) and regulatory arrangements (customs, taxation, company law) to allow the economy to integrate more fully with global markets. In this Investment-Driven phase, efficiency in producing standard products and services becomes a dominant source of global competitiveness. The products and services produced become more sophisticated, but technology and designs still largely come from abroad. Technology is accessed through licensing, joint ventures, foreign direct investment, and imitation. Nations in this stage not only assimilate foreign technology, however, but they also develop the capacity to improve on it. The national business environment supports investment in efficient infrastructure and modern production methods. Companies often produce under contract to foreign original equipment manufacturers (OEM), which control design and marketing. Gradually, companies extend capabilities more widely in the value chain. An Investment-Driven economy is concentrated on manufacturing and on outsourced service exports. It is susceptible to financial crises since it relies heavily on foreign capital flows, as well as external sector-specific demand shocks.

Perhaps the hardest transition is from technology-importing, efficiency-based development to innovation-based development. This requires a direct government role in fostering a high rate of innovation, through public as well as private investments in research and development, higher education, and improved capital markets and regulatory systems that support the start-up of high-technology enterprises. At this innovation stage, enterprises themselves become less hierarchical, with much more delegation of authority to sub-units within the enterprise. Buyers and suppliers and corporate sub-units are often linked together in flexible networking arrangements that facilitate innovations and rapid shifts in the division of labor within the organization. Firms invest heavily in the continual training and upgrading of their workforce. Compensation systems involve incentive payment schemes linked to the productivity of different parts of the enterprise. In the same way, the firms within an industry also become much more interactive, with deep industrial clusters characterized by a sophisticated division of labor, increasing flows of workers between enterprises, and a mix of fierce competition and cooperation among enterprises within an industry. Companies compete with unique strategies that are often global in scope. Such characteristics have been noted in American high-tech regions such as Silicon Valley, Route 128 in Boston, and the Research Triangle of North Carolina.

It is our hypothesis that many of the failures in economic development in recent years involve countries getting stuck at critical junctures of economic transition: Between Factor-Driven and Investment-Driven or between Investment-Driven and Innovation-Driven stages. For example, some countries successfully master the initial phase of Factor-Driven growth, but then fail to make the transition to technology imports and globalized production systems. Others effectively reach the investment phase of development, but then fail to progress to homegrown innovation. These transition points are indeed difficult to manage from both a macroeconomic and microeconomic perspective. The shift from one phase of development to the next often requires new ways of organizing governments, markets, and enterprises, so it is not altogether surprising therefore that many countries fail at making the appropriate transitions, or even fail to recognize that such a transition is needed. The transition from primary commodities to increased utilization of imported technologies to innovation requires changes in government priorities and spending patterns as well as in the internal structure and aims of business enterprises. Shifts in both macroeconomic policy and microeconomic business structure are necessary. Ironically, old strategies become the new weaknesses. A highly opportunistic corporate approach that worked well serving disparate OEM customers, for example, becomes a liability in making the long-term commitments required for advanced production processes and pursuing true innovations.

This framework helps to highlight why some countries enjoy significant economic progress for a period and then appear to stall in their development. When economies reach transition points, they require wholesale transformation of many interdependent dimensions. Successful Investment-Driven economies such as Taiwan and Singapore, for example, are finding that their reliance on sustained infrastructure investments, OEM manufacturing for multinationals, and government guidance of the economy to boost efficiency are insufficient to support very high levels of prosperity. Their current level of wages and domestic costs makes them vulnerable to competition from lower-wage countries such as China. Likewise Ireland, which has been tremendously successful in attracting foreign investment for manufacturing, now faces the need to justify higher wages and higher local costs without yet having developed a world-class innovative structure. In a more severe example, Argentina has become caught in the early Investment-Driven stage of development where it still has to compete on price, but its overvalued exchange rate and lack of technological sophistication and scientific innovative capacity are combining to keep the economy in crisis. The challenge for all these economies is to move to an Innovation-Driven economy with world-class technological capacities

and the presence of deep clusters. To do so, companies need to move to new types of strategies, investment priorities must change, higher education must take on even greater importance, and government's role in the economy needs to shift.

One of the principal goals of the *Global Competitiveness Report* is to identify the policy challenges that face governments at various levels of development. As suggested earlier, some tasks are common to all governments: macroeconomic stability, provision of basic medical and health care, openness of the economy, and a competitive exchange rate that supports export growth. Some tasks are critical for countries attempting to move beyond a traditional primary commodity base: improvements of infrastructure, universal secondary education, improved technical education, and flexibility of labor markets. Finally, special tasks are required for countries attempting to move from technology-using to technology-innovating economies: for example, a venture capital sector as well as other improved financial and legal arrangements for new startups, increased government spending on R&D, and improved legal tools for intellectual property rights. Reflecting their complementary perspectives, the Growth Competitiveness Index and Current Competitiveness Index aim to shed light on the respective macro and micro priorities at various phases of economic development.

The Growth Competitiveness Index

Building on the latest developments in economic growth research, as well as the results from recent years' *Global Competitiveness Reports*, the Growth Competitiveness Index methodology has been updated since last year to provide a ranking of the underlying potential for medium-term (five years) growth that better accounts for the widely varying levels of development of the included countries. As outlined in detail in Chapter 1.1 by John W McArthur and Jeffrey D Sachs, the GCI divides the *Report's* sample of 75 countries into two main groups based on their level of technological capacity. Using patenting as a measure of innovative capacity, the Growth Competitiveness chapter identifies the 21 Innovation-Driven economies in the world today, for which it uses the shorthand term *core* economies (a term with no moral judgments intended, simply a statement about innovation as the source of growth!). It then attempts to identify the specific factors in technological advancement among these core economies. At the same time, the GCI includes an entirely separate measure of technological advancement for the non-innovating (or *non-core*) economies, one that puts more weight on technological diffusion as these economies absorb and adapt production practices developed mainly by the innovating economies.

The GCI not only incorporates the differing forms of technological advancement that are linked to growth in the core and non-core economies, but also stresses the differing importance of technological advancement for these two groups of economies. The GCI is comprised of three subindexes: the level of technology in an economy, the quality of public institutions, and the macroeconomic conditions related to growth. Among the world's core economies, statistical evidence indicates that innovation plays a dominant role in medium-term economic growth. For these economies, the GCI thus places a weight of 1/2 on the technology index against weights of 1/4 each on public institutions and macroeconomic environment. Among the non-core economies, technological advancement, measured largely by the economies' performance in skill-based manufacturing exports, appears to play a more limited role relative to the other two factors. Thus, the GCI places a weight of 1/3 on each component index when calculating overall scores for the non-innovating economies. For the three economies that appear to be at the cusp of innovation-driven growth—Hong Kong SAR, Ireland, and Singapore—GCI values are calculated as an average of those economies' scores using the core and non-core formulas.

The new GCI results are listed in Table 1, which shows this year's overall rankings as well as the change in rankings among only those countries included in this and last year's *Reports*. Finland, for the first time, ranks first in the world, indicating that it now has the best prospects for growth over the next five years. This country's remarkable turnaround over the past decade serves as evidence of how quickly an economy's prospects can be transformed by strong political institutions, a focus on technology, and sound macroeconomic management. The United States ranks second. Although the United States is currently at risk of a recession, it is still far and away the world's technological leader and engine of economic growth in the medium term. Canada, the sixth-ranked economy in the 2000 GCI, rounds out the top three places, having moved up in the growth rankings mainly due to this year's weight accorded to tertiary education as a key factor in technological innovation. Australia and New Zealand, two other countries with strong measures of university-educated human capital, have jumped significantly in the growth rankings from 11th to 5th and 19th to 10th spots, respectively. Notably, and reflecting their looming challenges in making the transition from investment-based to innovation-based growth, Singapore has dropped from 2nd to 4th place, Ireland has dropped from 4th to 11th, and Hong Kong SAR has shifted from 7th to 13th. Meanwhile, Japan's ongoing economic stagnation is reflected in its continuing low position at 21st, down one slot from last year.

Other notable GCI results include the strong growth prospects of new entries Estonia, at 29th, and Slovenia, at 31st. Estonia's ranking is well ahead of the results for Baltic neighbors Lithuania (43) and Latvia (47). Results lower down the list are generally more stable, with the important exceptions of Turkey, which dropped six spots compared with last year, and Indonesia, which tumbled 10 places. Of additional importance are the newly included Latin American economies, most of which scored in the lower quintile of the growth rankings, frequently reflecting their difficulty in emerging from a Factor-Driven to an Investment-oriented stage of development. Brazil, nonetheless, has moved up five spots, ranking 44th in the expanded sample, while Chile holds steady in 27th. Other relatively bright spots in Latin America include new entrants Uruguay at 46th and the Dominican Republic at 50th.

Bangladesh and Nigeria, the two poorest economies in our sample, are included in this year's *Report* for the first time ever and, perhaps not surprisingly, rank near the very bottom of the GCI scale. This should not, however, be taken as a sign of pessimism about these economies. Indeed, the avid willingness of business people in those economies to participate in the Executive Survey reflected a remarkable interest in policy dialogue and subsequent economic transformation. As this *Report's* chapter on Growth Competitiveness also outlines, both Bangladesh and Nigeria have a tremendous opportunity for what economists call "catch-up" growth if those countries are able to continue to enhance their political and technological capacities under the auspices of stable macroeconomics.

The GCI's component indexes on technology, public institutions, and macroeconomic environment are reported within the same chapter and are presented here in Table 2. Careful assessment of these indexes and the variables they comprise reveals many of the relative strengths and weaknesses to growth within each economy. China and Korea provide two very brief examples. China ranks 6th on the macroeconomic environment index, but only 50th on the measure of public institutions and 53rd on the technology index, yielding an overall GCI ranking in 39th place. Korea, on the other hand, ranks 9th in technology and 8th for its macroeconomic environment, but 44th for its public institutions, producing a 23rd place score overall. Underlying these indexes are numerous subindexes that can be investigated in some detail, thereby providing policymakers and business leaders reading this *Report* with valuable information regarding how best to advance their economies' growth prospects.

Table 2. Rankings of growth competitiveness component indexes

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

The Current Competitiveness Index

Whereas the Growth Competitiveness Index strives to estimate the underlying conditions for growth over the coming five years, the Current Competitiveness Index (CCI) evaluates the underlying conditions defining the *current* level of productivity in each of the 75 economies covered. Using a microeconomic approach focusing on the detailed conditions that support a high level of sustainable productivity, measured by GDP per capita, the CCI aims to move beyond the examination of broad, aggregate variables characteristic of most economic growth models. Using common factor analysis, the Current Competitiveness Index (CCI) is an aggregate measure of microeconomic competitiveness. This chapter also reports two subindexes, one focusing on company sophistication and the other on quality of the national business environment drawing on a complex array of variables with a demonstrated statistical relationship to GDP per capita.

This year's CCI rankings are shown in Table 1, while subrankings on the sophistication of company operating practices in each country and the quality of the business environment are presented in Table 3. For the second year, Finland edges out the United States to achieve the number one ranking. Advanced nations improving their current competitiveness ranking in 2001 include the Netherlands, Sweden, Australia, Austria, France, and Iceland. Advanced countries that experienced a decline in the rankings in 2001 include Germany, Denmark, and Belgium in Europe; and Singapore, Japan, and Hong Kong SAR in Asia. Developing nations that improved their current competitiveness rankings on a comparable sample basis include Hungary, India, Thailand, Poland, China, Russia, and Ukraine. Developing countries whose position has fallen include Chile, Malaysia, Turkey, the Czech Republic, Greece, Jordan, Mauritius, and Peru. As important as the overall ranking, however, is the subrankings and specific strengths and weaknesses presented in the *Report*. Taken together, they provide a concrete set of priorities for national action.

Table 3: Rankings on current competitiveness component indexes

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

The CCI measures the level of GDP per capita that is sustainable in the long term. However, in the short and medium run, nations can over- or underperform their microeconomic fundamentals because of surges of inbound FDI, natural resource windfalls, and the like. The chapter compares a country's *expected* GDP per capita, given its current microeconomic competitiveness, with its actual GDP per capita. A positive gap signals upside potential, while a negative gap indicates vulnerability. Finland leads the advanced countries in upside potential, which is consistent with its high GCI ranking. Finland's stunning turnaround in microeconomic competitiveness is still far from being fully realized in terms of reported prosperity. Conversely, Norway, Iceland, and Ireland all continue to enjoy a level of prosperity that exceeds their microeconomic fundamentals. This suggests a challenge for these countries in maintaining their current success. To a lesser extent this is also true for the United States and Canada.

Turkey, Brazil, and South Africa are among the middle-income countries that should be able to support a higher GDP per but are currently underperforming for various reasons. The converse is true for Greece, Argentina, Russia, and Slovenia, which are among a group of countries whose levels of income will be unsustainable without substantial microeconomic reform. India heads the list of low-income countries with upside potential that could be unlocked by governmental and political reform.

Our findings make it clear that micro reforms must go beyond reducing the role of government and abolishing market distortions. Government also has a range of positive roles that are fundamental to prosperity—such as investing in specialized human resources, building innovative capacity, facilitating cluster development, and stimulating advanced demand via regulatory standards. Many nations need to move beyond first stage micro reforms and address these agendas.

In keeping with the overall theme of this year's *Report*, our results highlight the need to set a nation's economic priorities to be consistent with its level of development. Especially challenging are the difficult transitions between competitive stages. At the Factor-Driven stage, our findings suggest the core challenge for firms is to increase their efficiency, for example, by improving production process sophistication and beginning to delegate authority. Improving transportation and communications infrastructure, upgrading public education and the training of management, liberalizing trade, and reducing corruption are essential. These steps create a foundation of efficiency, transparency, and competitive pressure necessary to improve the productivity of Factor-Driven competition.

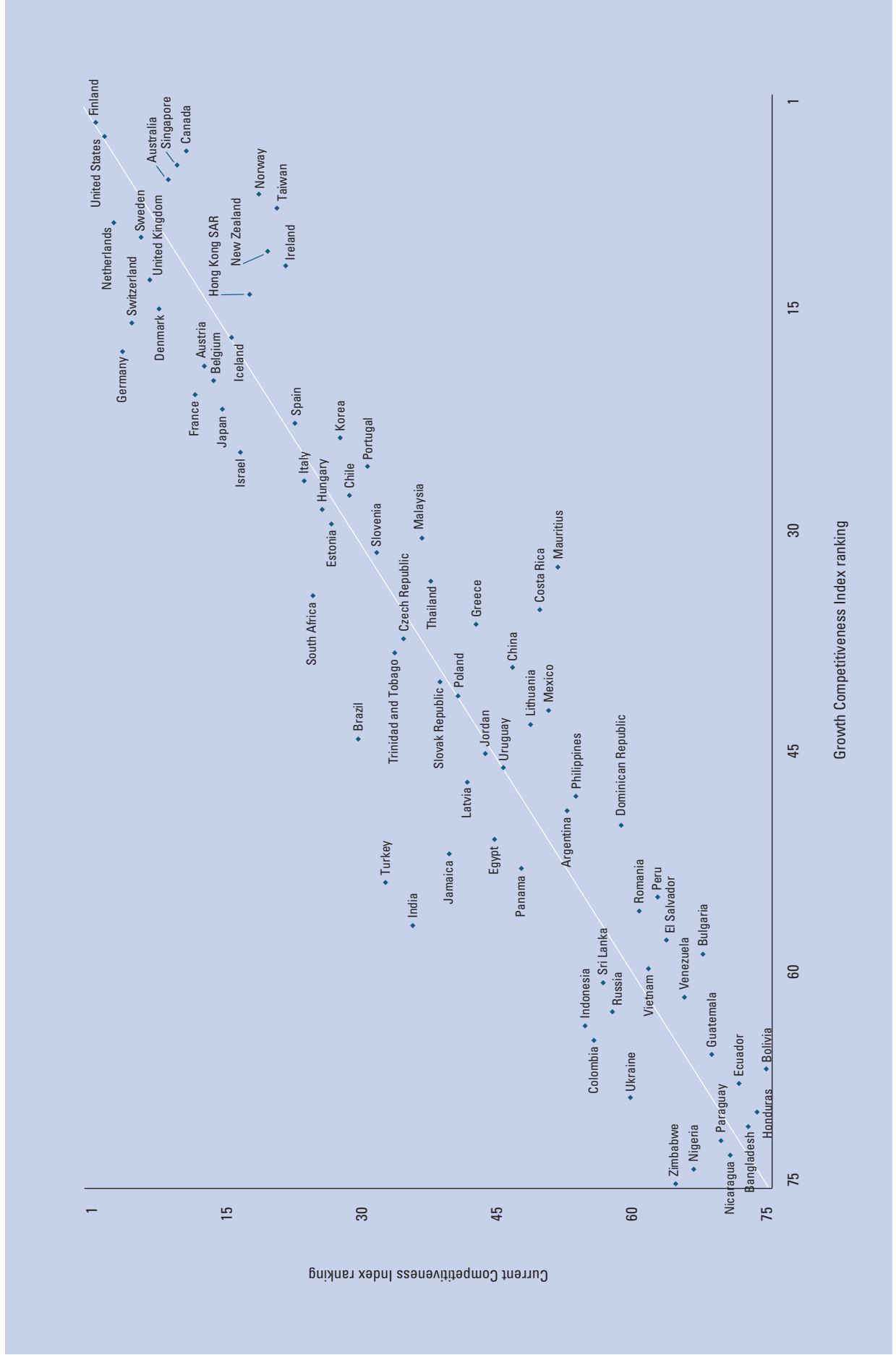
To move into middle income, the challenge is to make the transition to the Investment-Driven stage. The Investment-Driven stage depends on a high rate of investment in products, processes, and the acquisition of technology. Corporate priorities expand to include, for example, in-house product development, licensing the best foreign technology, connecting to foreign markets, and developing the capacity to improve technology. Among other things, reducing bureaucratic red tape and enhancing the legal system become important to enhance business efficiency, while local financial markets become much more necessary to mobilize debt and equity capital.

To reach high-income status, incremental improvements in quality and efficiency are no longer enough. To reach the Innovation-Driven stage, companies must innovate at the world technology frontier, develop unique product designs, sell globally, and create more decentralized and flexible organizational structures. Truly world-class research institutions must emerge, along with strong research collaboration with universities, venture capital availability, truly sophisticated demand conditions, and intense local competition.

The CCI and the GCI measure different but complementary dimensions of competitiveness. Figure 1 compares the two rankings for 2001 and reveals that they are highly correlated. Finland ranks first on both Indexes, while the United States ranks second. However, there are divergences in rankings that are potentially revealing about country economic prospects. Of the high-income countries, for instance, Norway and Ireland rank 10 or more positions higher on growth competitiveness than they do on current competitiveness. Significant micro reform will be a central challenge in these countries. Conversely, Germany and Switzerland rank 10 or more positions worse on growth competitiveness than they do on current competitiveness. Creating the vitality and assets required for growth looms as the fundamental challenge in already highly productive economies.

Of the medium-income countries, Mauritius, Costa Rica, Taiwan, and New Zealand rank significantly better on growth competitiveness than on current competitiveness. Turkey and Brazil, on the other hand, rank worse on growth competitiveness than on current competitiveness. Creating more dynamism and the capacity for change are the challenge for these countries. Of the low-income countries, Bulgaria, Bolivia, and the Dominican Republic are among the countries with higher ranks on growth competitiveness than on current competitiveness. India, Jamaica, Indonesia, Colombia, Ukraine, and Zimbabwe are facing lower growth prospects that lag their ranking on current competitiveness.

Figure 1: Growth and Current Competitiveness Index rankings



Structure of the Report

Just as the *Report* includes two distinct perspectives on competitiveness, it includes chapters on a range of other central issues relating to competitiveness and economic performance. In each case, authors have taken advantage of the Executive Opinion Survey's to inform their own research.

The chapter by Daniel Esty of Yale University and Michael E Porter on "Measuring National Environmental Regulation and Performance," explores the differences among countries in environmental performance and their link between environmental outcomes and national environmental policy choices. The chapter also explores the crucial question of whether environmental quality must come at the expense of competitiveness and economic development, as traditional economic theory has suggested. The findings are revealing: environmental performance varies systematically with the quality of a country's environmental regulatory regime. The statistical findings are then used to construct an index that ranks countries in terms of the quality of their environmental regulations. The research reveals that there is no evidence that higher environmental quality compromises economic progress. Environmental performance is positively and highly correlated to GDP per capita. The chapter presents preliminary evidence suggesting that countries with stricter environmental regulation than would be expected at their level of GDP per capita enjoy faster economic growth.

The chapter on "National Innovative Capacity" by Porter and Scott Stern of Northwestern University delves in detail into the conditions that allow a country to innovate at the global technology frontier. The findings reveal the striking degree to which the national circumstances actually explain differences across countries in innovative activity measured by US patenting. The statistical findings allow the construction of an overall innovative capacity ranking of the 75 countries, as well as comparisons across countries in important components of innovative capacity including availability of scientific and technical personnel, innovation-related policy choices, cluster vitality, and the quality of linkage mechanisms between basic research and the private sector.

The next chapter presents an update on "Economic Creativity" by Andrew M Warner of the Center for International Development at Harvard University. The concept of economic creativity was central to last year's overall Growth Competitiveness Index and moreover provided a methodological breakthrough that stimulated much of our research over the past year on how to quantify the distinct effects of innovation versus diffusion as contributors to economic growth.

The fourth chapter of Part 2 provides a new framework for assessing national trade performance at the sectoral level, as constructed by Cornelius along with International Trade Centre economists Friedrich von Kirchbach, Mondher Mimouni, Jean-Michel Pasteels, and Shilpa Phadke. Taking advantage of sophisticated United Nations data on the trade flows of all 75 GCR countries over the past five years, the authors are able to assess how countries' individual industries are performing compared with the same industries in other countries. They furthermore compare the future prospects for those industries, based on a range of factors that includes the current global demand trends for those industries.

In the next chapter of Part 2, Peter Cornelius and Yong Zhang of the World Economic Forum review recent developments in European labor markets and the context for ongoing structural reform in this area. Using questions from the Executive Opinion Survey, they then create a measure of labor market flexibility to compare countries across the European Union. The authors discuss how labor market restrictions have become an impediment to growth in the European Union, particularly since exchange rates have been removed as a macroeconomic adjustment mechanism.

The chapter on labor markets is followed by an update in which Warner joins Cornelius to assess the performance of the euro as of early 2001. Here the authors find some interesting shifts in European executives' assessment of the euro's prospects for stability.

Finally, Part 2 concludes with a review of the Executive Opinion Survey by Cornelius and McArthur, including a brief description of our surveying methodology, several descriptive statistics of our Survey sample, and a few key tests of the consistency and accuracy of the Survey results.

The third and final section of this *Report* is broken into two parts, country profiles and data tables. In the country profiles, we outline some key advantages and disadvantages drawn from the variables and methodologies used in constructing the Growth Competitiveness Index and the Current Competitiveness Index. We also include numerous strengths and weaknesses of each economy that are not directly included in the respective Indexes but might nonetheless be of interest to the reader. In the accompanying data tables, results are listed by country for most variables covered in the *Report*. These tables provide easy reference for the reader who wishes to look at each variable in detail. The data also provide a wealth of information for policymakers and business leaders who wish to compare their economies to others across a range of dimensions. For researchers and data enthusiasts hoping to gain a much deeper level of knowledge from the *Report's* underlying data, a full electronic version of the Survey data is available as an accompaniment to this *Report*.

Notes

- ⁱ We explored the stages of national competitive development in Michael E Porter, *The Competitive Advantage of Nations*. New York: The Free Press; London: Macmillan Press, 1990.

The Competitiveness Indexes

Part 1

The Growth Competitiveness Index: Measuring Technological Advancement and the Stages of Development

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A central objective of the *Global Competitiveness Report* is to assess the capacity of the world's economies to achieve sustained economic growth. We do this by analyzing the extent to which individual national economies have the structures, institutions, and policies in place for economic growth over the medium term, roughly a perspective of five years. These structural, institutional, and policy features of national economies are summarized in the Growth Competitiveness Index (GCI). We do not try to predict short-term business cycles, though we discuss short-term issues, especially as they affect the longer-term prospects for economic growth.

Economists' knowledge of the processes and policies that underpin economic growth has advanced tremendously over the past decade. With the increasing availability of cross-country macroeconomic data, the rapid evolution in theoretical and statistical methods, and the increasing sophistication of survey tools—including the Executive Opinion Survey that is conducted annually in preparation of this *Report*—economists have vastly increased their ability to test theories of economic growth. At least some of the ideological battles of the past are receding in the face of improved evidence.¹

Of course, our knowledge remains imperfect. We do not know the exact mechanisms through which growth occurs, nor are we able to forecast future growth rates with absolute precision. Economic crises sometimes emerge somewhat out of the blue, as with Japan's decade long recession and the East Asian crisis in 1997. Research into the subject of economic growth is ongoing, and thus our understanding of the relevant technological, institutional, geographical, and societal factors improves with every year that passes. As a result, we are constantly updating the framework used in the Growth Competitiveness Index. This year's GCI is no exception.

This chapter on growth competitiveness contains two distinct sections. The first provides an outline of current knowledge concerning economic growth and the results for this year's GCI. The second proceeds in greater detail, describing the new GCI methodology and logic used in the construction of this year's Index.

ECONOMIC GROWTH AND GROWTH COMPETITIVENESS: THE FUNDAMENTALS

An overview of economic growth

Economists have identified three inter-related mechanisms involved in economic growth. The first is the efficient allocation of resources, based on market competition and a sophisticated division of labor. Adam Smith identified this factor already in 1776, and observed that international trade plays an enormously important role in achieving an efficient division of labor. The second mechanism is capital accumulation. When national saving is converted into increasing capital per worker, the output per worker also tends to rise. Economists have come to appreciate that productive capital includes not just the plant and equipment of business sector, but also the human capital that results from investments in education, health, and on-the-job training. The third mechanism in economic growth is technological advance. Improvements in technology (both new goods and better ways of producing goods) can be achieved by creating a truly new technology, or by adopting (and adapting) a technology that has been developed abroad. The first process is called *technological innovation*; the second, *technological diffusion*.

All three mechanisms—division of labor, capital accumulation, and technological advance—are important, but technological advance is probably the most fundamental of the three in modern history. Without technological advance, the benefits of an improved division of labor, or a higher rate of capital accumulation, push the economy to a higher standard of living but not to continuously high economic growth. For example, as capital is accumulated, the rate of return on new investment tends to fall over time unless the capital accumulation is accompanied by technological change, which creates new profitable investment opportunities. Thus, the Soviet Union accumulated capital at a high rate, but because civilian technology was nearly moribund, the rate of return to new investments fell to close to 0 by the 1980s, contributing to the collapse of the system.

Technological advance, on the other hand, has been self-perpetuating in the high-income countries. Each new technological innovation triggers yet further innovation, in a kind of chain reaction that fuels long-term economic growth. Thus, in the science-based, technologically advanced economies, economic growth has continued for nearly two centuries without running out of dynamism, or even slowing down.

There are, of course, volumes to be written about how the structural characteristics and economic policies of each economy affect economic growth. The division of labor is affected by trade policies, state versus private ownership, the legal system, and so forth. Capital accumulation is affected by the confidence in property rights, the rates

of taxation, the faith in the judicial system, and the extent of macroeconomic stability or instability. Technological diffusion and innovation are affected by intellectual property rights, the size of the potential market for a new invention, government support for scientific research, the state of the higher education, and many other factors.

Economists have increasingly returned to another idea of Adam Smith's as well: that physical geography plays an important role in determining economic growth. When a poorer economy is close to a richer economy, the poorer neighbor can often benefit by absorbing technologies and capital from the richer neighbor. Economic growth then spreads "within the neighborhood" of the richer economy. A more distant economy, by contrast, may be less able to benefit from capital inflows and technological diffusion. Climatic factors can also affect long-term development, because of the effects of climate on disease, food productivity, and other sectors of the economy.

By virtue of their distinctive histories, geography, and social conditions, countries are at widely varying levels of income, technological sophistication, capacity to innovate, and overall capacity to achieve sustained economic growth. But perhaps the most significant global division today from the view of long-term economic growth is the one between countries that are able to achieve technological innovation at a high rate and those that are not. The main innovators in the world, as measured, for example, by the rate at which they patent new products and processes, are few in number. The United States and Canada, Western Europe, Japan, and a handful of other economies (Israel, Korea, Singapore, and Taiwan) account for the vast bulk of new patents each year. In 2000, these countries accounted for barely 15 percent of the world's population, but fully 99 percent of the patents issued for new inventions by the US Patent Office.

The world's technological divide was first incorporated into the growth competitiveness framework in last year's *Report* when our colleague Andrew Warner constructed the economic creativity index to distinguish empirically between growth stimulated by innovation and growth fueled by technology transfer. (An update on economic creativity by Dr Warner is included in Chapter 2.3 of this *Report*. Another chapter on innovation by Michael E Porter and Scott Stern appears as Chapter 2.2.) This year we build on the distinction between innovation and technology transfer by using the term *core economy* for a country that is a technological innovator; all the rest are said to be *non-core economies*. This classification system allows us to distinguish statistically how various factors affect growth at different stages of development. (The methodology section in the second half of this chapter describes exactly how this framework applies to our growth competitiveness calculations.) As an empirical matter, we define the core group as all economies that achieve

at least 15 patents per million population. The economies meeting this core criterion in 2000 are listed in Box 1. The core economies are, typically, the richest countries and typically have achieved sustained economic growth over the course of many years, indeed decades. Their economic growth is powered, fundamentally, by their capacity to innovate. The competition among the core economies is closely related to their relative capacities to innovate and to win new global markets for their technologically advanced products.

Box 1: Core innovators as of 2000

Countries with more than 15 US utility patents registered per million population in 2000.

| | | |
|-----------|---------------|----------------|
| Australia | Hong Kong SAR | New Zealand |
| Austria | Iceland | Norway |
| Belgium | Ireland | Singapore |
| Canada | Israel | Sweden |
| Denmark | Italy | Switzerland |
| Finland | Japan | Taiwan |
| France | Korea | United Kingdom |
| Germany | Netherlands | United States |

We certainly don't want to be misunderstood by our use of terms. The use of *core* and *non-core* is not meant as a value judgment in any way, nor as a slight or insult to the non-innovating regions. It is meant only as a useful shorthand to describe the critical division in today's world economy between the innovating and non-innovating economies. The economic dynamics have been very different in these two groups of countries, and we highlight those differences in this *Report*. We also hope that the description will help more countries to develop the means for higher rates of technological innovation within their own economies.

The non-core economies often achieve very high rates of growth, indeed the world's very highest rates, by rapidly absorbing the advanced technologies and capital of the core economies. This process of "catch-up growth" has been extremely important for many developing countries. But we should highlight the fact that catch-up growth has its inherent limits. As a non-core economy narrows the income gap with the technological leaders, its ability to narrow the gap still further tends to diminish, or even disappear. In order to close the income gap fully, the non-core economy must become a technological innovator—in other words, it must become part of the core economy itself.

Globalization has generated new opportunities for countries, but also new challenges. By raising the mobility of financial capital, skilled workers, and new technologies, economies now have the capacity to grow at super-charged annual rates if they can become attractive magnets for investment and technological diffusion. But at the same time, globalization punishes the laggard economies far more harshly than in the past. When the business environment is poor, skilled workers and capital simply "pack up their bags" and leave for a more promising location. Thus, lawless governments impose a particularly high economic cost on their countries. Unfortunately, some of the losers today are suffering not for their sins, but for their poor geographical inheritance. Some distant locations (such as landlocked countries in Latin American, Africa, and Asia) are experiencing high rates of brain drain and capital outflow because their remoteness raises transport costs and diminishes the incentives for investment. Even here, however, investments in infrastructure (such as better roads and airports, and better Internet connectivity) can compensate for some of the inherent difficulties.

The most successful of the non-core economies in recent years have achieved fast growth by attracting high levels of foreign direct investment (FDI) from the high-tech multinational firms of the core economies. This FDI brings with it new technology, capital, export markets, and organizational know-how, all in one process. Thus, China, Singapore, Hong Kong, and more recently Ireland, Mexico, and Poland, have all achieved FDI-led growth at very rapid rates. Much of this FDI has been export oriented. The multinational firm has invested in these non-core economies not so much for the local market (though that can be important) but rather because it sees the economy as an export platform for the world market. Thus, the regions that have benefited most from this kind of FDI are those that have good access to global shipping lanes (eg, coastal regions) or land proximity to major markets (Mexico, Poland).

The boundaries between core and non-core economies are clearly not rigid. A technologically laggard country can become an innovator, but the breakthrough from non-core to core economy is not a simple one, and most places in the world have not accomplished the transition. That is, of course, why the group of core economies remains so small as a share of the world's population. Yet countries such as Iceland, Ireland, Hong Kong SAR, Korea, Singapore, and Taiwan have all achieved a breakthrough in innovative capacity, and have thereby become part of the "core" of the world economy (see Table 1). They are all growing rapidly based largely on their technological prowess. One of our goals in this *Report* is to identify some of the key factors that allow an economy to

Table 1: Core technology-innovating economies in the 1980s and in 2000

| country | Average Annual US Utility Patents Granted per Million Population in 1980s* | 1980s rank | US Utility Patents Granted per Million Population in 2000* | 2000 rank |
|---|--|------------|--|-----------|
| 1980s Core technology innovators | | | | |
| Switzerland | 189.6 | 1 | 182.1 | 4 |
| United States | 165.8 | 2 | 308.7 | 1 |
| Japan | 101.2 | 3 | 246.6 | 2 |
| Sweden | 94.3 | 4 | 177.2 | 5 |
| Germany | 85.1 | 5 | 123.6 | 7 |
| Netherlands | 51.9 | 6 | 78.1 | 11 |
| Canada | 50.3 | 7 | 111.2 | 9 |
| United Kingdom | 43.2 | 8 | 60.6 | 16 |
| France | 43.0 | 9 | 64.4 | 14 |
| Israel | 42.1 | 10 | 135.0 | 6 |
| Austria | 40.3 | 11 | 62.1 | 15 |
| Finland | 37.0 | 12 | 119.4 | 8 |
| Denmark | 31.7 | 13 | 82.3 | 10 |
| Belgium | 26.4 | 14 | 67.8 | 13 |
| Norway | 22.6 | 15 | 55.1 | 18 |
| Australia | 21.4 | 16 | 36.7 | 20 |
| Italy | 16.4 | 17 | 29.7 | 22 |
| New Zealand | 15.2 | 18 | 28.0 | 23 |
| 1980s Non-core economies that became core innovators by 2000 | | | | |
| Taiwan | 12.8 | 19 | 210.3 | 3 |
| Iceland | 9.0 | 21 | 61.6 | 17 |
| Ireland | 8.8 | 22 | 32.4 | 21 |
| Hong Kong SAR | 5.4 | 23 | 26.3 | 24 |
| Singapore | 2.4 | 26 | 54.3 | 19 |
| Korea | 1.3 | 28 | 70.1 | 12 |

*Note that Luxembourg averaged 71.7 US patents per million population in the 1980s and achieved 91.8 per million population in 2000 but is not included in our analysis.

become an innovator, in order to help more countries achieve the transition to innovation. These factors include: sizeable investments in higher education, a good information technology base, high levels of government spending on research and development, and effective intellectual property laws that promote research and development.

Another objective of this *Report* is to estimate as accurately as possible the different roles of technology at different stages of development. Each country's specific challenges posed by globalization depend importantly on its stage of economic and technological development. A very poor country with rudimentary levels of health and education will generally not be competing on the basis of technological innovation. Rather, the goal for that country will be to attract capital investment and discourage capital flight, and to use the proceeds of economic growth to invest in improved health, education, and infrastructure. For a country somewhat higher up the development ladder, the main goal is likely to be to speed up the process

of technological diffusion into the country, in part by attracting high-tech foreign direct investments. For the most advanced of the non-core economies, the goal is likely to be the transition from technological diffusion to technological innovation—in other words, the transition from being a non-core economy to being a core economy. Among the most advanced countries, the main competition is in high-tech markets. Success in high-tech innovation depends on scientific prowess, the translation of science into technology, and the commercialization of that technology, often through start-up businesses.

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. For the core countries, for example, the weight accorded to technological indicators (relative to other factors) should be higher than for non-core economies. Similarly, the importance of innovation relative to diffusion is higher for the core economies than for the non-core economies. 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.

Finally, it is important to say a bit about the macroeconomic environment. Government monetary and fiscal policies, and stability of financial institutions, have important effects on short-term economic dynamics as well as on the long-term capacity to grow. The key macroeconomic factors in long-term growth are budget balance, modest taxation, high rates of national saving, stability in the financial system, and a realistic level of the exchange rate that preserves the competitiveness of the export sector. When one or more of these macroeconomic factors is jeopardized (for example, by large budget deficits or a banking crisis), the short-term consequences can be stunning. Banking crises in Latin America and Asia during the 1990s resulted in a collapse of GNP of 5 percent or more in a single year in many countries. The medium-term growth prospects are also implicated, though less dramatically, since macroeconomic instability seriously damages capital accumulation and the efficient division of labor. Although the short-term macroeconomic convulsions are often highest in the minds of investors or businessmen planning this year's strategy, our concern remains focused on the medium-term implications of the macroeconomic environment.

The Growth Competitiveness Index 2001–2002

Results

The overall Growth Competitiveness Index (GCI) aims to measure the capacity of the national economy to achieve sustained economic growth over the medium term, controlling for the current level of economic development.

Using data from recent years' Executive Opinion Survey, and building on other economic research by ourselves and colleagues at the Center for International Development at Harvard University—especially Andrew Warner, who has played a leading role in this *Report's* intellectual development—the GCI 2001 focuses on three pillars of growth: technology, public institutions, and the macroeconomic environment, each with its own index. This is slightly modified from last year's Growth Index, which focused on economic creativity (similar to this year's technology index), finance (closely linked to the new macroeconomic environment index); and internationalization (which is somewhat related to both the technology and macroeconomic indexes). We also, for the first time, present a unified Index that distinguishes between growth factors affecting the world's core innovator economies and those affecting the non-core technological adapters.

Despite the revisions in methodology and labeling, the reader should be aware that many of last year's underlying variables are still included in this year's overall Growth Index. Many have been re-categorized, however, and several have also been dropped in light of new evidence regarding the role of various factors at different stages of development. Broadly speaking, the technology index measures the capacity for innovation and diffusion of technology. The public institutions subindex mainly measures the role of politics and the bureaucracy in supporting market-based economic activity and the division of labor. The macroeconomic environment index measures variables related to capital accumulation and the efficiency of the division of labor.

This year's results are presented in Tables 2 and 3. Table 2 focuses on the overall rankings, comparing this year's placings to last year's for the 58 countries included in both GCIs. Table 3 presents the results for the technology, public institutions, and macroeconomic environment indexes that, together, form the overall GCI. As explained in more detail below, these component indexes are constructed and weighted somewhat differently for the core and non-core economies.

When looking at Table 2, the reader should note that, given the updates in this year's GCR methodology as well as the expanded coverage of 17 new countries, a precise comparison between this year's and last year's results is not recommended. The reader should also note that, due to its perennially small yield in our Executive Opinion Survey,

Table 2: Growth Competitiveness Index rankings and 2000 comparisons

| country | GCI 2001 rank | GCI 2001 score | GCI 2001 rank among GCR 2000 countries | GCI 2000 rank |
|---------------------|---------------|----------------|--|---------------|
| Finland | 1 | 6.03 | 1 | 5 |
| United States | 2 | 5.95 | 2 | 1 |
| Canada | 3 | 5.87 | 3 | 6 |
| Singapore | 4 | 5.84 | 4 | 2 |
| Australia | 5 | 5.74 | 5 | 11 |
| Norway | 6 | 5.64 | 6 | 15 |
| Taiwan | 7 | 5.59 | 7 | 10 |
| Netherlands | 8 | 5.56 | 8 | 3 |
| Sweden | 9 | 5.55 | 9 | 12 |
| New Zealand | 10 | 5.53 | 10 | 19 |
| Ireland | 11 | 5.52 | 11 | 4 |
| United Kingdom | 12 | 5.51 | 12 | 8 |
| Hong Kong SAR | 13 | 5.47 | 13 | 7 |
| Denmark | 14 | 5.44 | 14 | 13 |
| Switzerland | 15 | 5.43 | 15 | 9 |
| Iceland | 16 | 5.40 | 16 | 23 |
| Germany | 17 | 5.39 | 17 | 14 |
| Austria | 18 | 5.33 | 18 | 17 |
| Belgium | 19 | 5.31 | 19 | 16 |
| France | 20 | 5.29 | 20 | 21 |
| Japan | 21 | 5.25 | 21 | 20 |
| Spain | 22 | 5.17 | 22 | 26 |
| Korea | 23 | 5.13 | 23 | 28 |
| Israel | 24 | 5.01 | 24 | 18 |
| Portugal | 25 | 4.92 | 25 | 22 |
| Italy | 26 | 4.90 | 26 | 29 |
| Chile | 27 | 4.90 | 27 | 27 |
| Hungary | 28 | 4.87 | 28 | 25 |
| Estonia | 29 | 4.87 | — | — |
| Malaysia | 30 | 4.83 | 29 | 24 |
| Slovenia | 31 | 4.70 | — | — |
| Mauritius | 32 | 4.60 | 30 | 35 |
| Thailand | 33 | 4.53 | 31 | 30 |
| South Africa | 34 | 4.50 | 32 | 32 |
| Costa Rica | 35 | 4.49 | 33 | 37 |
| Greece | 36 | 4.46 | 34 | 33 |
| Czech Republic | 37 | 4.41 | 35 | 31 |
| Trinidad and Tobago | 38 | 4.40 | — | — |
| China | 39 | 4.40 | 36 | 40 |
| Slovak Republic | 40 | 4.36 | 37 | 38 |
| Poland | 41 | 4.30 | 38 | 34 |
| Mexico | 42 | 4.29 | 39 | 42 |
| Lithuania | 43 | 4.27 | — | — |
| Brazil | 44 | 4.26 | 40 | 45 |
| Jordan | 45 | 4.24 | 41 | 46 |
| Uruguay | 46 | 4.22 | — | — |
| Latvia | 47 | 4.19 | — | — |
| Philippines | 48 | 4.16 | 42 | 36 |
| Argentina | 49 | 4.11 | 43 | 44 |
| Dominican Republic | 50 | 4.10 | — | — |
| Egypt | 51 | 4.03 | 44 | 41 |
| Jamaica | 52 | 3.92 | — | — |
| Panama | 53 | 3.88 | — | — |
| Turkey | 54 | 3.86 | 45 | 39 |
| Peru | 55 | 3.85 | 46 | 47 |
| Romania | 56 | 3.84 | — | — |
| India | 57 | 3.84 | 47 | 48 |
| El Salvador | 58 | 3.84 | 48 | 49 |
| Bulgaria | 59 | 3.82 | 49 | 57 |
| Vietnam | 60 | 3.77 | 50 | 52 |
| Sri Lanka | 61 | 3.74 | — | — |
| Venezuela | 62 | 3.70 | 51 | 53 |
| Russia | 63 | 3.70 | 52 | 54 |
| Indonesia | 64 | 3.69 | 53 | 43 |
| Colombia | 65 | 3.68 | 54 | 51 |
| Guatemala | 66 | 3.44 | — | — |
| Bolivia | 67 | 3.42 | 55 | 50 |
| Ecuador | 68 | 3.36 | 56 | 58 |
| Ukraine | 69 | 3.26 | 57 | 56 |
| Honduras | 70 | 3.11 | — | — |
| Bangladesh | 71 | 3.04 | — | — |
| Paraguay | 72 | 3.01 | — | — |
| Nicaragua | 73 | 3.01 | — | — |
| Nigeria | 74 | 2.99 | — | — |
| Zimbabwe | 75 | 2.81 | 58 | 55 |

Table 3: Growth Competitiveness Index component indexes

| TECHNOLOGY | | | PUBLIC INSTITUTIONS | | | MACROECONOMIC ENVIRONMENT | | |
|---------------------|------|-------|---------------------|------|-------|---------------------------|------|-------|
| Country | Rank | Score | Country | Rank | Score | Country | Rank | Score |
| United States | 1 | 6.42 | Finland | 1 | 6.59 | Singapore | 1 | 5.52 |
| Canada | 2 | 6.37 | Iceland | 2 | 6.56 | Ireland | 2 | 5.20 |
| Finland | 3 | 6.35 | Denmark | 3 | 6.42 | Switzerland | 3 | 5.18 |
| Taiwan | 4 | 6.19 | New Zealand | 4 | 6.33 | Hong Kong SAR | 4 | 5.12 |
| Australia | 5 | 6.05 | Netherlands | 5 | 6.29 | Norway | 5 | 5.08 |
| Sweden | 6 | 5.81 | Singapore | 6 | 6.27 | China | 6 | 5.04 |
| Norway | 7 | 5.77 | Sweden | 7 | 6.19 | United States | 7 | 4.97 |
| Estonia | 8 | 5.68 | Australia | 8 | 6.17 | Korea | 8 | 4.94 |
| Korea | 9 | 5.66 | United Kingdom | 9 | 6.14 | Netherlands | 9 | 4.88 |
| United Kingdom | 10 | 5.56 | Hong Kong SAR | 10 | 6.01 | Finland | 10 | 4.82 |
| New Zealand | 11 | 5.55 | Canada | 11 | 6.01 | Spain | 11 | 4.82 |
| Denmark | 12 | 5.54 | United States | 12 | 6.01 | United Kingdom | 12 | 4.81 |
| Belgium | 13 | 5.54 | Switzerland | 13 | 5.99 | Canada | 13 | 4.74 |
| Netherlands | 14 | 5.54 | Israel | 14 | 5.98 | New Zealand | 14 | 4.70 |
| Germany | 15 | 5.49 | Austria | 15 | 5.98 | Taiwan | 15 | 4.69 |
| Austria | 16 | 5.45 | Norway | 16 | 5.95 | Thailand | 16 | 4.68 |
| France | 17 | 5.44 | Germany | 17 | 5.93 | Australia | 17 | 4.68 |
| Singapore * | 18 | 5.44 | Ireland | 18 | 5.87 | Japan | 18 | 4.66 |
| Iceland | 19 | 5.41 | Japan | 19 | 5.76 | Germany | 19 | 4.65 |
| Czech Republic | 20 | 5.39 | France | 20 | 5.72 | Malaysia | 20 | 4.59 |
| Hungary | 21 | 5.39 | Chile | 21 | 5.69 | Chile | 21 | 4.56 |
| Malaysia | 22 | 5.36 | Belgium | 22 | 5.67 | France | 22 | 4.54 |
| Japan | 23 | 5.28 | Spain | 23 | 5.47 | Italy | 23 | 4.53 |
| Switzerland | 24 | 5.27 | Taiwan | 24 | 5.30 | Belgium | 24 | 4.48 |
| Portugal | 25 | 5.27 | Portugal | 25 | 5.25 | Trinidad and Tobago | 25 | 4.48 |
| Israel | 26 | 5.27 | Hungary | 26 | 5.20 | Austria | 26 | 4.46 |
| Spain | 27 | 5.23 | Italy | 27 | 5.05 | South Africa | 27 | 4.43 |
| Ireland * | 28 | 5.20 | Jordan | 28 | 5.04 | Philippines | 28 | 4.42 |
| Slovak Republic | 29 | 5.18 | Estonia | 29 | 4.99 | Sweden | 29 | 4.40 |
| Slovenia | 30 | 5.18 | Slovenia | 30 | 4.90 | Mauritius | 30 | 4.34 |
| Italy | 31 | 5.01 | Uruguay | 31 | 4.89 | Denmark | 31 | 4.28 |
| Costa Rica | 32 | 4.97 | Mauritius | 32 | 4.79 | Greece | 32 | 4.26 |
| Hong Kong SAR * | 33 | 4.93 | Egypt | 33 | 4.76 | Brazil | 33 | 4.24 |
| Latvia | 34 | 4.83 | Lithuania | 34 | 4.70 | Iceland | 34 | 4.24 |
| Poland | 35 | 4.75 | South Africa | 35 | 4.69 | Portugal | 35 | 4.24 |
| Mexico | 36 | 4.70 | Trinidad and Tobago | 36 | 4.63 | Mexico | 36 | 4.18 |
| Mauritius | 37 | 4.67 | Costa Rica | 37 | 4.56 | Vietnam | 37 | 4.15 |
| Greece | 38 | 4.62 | Slovak Republic | 38 | 4.54 | Hungary | 38 | 4.04 |
| Thailand | 39 | 4.54 | Malaysia | 39 | 4.53 | Slovenia | 39 | 4.02 |
| Philippines | 40 | 4.53 | Greece | 40 | 4.50 | Argentina | 40 | 3.99 |
| Lithuania | 41 | 4.46 | Poland | 41 | 4.40 | Indonesia | 41 | 3.96 |
| Chile | 42 | 4.45 | Thailand | 42 | 4.36 | Costa Rica | 42 | 3.94 |
| Jamaica | 43 | 4.43 | Jamaica | 43 | 4.30 | Estonia | 43 | 3.94 |
| Dominican Republic | 44 | 4.42 | Korea | 44 | 4.25 | Panama | 44 | 3.92 |
| Uruguay | 45 | 4.40 | Peru | 45 | 4.24 | India | 45 | 3.88 |
| South Africa | 46 | 4.39 | Turkey | 46 | 4.21 | Dominican Republic | 46 | 3.87 |
| Romania | 47 | 4.33 | Brazil | 47 | 4.21 | El Salvador | 47 | 3.87 |
| Argentina | 48 | 4.33 | Latvia | 48 | 4.18 | Bangladesh | 48 | 3.81 |
| Brazil | 49 | 4.33 | India | 49 | 4.11 | Czech Republic | 49 | 3.81 |
| Bulgaria | 50 | 4.32 | China | 50 | 4.10 | Poland | 50 | 3.75 |
| Turkey | 51 | 4.28 | Bulgaria | 51 | 4.07 | Egypt | 51 | 3.74 |
| Trinidad and Tobago | 52 | 4.10 | Romania | 52 | 4.06 | Guatemala | 52 | 3.73 |
| China | 53 | 4.05 | Czech Republic | 53 | 4.04 | Venezuela | 53 | 3.73 |
| Jordan | 54 | 3.99 | Dominican Republic | 54 | 4.02 | Jordan | 54 | 3.69 |
| Venezuela | 55 | 3.98 | Argentina | 55 | 4.01 | Nigeria | 55 | 3.68 |
| Colombia | 56 | 3.92 | Mexico | 56 | 3.99 | Lithuania | 56 | 3.66 |
| Panama | 57 | 3.89 | Colombia | 57 | 3.85 | Russia | 57 | 3.64 |
| El Salvador | 58 | 3.86 | Sri Lanka | 58 | 3.84 | Peru | 58 | 3.62 |
| Sri Lanka | 59 | 3.82 | Panama | 59 | 3.83 | Latvia | 59 | 3.58 |
| Russia | 60 | 3.78 | El Salvador | 60 | 3.79 | Sri Lanka | 60 | 3.56 |
| Indonesia | 61 | 3.76 | Russia | 61 | 3.68 | Israel | 61 | 3.55 |
| Peru | 62 | 3.71 | Bolivia | 62 | 3.67 | Ecuador | 62 | 3.45 |
| Ukraine | 63 | 3.68 | Vietnam | 63 | 3.58 | Uruguay | 63 | 3.38 |
| Egypt | 64 | 3.59 | Philippines | 64 | 3.53 | Slovak Republic | 64 | 3.35 |
| Vietnam | 65 | 3.56 | Venezuela | 65 | 3.40 | Paraguay | 65 | 3.31 |
| India | 66 | 3.54 | Indonesia | 66 | 3.35 | Colombia | 66 | 3.29 |
| Bolivia | 67 | 3.52 | Nicaragua | 67 | 3.33 | Romania | 67 | 3.14 |
| Guatemala | 68 | 3.38 | Ecuador | 68 | 3.30 | Turkey | 68 | 3.10 |
| Ecuador | 69 | 3.33 | Zimbabwe | 69 | 3.30 | Bulgaria | 69 | 3.09 |
| Honduras | 70 | 3.29 | Guatemala | 70 | 3.22 | Bolivia | 70 | 3.08 |
| Nicaragua | 71 | 3.21 | Ukraine | 71 | 3.15 | Jamaica | 71 | 3.05 |
| Zimbabwe | 72 | 3.20 | Honduras | 72 | 3.01 | Honduras | 72 | 3.02 |
| Paraguay | 73 | 2.98 | Nigeria | 73 | 2.84 | Ukraine | 73 | 2.95 |
| Bangladesh | 74 | 2.83 | Paraguay | 74 | 2.75 | Nicaragua | 74 | 2.48 |
| Nigeria | 75 | 2.44 | Bangladesh | 75 | 2.48 | Zimbabwe | 75 | 1.93 |

* = When calculated as core economy. See Table 6B for values when calculated as non-core.

Luxembourg is not included in this year's rankings, so all 2000 rankings below third place have been scaled up one spot relative to their published order in the *Global Competitiveness Report 2000*.

Although the GCI sample has been expanded and its methodology modified, there is a high correlation between the rankings for last year and this year.ⁱⁱ In our view, this has two main explanations. First, despite changes in our growth competitiveness methodology in recent years, our Index is robustly capturing the key underlying elements affecting medium-run economic growth. Second, the consistency in rankings suggests that the underlying processes affecting growth have themselves been changing only gradually over the past three to five years. *We urge appropriate caution in the interpretation of the rankings.* An index like this cannot finely distinguish between the growth prospects of countries that are very similarly ranked. The trends throughout Table 2 are informative, but one should not over-interpret a movement of a few slots in the ranking.

Nonetheless, reading through the GCI rankings, the most obvious changes have taken place in the top spots, where Finland, for the first time, ranks first in the world. This is a notable achievement for a small open economy that underwent a deep recession after the Soviet Union collapsed a decade ago. It also serves as evidence of how quickly an economy's prospects can be transformed by strong political institutions, a focus on technology (especially the prowess of Nokia and the rest of the ICT sector), and sound macroeconomic management. The United States, currently at risk of a recession but still the world's largest market, technological leader, and engine of economic growth, has slipped to second spot—an interesting yet marginal overall change. The United States is still, of course, the overwhelming powerhouse of the world economy in the high-tech industries. Canada, the sixth-ranked economy in the 2000 GCI, rounds out the top three places, having moved up mainly due to this year's weight accorded to tertiary education as a key factor in technological innovation.

Singapore, the second ranked economy in the 2000 GCI, has dropped two spots to fourth, due more to the increased weight on innovation in this year's Index than to shifts in the local economy. Similarly Ireland and Hong Kong SAR, still strong economies with impressive growth prospects, have dropped from 5th to 11th and 8th to 13th, respectively, because of evidence that they will need to become more innovative to maintain their current high growth rates into the future. These three fast-growing economies have each been highly successful in pursuing technology-diffusing, manufacturing-based export growth strategies. They have concurrently expanded their local scientific and innovation capacities so that each now easily surpasses our 15 patents per million population criterion

for the technological core. Yet despite their fast-paced growth and their development of local innovative capacities, they have not yet fully transformed their source of growth from diffusion to innovation. They appear to be, in a sense, between non-core and core economy status. In our final GCI rankings, we calculated their scores as both core and non-core economies, and then averaged the two. If we were to have calculated each solely as non-core economies, each would have had a higher overall ranking.ⁱⁱⁱ

Norway marks another interesting shift in the rankings—this year up from 15th to 6th—having invested heavily in developing its information and communications technology (ICT) capacity, not unrelated to its Scandinavian neighbors' strength in this regard, while its government has concurrently enjoyed enviable macroeconomic conditions thanks to natural resource abundance and high oil prices. New Zealand has also scored a dramatic jump in the rankings, from 19th to 10th, reflecting its consistently stable macroeconomic and institutional environment and also its growing technological capacity that receives increased attention in this year's methodology. Iceland's move seven spots up, from 23rd to 16th, reflects the positive growth prospects for another country with one of the world's most advanced ICT infrastructures.

At the middle and lower ends of the rankings of countries covered in both this and last year's GCRs, results are more stable, with few countries experiencing dramatic shifts. For instance, Chile and South Africa are unchanged at 27th and 32nd spots respectively. Notable exceptions include Turkey, which was surveyed during the height of its economic crisis in the early months of 2001 and dropped six spots on the rankings. Even more dramatic was the drop for Indonesia, a country that has experienced ongoing political uncertainty while flirting with the prospect of major turmoil over the past year. It dropped 10 places, from 43rd to 53rd. Meanwhile, Mauritius climbed five spots from 35th to 30th, Jordan moved up from 46th to 41st, and Bulgaria jumped an impressive 8 places from 57th to 49th. Interestingly, Argentina has barely shifted since last year, improving one place from 44th to 43rd. Argentina is a bit of a paradox, of course. Many features of its economy are satisfactory, yet the economy remains trapped with an overvalued currency and unimpressive technological dynamics. Argentina may be a quintessential case of an economy that was fairly sophisticated 40 years ago but failed to develop its technological capacity.

On a less optimistic note, there is year-to-year consistency at the very bottom of the rankings, with three of the final four spots among the 58 countries covered in 2000 still occupied by Ecuador, Ukraine, and Zimbabwe, all countries facing ongoing macroeconomic disorder with

Figure 1: Partial regression results of GCI versus 1992–2000 GDP per capita growth, controlling for initial GDP level*

*More precisely, growth here is measured as the average annual change in the GDP GAP with the United States from 1992 to 2000 (1995 to 2000 for transition economies), as explained in the methodology section of this chapter.

little positive growth prospect in sight. Joining Ukraine toward the bottom of list, Russia continues to suffer the consequences of decades of economic mismanagement under Soviet rule and the haphazard process of economic change since 1991. Although it has moved up two slots, it remains very low, and this year is in the 52nd position.

Looking at the 17 countries added to this year's expanded GCI sample, one finds some interesting results. The top-scoring new entrant is Estonia, ranking 29th overall and well ahead of its Baltic neighbors Lithuania at 43rd and Latvia at 47th. The Caribbean economies of Trinidad and Tobago and Jamaica also provide noteworthy results, ranking 38th and 52nd respectively. Romania, a new addition at 56th, comes slightly behind. The members of the largest geographic group of new additions to the GCR—Latin American economies—have their economic difficulties reflected in generally low rankings. Honduras at 70th, Paraguay at 72nd, and Nicaragua at 73rd occupy three of the bottom six rankings. Guatemala, at 66th, is not far ahead. The relative bright spots among the newly included Latin American countries are found in Uruguay (46th), the Dominican Republic (50th) and Panama (53rd). Interspersed among these rankings are Latin American economies included in previous years' *Reports*: El Salvador (58th), Venezuela (62nd), Colombia (65th), and Bolivia (67th).

The Growth Competitiveness Index and economic growth

The goal of the GCI is to capture important factors in economic growth over roughly a five-year perspective. Of course, we cannot test the GCI for 2001 based on future growth, so instead we examine whether the GCI helps to account for patterns of growth during the recent past and then extrapolate into the future. Specifically, we examine the relationship between the GCI and economic growth from 1992 to 2000. The basic test equation explains annual economic growth over this period as a function of the country's GCI score and its initial level of income in 1992 (on the grounds that poorer countries, all other things equal, will tend to grow faster). As shown in Figure 1, the GCI has a strong relationship with recent economic growth, controlling for initial income level. (The same test reveals, as expected, that countries that began the 1990s relatively poorer achieved faster average growth over the period than their wealthier counterparts.) Of course, the real proof of the pudding for the GCI will be whether the Index helps account for future rather than past growth!

Interpreting the Growth Competitiveness Index

Although changes in the GCI rankings are informative, several points need to be established in order to ensure proper interpretation of the Index. First, as mentioned, the underlying methodology of the Index has been updated since last year, so year-to-year comparisons are not exact. Second, as also outlined above, the growth prospects of an economy depend not only on the GCI score but also on the level of per capita income. The catch-up effect is not included within the GCI itself, so a poor country with a low GCI might still have good growth prospects because it has room to “catch up” relative to a richer country with a somewhat higher GCI score.

Third, GCI rankings should not be confused with GCI scores. The difference in growth prospects for economies, say, five spots apart from one another on the rankings are not the same at all points on the GCI distribution. For instance, Finland’s top GCI score of 6.03 is roughly 0.3 greater than Australia’s 5th place score, whereas New Zealand’s 10th place score of 5.53 is only 0.1 greater than Switzerland’s 15th ranked value of 5.43. In an even tighter bunching, Panama’s 53rd place score of 3.88 is barely different from El Salvador’s value five slots lower at 3.84.

Fourth, the maximum possible score on the GCI is 7; the lowest is 1. All component variables, whether taken from the GCR Executive Opinion Survey or from hard data sources, have been re-based so that the “top” score is always equal to 7 and the “lowest” score is always to 1. Based on our statistical analysis, for two economies at the same level of per capita income, an increase of one point in GCI score (on the 1-to-7 scale) is linked, on average, to a rise of the growth rate of slightly more than 3 percentage points per annum. Conversely, the GCI implies that two economies with similar scores but different starting income levels will have different growth rates. For example, an economy with GDP per capita of \$10,000 and a GCI score of 5 is predicted to grow, on average, nearly 2 percentage points faster per year than an economy with GDP per capita of \$20,000 and the same GCI score of 5.

Fifth, although we and our colleagues at the Center for International Development at Harvard have spent a great amount of time studying such important growth factors as climate and proximity to markets, these geographical factors are not directly included in the GCI. Geographical factors do appear indirectly, because they affect industrial structure and other economic variables that are included in the Index. We want to stress, however, the importance and relative neglect of these geographical factors. The Baltic countries, for instance, with their seaport access and proximity to Western European markets, have an intrinsic advantage—independent of their policies—over land-locked economies in South America or economies such as Nigeria that have ample ocean access

but no major export markets nearby. Similarly, Mexico has an intrinsic growth advantage over Argentina, and Poland over Romania. At the same time, New Zealand has very strong institutional, macroeconomic, and technological prospects for growth, as evidenced by its top-10 ranking on this year’s Index, but it is located thousands of miles from most major markets, with the minor exception of Australia. We hope in future studies to incorporate these factors more directly in the GCI.

Sixth, there are fundamental limitations to the statistical analysis of medium-term growth. Regression tools allow us to capture and estimate the effects of numerous factors across a wide range of economies, but the range of countries with available data is inherently small and the period available for analysis is unfortunately short.

Individual countries have specific characteristics that will inevitably be missed in our cross-sectional research, which relies on averages and trends. Also, our unit of analysis—the national economy—is blunt. The economies in our sample range from small and homogeneous societies such as Iceland, with a population of fewer than 300,000, to the massive and diverse countries of India and China, each with more than one billion people and an incredible internal diversity. The GCI does not account for these internal variations in growth prospects.

Finally, one must be sure not to confuse the last places on the GCI ranking with the worst growth prospects in the world. There are more than 150 countries around the world with populations of greater than one million. In this study we cover only 74 of those plus Iceland. We do not yet include the other 75 economies due to problems in collecting data, problems that are often highly related to the lack of economic development and growth competitiveness. The countries that occupy the last few spots of the GCI are far from lost causes—they merely represent the economies with the most policy work to do among our sample of countries. They also represent the countries with the greatest opportunity for “catch-up” growth as described above. Nigeria, for example, as the most populous country in Africa, stands truly at the dawn of a new economic and political era and, despite its fragile policy environment, could make great strides in economic development with good domestic policies and international help. Rather than seeing a low score on the ranking as cause for despair, we would instead hope that policymakers and business leaders will view the information contained in this report as a useful means to identify policy priorities and, in the future, to benchmark the success of new initiatives. Indeed, regardless of national income level, we aim for the information contained in the GCI to help policymakers and private-sector representatives in every country identify their national priorities as they seek to enhance their citizens’ levels of economic welfare.

A brief comment on the United States

With the United States in slowdown, all eyes are on the country for clues about economic prospects in the coming few years. Will the United States go into a deep and prolonged slump, as Japan did after the bursting of its financial bubble in the early 1990s? Will it recover fairly quickly and resume its dynamic growth of the second half of the 1990s? Although we are reluctant to make short-term forecasts, especially given the purposes of the GCI, we stress that the underlying competitiveness of the United States economy remains very strong, auguring well over a five-year perspective. Of course, there are some notable blemishes that merit our attention.

The United States is in a slowdown now related to the end of a huge wave of investment in ICT capital stock. There are three reasons for the slowdown. First, after an enormous building period in information technology, companies are taking a breather in their ICT investments. They have no need to keep accumulating IT equipment as rapidly as they did in the second half of the 1990s. Second, the roll out of high bandwidth applications is certainly proceeding more slowly than expected just a few years ago. Third, the United States experienced a financial bubble when optimism about the IT revolution led to a euphoric overpricing of the technology sector. The risks of the US bubble have been evident for years, even before the stock market crash of 2000–2001. In mid-1998, the *Global Competitiveness Report* warned about the apparent overvaluation of the stock market.^{iv} The worry was repeated in the 1999 GCR, when we wrote, “Everybody with sufficient stock market holdings feels rich and very clever. . . . Our best guess is that they will feel a little less clever in a year’s time,”^v a view that was vindicated by the subsequent end of the bubble beginning in the spring of 2000.

Does the bursting of the bubble undermine the case for the competitiveness of the United States? Not really, if we take a view over five or more years. The dynamism of the US economy remains tremendous. The flexibility of labor markets, ease of startups, technological prowess, and fiscal balance are all very strong. The financial sector appears to be sound, even after the collapse of the bubble, though undoubtedly there will be a stream of bad news as some heavily indebted enterprises go under. It seems unlikely to us that the United States will therefore enter into a prolonged slump of the sort that afflicted Japan in the 1990s. It is notable that Japan’s competitiveness ranking has always been much lower than that of the United States in the past five years, and continues to be much lower in this year’s *Report*.

The United States does have its relative weaknesses, however. Although the United States ranks second overall, this is a reflection of extraordinary strength in technology, combined with notably lower scores on the other two GCI component indexes. On the macroeconomic environment index, it rates seventh, somewhat behind the top countries of Singapore and Ireland. On the public institutions index, it ranks even lower, placing 12th, with a score roughly comparable with those of Hong Kong SAR and Israel. On more specific points, the dollar is surely overvalued relative to the euro. The rule of law is not as strong as Americans sometimes assume, as evidenced by 11th place ranking on the US corruption subindex and 17th place ranking on its measure of contracts and law. The low placing on the latter measure is due to poor scores on Executive Opinion Survey questions relating to government neutrality in public contracts and policy (18th overall) and a 22nd place ranking on the business costs imposed by organized crime. Note that this latter ranking is roughly the same as last year’s, when the United States scored 25th on the same question.

Perhaps most notably, and somewhat notoriously, the United States is an unequal society, with huge perceived (and likely quite real) discrepancies between services enjoyed by the rich and the poor. In our Executive Opinion Survey question that asks about the difference in health care availability for the rich and poor, the United States scores 27th, behind Estonia and just ahead of Malaysia. In a parallel question that asks about discrepancies in schools available for rich versus poor children, the United States ranks even worse at 43rd, after Russia and barely above Uruguay. These Survey results highlight the inequalities in the United States when compared with inequalities in other countries, especially those in Western Europe, where the social welfare state is far more inclusive and therefore the quality of public services compared with private services also considered to be quite high. It is notable that Finland, the top country in this year’s GCI, ranks best in the world on the measure of perceived educational equality and third on the measure of health care equality. Thus, Finland has achieved a technologically sophisticated economy with a high degree of social equality as well.

METHODOLOGY BEHIND THE GROWTH COMPETITIVENESS INDEX

As outlined in the previous section, because of the different growth trajectories that economies typically face at different levels of development, a fundamental issue must be considered when assessing growth competitiveness around the world: Different growth factors play different roles at different stages of development.^{vi} 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.

Technology plays a key role in all stages of development. But again, the means through which technological progress occurs, and the conditions conducive to its advance, will vary at different levels of development. At low levels of development, growth competitiveness is achieved mainly through the effective exploitation of land, primary commodities, and unskilled labor. As economies move from low- to middle-income status, competitiveness is increasingly achieved by harnessing global technologies to local production. Foreign direct investment, joint ventures, and outsourcing arrangements help to integrate the national economy into international production systems, thereby facilitating the improvement of technologies and the inflows of foreign capital that support economic growth. The transition from middle-income to high-income status involves a transition from a technology-importing economy to a technology-generating economy, from technological adoption to innovation. At high levels of income, global competitiveness depends on innovation, high rates of social learning, and rapid adaptability to new technologies.

By adding 17 countries to our analysis since last year’s GCR, we have significantly expanded our competitiveness research capacity. Most of the economies added to the GCR are middle-income developing countries, so including them provides more information about economic growth in the non-core economies. We should reiterate that the inherently backward-looking nature of empirical economic research poses a fundamental limitation in projecting future growth rates. The patterns that typified growth in the 1990s are not exactly the same as those that characterized growth in the 1960s or even the 1970s, and one can never fully predict what future technological innovations or revolutions will transform economic dynamics around the world. Despite these limitations, we

have found growth trends from the past decade that are strikingly clear and thus not likely to change dramatically over the coming five years. These are the trends that inform our analysis and give rise to the growth forecast represented by the GCI.

The steps of our methodology in uncovering and determining relative weights for these trends are as follows:

1. First, for our 1990s economic analysis, we divided our sample of 75 economies into core and non-core groups based on an objective measure of their level of technological sophistication: the 1980s average annual number of utility patents registered in the United States per million population. This variable has strengths and weaknesses as a general indicator of technology, but it does help to provide a clear grouping of the economies that were registering technological advances—at an international standard—at the beginning of the 1990s. By this criterion, we identified 18 core economies with more than 15 US utility patents granted per million population in the 1980s. These were Switzerland, the United States, Japan, Sweden, Germany, the Netherlands, Canada, the United Kingdom, France, Israel, Austria, Finland, Denmark, Belgium, Norway, Australia, Italy, and New Zealand. Table 1 lists the economies included in the 1980s core and also those that achieved the core criterion by 2000 and were hence counted as core economies in calculations for this year’s GCI.
2. As a second step, we calculated the 1992 and 2000 levels of Gross Domestic Product (GDP) per capita, measured at purchasing power parity (PPP), for all 75 countries in our sample, with the exception of the former Eastern Bloc transition economies, for which we calculated 1995 levels. We then calculated the ratio of each country’s GDP per capita PPP to US GDP per capita PPP in both 1992 (1995 for the transition economies) and 2000, and calculated the average annual change in the ratio over that period as our measure of economic growth. As a shorthand, we call this ratio to US GDP the *GDP GAP*. We chose 1992 as a starting point, since it marks the end of the last major industrialized world recession and removes business cycle fluctuations that might otherwise distort the analysis of growth rates. For the transition economies, we selected 1995 in order to avoid incorporating the general negative growth that occurred during the first years of those economies’ post-communism adjustment period.

3. Third, drawing on the economic growth literature and our own research at CID, we constructed more than a dozen subindexes to test their links with economic growth (as defined above). The indexes were typically comprised of both “hard” and “soft” data, the latter coming from the results of the Executive Opinion Survey. Using these subindexes, and testing them in a variety of specifications, we created indexes for three broad factors that were linked to economic growth in the 1990s: the quality of public institutions, the macroeconomic environment, and technology. As we have already stressed, 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. Measurements for each of these three pillars of growth, as well as their weightings in the GCI, are given below.
4. We then combined the component indexes into the overall GCI. For the core economies, our statistical analysis suggested we should place extra emphasis on the role of innovation and technology. Accordingly, the weightings for the core economies were as follows:

$$\begin{aligned} \text{Core GCI} = & 1/2 \text{ technology index} \\ & + 1/4 \text{ public institutions index} \\ & + 1/4 \text{ macroeconomic environment index.} \end{aligned}$$

Meanwhile, for the non-core economies, our statistical analysis suggested a more balanced weighting between technology, institutions, and macroeconomic conditions. We therefore calculated GCI values for these countries as a simple average of the three component indexes:

$$\begin{aligned} \text{Non-core GCI} = & 1/3 \text{ technology index} \\ & + 1/3 \text{ public institutions index} \\ & + 1/3 \text{ macroeconomic environment} \\ & \text{index.} \end{aligned}$$

As noted above, for Ireland, Singapore, and Hong Kong SAR—economies in transition from non-core to core status—we averaged their core GCI and non-core GCI scores to calculate an overall score.

Fourth, we examined the relationship between the GCI and growth during 1992 to 2000 using the following growth equation:

$$\begin{aligned} \text{Average Annual Change in GAP} = & \beta_0 + \beta_1 \times \text{GCI} \\ & + \beta_2 \times \text{natural log (percentage GDP GAP in 1992)}^{\text{vii}} \end{aligned}$$

The results of this regression equation were displayed in Figure 1.^{viii} We now turn to a more detailed discussion of the subcomponents of the overall Index.

Technology

Capturing the various processes of technological development forms a central challenge of our competitiveness research. Constructing measures that are precise enough to represent trends in specific countries yet broad enough to allow global comparability is a long-term research endeavor in which we are still in the early stages. Nonetheless, in the preparation of this year’s *Report* we have investigated and developed technology indicators that provide a crucial advance in the evolution of global competitiveness comparisons. Since the core and non-core technology economies follow distinctly different processes of technological development, we have developed respective measures of technology that are used in competitiveness calculations for each group.

Technology in the core economies

For the core economies, the technology index is a simple average of an innovation subindex and an information and communication technology (ICT) subindex, both of which are comprised of hard and soft data. (The reader should note that the innovation subindex presented here is different from the “innovative capacity index” constructed by Michael E Porter and Scott Stern in Chapter 2.2 of this *Report*. That measure seeks to explain the underlying factors that contribute to innovation as measured by patents. The innovation subindex here seeks to explain the elements of innovation, such as patents, that are linked measurably to growth.) Using a simple linear transformation, the hard data were converted to a 1-to-7 scale so that they could be easily merged with the Executive Opinion Survey questions, most of which have possible responses on a range of 1 to 7, with 1 being the low score and 7 the high score.^{ix} The precise composition of the technology index is outlined in Box 2.

Box 2: Technology index components

Technological core economies

core technology index = $1/2$ innovation subindex
+ $1/2$ ICT subindex.

Technological non-core economies

non-core technology index = $1/8$ innovation subindex
+ $3/8$ technology transfer subindex
+ $1/2$ ICT subindex.

1. 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 Does continuous innovation play a major role in generating revenue for your business?
- 3.06 How much do companies in your country spend on R&D relative to other countries?
- 3.09 What is the extent of business collaboration in R&D with local universities?

innovation hard data

- 3.16 US Utility Patents Granted per million population in 2000
- 3.19 Gross Tertiary Enrollment Rate in 1997*

2. Technology transfer subindex

technology transfer subindex = $1/2$ technology transfer
Survey question
+ $1/2$ technology-in-trade residual.

- 3.04 Is foreign direct investment in your country an important source of new technology?
- 3.23 Technology-in-trade residual in 1999*

* Or latest available year.

3. Information and communication technology subindex

ICT subindex = $1/3$ ICT Survey data + $2/3$ ICT hard data

ICT Survey questions

- 4.03 How extensive is Internet access in schools?
- 4.07 Is competition among ISPs sufficient to ensure high quality, infrequent interruptions and low prices?
- 4.08 Is ICT an overall priority for the government?
- 4.09 Are government programs successful in promoting the use of ICT?
- 4.11 Are laws relating to ICT (electronic commerce, digital signatures, consumer protection) well developed and enforced?

ICT hard data

- 4.13 Number of mobile telephone users per capita
- 4.14 Number of Internet users per capita
- 4.15 Number of Internet hosts per capita
- 4.16 Number of telephone mainlines per capita
- 4.17 Number of personal computers per capita

Innovation subindex

When considering economic growth, a measure of innovation is central to measuring levels of technological sophistication in the core economies. Innovation is a product of many factors, but foremost among these are skilled human resources, well-developed market incentive structures for science, and intensive interaction between scientific and business sectors. The innovation measure aims to capture many of these processes through the use of hard and Survey data. On the hard side, we include two variables: US utility patents granted per million population and gross tertiary enrollment rates.

Patents are not a perfect measure of innovation, since they do not distinguish between very minor innovations that are simply technological refinements and major innovations that revolutionize a field. However, on average they present a very useful measure of innovation intensity in an economy and, to some extent, of the frequency with which innovations are taken to market rather than simply left in a laboratory. Tertiary education enrollment rates form a similarly broad but useful measure. They do not tell us the specific skill composition of a workforce, nor the precise number of product and process innovators in an economy, but they do provide a sound indication of a country's capacity to develop new technology and products at all levels of its economy. In fact, when performing statistical tests in which different variables were assessed in terms of their relationship with 1990s growth in the core economies, tertiary enrollment rates were found to be the variable most closely linked to high growth in the 1990s. We hence placed a greater weighting on it ($3/4$) than on patents ($1/4$) in the construction of the hard data portion of the innovation subindex.

The Survey questions incorporated in the innovation subindex form broad indicators of technological sophistication and product development. As shown in Box 2, the innovation subindex blends the hard data score with average country Survey scores from questions on the overall level of technology in the economy, the role of continuous innovation in generating revenue, company R&D spending relative to international peers, and private sector R&D collaboration with local universities. The overall innovation subindex places a $3/4$ weight on the hard data and $1/4$ weight on the soft data.

Innovation subindex scores and rankings are listed for the full sample in Table 4 and for only the core in Table 6A. In both tables, one sees that Canada is ranked first among the core economies, just slightly ahead of the United States, while Hong Kong, Iceland, and Ireland occupy the bottom positions. The greatest driving factor on these rankings is gross tertiary enrollment, a measure on which Canada's 88 percent ratio is the highest in the world by a significant margin.^x The United States has the second-highest ratio at 81 percent and Australia the

Table 4: Innovation subindex

innovation subindex = 3/4 hard data score + 1/4 Survey data score

| Country | Innovation Subindex | Rank | Country | Innovation Hard Data Score | Rank | Country | Innovation Survey Data Score | Rank |
|---------------------|---------------------|------|---------------------|----------------------------|------|---------------------|------------------------------|------|
| Canada | 6.51 | 1 | Canada | 6.84 | 1 | Finland | 6.14 | 1 |
| United States | 6.50 | 2 | Taiwan* | 6.76 | 2 | United States | 6.11 | 2 |
| Taiwan | 6.37 | 3 | United States | 6.63 | 3 | Sweden | 5.99 | 3 |
| Finland | 6.12 | 4 | Australia | 6.24 | 4 | Switzerland | 5.93 | 4 |
| Australia | 5.96 | 5 | Finland | 6.12 | 5 | Germany | 5.89 | 5 |
| Korea | 5.46 | 6 | Korea | 5.69 | 6 | Israel | 5.79 | 6 |
| Norway | 5.27 | 7 | Norway | 5.34 | 7 | France | 5.73 | 7 |
| Belgium | 5.19 | 8 | New Zealand | 5.27 | 8 | Japan | 5.72 | 8 |
| Sweden | 5.17 | 9 | Belgium | 5.07 | 9 | Netherlands | 5.70 | 9 |
| New Zealand | 5.11 | 10 | Sweden | 4.89 | 10 | Singapore | 5.70 | 10 |
| United Kingdom | 5.02 | 11 | United Kingdom | 4.84 | 11 | United Kingdom | 5.55 | 11 |
| France | 5.01 | 12 | France | 4.78 | 12 | Belgium | 5.54 | 12 |
| Germany | 4.98 | 13 | Germany | 4.67 | 13 | Canada | 5.51 | 13 |
| Netherlands | 4.88 | 14 | Denmark | 4.66 | 14 | Austria | 5.38 | 14 |
| Denmark | 4.83 | 15 | Austria | 4.62 | 15 | Denmark | 5.35 | 15 |
| Austria | 4.81 | 16 | Netherlands | 4.61 | 16 | Ireland | 5.32 | 16 |
| Japan | 4.74 | 17 | Spain | 4.45 | 17 | Iceland | 5.27 | 17 |
| Israel | 4.71 | 18 | Italy | 4.44 | 18 | Taiwan | 5.19 | 18 |
| Singapore | 4.48 | 19 | Japan | 4.42 | 19 | Australia | 5.10 | 19 |
| Spain | 4.48 | 20 | Israel | 4.35 | 20 | Norway | 5.06 | 20 |
| Italy | 4.47 | 21 | Ireland | 4.13 | 21 | Hong Kong SAR | 4.79 | 21 |
| Switzerland | 4.44 | 22 | Singapore | 4.08 | 22 | Korea | 4.77 | 22 |
| Ireland | 4.43 | 23 | Iceland | 4.04 | 23 | South Africa | 4.76 | 23 |
| Iceland | 4.35 | 24 | Greece | 3.99 | 24 | New Zealand | 4.63 | 24 |
| Greece | 3.95 | 25 | Switzerland | 3.94 | 25 | Hungary | 4.63 | 25 |
| Estonia | 3.94 | 26 | Estonia | 3.80 | 26 | Czech Republic | 4.61 | 26 |
| Slovenia | 3.80 | 27 | Russia | 3.73 | 27 | Italy | 4.58 | 27 |
| Russia | 3.72 | 28 | Slovenia | 3.65 | 28 | Spain | 4.56 | 28 |
| Hong Kong SAR | 3.67 | 29 | Argentina | 3.55 | 29 | Chile | 4.40 | 29 |
| Argentina | 3.61 | 30 | Portugal | 3.49 | 30 | Brazil | 4.38 | 30 |
| Portugal | 3.58 | 31 | Ukraine | 3.47 | 31 | Estonia | 4.34 | 31 |
| Costa Rica | 3.51 | 32 | Hong Kong SAR | 3.29 | 32 | Slovak Republic | 4.30 | 32 |
| Ukraine | 3.48 | 33 | Bulgaria | 3.29 | 33 | India | 4.29 | 33 |
| Chile | 3.41 | 34 | Costa Rica | 3.25 | 34 | Poland | 4.29 | 34 |
| Hungary | 3.30 | 35 | Chile | 3.08 | 35 | Costa Rica | 4.28 | 35 |
| Latvia | 3.29 | 36 | Latvia | 3.05 | 36 | Slovenia | 4.24 | 36 |
| Panama | 3.24 | 37 | Panama | 3.03 | 37 | China | 4.23 | 37 |
| Czech Republic | 3.24 | 38 | Hungary | 2.85 | 38 | Malaysia | 4.23 | 38 |
| Bulgaria | 3.19 | 39 | Venezuela | 2.80 | 39 | Trinidad and Tobago | 4.14 | 39 |
| South Africa | 3.10 | 40 | Uruguay | 2.79 | 40 | Philippines | 4.02 | 40 |
| Uruguay | 3.03 | 41 | Czech Republic | 2.78 | 41 | Latvia | 4.02 | 41 |
| Venezuela | 3.01 | 42 | Poland | 2.55 | 42 | Thailand | 3.98 | 42 |
| Poland | 2.98 | 43 | South Africa | 2.55 | 43 | Indonesia | 3.91 | 43 |
| Slovak Republic | 2.97 | 44 | Slovak Republic | 2.53 | 44 | Jamaica | 3.87 | 44 |
| Philippines | 2.80 | 45 | Bolivia | 2.46 | 45 | Portugal | 3.86 | 45 |
| Dominican Republic | 2.78 | 46 | Dominican Republic | 2.46 | 46 | Panama | 3.85 | 46 |
| Thailand | 2.77 | 47 | Lithuania | 2.46 | 47 | Greece | 3.82 | 47 |
| Lithuania | 2.76 | 48 | Philippines | 2.39 | 48 | Mexico | 3.80 | 48 |
| Brazil | 2.66 | 49 | Peru | 2.38 | 49 | Jordan | 3.79 | 49 |
| Malaysia | 2.64 | 50 | Thailand | 2.36 | 50 | Argentina | 3.79 | 50 |
| Peru | 2.62 | 51 | Romania | 2.33 | 51 | Dominican Republic | 3.75 | 51 |
| Mexico | 2.61 | 52 | Mexico | 2.21 | 52 | Uruguay | 3.74 | 52 |
| Romania | 2.51 | 53 | Egypt | 2.15 | 53 | Russia | 3.68 | 53 |
| Bolivia | 2.50 | 54 | Malaysia | 2.11 | 54 | Vietnam | 3.68 | 54 |
| Egypt | 2.47 | 55 | Turkey | 2.09 | 55 | Lithuania | 3.64 | 55 |
| Turkey | 2.45 | 56 | Brazil | 2.08 | 56 | Nigeria | 3.64 | 56 |
| Colombia | 2.39 | 57 | Colombia | 2.03 | 57 | Zimbabwe | 3.63 | 57 |
| Jamaica | 2.29 | 58 | Ecuador | 2.01 | 58 | Sri Lanka | 3.63 | 58 |
| Ecuador | 2.25 | 59 | Jamaica | 1.76 | 59 | Venezuela | 3.62 | 59 |
| Jordan | 2.25 | 60 | Jordan | 1.73 | 60 | Mauritius | 3.56 | 60 |
| India | 2.16 | 61 | El Salvador | 1.73 | 61 | Turkey | 3.53 | 61 |
| El Salvador | 2.08 | 62 | Honduras | 1.64 | 62 | Ukraine | 3.50 | 62 |
| China | 2.07 | 63 | Guatemala | 1.58 | 63 | Colombia | 3.47 | 63 |
| Indonesia | 2.06 | 64 | India | 1.44 | 64 | Egypt | 3.44 | 64 |
| Guatemala | 2.00 | 65 | Indonesia | 1.44 | 65 | Peru | 3.34 | 65 |
| Honduras | 1.96 | 66 | Nicaragua | 1.40 | 66 | Guatemala | 3.26 | 66 |
| Trinidad and Tobago | 1.94 | 67 | China | 1.35 | 67 | El Salvador | 3.14 | 67 |
| Nicaragua | 1.83 | 68 | Paraguay | 1.32 | 68 | Nicaragua | 3.11 | 68 |
| Sri Lanka | 1.81 | 69 | Trinidad and Tobago | 1.21 | 69 | Romania | 3.05 | 69 |
| Vietnam | 1.77 | 70 | Sri Lanka | 1.21 | 70 | Bangladesh | 3.01 | 70 |
| Zimbabwe | 1.75 | 71 | Vietnam | 1.14 | 71 | Paraguay | 3.00 | 71 |
| Paraguay | 1.74 | 72 | Zimbabwe | 1.12 | 72 | Ecuador | 3.00 | 72 |
| Mauritius | 1.71 | 73 | Mauritius | 1.10 | 73 | Honduras | 2.92 | 73 |
| Nigeria | 1.66 | 74 | Bangladesh | 1.09 | 74 | Bulgaria | 2.89 | 74 |
| Bangladesh | 1.57 | 75 | Nigeria | 1.00 | 75 | Bolivia | 2.61 | 75 |

*Note that Taiwan's hard data innovation score is based solely on patent levels, since gross tertiary enrollment data comparable with the other countries is not available.

Table 5: Information and communications technology subindex

ICT subindex = 2/3 hard data score + 1/3 Survey data score

| Country | ICT Subindex | Rank | Country | ICT Hard Data Score | Rank | Country | ICT Survey Data Score | Rank |
|---------------------|--------------|------|---------------------|---------------------|------|---------------------|-----------------------|------|
| Finland | 6.58 | 1 | Norway | 6.83 | 1 | Finland | 6.37 | 1 |
| Iceland | 6.47 | 2 | Iceland | 6.83 | 2 | Singapore | 6.06 | 2 |
| Sweden | 6.45 | 3 | Sweden | 6.77 | 3 | Sweden | 5.82 | 3 |
| Singapore | 6.40 | 4 | United States | 6.70 | 4 | Iceland | 5.75 | 4 |
| United States | 6.34 | 5 | Denmark | 6.69 | 5 | United States | 5.63 | 5 |
| Norway | 6.28 | 6 | Finland | 6.68 | 6 | Canada | 5.55 | 6 |
| Denmark | 6.25 | 7 | Switzerland | 6.63 | 7 | Hong Kong SAR | 5.47 | 7 |
| Canada | 6.23 | 8 | Netherlands | 6.62 | 8 | Estonia | 5.45 | 8 |
| Netherlands | 6.20 | 9 | Australia | 6.60 | 9 | Denmark | 5.37 | 9 |
| Hong Kong SAR | 6.19 | 10 | Canada | 6.57 | 10 | United Kingdom | 5.37 | 10 |
| Australia | 6.15 | 11 | Singapore | 6.56 | 11 | Netherlands | 5.36 | 11 |
| Switzerland | 6.10 | 12 | Hong Kong SAR | 6.56 | 12 | Austria | 5.33 | 12 |
| Austria | 6.09 | 13 | Japan | 6.52 | 13 | Australia | 5.26 | 13 |
| United Kingdom | 6.09 | 14 | Taiwan | 6.48 | 14 | Norway | 5.18 | 14 |
| Germany | 6.01 | 15 | Austria | 6.48 | 15 | Ireland | 5.16 | 15 |
| Taiwan | 6.01 | 16 | Germany | 6.46 | 16 | Korea | 5.15 | 16 |
| New Zealand | 5.99 | 17 | United Kingdom | 6.46 | 17 | Germany | 5.11 | 17 |
| Ireland | 5.97 | 18 | New Zealand | 6.45 | 18 | France | 5.09 | 18 |
| Belgium | 5.90 | 19 | Ireland | 6.38 | 19 | Taiwan | 5.07 | 19 |
| Estonia | 5.88 | 20 | Belgium | 6.36 | 20 | New Zealand | 5.06 | 20 |
| France | 5.87 | 21 | Israel | 6.30 | 21 | Switzerland | 5.05 | 21 |
| Korea | 5.87 | 22 | France | 6.26 | 22 | Belgium | 4.97 | 22 |
| Israel | 5.83 | 23 | Korea | 6.23 | 23 | Israel | 4.88 | 23 |
| Japan | 5.82 | 24 | Portugal | 6.15 | 24 | Spain | 4.86 | 24 |
| Portugal | 5.68 | 25 | Italy | 6.15 | 25 | Portugal | 4.73 | 25 |
| Spain | 5.63 | 26 | Estonia | 6.10 | 26 | Hungary | 4.60 | 26 |
| Italy | 5.55 | 27 | Slovenia | 6.07 | 27 | Czech Republic | 4.59 | 27 |
| Slovenia | 5.47 | 28 | Spain | 6.01 | 28 | India | 4.57 | 28 |
| Czech Republic | 5.45 | 29 | Czech Republic | 5.88 | 29 | Chile | 4.57 | 29 |
| Hungary | 5.30 | 30 | Greece | 5.85 | 30 | Jordan | 4.56 | 30 |
| Slovak Republic | 5.26 | 31 | Slovak Republic | 5.69 | 31 | Malaysia | 4.49 | 31 |
| Chile | 5.20 | 32 | Hungary | 5.66 | 32 | Brazil | 4.49 | 32 |
| Malaysia | 5.16 | 33 | Uruguay | 5.62 | 33 | Japan | 4.42 | 33 |
| Uruguay | 5.15 | 34 | Chile | 5.51 | 34 | Slovak Republic | 4.40 | 34 |
| Greece | 5.14 | 35 | Malaysia | 5.50 | 35 | Italy | 4.37 | 35 |
| Latvia | 5.02 | 36 | Latvia | 5.48 | 36 | Slovenia | 4.27 | 36 |
| Poland | 4.90 | 37 | Poland | 5.46 | 37 | South Africa | 4.27 | 37 |
| Brazil | 4.86 | 38 | Argentina | 5.31 | 38 | Egypt | 4.24 | 38 |
| Argentina | 4.84 | 39 | Mauritius | 5.29 | 39 | Uruguay | 4.21 | 39 |
| South Africa | 4.80 | 40 | Lithuania | 5.22 | 40 | Jamaica | 4.11 | 40 |
| Mauritius | 4.77 | 41 | Costa Rica | 5.15 | 41 | Latvia | 4.09 | 41 |
| Costa Rica | 4.69 | 42 | Trinidad and Tobago | 5.11 | 42 | Philippines | 4.07 | 42 |
| Lithuania | 4.67 | 43 | South Africa | 5.07 | 43 | China | 3.96 | 43 |
| Trinidad and Tobago | 4.64 | 44 | Turkey | 5.05 | 44 | Colombia | 3.95 | 44 |
| Turkey | 4.61 | 45 | Brazil | 5.04 | 45 | Thailand | 3.94 | 45 |
| Mexico | 4.60 | 46 | Mexico | 4.99 | 46 | El Salvador | 3.93 | 46 |
| Jamaica | 4.57 | 47 | Bulgaria | 4.94 | 47 | Argentina | 3.92 | 47 |
| Venezuela | 4.51 | 48 | Venezuela | 4.85 | 48 | Panama | 3.86 | 48 |
| Panama | 4.48 | 49 | Romania | 4.84 | 49 | Dominican Republic | 3.86 | 49 |
| Bulgaria | 4.45 | 50 | Jamaica | 4.81 | 50 | Venezuela | 3.84 | 50 |
| Colombia | 4.40 | 51 | Panama | 4.79 | 51 | Mexico | 3.82 | 51 |
| Jordan | 4.26 | 52 | Russia | 4.66 | 52 | Costa Rica | 3.78 | 52 |
| Thailand | 4.23 | 53 | Colombia | 4.62 | 53 | Poland | 3.77 | 53 |
| Russia | 4.16 | 54 | Thailand | 4.37 | 54 | Turkey | 3.75 | 54 |
| Philippines | 4.12 | 55 | Peru | 4.23 | 55 | Mauritius | 3.73 | 55 |
| China | 4.04 | 56 | Philippines | 4.14 | 56 | Greece | 3.71 | 56 |
| Dominican Republic | 4.02 | 57 | Jordan | 4.10 | 57 | Trinidad and Tobago | 3.71 | 57 |
| Peru | 4.01 | 58 | Dominican Republic | 4.10 | 58 | Lithuania | 3.58 | 58 |
| Romania | 4.00 | 59 | China | 4.08 | 59 | Peru | 3.57 | 59 |
| El Salvador | 3.93 | 60 | Ukraine | 4.01 | 60 | Bulgaria | 3.48 | 60 |
| Egypt | 3.82 | 61 | El Salvador | 3.92 | 61 | Indonesia | 3.44 | 61 |
| Ukraine | 3.77 | 62 | Paraguay | 3.90 | 62 | Sri Lanka | 3.43 | 62 |
| Ecuador | 3.62 | 63 | Ecuador | 3.88 | 63 | Ukraine | 3.29 | 63 |
| Paraguay | 3.56 | 64 | Bolivia | 3.87 | 64 | Vietnam | 3.24 | 64 |
| Bolivia | 3.52 | 65 | Guatemala | 3.77 | 65 | Nigeria | 3.17 | 65 |
| Guatemala | 3.50 | 66 | Egypt | 3.61 | 66 | Russia | 3.15 | 66 |
| Indonesia | 3.44 | 67 | Indonesia | 3.44 | 67 | Ecuador | 3.11 | 67 |
| India | 3.43 | 68 | Sri Lanka | 3.41 | 68 | Nicaragua | 3.05 | 68 |
| Sri Lanka | 3.42 | 69 | Honduras | 3.36 | 69 | Guatemala | 2.97 | 69 |
| Honduras | 3.22 | 70 | Nicaragua | 3.29 | 70 | Bangladesh | 2.94 | 70 |
| Nicaragua | 3.21 | 71 | Zimbabwe | 3.21 | 71 | Zimbabwe | 2.94 | 71 |
| Zimbabwe | 3.12 | 72 | India | 2.86 | 72 | Honduras | 2.92 | 72 |
| Vietnam | 2.84 | 73 | Vietnam | 2.64 | 73 | Paraguay | 2.89 | 73 |
| Nigeria | 2.16 | 74 | Nigeria | 1.66 | 74 | Bolivia | 2.80 | 74 |
| Bangladesh | 1.96 | 75 | Bangladesh | 1.47 | 75 | Romania | 2.34 | 75 |

third-highest at 80 percent. Finland, the top European country in this regard, is next at 74 percent. Hong Kong has the lowest ratio among core economies at 22 percent, anchoring it in a low innovation ranking. On the patent measures, the United States and Japan are clearly the world leaders, with 309 and 246 respective US patents granted per million people in 2000. Canada ranks 9th among patent recipients, with 111 per million population in the same year. On the Survey measures of innovation, Finland comes out on top, followed closely by the United States and Sweden. Italy, New Zealand, and Korea meanwhile fill out the bottom side of the same scale, indicating low levels of firm-based innovation and university-business research collaboration in those countries.

Information and communications technology subindex

The ICT subindex is comprised of 2/3 hard data and 1/3 Survey data. The hard data include simple per capita measures of telephone lines, personal computers, Internet usage, Internet hosts, and mobile phone users, as published by the International Telecommunications Union. These data were again combined into an overall 1-to-7 scale that was in turn merged with Survey questions regarding ICT usage and government policies, as outlined in Box 2.

Table 5 shows the ICT subindex scores, with the Scandinavian countries occupying three of the top six positions. Finland takes the top spot by virtue of its highest average score on the Survey questions along with a high ranking on the hard measures of ICT, reflecting the overall prioritization of communications technology in that economy. Notably, Norway has the highest combined score on the hard ICT variables, followed closely by Iceland and Sweden. Last among the core economies on the overall ICT scores are Israel, Japan, and Italy, each of which have a low ranking among the core on hard measures of connectivity. These three countries score particularly poorly, however, on the survey measures of ICT, suggesting less of an emphasis on ICT in the public policies of these economies.

To form the overall core-economy technology index, the ICT subindex is averaged with the innovation subindex. The results are presented in Table 6A, which lists technology rankings for the core separately from the non-core. The United States ranks as the global technological leader, followed by Canada, Finland, and Taiwan. Note that this ranking represents a broad measure of technology, reflecting current ICT infrastructure, recent history of scientific innovation and product innovation, human resource potential for future innovation, and the policy environment for future scientific and product discovery. Several western European economies, including Germany, France, Austria, and Belgium, are tightly clustered in the middle of the group, all lagging behind their Scandinavian neighbors. Impressively, Korea and Taiwan, two countries

that were not among the core in the 1980s, both rank among the top 8 economies on this measure in 2001. Singapore, with its large push to develop local technological capacity, ranks just behind France. Further behind are Hong Kong and Ireland, two economies that, despite their fast growth, have not yet reached the top global tier of technological innovation processes.

Technology in the non-core economies

For countries that have not yet reached the stage of global technological competitiveness, one needs a measure of how quickly they are absorbing and implementing internationally competitive production technologies from the most sophisticated economies. To do this, we used the United Nations' COMTRADE database and also Statistics Canada's *World Trade Analyzer* to create a variable that measures the extent of manufacturing technology in the export structure of non-core economies. Countries with a technology-based export sector are judged to be more adept, in general, at absorbing technologies from abroad than economies with a primary commodity-based export structure. Regression analysis confirms strongly that, all other things equal, primary commodity-based economies indeed grew less rapidly in the past decade (and since 1970) than did more technology-based export economies.

To construct the technology-in-trade variable, we first calculated the average value of non-primary product exports as a proportion of GDP throughout the 1990s. To ensure the broadest possible reference base, we calculated this not just for the GCR sample, but also for the more than 100 countries for which detailed international trade data are available. Non-primary exports were defined to include most processed textiles and manufactured goods, but not mining products or processed raw materials.^{xi} We then regressed the natural logarithm of the average 1990s value of non-primary exports as a percent of GDP on the natural logarithm of national population in the same period, and then converted the residual to a 1-to-7 scale, as with our other hard data.^{xii} This *trade residual* term is important because small economies are inherently more open to trade, so when measuring extent of trade one needs to control for the size of an economy to understand the underlying variation in its trade performance.

The technology transfer subindex was created by averaging the technology-in-trade variable with a Survey question on the extent to which foreign direct investment "is an important source of new technology." This technology transfer subindex was then given a 3/8 weight against a 1/8 weight for the innovation subindex and a 4/8 weight for the ICT subindex to create non-core values on the overall technology index. The rationale for the various technology weightings merits a brief explanation. In our simple least squares regression analysis, we found that,

Table 6A: Technological core economies

| Country | Technology Index | Core Rank | Country | Innovation Subindex | Core Rank | Country | ICT Subindex | Core Rank |
|----------------|------------------|-----------|----------------|---------------------|-----------|----------------|--------------|-----------|
| United States | 6.42 | 1 | Canada | 6.51 | 1 | Finland | 6.58 | 1 |
| Canada | 6.37 | 2 | United States | 6.50 | 2 | Iceland | 6.47 | 2 |
| Finland | 6.35 | 3 | Taiwan | 6.37 | 3 | Sweden | 6.45 | 3 |
| Taiwan | 6.19 | 4 | Finland | 6.12 | 4 | Singapore | 6.40 | 4 |
| Australia | 6.05 | 5 | Australia | 5.96 | 5 | United States | 6.34 | 5 |
| Sweden | 5.81 | 6 | Korea | 5.46 | 6 | Norway | 6.28 | 6 |
| Norway | 5.77 | 7 | Norway | 5.27 | 7 | Denmark | 6.25 | 7 |
| Korea | 5.66 | 8 | Belgium | 5.19 | 8 | Canada | 6.23 | 8 |
| United Kingdom | 5.56 | 9 | Sweden | 5.17 | 9 | Netherlands | 6.20 | 9 |
| New Zealand | 5.55 | 10 | New Zealand | 5.11 | 10 | Hong Kong SAR | 6.19 | 10 |
| Denmark | 5.54 | 11 | United Kingdom | 5.02 | 11 | Australia | 6.15 | 11 |
| Belgium | 5.54 | 12 | France | 5.01 | 12 | Switzerland | 6.10 | 12 |
| Netherlands | 5.54 | 13 | Germany | 4.98 | 13 | Austria | 6.09 | 13 |
| Germany | 5.49 | 14 | Netherlands | 4.88 | 14 | United Kingdom | 6.09 | 14 |
| Austria | 5.45 | 15 | Denmark | 4.83 | 15 | Germany | 6.01 | 15 |
| France | 5.44 | 16 | Austria | 4.81 | 16 | Taiwan | 6.01 | 16 |
| Singapore | 5.44 | 17 | Japan | 4.74 | 17 | New Zealand | 5.99 | 17 |
| Iceland | 5.41 | 18 | Israel | 4.71 | 18 | Ireland | 5.97 | 18 |
| Japan | 5.28 | 19 | Singapore | 4.48 | 19 | Belgium | 5.90 | 19 |
| Switzerland | 5.27 | 20 | Italy | 4.47 | 20 | France | 5.87 | 20 |
| Israel | 5.27 | 21 | Switzerland | 4.44 | 21 | Korea | 5.87 | 21 |
| Ireland | 5.20 | 22 | Ireland | 4.43 | 22 | Israel | 5.83 | 22 |
| Italy | 5.01 | 23 | Iceland | 4.35 | 23 | Japan | 5.82 | 23 |
| Hong Kong SAR | 4.93 | 24 | Hong Kong SAR | 3.67 | 24 | Italy | 5.55 | 24 |

Table 6B: Technological transition economies

| Country | Technology Index | Rank Among Non-core Economies | Country | Innovation Subindex | Rank Among Non-core Economies | Country | ICT Subindex | Rank Among Non-core Economies | Country | Technology Transfer Subindex | Rank Among Non-core Economies |
|---------------|------------------|-------------------------------|---------------|---------------------|-------------------------------|---------------|--------------|-------------------------------|---------------|------------------------------|-------------------------------|
| Singapore | 6.26 | 1 | Singapore | 4.48 | 1 | Singapore | 6.40 | 1 | Singapore | 6.67 | 1 |
| Ireland | 5.96 | 2 | Ireland | 4.43 | 3 | Hong Kong SAR | 6.19 | 2 | Ireland | 6.46 | 3 |
| Hong Kong SAR | 5.93 | 3 | Hong Kong SAR | 3.67 | 8 | Ireland | 5.97 | 3 | Hong Kong SAR | 6.32 | 4 |

among the technology variables, ICT was linked to approximately half of the variation in average annual growth, so we gave it a corresponding weight in the technology index. Calculating the remainder of technology transfer and innovation subindexes was slightly more complicated. Using a statistical tool known as nonlinear least squares, we estimated the relative weights on innovation relative to technology transfer, and found an almost perfectly symmetrical result for the core and non-core. With the average annual 1992 to 2000 change in the per capita GDP GAP still as the dependent variable, for the core economies we found our measure of innovation to merit a weighting of 0.85 relative to technology transfer. This result and other statistical tests not reported here supported our emphasis on innovation in the core technology index.^{xiii} For the non-core economies, we found that technology transfer merited a weighting of 0.81 relative to innovation. Given the small sample, the relatively short time period covered in this assessment, the other variables affecting growth that are not included in our model, and our general hesitation to place too much emphasis on any single factor in the development process, we scale back the coefficient on technology transfer to 0.75 in our GCR calculations.

In Table 6B, we present the technology index results obtained for the technological transition economies—Hong Kong SAR, Ireland, and Singapore—when they are considered non-core economies. In clear contrast to their rankings on the innovation-based core technology index, these economies score significantly ahead of the rest of the non-core economies when a technology transfer approach is used to assess their technological competitiveness. In Table 6C, we rank only the non-core economies as defined by 2000 patent levels. Notable on this list are the countries ranked 1st through 3rd: Estonia, the Czech Republic, and Hungary. Each of these economies has adopted manufacturing-based export-led growth strategies, and the success of those policies is clearly reflected in their index scores.

Portugal and Spain are also of significant interest. Both of these economies have enjoyed average real per capita growth rates of more than 3 percent over the past five years, but neither has been a tremendously successful innovator. Neither has a sufficient patenting rate to be included among the European core economies, and neither ranks among the top 15 non-core skilled manufacturing exporters. Through their close links with the rest of Western Europe, these economies do have high ICT scores, results that bolster their overall technology scores.

Table 6C: Technological non-core economies

| Country | Technology Index | Non-core Rank | Country | Innovation Subindex | Non-core Rank | Country | ICT Subindex | Non-core Rank | Country | Technology Transfer Subindex | Non-core Rank |
|---------------------|------------------|---------------|---------------------|---------------------|---------------|---------------------|--------------|---------------|---------------------|------------------------------|---------------|
| Estonia | 5.68 | 1 | Spain | 4.48 | 1 | Estonia | 5.88 | 1 | Malaysia | 6.54 | 1 |
| Czech Republic | 5.39 | 2 | Greece | 3.95 | 2 | Portugal | 5.68 | 2 | Hungary | 6.19 | 2 |
| Hungary | 5.39 | 3 | Estonia | 3.94 | 3 | Spain | 5.63 | 3 | Czech Republic | 6.03 | 3 |
| Malaysia | 5.36 | 4 | Slovenia | 3.80 | 4 | Slovenia | 5.47 | 4 | Estonia | 5.98 | 4 |
| Portugal | 5.27 | 5 | Russia | 3.72 | 5 | Czech Republic | 5.45 | 5 | Costa Rica | 5.84 | 5 |
| Spain | 5.23 | 6 | Argentina | 3.61 | 6 | Hungary | 5.30 | 6 | Slovak Republic | 5.81 | 6 |
| Slovak Republic | 5.18 | 7 | Portugal | 3.58 | 7 | Slovak Republic | 5.26 | 7 | Philippines | 5.65 | 7 |
| Slovenia | 5.18 | 8 | Costa Rica | 3.51 | 8 | Chile | 5.20 | 8 | Thailand | 5.56 | 8 |
| Costa Rica | 4.97 | 9 | Ukraine | 3.48 | 9 | Malaysia | 5.16 | 9 | Mexico | 5.53 | 9 |
| Latvia | 4.83 | 10 | Chile | 3.41 | 10 | Uruguay | 5.15 | 10 | Mauritius | 5.52 | 10 |
| Poland | 4.75 | 11 | Hungary | 3.30 | 11 | Greece | 5.14 | 11 | Dominican Republic | 5.50 | 11 |
| Mexico | 4.70 | 12 | Latvia | 3.29 | 12 | Latvia | 5.02 | 12 | Romania | 5.37 | 12 |
| Mauritius | 4.67 | 13 | Panama | 3.24 | 13 | Poland | 4.90 | 13 | Portugal | 5.28 | 13 |
| Greece | 4.62 | 14 | Czech Republic | 3.24 | 14 | Brazil | 4.86 | 14 | Slovenia | 5.24 | 14 |
| Thailand | 4.54 | 15 | Bulgaria | 3.19 | 15 | Argentina | 4.84 | 15 | Poland | 5.15 | 15 |
| Philippines | 4.53 | 16 | South Africa | 3.10 | 16 | South Africa | 4.80 | 16 | Vietnam | 5.12 | 16 |
| Lithuania | 4.46 | 17 | Uruguay | 3.03 | 17 | Mauritius | 4.77 | 17 | Latvia | 5.08 | 17 |
| Chile | 4.45 | 18 | Venezuela | 3.01 | 18 | Costa Rica | 4.69 | 18 | Sri Lanka | 5.01 | 18 |
| Jamaica | 4.43 | 19 | Poland | 2.98 | 19 | Lithuania | 4.67 | 19 | Jamaica | 4.96 | 19 |
| Dominican Republic | 4.42 | 20 | Slovak Republic | 2.97 | 20 | Trinidad and Tobago | 4.64 | 20 | Spain | 4.96 | 20 |
| Uruguay | 4.40 | 21 | Philippines | 2.80 | 21 | Turkey | 4.61 | 21 | Indonesia | 4.76 | 21 |
| South Africa | 4.39 | 22 | Dominican Republic | 2.78 | 22 | Mexico | 4.60 | 22 | Lithuania | 4.74 | 22 |
| Romania | 4.33 | 23 | Thailand | 2.77 | 23 | Jamaica | 4.57 | 23 | China | 4.73 | 23 |
| Argentina | 4.33 | 24 | Lithuania | 2.76 | 24 | Venezuela | 4.51 | 24 | Bulgaria | 4.51 | 24 |
| Brazil | 4.33 | 25 | Brazil | 2.66 | 25 | Panama | 4.48 | 25 | Turkey | 4.45 | 25 |
| Bulgaria | 4.32 | 26 | Malaysia | 2.64 | 26 | Bulgaria | 4.45 | 26 | Bangladesh | 4.41 | 26 |
| Turkey | 4.28 | 27 | Peru | 2.62 | 27 | Colombia | 4.40 | 27 | El Salvador | 4.37 | 27 |
| Trinidad and Tobago | 4.10 | 28 | Mexico | 2.61 | 28 | Jordan | 4.26 | 28 | South Africa | 4.27 | 28 |
| China | 4.05 | 29 | Romania | 2.51 | 29 | Thailand | 4.23 | 29 | Jordan | 4.21 | 29 |
| Jordan | 3.99 | 30 | Bolivia | 2.50 | 30 | Russia | 4.16 | 30 | Brazil | 4.17 | 30 |
| Venezuela | 3.98 | 31 | Egypt | 2.47 | 31 | Philippines | 4.12 | 31 | Greece | 4.15 | 31 |
| Colombia | 3.92 | 32 | Turkey | 2.45 | 32 | China | 4.04 | 32 | India | 4.14 | 32 |
| Panama | 3.89 | 33 | Colombia | 2.39 | 33 | Dominican Republic | 4.02 | 33 | Trinidad and Tobago | 4.09 | 33 |
| El Salvador | 3.86 | 34 | Jamaica | 2.29 | 34 | Peru | 4.01 | 34 | Argentina | 3.88 | 34 |
| Sri Lanka | 3.82 | 35 | Ecuador | 2.25 | 35 | Romania | 4.00 | 35 | Bolivia | 3.86 | 35 |
| Russia | 3.78 | 36 | Jordan | 2.25 | 36 | El Salvador | 3.93 | 36 | Uruguay | 3.85 | 36 |
| Indonesia | 3.76 | 37 | India | 2.16 | 37 | Egypt | 3.82 | 37 | Honduras | 3.84 | 37 |
| Peru | 3.71 | 38 | El Salvador | 2.08 | 38 | Ukraine | 3.77 | 38 | Chile | 3.80 | 38 |
| Ukraine | 3.68 | 39 | China | 2.07 | 39 | Ecuador | 3.62 | 39 | Colombia | 3.78 | 39 |
| Egypt | 3.59 | 40 | Indonesia | 2.06 | 40 | Paraguay | 3.56 | 40 | Zimbabwe | 3.78 | 40 |
| Vietnam | 3.56 | 41 | Guatemala | 2.00 | 41 | Bolivia | 3.52 | 41 | Nicaragua | 3.69 | 41 |
| India | 3.54 | 42 | Honduras | 1.96 | 42 | Guatemala | 3.50 | 42 | Peru | 3.67 | 42 |
| Bolivia | 3.52 | 43 | Trinidad and Tobago | 1.94 | 43 | Indonesia | 3.44 | 43 | Guatemala | 3.66 | 43 |
| Guatemala | 3.38 | 44 | Nicaragua | 1.83 | 44 | India | 3.43 | 44 | Egypt | 3.66 | 44 |
| Ecuador | 3.33 | 45 | Sri Lanka | 1.81 | 45 | Sri Lanka | 3.42 | 45 | Ukraine | 3.63 | 45 |
| Honduras | 3.29 | 46 | Vietnam | 1.77 | 46 | Honduras | 3.22 | 46 | Venezuela | 3.60 | 46 |
| Nicaragua | 3.21 | 47 | Zimbabwe | 1.75 | 47 | Nicaragua | 3.21 | 47 | Panama | 3.32 | 47 |
| Zimbabwe | 3.20 | 48 | Paraguay | 1.74 | 48 | Zimbabwe | 3.12 | 48 | Ecuador | 3.31 | 48 |
| Paraguay | 2.98 | 49 | Mauritius | 1.71 | 49 | Vietnam | 2.84 | 49 | Russia | 3.30 | 49 |
| Bangladesh | 2.83 | 50 | Nigeria | 1.66 | 50 | Nigeria | 2.16 | 50 | Nigeria | 3.06 | 50 |
| Nigeria | 2.44 | 51 | Bangladesh | 1.57 | 51 | Bangladesh | 1.96 | 51 | Paraguay | 2.62 | 51 |

Other interesting stories are found further down the non-core technology rankings. With the exception of Mexico, Uruguay, and the Dominican Republic, most Latin American economies rank among the bottom half of the list. Argentina, one of the wealthiest countries in the non-core group, ranks 24th, just ahead of Brazil, which has a per capita GDP (PPP) nearly 50 percent smaller. Like much of Latin America, Argentina is an economy that needs to develop its technological base in order to grow.

Public institutions

Although technology provides a key pillar of economic growth, so too does the quality of the public institutions. Institutions are crucial for their role in ensuring the protection of property rights, the objective resolution of contract and other legal disputes, efficiency of government spending in public services, and transparency in all levels of government.^{xiv} All of these factors underpin the division of labor, and therefore the efficiency of resource allocation. They are also fundamental in establishing the societal stability required for growth. Although the quality of institutions has been difficult to measure historically, in recent years the *Global Competitiveness Report's* Executive Opinion Survey has played an important role in developing new techniques to quantify institutional quality across countries.^{xv}

As with technology, institutions play different roles at different stages of economic development. Our regressions have shown evidence that once a threshold of institutional development has been met, it is very difficult to detect the growth effects of further modest improvements in institutional quality. (This is of course a working hypothesis that could be disproved with the development of more sophisticated measures of institutional quality.) Our regressions also show that institutional quality is closely linked to economic growth in the non-core countries. This is why we place a weight of 1/3 on the public institutions index in the non-core GCI calculations and a weight of only 1/4 in the core GCI calculations.

Box 3: Public institutions index

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

contracts and law subindex Survey questions

- 6.01 Is the judiciary independent from the government and/or parties to dispute?
- 6.02 Are financial assets and wealth clearly delineated and well protected by law?
- 6.04 Is your government neutral among bidders when deciding upon public contracts?
- 6.12 Does organized crime impose significant costs on business?

corruption subindex Survey questions

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

The public institutions index (PII) is based entirely on Survey data and has two main components, as outlined in Box 3. The first is a measure of contract and law enforcement. It consists of economies' average score on questions concerning neutrality in government procurement, judicial independence, clear delineation and respect for property rights, and costs related to organized crime. The second element of the public institutions index is a subindex of corruption, or the abuse of public service positions for personal financial gain. This subindex measures the pervasiveness of bribery in three key public service areas: imports and exports, connection to public utilities, and tax collection.

Results for the PII and its main components are listed in Table 7. Finland, Iceland, Denmark, and New Zealand rank as the countries with the four top scores for overall institutional quality. Bangladesh, Paraguay, Nigeria, and

Honduras have the lowest scores. It is further interesting to note the countries that score significantly better or worse than one might expect based on their GDP per capita. The Czech Republic and Argentina, for instance, score 53th and 55th, despite the fact that they have the 29th and 31st highest respective incomes per capita in the world. And even though it has grown to be the 24th richest economy today, Korea still rates almost as poorly at 44th. On the positive side, Egypt rates 33rd on the PII, contrasting with its 64th place ranking in per capita wealth. Jordan also ranks at 28th and Uruguay 31st on the PII, compared to 58th and 41st, respectively, on income per person.

Looking at the subindexes of the PII, Finland, Iceland, and Denmark cover the top three places on *both* the contracts and law measure and the corruption subindexes. These closely linked rankings suggest that the three countries have strong overall public and legal institutions relative to the rest of the world. Indeed, looking through the rest of the sample in Table 7, one finds that for the most part there is a strong similarity between countries' rankings on the two subindexes. This suggests that the subcomponents are capturing similar information about the rule of law in society.

Some important information may also be found when countries have significantly different rankings on the two subindexes. Among the high-income countries, for instance, Canada ranks 6th on corruption but 19th on contracts and law. Switzerland's case is nearly the exact opposite, rating 6th on contracts and law but 20th on corruption.

Lower down the list, at income levels where our research shows that differences in institutional quality play a much larger role in economic development, is where the most important information seems to be found. Consider Egypt. Its legal system of contracts and government neutrality scores in 24th place, which is high relative to its income level. Unfortunately, corruption seems to be weakening its institutions tremendously, according to the views of the business community, as indicated by its 54th place ranking on that subindex. India shares a similar problem, ranking 33rd on contracts and law but right near the bottom, at 66th, on corruption. Likewise, Thailand ranks 34th and 59th, Romania 39th and 64th, and Vietnam 49th and 71st on the respective subindexes. These are countries where effective anti-corruption measures could dramatically improve the prospects for growth.

Conversely, in many instances corruption is much less of a problem than weaknesses in contracts and law. Lithuania achieves a high score at 17th on frequency of bribery, but it ranks near the bottom at 59th on the measure of law and property rights. The pattern is similar in Peru (30th and 60th), Bulgaria (34th and 64th), and Colombia (40th and 67th). Dramatic institutional reforms

Table 7: Public institutions index

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

| Country | Public Institutions Index | Rank | Country | Contracts and Law Subindex | Rank | Country | Corruption Subindex | Rank |
|---------------------|---------------------------|------|---------------------|----------------------------|------|---------------------|---------------------|------|
| Finland | 6.59 | 1 | Finland | 6.35 | 1 | Iceland | 6.98 | 1 |
| Iceland | 6.56 | 2 | Denmark | 6.21 | 2 | Finland | 6.83 | 2 |
| Denmark | 6.42 | 3 | Iceland | 6.14 | 3 | Denmark | 6.62 | 3 |
| New Zealand | 6.33 | 4 | Netherlands | 6.09 | 4 | New Zealand | 6.61 | 4 |
| Netherlands | 6.29 | 5 | New Zealand | 6.05 | 5 | Singapore | 6.56 | 5 |
| Singapore | 6.27 | 6 | Switzerland | 5.97 | 6 | Canada | 6.52 | 6 |
| Sweden | 6.19 | 7 | Singapore | 5.97 | 7 | Sweden | 6.51 | 7 |
| Australia | 6.17 | 8 | Germany | 5.89 | 8 | Australia | 6.49 | 8 |
| United Kingdom | 6.14 | 9 | Austria | 5.89 | 9 | Netherlands | 6.48 | 9 |
| Hong Kong SAR | 6.01 | 10 | Sweden | 5.87 | 10 | United Kingdom | 6.42 | 10 |
| Canada | 6.01 | 11 | Australia | 5.86 | 11 | United States | 6.38 | 11 |
| United States | 6.01 | 12 | United Kingdom | 5.86 | 12 | Hong Kong SAR | 6.38 | 12 |
| Switzerland | 5.99 | 13 | Israel | 5.78 | 13 | Chile | 6.35 | 13 |
| Israel | 5.98 | 14 | Ireland | 5.71 | 14 | Japan | 6.29 | 14 |
| Austria | 5.98 | 15 | France | 5.69 | 15 | Norway | 6.28 | 15 |
| Norway | 5.95 | 16 | Hong Kong SAR | 5.64 | 16 | Israel | 6.18 | 16 |
| Germany | 5.93 | 17 | United States | 5.64 | 17 | Lithuania | 6.07 | 17 |
| Ireland | 5.87 | 18 | Norway | 5.62 | 18 | Austria | 6.07 | 18 |
| Japan | 5.76 | 19 | Canada | 5.50 | 19 | Ireland | 6.02 | 19 |
| France | 5.72 | 20 | Belgium | 5.41 | 20 | Switzerland | 6.01 | 20 |
| Chile | 5.69 | 21 | Jordan | 5.27 | 21 | Germany | 5.98 | 21 |
| Belgium | 5.67 | 22 | Spain | 5.23 | 22 | Taiwan | 5.98 | 22 |
| Spain | 5.47 | 23 | Japan | 5.23 | 23 | Belgium | 5.92 | 23 |
| Taiwan | 5.30 | 24 | Egypt | 5.15 | 24 | France | 5.75 | 24 |
| Portugal | 5.25 | 25 | Portugal | 5.06 | 25 | Spain | 5.71 | 25 |
| Hungary | 5.20 | 26 | Chile | 5.03 | 26 | Hungary | 5.69 | 26 |
| Italy | 5.05 | 27 | Uruguay | 5.01 | 27 | Italy | 5.56 | 27 |
| Jordan | 5.04 | 28 | Mauritius | 4.91 | 28 | Portugal | 5.44 | 28 |
| Estonia | 4.99 | 29 | Hungary | 4.70 | 29 | Estonia | 5.42 | 29 |
| Slovenia | 4.90 | 30 | Taiwan | 4.62 | 30 | Peru | 5.31 | 30 |
| Uruguay | 4.89 | 31 | Estonia | 4.55 | 31 | Slovenia | 5.29 | 31 |
| Mauritius | 4.79 | 32 | Italy | 4.55 | 32 | South Africa | 5.21 | 32 |
| Egypt | 4.76 | 33 | India | 4.54 | 33 | Slovak Republic | 5.13 | 33 |
| Lithuania | 4.70 | 34 | Thailand | 4.53 | 34 | Bulgaria | 5.12 | 34 |
| South Africa | 4.69 | 35 | Costa Rica | 4.52 | 35 | Trinidad and Tobago | 5.10 | 35 |
| Trinidad and Tobago | 4.63 | 36 | Slovenia | 4.50 | 36 | Malaysia | 4.97 | 36 |
| Costa Rica | 4.56 | 37 | Greece | 4.44 | 37 | Jordan | 4.81 | 37 |
| Slovak Republic | 4.54 | 38 | Poland | 4.32 | 38 | Uruguay | 4.78 | 38 |
| Malaysia | 4.53 | 39 | Romania | 4.30 | 39 | Latvia | 4.73 | 39 |
| Greece | 4.50 | 40 | South Africa | 4.17 | 40 | Colombia | 4.73 | 40 |
| Poland | 4.40 | 41 | Trinidad and Tobago | 4.15 | 41 | Jamaica | 4.70 | 41 |
| Thailand | 4.36 | 42 | Malaysia | 4.10 | 42 | Mauritius | 4.67 | 42 |
| Jamaica | 4.30 | 43 | Korea | 4.09 | 43 | Costa Rica | 4.60 | 43 |
| Korea | 4.25 | 44 | Turkey | 3.98 | 44 | Greece | 4.57 | 44 |
| Peru | 4.24 | 45 | Brazil | 3.97 | 45 | Poland | 4.48 | 45 |
| Turkey | 4.21 | 46 | Slovak Republic | 3.95 | 46 | El Salvador | 4.47 | 46 |
| Brazil | 4.21 | 47 | Jamaica | 3.89 | 47 | Dominican Republic | 4.46 | 47 |
| Latvia | 4.18 | 48 | Czech Republic | 3.85 | 48 | China | 4.46 | 48 |
| India | 4.11 | 49 | Vietnam | 3.77 | 49 | Brazil | 4.45 | 49 |
| China | 4.10 | 50 | Argentina | 3.75 | 50 | Turkey | 4.44 | 50 |
| Bulgaria | 4.07 | 51 | China | 3.74 | 51 | Korea | 4.41 | 51 |
| Romania | 4.06 | 52 | Sri Lanka | 3.66 | 52 | Mexico | 4.40 | 52 |
| Czech Republic | 4.04 | 53 | Latvia | 3.62 | 53 | Russia | 4.38 | 53 |
| Dominican Republic | 4.02 | 54 | Dominican Republic | 3.59 | 54 | Egypt | 4.37 | 54 |
| Argentina | 4.01 | 55 | Mexico | 3.58 | 55 | Argentina | 4.28 | 55 |
| Mexico | 3.99 | 56 | Philippines | 3.54 | 56 | Bolivia | 4.26 | 56 |
| Colombia | 3.85 | 57 | Panama | 3.41 | 57 | Panama | 4.26 | 57 |
| Sri Lanka | 3.84 | 58 | Indonesia | 3.35 | 58 | Czech Republic | 4.23 | 58 |
| Panama | 3.83 | 59 | Lithuania | 3.34 | 59 | Thailand | 4.19 | 59 |
| El Salvador | 3.79 | 60 | Peru | 3.16 | 60 | Guatemala | 4.12 | 60 |
| Russia | 3.68 | 61 | El Salvador | 3.11 | 61 | Venezuela | 4.05 | 61 |
| Bolivia | 3.67 | 62 | Bolivia | 3.08 | 62 | Sri Lanka | 4.03 | 62 |
| Vietnam | 3.58 | 63 | Zimbabwe | 3.01 | 63 | Ecuador | 3.91 | 63 |
| Philippines | 3.53 | 64 | Bulgaria | 3.01 | 64 | Romania | 3.82 | 64 |
| Venezuela | 3.40 | 65 | Nigeria | 2.98 | 65 | Nicaragua | 3.76 | 65 |
| Indonesia | 3.35 | 66 | Russia | 2.97 | 66 | India | 3.67 | 66 |
| Nicaragua | 3.33 | 67 | Colombia | 2.96 | 67 | Honduras | 3.64 | 67 |
| Ecuador | 3.30 | 68 | Nicaragua | 2.91 | 68 | Zimbabwe | 3.58 | 68 |
| Zimbabwe | 3.30 | 69 | Bangladesh | 2.84 | 69 | Philippines | 3.51 | 69 |
| Guatemala | 3.22 | 70 | Ukraine | 2.84 | 70 | Ukraine | 3.47 | 70 |
| Ukraine | 3.15 | 71 | Venezuela | 2.76 | 71 | Vietnam | 3.39 | 71 |
| Honduras | 3.01 | 72 | Paraguay | 2.72 | 72 | Indonesia | 3.35 | 72 |
| Nigeria | 2.84 | 73 | Ecuador | 2.70 | 73 | Paraguay | 2.77 | 73 |
| Paraguay | 2.75 | 74 | Honduras | 2.37 | 74 | Nigeria | 2.70 | 74 |
| Bangladesh | 2.48 | 75 | Guatemala | 2.31 | 75 | Bangladesh | 2.13 | 75 |

are still needed in these countries in order to advance economic development, but on the more optimistic side, the somewhat lower perceived extent of corruption may indicate an opening for increasing transparency and objectivity in key areas of governance and law.

Let us reiterate that these measures are not objective standards, but rather perceptions among business executives. We believe that governments should take these perceptions seriously, not just dispute their exactitude.^{xvi} These kinds of perception indexes, in our studies and in many other studies, have helped account for differences in economic growth, with countries with high perceived corruption suffering lower growth.

Macroeconomic environment

The third and final pillar of the GCI is formed by an index of the macroeconomic environment. This index has three main elements: hard data to measure the overall stability of a country's macro economy, Survey data to assess the short-term outlook of private agents in the economy, and a measure of the share of government expenditures as a percentage of GDP.

The hard data components of the macroeconomic stability subindex, as outlined in Box 4, include the real exchange rate relative to the United States,^{xvii} the interest rate spread between deposits and loans, the general government budget balance as a percent of GNP, consumer

price inflation in 2000, and the national savings rate. These variables, which as always are rescaled to 1-to-7 scores for index calculations, are each evenly weighted with two Survey questions, one asking about prospects for recession in the coming year and another asking about the tightening of credit over the past year.

Table 8 reviews the results of the macroeconomic stability subindex. Singapore, with its high savings rates, sound financial system, and strong history of fiscal responsibility, rates first again on this measure. Norway, which last year enjoyed a general government surplus of nearly 15 percent, ranks 2nd. Next are Finland, the Netherlands, Sweden, and Switzerland, each of which has healthy macroeconomic environments at the moment. The United States, largely due to its low savings rate and expectations of recession, has the lowest of all its subindex rankings here, placing 42nd in the sample. Most unstable are the economies with headline-grabbing fiscal histories in recent years, including Bolivia, Nicaragua, and Zimbabwe.

To calculate the overall macroeconomic environment index, the stability subindex is given a 1/2 weighting against the broad measure of a country's current macroeconomic situation provided by the *Institutional Investor's* country credit rating, which receives a 1/4 weight, and government expenditure as a percent of GNP, which also receives a 1/4 weight.^{xviii} Many studies have shown that high levels of government expenditure relative to GNP are associated with low economic growth.^{xix} This is probably because high rates of taxation are then required to pay for the government expenditures, and the high rates of taxation have a depressing effect on economic growth. The most heavily taxed region in the world, Western Europe, probably suffers a reduced rate of economic growth as a consequence.

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. This is the case, for example, in Guatemala, which has extremely low government spending—too low to meet even the basic health and education needs of the population. Higher levels of government spending, as in Western Europe, 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. These are difficult political, economic, philosophical tradeoffs. We hope in future studies to develop a more sophisticated evaluation of different types of government spending and their effects on competitiveness, stability, and other dimensions of economic performance.

Box 4: Macroeconomic environment index

macroeconomic
environment index = 1/2 macroeconomic stability subindex
+ 1/4 country credit rating in March 2001
+ 1/4 general government expenditure in 2000

Macroeconomic stability subindex

macroeconomic
stability subindex = 5/7 macroeconomic hard data
+ 2/7 macroeconomic survey data

Macroeconomic environment hard data

- 2.28 Inflation in 2000
- 2.30 Lending – borrowing interest rate spread in 2000
- 2.29 Real exchange rate relative to the United States in 2000 (1990–95 = 100)
- 2.24 General government surplus in 2000
- 2.26 National savings rate in 2000

Macroeconomic environment Survey questions

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

Table 8: Macroeconomic environment index

macroeconomic environment index = 1/2 stability subindex score + 1/4 country credit rating score + 1/4 government expenditure score

| Macroeconomic Environment Index Score | | | Macroeconomic Stability Subindex | | | Country Credit Rating | | | Government Expenditure Score | | |
|---------------------------------------|-------------|------|----------------------------------|----------|------|-----------------------|-------|------|------------------------------|-------|------|
| Country | Index Score | Rank | Country | Subindex | Rank | Country | Score | Rank | Country | Score | Rank |
| Singapore | 5.52 | 1 | Singapore | 5.37 | 1 | Switzerland | 7.00 | 1 | Guatemala | 7.00 | 1 |
| Ireland | 5.20 | 2 | Norway | 5.35 | 2 | Germany | 6.92 | 2 | Dominican Republic | 6.70 | 2 |
| Switzerland | 5.18 | 3 | Finland | 5.25 | 3 | Netherlands | 6.87 | 3 | Thailand | 6.34 | 3 |
| Hong Kong SAR | 5.12 | 4 | Netherlands | 5.13 | 4 | France | 6.83 | 4 | China | 6.29 | 4 |
| Norway | 5.08 | 5 | Sweden | 5.13 | 5 | United States | 6.82 | 5 | El Salvador | 6.17 | 5 |
| China | 5.04 | 6 | Switzerland | 5.13 | 6 | United Kingdom | 6.79 | 6 | Bangladesh | 6.13 | 6 |
| United States | 4.97 | 7 | Korea | 5.03 | 7 | Norway | 6.67 | 7 | Hong Kong SAR | 6.10 | 7 |
| Korea | 4.94 | 8 | Spain | 5.03 | 8 | Austria | 6.57 | 8 | Philippines | 6.07 | 8 |
| Netherlands | 4.88 | 9 | France | 5.01 | 9 | Canada | 6.48 | 9 | Venezuela | 5.77 | 9 |
| Finland | 4.82 | 10 | Italy | 4.98 | 10 | Denmark | 6.47 | 10 | Indonesia | 5.66 | 10 |
| Spain | 4.82 | 11 | Austria | 4.91 | 11 | Finland | 6.42 | 11 | Costa Rica | 5.65 | 11 |
| United Kingdom | 4.81 | 12 | Ireland | 4.91 | 12 | Japan | 6.40 | 12 | Mexico | 5.49 | 12 |
| Canada | 4.74 | 13 | Belgium | 4.90 | 13 | Belgium | 6.38 | 13 | Argentina | 5.39 | 13 |
| New Zealand | 4.70 | 14 | Canada | 4.89 | 14 | Sweden | 6.35 | 14 | Vietnam | 5.28 | 14 |
| Taiwan | 4.69 | 15 | China | 4.83 | 15 | Singapore | 6.29 | 15 | Mauritius | 5.22 | 15 |
| Thailand | 4.68 | 16 | Germany | 4.83 | 16 | Ireland | 6.29 | 16 | Korea | 5.20 | 16 |
| Australia | 4.68 | 17 | Hong Kong SAR | 4.77 | 17 | Spain | 6.19 | 17 | Chile | 5.06 | 17 |
| Japan | 4.66 | 18 | Denmark | 4.74 | 18 | Italy | 6.17 | 18 | Ecuador | 5.05 | 18 |
| Germany | 4.65 | 19 | Vietnam | 4.70 | 19 | Portugal | 5.97 | 19 | Peru | 5.05 | 18 |
| Malaysia | 4.59 | 20 | Trinidad and Tobago | 4.66 | 20 | Australia | 5.78 | 20 | Singapore | 5.03 | 20 |
| Chile | 4.56 | 21 | Nigeria | 4.65 | 21 | New Zealand | 5.62 | 21 | South Africa | 5.03 | 20 |
| France | 4.54 | 22 | Hungary | 4.64 | 22 | Taiwan | 5.56 | 22 | Sri Lanka | 5.03 | 20 |
| Italy | 4.53 | 23 | New Zealand | 4.61 | 23 | Iceland | 5.34 | 23 | Trinidad and Tobago | 4.92 | 23 |
| Belgium | 4.48 | 24 | Malaysia | 4.60 | 24 | Greece | 5.18 | 24 | Malaysia | 4.89 | 24 |
| Trinidad and Tobago | 4.48 | 25 | Greece | 4.60 | 25 | Hong Kong SAR | 4.86 | 25 | Brazil | 4.88 | 25 |
| Austria | 4.46 | 26 | United Kingdom | 4.60 | 26 | Chile | 4.76 | 26 | Paraguay | 4.82 | 26 |
| South Africa | 4.43 | 27 | Taiwan | 4.53 | 27 | Slovenia | 4.63 | 27 | Ireland | 4.71 | 27 |
| Philippines | 4.42 | 28 | South Africa | 4.53 | 28 | Korea | 4.51 | 28 | United States | 4.71 | 27 |
| Sweden | 4.40 | 29 | Japan | 4.52 | 29 | Israel | 4.49 | 29 | Bolivia | 4.66 | 29 |
| Mauritius | 4.34 | 30 | Russia | 4.52 | 30 | Czech Republic | 4.38 | 30 | Panama | 4.58 | 30 |
| Denmark | 4.28 | 31 | Brazil | 4.50 | 31 | Hungary | 4.35 | 31 | Colombia | 4.42 | 31 |
| Greece | 4.26 | 32 | Slovenia | 4.41 | 32 | Poland | 4.28 | 32 | Egypt | 4.33 | 32 |
| Brazil | 4.24 | 33 | Portugal | 4.41 | 33 | Malaysia | 4.25 | 33 | India | 4.29 | 33 |
| Iceland | 4.24 | 34 | Thailand | 4.39 | 34 | China | 4.22 | 34 | Nigeria | 4.29 | 33 |
| Portugal | 4.24 | 35 | Australia | 4.39 | 35 | Mexico | 4.13 | 35 | Lithuania | 4.22 | 35 |
| Mexico | 4.18 | 36 | Estonia | 4.39 | 36 | Estonia | 3.81 | 36 | Australia | 4.15 | 36 |
| Vietnam | 4.15 | 37 | Iceland | 4.33 | 37 | Mauritius | 3.74 | 37 | Taiwan | 4.12 | 37 |
| Hungary | 4.04 | 38 | Philippines | 4.28 | 38 | Trinidad and Tobago | 3.66 | 38 | Honduras | 4.08 | 38 |
| Slovenia | 4.02 | 39 | Indonesia | 4.26 | 39 | Uruguay | 3.65 | 39 | Jordan | 3.99 | 39 |
| Argentina | 3.99 | 40 | Chile | 4.20 | 40 | South Africa | 3.62 | 40 | New Zealand | 3.95 | 40 |
| Indonesia | 3.96 | 41 | Mauritius | 4.20 | 41 | Thailand | 3.59 | 41 | Jamaica | 3.86 | 41 |
| Costa Rica | 3.94 | 42 | United States | 4.17 | 42 | India | 3.40 | 42 | Uruguay | 3.84 | 42 |
| Estonia | 3.94 | 43 | Czech Republic | 4.12 | 43 | Egypt | 3.38 | 43 | Ukraine | 3.84 | 42 |
| Panama | 3.92 | 44 | Israel | 4.04 | 44 | Latvia | 3.25 | 44 | Russia | 3.69 | 44 |
| India | 3.88 | 45 | Latvia | 4.03 | 45 | Slovak Republic | 3.23 | 45 | Turkey | 3.61 | 45 |
| Dominican Republic | 3.87 | 46 | Jordan | 4.03 | 46 | Panama | 3.22 | 46 | Romania | 3.54 | 46 |
| El Salvador | 3.87 | 47 | Slovak Republic | 4.00 | 47 | Costa Rica | 3.14 | 47 | Nicaragua | 3.47 | 47 |
| Bangladesh | 3.81 | 48 | Poland | 3.98 | 48 | Lithuania | 3.11 | 48 | Switzerland | 3.45 | 48 |
| Czech Republic | 3.81 | 49 | Panama | 3.95 | 49 | Brazil | 3.09 | 49 | United Kingdom | 3.25 | 49 |
| Poland | 3.75 | 50 | India | 3.91 | 50 | Turkey | 3.09 | 49 | Japan | 3.22 | 50 |
| Egypt | 3.74 | 51 | Argentina | 3.88 | 51 | Philippines | 3.05 | 51 | Estonia | 3.18 | 51 |
| Guatemala | 3.73 | 52 | Ecuador | 3.75 | 52 | Colombia | 2.85 | 52 | Spain | 3.04 | 52 |
| Venezuela | 3.73 | 53 | Lithuania | 3.66 | 53 | Argentina | 2.79 | 53 | Latvia | 3.00 | 53 |
| Jordan | 3.69 | 54 | Egypt | 3.63 | 54 | El Salvador | 2.71 | 54 | Iceland | 2.98 | 54 |
| Nigeria | 3.68 | 55 | Bangladesh | 3.62 | 55 | Jordan | 2.70 | 55 | Bulgaria | 2.97 | 55 |
| Lithuania | 3.66 | 56 | Romania | 3.56 | 56 | Peru | 2.70 | 55 | Norway | 2.92 | 56 |
| Russia | 3.64 | 57 | Mexico | 3.55 | 57 | Venezuela | 2.49 | 57 | Poland | 2.74 | 57 |
| Peru | 3.62 | 58 | Costa Rica | 3.49 | 58 | Bulgaria | 2.43 | 58 | Canada | 2.71 | 58 |
| Latvia | 3.58 | 59 | Bulgaria | 3.48 | 59 | Sri Lanka | 2.40 | 59 | Greece | 2.65 | 59 |
| Sri Lanka | 3.56 | 60 | Ukraine | 3.45 | 60 | Dominican Republic | 2.38 | 60 | Czech Republic | 2.61 | 60 |
| Israel | 3.55 | 61 | Sri Lanka | 3.40 | 61 | Guatemala | 2.25 | 61 | Slovenia | 2.61 | 60 |
| Ecuador | 3.45 | 62 | Peru | 3.37 | 62 | Paraguay | 2.05 | 62 | Hungary | 2.53 | 62 |
| Uruguay | 3.38 | 63 | Venezuela | 3.32 | 63 | Bolivia | 1.97 | 63 | Netherlands | 2.38 | 63 |
| Slovak Republic | 3.35 | 64 | El Salvador | 3.30 | 64 | Jamaica | 1.94 | 64 | Finland | 2.37 | 64 |
| Paraguay | 3.31 | 65 | Honduras | 3.22 | 65 | Vietnam | 1.94 | 64 | Portugal | 2.18 | 65 |
| Colombia | 3.29 | 66 | Dominican Republic | 3.21 | 66 | Romania | 1.92 | 66 | Slovak Republic | 2.17 | 66 |
| Romania | 3.14 | 67 | Jamaica | 3.20 | 67 | Bangladesh | 1.85 | 67 | Germany | 2.04 | 67 |
| Turkey | 3.10 | 68 | Paraguay | 3.18 | 68 | Russia | 1.82 | 68 | Italy | 1.97 | 68 |
| Bulgaria | 3.09 | 69 | Uruguay | 3.02 | 69 | Indonesia | 1.68 | 69 | Belgium | 1.76 | 69 |
| Bolivia | 3.08 | 70 | Colombia | 2.94 | 70 | Honduras | 1.59 | 70 | Zimbabwe | 1.71 | 70 |
| Jamaica | 3.05 | 71 | Turkey | 2.85 | 71 | Ecuador | 1.26 | 71 | Israel | 1.62 | 71 |
| Honduras | 3.02 | 72 | Guatemala | 2.84 | 72 | Nigeria | 1.14 | 72 | Austria | 1.44 | 72 |
| Ukraine | 2.95 | 73 | Bolivia | 2.84 | 73 | Ukraine | 1.08 | 73 | France | 1.33 | 73 |
| Nicaragua | 2.48 | 74 | Nicaragua | 2.72 | 74 | Nicaragua | 1.01 | 74 | Denmark | 1.17 | 74 |
| Zimbabwe | 1.93 | 75 | Zimbabwe | 2.50 | 75 | Zimbabwe | 1.00 | 75 | Sweden | 1.00 | 75 |

CONCLUSION

As the world becomes increasingly interconnected but the disparities between wealthy and poor countries become ever starker, policymakers, business leaders, academics, and other globally minded citizens all require a much keener understanding of the forces contributing to economic growth in both the medium and long term, and how the importance of those forces changes at different stages of economic development. This chapter has focused on the central processes underpinning medium-term economic growth, with particular emphasis on technological advancement.

Marking a new direction in competitiveness research, we outlined key empirical distinctions between technological diffusion and innovation as pertains to economic growth. In so doing, we estimated not just the changing nature of technological advancement that typically accompanies economic development, but also the increasing importance of technology as economies create a sustainable capacity for innovation.

By dividing our sample of GCR countries into two groups, core and non-core technological innovators, we were able to estimate the respective growth-related effects of innovation and diffusion in the 1990s. Our evidence indicates that innovation matters substantially more than diffusion in the core economies, and that diffusion matters proportionately more in the non-core ones. Our evidence furthermore suggests that public institutions and the macroeconomic environment remain more important for economic growth within the non-core economies than within the core economies. This is partly due to the limited variation in institutional quality and macroeconomic factors among core economies. It is also likely due to a threshold effect, whereby economies that have attained a certain level of quality in institutions and macroeconomic policymaking yield increasingly small benefits from marginal improvements in those areas.

All of these findings are incorporated in the new Growth Competitiveness Index, which blends core and non-core measures of technological advancement with measures of institutional quality and the macroeconomic environment to create a unified competitiveness ranking across 75 countries. GCI scores represent our best estimate at the underlying growth prospects for each country, once their current level of GDP is taken into account. Of equal importance, rankings in the GCI's three component indexes of technology, public institutions, and macroeconomic environment provide important insight into each economy's specific sources of growth competitiveness.

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Notes

- ⁱ Much of the empirical knowledge today was stimulated by Robert J Barro's seminal work, "Economic Growth in a Cross-Section of Countries," *Quarterly Journal of Economics* CVI (1991): 407-443.
- ⁱⁱ The simple correlation coefficient between the rankings for the two years is 0.97.
- ⁱⁱⁱ Specifically, Singapore would jump from 4th to 2nd overall on the GCI, Ireland would shift from 11th to 8th, and Hong Kong SAR would leap from 13th to 6th—compared with their 2000 overall rankings of 2nd, 4th, and 7th, respectively.
- ^{iv} See Jeffrey D Sachs, "Ten Trends in Global Competitiveness in 1998," *Global Competitiveness Report 1998*, (Geneva: World Economic Forum, 1998) p.18.
- ^v Jeffrey D Sachs and Andrew M Warner "Year in Review," in *Global Competitiveness Report 1999*, (Geneva: World Economic Forum, 1999) p.21.
- ^{vi} Indeed, there is strong evidence that even the catch-up effect occurs only once a minimum threshold of economic development has been met. For instance, of the 36 countries ranked as having "high" human development in the United Nations' 1990 *Human Development Report*, 35 achieved rising living standards from 1990 to 1998 and the entire group averaged 2.3 percent average annual economic growth over the same period. At the same time, the 34 middle-development countries achieved a slightly lower average growth rate of 1.9 percent per year, with 7 experiencing declines in GDP per capita. Meanwhile, low-development countries averaged 0 percent economic growth, with 15 of 34 experiencing an outright decline in living standards.
- ^{vii} Again, the GDP GAP term is measured as a country's GDP per capita (PPP) as a percentage of the United States GDP per capita (PPP) in 1992, *ie*, all values in 1992 were between 0 and 1. We then calculated the natural logarithm of those values for the regression estimates. In parallel fashion, the dependent variable in this equation was calculated as the average annual change in the GDP GAP with the United States from 1992 to 2000. As mentioned in the text, for transition economies 1995 was used as the base year rather than 1992.
- ^{viii} The regression results for the overall GCI, with the average annual change in GDP GAP relative to the United States as the dependent variable, are as follows:
- | Variable | Coefficient | Standard Error |
|----------------------|-------------|----------------|
| ln (Initial GDP GAP) | -.028 | .005 |
| GCI | .033 | .005 |
| Constant term | -.187 | .026 |
- Number of observations = 75; Adjusted $R^2 = 0.41$
- ^{ix} The standard formula for converting each hard variable to the 1-to-7 scale was:
- $$6 \times \frac{(\text{Country Value} - \text{Sample Minimum})}{(\text{Sample Maximum} - \text{Sample Minimum})} + 1$$
- In some instances, minor adjustments were made to account for extreme outliers in the hard data.
- ^x Gross tertiary enrollment data were taken from the World Bank's *World Development Indicators 2001* and the World Bank Task Force on Education's *Higher Education in Developing Countries: Peril and Promise* (Washington, DC: World Bank, 2000). Most of these figures are for 1995 and 1996. The most recent are for 1997. Many national enrollment rates have undoubtedly changed substantially since then, but data for more recent cross-country analysis are simply not available.
- ^{xi} Specifically, we included all exports falling under the United Nations' Standard Industrial Trade Classification codes 54, 57, 58, 65, 7, 81, 82, 83, 84, 85, 87, 88, 893, 894, 898, 8996, and 95.
- ^{xii} Note that we again used the 1995-99 values for the transition economies to match our analysis of the average growth rate over the same period.

- ^{xiii} The specific results of the nonlinear least squares regression were as follows, with the average annual percentage change in GDP GAP relative to the United States still as the dependent variable in the following equation:

$$\begin{aligned} \text{Growth} = & \text{Constant} + B_1 \times 1980\text{s non-core} \times \{N_1 \{0.5 \\ & \times \text{ICT subindex} + 0.5 [(1 - N_2) \text{innovation subindex} \\ & + N_2 \times \text{technology transfer subindex}]\} \\ & + (1 - N_1) (\text{macroeconomic index} + \text{institutional index})\} \\ & + B_2 \times 1980\text{s core} \times \{C_1 \{0.5 \times \text{ICT subindex} \\ & + 0.5 [C_2 \times \text{innovation subindex} \\ & + (1 - C_2) \text{technology transfer index}]\} \\ & + (1 - C_1) (\text{macroeconomic index} + \text{institutional index})\} \\ & + G \times (\text{GDP GAP in 1992}), \end{aligned}$$

where B_1 , C_1 , C_2 , G , N_1 , and N_2 are the coefficients to be estimated.

The variables "1980s non-core" and "1980s core" take a 0 or 1 value depending on an economy's status in that period. The regression results are as follows:

| Variable | Coefficient symbol | Coefficient value | Standard error |
|---|--------------------|-------------------|----------------|
| Initial GDP GAP in 1992 | G | -.027 | .007 |
| Non-core Index weight | B_1 | .029 | .005 |
| Core Index weight | B_2 | .032 | .007 |
| Non-core technology weight | N_1 | .642 | .116 |
| Non-core diffusion weight over innovation | N_2 | .808 | .257 |
| Core technology weight | C_1 | .896 | .268 |
| Core innovation weight over diffusion | C_2 | .849 | .397 |
| Constant term | — | -.213 | .033 |

Number of observations = 75

Adjusted $R^2 = 0.50$

- ^{xiv} Stephen Knack and Philip Keefer, "Institutions and Economic Performance: Cross-Country Tests Using Alternative Institutional Measures," *Economics and Politics*, VII (1995): 207-220; Paolo Mauro, "Corruption and Growth," *Quarterly Journal of Economics*, CX: 681-713 (1995); Robert J Barro, *Determinants of Economic Growth: A Cross-Country Empirical Study* (Cambridge, MA: MIT Press, 1997).
- ^{xv} See, for example, Shang-jin Wei, "Why Is Corruption So Much More Taxing Than Tax? Arbitrariness Kills," NBER Working Paper No. 6255, 1997; Daniel Kaufman and Shang-jin Wei, "Does 'Grease Money' Speed Up the Wheels of Commerce?" NBER Working Paper No. 7093, 1999.
- ^{xvi} Nonetheless, in one noteworthy example of the robustness of the Survey results, we find that national scores on the public institutions index remain almost exactly the same when half the Survey responses from the sample are randomly excluded. For more details on the consistency of Executive Opinion Survey results and the possibility of national-level perception bias, consult the final chapter of this *Report*.
- ^{xvii} For the real exchange rate measure, the average value from 1990 to 1995 is set to 100, except for the transition economies where we set 1995 values to 100. To avoid excessive complication, real exchange rates were converted to simple scores on the standard 1-to-7 scale. Values of less than 80, *ie*, those that are strongly overvalued, were given a score of 1. Those with values of less than 100 and greater than 80 were given a score of 2.5. Values of 100-120, 120-140, and 140 and above were given scores of 4, 5.5, and 7 respectively.
- ^{xviii} The *Institutional Investor's* country credit ratings are taken from <http://www.iimagazine.com/premium/r/countrycredit/ccr/2001.htm>.
- ^{xix} Most prominent among these studies is Barro 1997, *op cit*.

Enhancing the Microeconomic Foundations of Prosperity: The Current Competitiveness Indexⁱ

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Competitiveness has become a central preoccupation of both advanced and developing countries in an increasingly open and integrated world economy. Despite its acknowledged importance, the concept of competitiveness is often misunderstood. Here, we define competitiveness concretely and show its direct relationship to a nation's standard of living. The Current Competitiveness Index provides a conceptual framework and a data-rich basis to analyze the fundamental competitiveness of countries in a comparative context.

Much discussion of competitiveness has focused on the macroeconomic, political, and legal circumstances that underpin a successful economy. These circumstances are becoming increasingly well understood. A stable set of political institutions, a trusted legal context, and sound fiscal and monetary policies contribute greatly to a healthy economy. However, these macroeconomic conditions are necessary but not sufficient. They provide the opportunity to create wealth, but do not by themselves create wealth. Wealth is actually created in the microeconomic foundations of the economy, rooted in company operating practices and strategies as well as in the quality of the inputs, infrastructure, institutions, and array of regulatory and other policies that constitute the business environment in which a nation's firms compete. Unless there is appropriate improvement at the microeconomic level, political, legal, and monetary and fiscal reforms will not bear full fruit.

Beginning in 1998, we began an effort to examine statistically the microeconomic foundations of competitiveness and prosperity across a wide array of countries. The microeconomic approach focuses on the detailed conditions that support a high level of sustainable productivity and prosperity, measured by GDP per capita. The approach aims to move beyond the examination of broad, aggregate variables characteristic of most economic growth models, such as marginal savings and investments rates, and examines the complex array of national circumstances that support productivity. These microeconomic differences between nations prove to account for a very high proportion of the variation across countries in the level GDP per capita.ⁱⁱ The approach also recognizes that improvement in competitive potential and prosperity is not a simple linear process in which nation's progress on a constant set of dimensions. Instead, successful economic development involves the successive focus on competing on increasingly sophisticated dimensions. This year's *Report* highlights especially the shifting priorities that arise at different stages of economic development.

In the *Global Competitiveness Report 2001–2002*, we again present separate indexes for current (sustainable) competitiveness and growth competitiveness. These indexes focus on different dimensions of the challenge of improving prosperity, and provide greater insight into the strengths and challenges of nations than is possible in a single index.

The Current Competitiveness Index examines the microeconomic bases of a nation's GDP per capita. While nations can over- or underperform their fundamentals in the short and medium run, the index provides insights into the level of GDP per capita that is sustainable in the long term. The Growth Competitiveness Index looks at the more macroeconomic sources of GDP per capita growth, and generates predictions about the ability of a country to improve its per capita income over time at more/less than the convergence growth rate. Although the sustainable level of current GDP per capita and the rate of growth are correlated in the long term, each requires its own distinctive agenda.

This year's Current Competitiveness Index includes further enhancements in country coverage, variables measured, and methods compared with previous years. We are particularly pleased to have added more countries, bringing the total to 75, up from 58 last year. The countries added are all developing countries, providing a much richer platform for exploring the earlier stages of development.

Despite the significant expansion of the sample, the statistical findings are remarkably stable compared with the 2000 *Report*. The results again provide strong support for the importance of microeconomic competitiveness for prosperity and economic development. Our findings also verify the striking and regular pattern of microeconomic changes that accompany economic development.

This chapter presents six sets of results: First, we analyze the impact of individual microeconomic indicators on the level of GDP per capita to verify statistical validity, and test for the functional form of the relationship.

Second, we create an aggregate measure of microeconomic competitiveness, the Current Competitiveness Index (CCI), together with two subindexes focusing on company sophistication and the quality of the national business environment. We analyze the impact of these overall indexes on GDP per capita.

Third, we use the statistical models to generate strengths and weaknesses for each country as well as insights into the overall patterns of competitive development in the world economy.

Fourth, we investigate the variations in the causes of prosperity at different stages of economic development. This allows us to highlight the most salient challenges for low-income, middle-income, and high-income nations and the major challenges those nations face in making the transition from one stage to another.

Fifth, we briefly analyze the impact of microeconomic indicators on economic growth and the relationship of imbalances between actual and predicted income levels with growth of GDP per capita.

Finally, we utilize the Index to generate the country current competitiveness rankings (see Table 1) and identify those countries whose current competitiveness will support higher incomes and who may be poised for improvement, as well as those countries whose current performance is ahead of their measured competitiveness and may face challenges in sustaining it.

As in any such investigation of a complex topic in a large number of countries, the data and the methods that are available are far from perfect. There are simply no available "hard" data on most of the salient dimensions of competitiveness, especially for a broad array of countries. Another challenge is establishing causality, because a strong statistical association does not prove the direction in which causality proceeds. We proceed pragmatically, while aiming to improve the effort each year. What is heartening is the consistency of the findings over time, and the remarkable robustness of the results to sensitivity analysis.

We believe strongly that insights into the microeconomic correlates of rising prosperity are important even if causality remains unproven. Although there may be a natural tendency for some microeconomic conditions to improve as GDP per capita grows, such improvement is clearly far from automatic. Along virtually all dimensions, microeconomic circumstances *can be influenced markedly* by purposeful action in both government and the private sector. It will be many years before definitive tests of causality will be possible, but this does not diminish the importance of understanding the microeconomic changes that accompany successful development and the patterns by which nations improve them.

Our results again highlight the pressing need to incorporate microeconomic and competitive thinking better into efforts to stimulate economic growth. In advanced countries, which have largely gotten their macro policies right, it is micro reform that holds the key to reversing unemployment problems and translating economic growth into a rising standard of living. The process of microeconomic reform also needs to move to a new stage: In countries such as New Zealand and the United Kingdom, microeconomic reforms so far have been focused on the

Table 1: The Current Competitiveness Index

| Country | CCI Ranking | | | | Company Operations and Strategy Ranking | | | | Quality of the National Business Environment Ranking | | | | 2000 GDP per Capita (ppp adjusted) |
|----------------------|-------------|------|------|------|---|------|------|------|--|------|------|------|------------------------------------|
| | 2001 | 2000 | 1999 | 1998 | 2001 | 2000 | 1999 | 1998 | 2001 | 2000 | 1999 | 1998 | |
| Finland | 1 | 1 | 2 | 2 | 2 | 3 | 7 | 8 | 1 | 1 | 2 | 2 | 24,864 |
| United States | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 33,886 |
| Netherlands | 3 | 4 | 3 | 3 | 3 | 7 | 8 | 5 | 3 | 3 | 3 | 4 | 25,598 |
| Germany | 4 | 3 | 6 | 4 | 4 | 1 | 5 | 1 | 4 | 6 | 5 | 8 | 24,931 |
| Switzerland | 5 | 5 | 5 | 9 | 5 | 5 | 2 | 3 | 5 | 10 | 9 | 10 | 28,518 |
| Sweden | 6 | 7 | 4 | 7 | 6 | 6 | 3 | 4 | 6 | 11 | 7 | 9 | 23,884 |
| United Kingdom | 7 | 8 | 10 | 5 | 7 | 11 | 13 | 9 | 8 | 9 | 8 | 5 | 23,197 |
| Denmark | 8 | 6 | 7 | 8 | 9 | 8 | 9 | 10 | 10 | 4 | 6 | 7 | 27,120 |
| Australia | 9 | 10 | 13 | 15 | 24 | 20 | 19 | 22 | 7 | 7 | 10 | 12 | 25,758 |
| Singapore | 10 | 9 | 12 | 10 | 15 | 15 | 14 | 12 | 9 | 5 | 12 | 6 | 23,000 |
| Canada | 11 | 11 | 8 | 6 | 14 | 16 | 12 | 15 | 11 | 8 | 4 | 3 | 27,783 |
| France | 12 | 15 | 9 | 11 | 10 | 9 | 6 | 6 | 12 | 15 | 11 | 13 | 24,032 |
| Austria | 13 | 13 | 11 | 16 | 11 | 12 | 10 | 11 | 13 | 12 | 13 | 17 | 26,314 |
| Belgium | 14 | 12 | 15 | 19 | 12 | 10 | 11 | 13 | 14 | 13 | 15 | 18 | 26,958 |
| Japan | 15 | 14 | 14 | 18 | 8 | 4 | 4 | 7 | 18 | 19 | 19 | 19 | 25,796 |
| Iceland | 16 | 17 | 22 | 24 | 16 | 14 | 21 | 28 | 15 | 16 | 21 | 23 | 29,167 |
| Israel | 17 | 18 | 20 | 21 | 18 | 13 | 18 | 21 | 17 | 20 | 20 | 20 | 19,577 |
| Hong Kong SAR | 18 | 16 | 21 | 12 | 21 | 23 | 24 | 17 | 16 | 14 | 18 | 11 | 24,448 |
| Norway | 19 | 20 | 18 | 14 | 23 | 21 | 23 | 14 | 19 | 18 | 16 | 15 | 29,500 |
| New Zealand | 20 | 19 | 16 | 17 | 19 | 22 | 16 | 19 | 20 | 17 | 14 | 16 | 20,010 |
| Taiwan | 21 | 21 | 19 | 20 | 20 | 18 | 17 | 16 | 21 | 21 | 22 | 21 | 17,223 |
| Ireland ^v | 22 | 22 | 17 | 13 | 17 | 19 | 20 | 18 | 22 | 22 | 17 | 14 | 25,200 |
| Spain | 23 | 23 | 23 | 22 | 22 | 24 | 22 | 23 | 23 | 23 | 23 | 22 | 19,202 |
| Italy | 24 | 24 | 25 | 26 | 13 | 17 | 15 | 20 | 24 | 26 | 27 | 27 | 23,304 |
| South Africa | 25 | 25 | 26 | 25 | 25 | 26 | 28 | 33 | 27 | 25 | 25 | 25 | 9,189 |
| Hungary | 26 | 32 | 33 | 31 | 33 | 34 | 36 | 39 | 25 | 31 | 33 | 31 | 12,335 |
| Estonia | 27 | — | — | — | 32 | — | — | — | 26 | — | — | — | 9,178 |
| Korea | 28 | 27 | 28 | 28 | 26 | 25 | 27 | 24 | 30 | 28 | 30 | 28 | 17,311 |
| Chile | 29 | 26 | 24 | 23 | 30 | 27 | 26 | 25 | 28 | 24 | 24 | 24 | 9,187 |
| Brazil | 30 | 31 | 35 | 35 | 29 | 29 | 32 | 27 | 32 | 32 | 37 | 39 | 7,389 |
| Portugal | 31 | 28 | 29 | 33 | 38 | 35 | 37 | 48 | 29 | 27 | 26 | 30 | 16,882 |
| Slovenia | 32 | — | — | — | 28 | — | — | — | 35 | — | — | — | 17,127 |
| Turkey | 33 | 29 | 31 | 29 | 44 | 28 | 33 | 26 | 31 | 29 | 32 | 29 | 6,870 |
| Trinidad and Tobago | 34 | — | — | — | 27 | — | — | — | 37 | — | — | — | 8,771 |
| Czech Republic | 35 | 34 | 41 | 30 | 41 | 41 | 55 | 31 | 33 | 34 | 36 | 33 | 13,721 |
| India | 36 | 37 | 42 | 44 | 43 | 40 | 48 | 50 | 34 | 37 | 43 | 42 | 2,403 |
| Malaysia | 37 | 30 | 27 | 27 | 37 | 30 | 25 | 34 | 38 | 30 | 31 | 26 | 8,924 |
| Thailand | 38 | 40 | 39 | 37 | 42 | 47 | 43 | 37 | 39 | 40 | 39 | 36 | 6,469 |
| Slovakia | 39 | 36 | 48 | 36 | 57 | 31 | 51 | 40 | 36 | 36 | 47 | 37 | 11,035 |
| Jamaica | 40 | — | — | — | 31 | — | — | — | 44 | — | — | — | 3,657 |
| Poland | 41 | 41 | 37 | 41 | 55 | 36 | 38 | 38 | 40 | 41 | 38 | 40 | 8,971 |
| Latvia | 42 | — | — | — | 35 | — | — | — | 43 | — | — | — | 6,838 |
| Greece | 43 | 33 | 36 | 38 | 51 | 32 | 45 | 32 | 42 | 33 | 34 | 38 | 16,326 |
| Jordan | 44 | 35 | 32 | 32 | 56 | 46 | 44 | 42 | 41 | 35 | 28 | 32 | 4,079 |
| Egypt | 45 | 39 | 43 | 40 | 36 | 44 | 49 | 47 | 46 | 39 | 42 | 35 | 3,602 |
| Uruguay | 46 | — | — | — | 48 | — | — | — | 45 | — | — | — | 8,904 |
| China | 47 | 44 | 49 | 42 | 39 | 38 | 31 | 35 | 47 | 45 | 50 | 44 | 3,953 |
| Panama | 48 | — | — | — | 40 | — | — | — | 49 | — | — | — | 6,169 |
| Lithuania | 49 | — | — | — | 47 | — | — | — | 48 | — | — | — | 6,999 |
| Costa Rica | 50 | 43 | 38 | — | 34 | 39 | 35 | — | 52 | 42 | 41 | — | 9,236 |
| Mexico | 51 | 42 | 34 | 39 | 46 | 42 | 30 | 29 | 53 | 43 | 35 | 41 | 8,914 |
| Mauritius | 52 | 38 | 30 | — | 49 | 37 | 29 | — | 50 | 38 | 29 | — | 9,512 |
| Argentina | 53 | 45 | 40 | 34 | 53 | 45 | 39 | 30 | 51 | 44 | 40 | 34 | 12,314 |
| Philippines | 54 | 46 | 44 | 45 | 45 | 43 | 34 | 41 | 54 | 46 | 46 | 45 | 3,956 |
| Indonesia | 55 | 47 | 53 | 51 | 50 | 51 | 47 | 52 | 57 | 47 | 52 | 51 | 3,014 |
| Colombia | 56 | 48 | 52 | 49 | 52 | 48 | 40 | 43 | 59 | 48 | 53 | 49 | 5,923 |
| Sri Lanka | 57 | — | — | — | 58 | — | — | — | 55 | — | — | — | 3,512 |
| Russia | 58 | 52 | 55 | 46 | 54 | 33 | 42 | 45 | 56 | 53 | 55 | 47 | 8,213 |
| Dominican Republic | 59 | — | — | — | 59 | — | — | — | 58 | — | — | — | 5,962 |
| Ukraine | 60 | 56 | 56 | 52 | 62 | 52 | 50 | 51 | 60 | 56 | 56 | 52 | 3,693 |
| Romania | 61 | — | — | — | 63 | — | — | — | 61 | — | — | — | 6,309 |
| Vietnam | 62 | 53 | 50 | 43 | 64 | 50 | 41 | 36 | 64 | 52 | 49 | 43 | 1,974 |
| Peru | 63 | 49 | 46 | 47 | 65 | 53 | 56 | 49 | 62 | 51 | 44 | 46 | 4,797 |
| El Salvador | 64 | 51 | 47 | — | 66 | 57 | 46 | — | 63 | 50 | 48 | — | 4,477 |
| Zimbabwe | 65 | 50 | 45 | 48 | 60 | 56 | 54 | 46 | 67 | 49 | 45 | 48 | 2,697 |
| Venezuela | 66 | 54 | 51 | 50 | 67 | 49 | 53 | 44 | 66 | 55 | 51 | 50 | 5,677 |
| Nigeria | 67 | — | — | — | 61 | — | — | — | 68 | — | — | — | 871 |
| Bulgaria | 68 | 55 | 54 | — | 70 | 54 | 52 | — | 65 | 54 | 54 | — | 5,469 |
| Guatemala | 69 | — | — | — | 69 | — | — | — | 69 | — | — | — | 3,784 |
| Paraguay | 70 | — | — | — | 68 | — | — | — | 71 | — | — | — | 4,396 |
| Nicaragua | 71 | — | — | — | 73 | — | — | — | 70 | — | — | — | 2,396 |
| Ecuador | 72 | 57 | 57 | — | 71 | 55 | 57 | — | 72 | 58 | 57 | — | 3,068 |
| Bangladesh | 73 | — | — | — | 72 | — | — | — | 73 | — | — | — | 1,561 |
| Honduras | 74 | — | — | — | 74 | — | — | — | 75 | — | — | — | 2,469 |
| Bolivia | 75 | 58 | 58 | — | 75 | 58 | 58 | — | 74 | 57 | 58 | — | 2,408 |

opening of markets and reducing the role of the government. Microeconomic reforms need to move to a second stage in which investments are made to upgrade the business environment and enhance the productivity of clusters.

Developing countries, again and again, are tripped up by microeconomic failures. With global capital markets, countries can engineer spurts of growth through macroeconomic and financial reforms that bring floods of capital and cause the illusion of progress as construction cranes dot the skyline. Such reforms allow countries to exploit current comparative advantages. Unless firms are fundamentally improving their operations and strategies and competition is moving to a higher level, however, growth will be snuffed out as jobs fail to materialize, wages stagnate, and returns to investment prove disappointing. Capital flows and attention then shifts elsewhere. The austerity that results from such cycles is at the core of the backlash against globalization that is becoming perhaps the most important global economic problem.

Successful economic development requires progress on multiple fronts simultaneously. Reform efforts also need to be tightly connected to the current stage of each country's development. As an economy progresses, the constraints to continued advancement shift. Also, at strategic points in the development process, the whole basis of national competitiveness must be transformed. This requires a change in many aspects of company strategy as well as new requirements for the national business environment. We investigate these inflection points in this chapter.

What is competitiveness?

Despite widespread acceptance of its importance, competitiveness remains a concept that is not well understood. The most intuitive definition of *competitiveness* is a country's share of world markets for its products. This makes competitiveness a zero-sum game, because each country's gains come at the expense of others. This view of competitiveness is used to justify intervention to skew market outcomes in a nation's favor, as well as policies to hold down local wages and devalue the nation's currency to expand exports. In fact, it is still often said that devaluation "makes a nation more competitive." Business leaders are prone to the market share view, because the policies seem to help solve their short-term problems in coping with international rivals.

The market share view of competitiveness, however, is deeply flawed. Where this thinking is entrenched, it becomes a principal reason why nations fail to progress economically. The goal of economic development is a rising standard of living. The need for low wages reveals a lack of competitiveness rather than competitive strength. Devaluation means that a nation takes a collective pay cut by discounting its products and services in world markets and paying more for the goods it purchases abroad. Nations with substantial export shares are often poor, while those with focused positions are often prosperous.

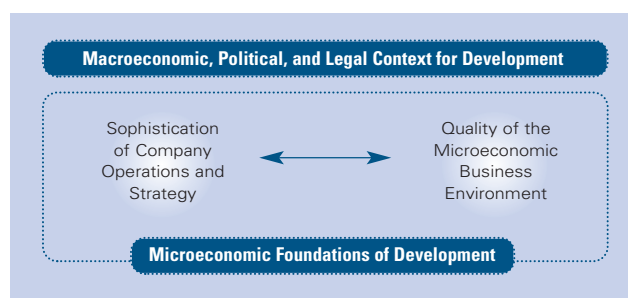
To understand competitiveness, it is necessary to move beyond the misleading metaphor of direct market competition and relate competitiveness to the sources of a nation's prosperity. A nation's standard of living is determined by the productivity of its economy, which is measured by the value of goods and services produced per unit of the nation's human, capital, and natural resources. Productivity depends both on the *value* of a nation's products and services, measured by the prices they can command in open markets, and the efficiency with which they can be produced.

True competitiveness, then, rests on productivity. This reveals the fundamental flaw in market share-based thinking. Productivity allows a nation to support a strong currency, and with it a high standard of living. Productivity is the goal, not exports per se. Exports of low-priced products, which support only subsistence wages, are not sufficient to make a nation prosperous. It is the productivity to manufacture high-quality products that support rising wages that really matters. The productivity underpinnings of competitiveness also make it clear that the entire economy matters for standard of living, not just the traded sector. The productivity of domestic industries has a major influence on the cost of living and the cost of doing business, not to mention the level of wages in the domestic economy.

The world economy is not a zero-sum game. Many nations can improve their prosperity if they can improve productivity and specialize in the products and services where they are most productive.

The central challenge in economic development, then, is how to create the conditions for rapid and sustained productivity growth. Stable political/legal institutions and sound macroeconomic policies create the potential for improving national prosperity. But wealth is actually created at the microeconomic level—in the ability of firms to create valuable goods and services using productive methods. Only in this way can a nation support high wages and attractive returns to capital. Political and legal institutions coupled with macroeconomic policies set the overall context, yet prosperity depends on improving a nation's capabilities at the microeconomic level (see Figure 1).

Figure 1: Determinants of productivity and productivity growth



The microeconomic foundations of productivity rest on two interrelated areas: (1) the sophistication with which companies or subsidiaries based in the country compete, and (2) the quality of the microeconomic business environment. National productivity is ultimately set by the productivity of a nation's companies. An economy cannot be competitive unless companies operating there are competitive, whether they are domestic or subsidiaries of foreign companies. However, the sophistication of companies is inextricably intertwined with the quality of the national business environment. More sophisticated strategies by companies require more highly skilled people, better information, improving infrastructure, more advanced institutions, and stronger competitive pressure.

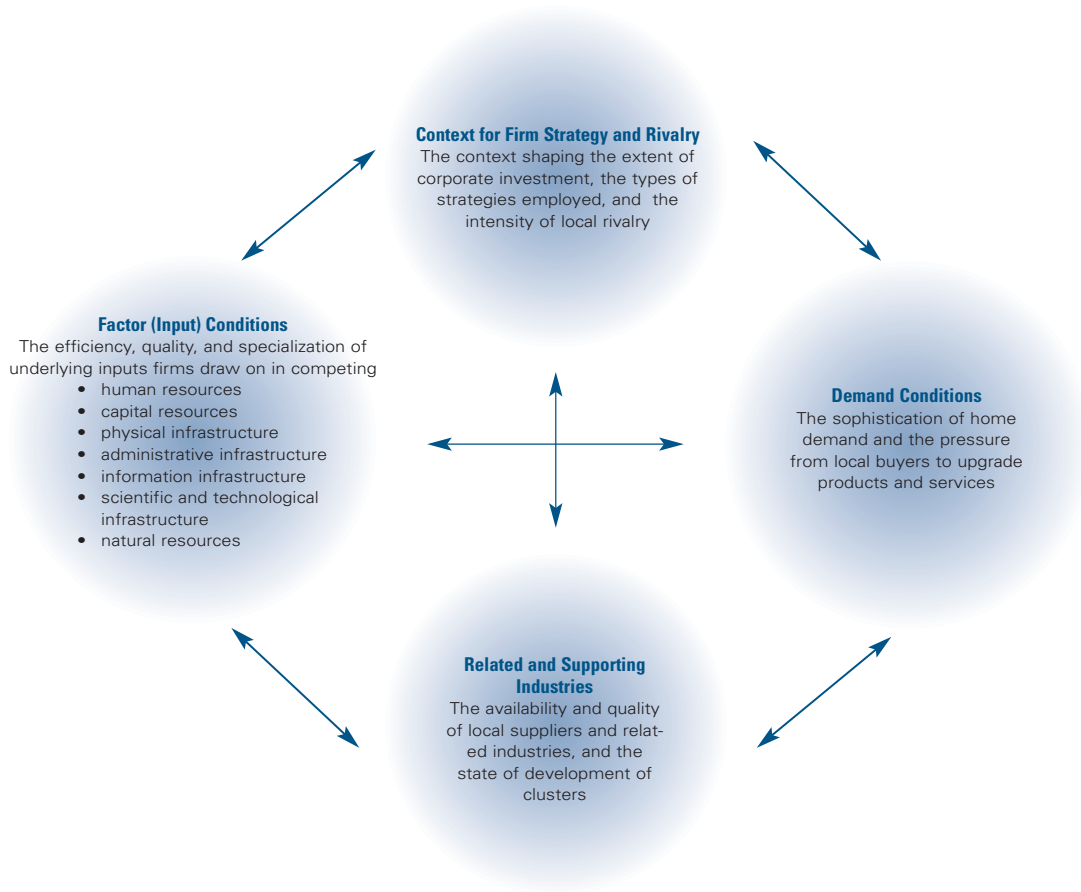
To support rising prosperity, companies must transform their ways of competing. The types of competitive advantages a nation's companies enjoy must shift from comparative advantages (low-cost labor or natural resources) to competitive advantages due to more distinctive products made with more productive methods. The transitions in goals, operating practices, and strategies required for successful development are described in detail in previous years' *Reports*. What were strengths in competing at earlier stages become weaknesses at more advanced levels of development. Rapid copying of foreign technology, for example, must give way to internal development of indigenous technology. Changes are often resisted by the corporate sector, because past approaches were profitable and because old habits are deeply ingrained in companies.

Moving to more sophisticated ways of competing depends on parallel changes in the microeconomic business environment. The business environment can be understood in terms of four interrelated influences: the quality of factor (input) conditions, the context for firm strategy and rivalry, the quality of demand conditions, and the presence of locally related and supporting industries (see Figure 2).

Government plays an inevitable role in economic development because it affects many aspects of the business environment. Government shapes the quality of factor conditions, for example, through its training and infrastructure policies. The sophistication of home demand derives in part from regulatory standards and processes, consumer protection laws, government purchasing, and openness to imports. Similar policy influences are present in all four parts of the business environment (sometimes referred to as the diamond). There are distinct roles for government in improving the business environment at the national, state, and local levels as well as in coordinating policies with neighboring countries. A concerted effort to improve the business environment is needed at all these governmental levels.

In addition to government, however, many other institutions in an economy have a role in economic development. Universities, schools, infrastructure providers, standard-setting agencies, and a myriad of other organizations contribute in some way to the microeconomic business environment. Such institutions must not just develop and improve themselves, but must also become more connected to the economy and better linked with the private sector.

The private sector itself is not only a consumer of the business environment but can and must play a role in shaping it. Individual firms can take steps such as establishing schools, attracting suppliers, or defining standards that not only benefit themselves but also improve the overall environment for competing. Collective industry bodies, such as trade associations and chambers of commerce, also have important roles to play in improving infrastructure, upgrading training institutions, and the like, that are often not recognized. The private sector can also take collective steps to enhance the ability of individual companies to improve operating practices and strategies.

Figure 2: The microeconomic business environment

Economic development

Successful economic development is a process of successive upgrading, in which the *business environment in a nation evolves to support and encourage increasingly sophisticated and productive ways of competing*. Nations at different levels of development face distinctly different challenges. The succession of improvements in the microeconomic environment that accompany successful development were explored in detail in previous years' *Reports*.

Seeing economic development as a sequential process of building interdependent microeconomic capabilities, evolving the modes of competing, improving incentives, and increasing rivalry also exposes important pitfalls in economic policy. The influence of one part of the microeconomic business environment depends on others. Lack of improvement in any important area can lead to a plateau in productivity growth and stalled development. Worse yet, it can undermine the whole reform process. When well-trained college graduates cannot find appropriate jobs because companies are still competing based on cheap labor, a backlash against business is created.

This analysis makes it clear why macroeconomic policy alone is insufficient. Macroeconomic policies fostering

high rates of capital investment will not translate into rising productivity, for example, unless the forms of investment are appropriate, the company skills and supporting industries are present to make the investments efficient, and strong competitive pressures and adequate corporate governance provide the needed market discipline. In Asia, for example, it was weaknesses in these areas that brought down economies that looked solid in terms of macroeconomic indicators. Moreover, high rates of public investment in human capital will not pay off unless a nation's microeconomic circumstances create the demand for skills in companies. Removing distortions in exchange rates and other prices will eliminate impediments to productivity, but microeconomic foundations must be in place if productivity is actually to increase. The prudence of foreign debt levels depends on exactly what the capital is invested in, together with the microeconomic fundamentals surrounding its deployment and governance. Regulating overall debt levels is less important, in many ways, than improving the microeconomic foundations. For sound policies at the macroeconomic level to translate into an increasingly productive economy, then, parallel microeconomic improvements must take place.

Figure 3: Stages of economic development

As nations develop, they progress through a number of stages in terms of their characteristic competitive advantages and modes of competing (see Figure 3).ⁱⁱⁱ In the Factor-Driven stage, basic factor conditions such as low-cost labor and access to natural resources are the dominant sources of competitive advantage and international products. Firms produce commodities or relatively simple products designed in other, more advanced countries. Technology is assimilated through imports, foreign direct investment, and imitation. In this stage, companies compete on price and lack direct access to consumers. They have limited roles in the value chain, are focused on assembly, labor-intensive manufacturing, and resource extraction. A Factor-Driven economy is highly sensitive to world economic cycles, commodity price trends, and exchange rate fluctuations.

In the Investment-Driven stage, efficiency in producing standard products and services becomes the dominant source of competitive advantage. The products and services produced become more sophisticated, but technology and designs still largely come from abroad. Technology is accessed through licensing, joint ventures, foreign direct investment, and imitation. However, nations in this stage not only assimilate foreign technology, but also develop the capacity to improve on it. The national business environment supports heavy investment in efficient infrastructure and modern production methods. Companies largely serve OEM customers and extend capabilities more widely in the value chain. An Investment-Driven economy is concentrated on manufacturing and on outsourced service exports. It is susceptible to financial crisis and external, sector-specific demand shocks.

In the Innovation-Driven stage, the ability to produce innovative products and services at the global technology frontier using the most advanced methods becomes the dominant source of competitive advantage. The national business environment is characterized by strengths in all areas together with the presence of deep clusters. Institutions and incentives supporting innovation are well developed. Companies compete with unique strategies that are often global in scope. An Innovation-Driven economy has a high service share, and is resilient to external shocks.

This analysis also begins to make it clear why countries find the transition to a new stage of development so difficult. Such inflection points require wholesale transformation of many interdependent dimensions of competition. In Asia, for example, successful Investment-Driven economies such as Taiwan and Singapore are finding that their reliance on sustained infrastructure investments, OEM manufacturing for multinationals, and government guidance of the economy to boost efficiency are insufficient to support higher levels of prosperity. Yet their current level of wages and domestic costs makes them vulnerable to competition from lower-wage countries such as China. The challenge for both Taiwan and Singapore is to move to an Innovation-Driven economy with a presence of deep clusters. To do so, however, companies need to move to new types of strategies, investment priorities must change, and government's role in the economy needs to shift.

Measuring microeconomic competitiveness

The Current Competitiveness Index (CCI) is constructed from measures of microeconomic competitiveness based primarily on Survey data drawn primarily from senior business leaders and, to a much lesser extent, from government officials. Only through a detailed survey can textured measures of the competitive environment and company practices be assembled across many countries. Although quantitative measures are available for some variables for some countries, a consistent ranking of a large number of countries is simply impossible at this time without the Survey. Moreover, the informed judgments of thousands of actual participants in the economies or companies are important in their own right.

This year's Survey involves more than 4,600 respondents from 75 countries. Approximately 37 percent of the respondents were from largely domestic companies, 34 percent were from significant exporters, 15 percent were from multinationals operating in the country, and 4 percent were from government. Survey data from the various categories of respondents in a country were quite similar, and the Survey findings have been quite consistent from year to year.

Appendix A lists the questions included in this year's Survey about the sophistication of company operations and strategy and the quality of the microeconomic business environment, grouped by part of the diamond. Questions on company operations and strategy were similar to 2000. New questions were added on the willingness to delegate authority and the extent of incentive compensation.

To assess the microeconomic business environment better, new questions were added in all four parts of the business environment: In the area of factor conditions, we added questions on the quality of math and science education and the availability of scientists and engineers. To measure demand conditions, we added questions on the extent of government procurement of advanced technology products and the laws relating to information technology. A series of new questions measured cluster depth and vitality. We added questions on the extent of product and process collaboration, the local availability of components and parts, the local availability process machinery, local access to specialized research and training services, and local information technology services. In the area of the context for firm strategy and rivalry, we added a question on the extent of cooperation in labor–employee relations.

The questions aim to capture the state of practice or the quality of capabilities in a nation, but do so in way that is meaningful for Survey respondents. For example, we get at the stock of basic human capital with a question on the quality in public schools because this is something that respondents can compare more readily across countries. The quality of schools, a flow measure, will be highly correlated with the stock of basic skills.

The sample of 75 countries extends our previous sample by adding almost 20 countries. The countries included in this year’s Index are shown in Table 1. In Appendix B, we report the results for the same set of countries as last year’s Index to facilitate comparisons.

To estimate the CCI, the principal dependent variable used is the level of GDP per capita in 2000, adjusted for purchasing power parity (PPP). GDP per capita is the broadest measure of national productivity and is tightly connected over time to a nation’s standard of living.^{iv} It is the best single, summary measure of current competitiveness available across all countries.^v Purchasing power parity adjustments for 2000 are not yet available. To derive the 2000 GDP per capita figures used in our models, we started with the 1999 GDP per capita adjusted for purchasing power parity, grew it at the growth rate of real GDP per capita in each country, and adjusted for inflation using the US GDP deflator.

In our analysis, we sometimes explored differences across countries at different income levels. Three groups of countries were defined based on their purchasing power–adjusted US–dollar GDP per capita in 2000: 28 low–income countries with a GDP below \$6,500; 28 middle–income countries with a GDP per capita between \$6,500 and \$23,000; and 19 high–income countries with a GDP per capita above \$23,000. The cut–off points were selected based on an analysis of Survey reply patterns.

Elements of microeconomic competitiveness

To construct an overall index of competitiveness, we must identify the most important individual dimensions of microeconomic capability and validate their statistical relationship to GDP per capita. In this section, we identify the most important explanatory variables.

Table 2 shows the bivariate relationships between the available set of microeconomic variables in this year’s Survey and GDP per capita. We also include US patents per capita for each country, a measure of scientific and technological prowess that is available for all countries. The variables are grouped into those measuring the sophistication of company operations and strategy and variables measuring the quality of the national business environment. Included in the table is the slope of the regression relationship, an indication of statistical significance, and the adjusted R^2 (or proportion of variation in GDP per capita explained adjusted for statistical degrees of freedom).^{vi}

All the reported variables are highly statistically significant in the full set of countries. A wide range of company practices and multiple dimensions of the business environment prove strongly related to competitiveness. Of the new indicators available from this year’s Survey, all are statistically significant. These findings are highly consistent with results from the earlier *Global Competitiveness Reports*. The stability of the results provides an important indication that the relationship between microeconomic circumstances and GDP per capita is robust and not an artifact of a single year or set of respondents.

Among the company variables, production process sophistication, the nature of the competitive advantage of a nation’s companies and subsidiaries, the extent of training, and the extent of marketing have the strongest bilateral association with per capita GDP. By itself, the measure of whether competitive advantage rests on cheap labor/natural resources versus innovative products and processes explains a remarkable 75 percent of the variance in GDP per capita. The overall competitive approach of local companies thus represents a powerful indicator of the state of economic development. Of the new company variables, the measure of willingness to delegate authority has a very strong association (R^2 of 70 percent) with GDP per capita.

Table 2: Bivariate regression results, dependent variable: 2000 GDP per capita (PPP-adjusted)

| | All Countries (N = 75) | | Low GDP Countries GDP per capita < \$6,500 (N = 28) | | Moderate GDP Countries GDP per capita > \$6,500 and < \$23,000 (N = 28) | | High GDP Countries GDP per capita > \$23,000 (N = 19) | |
|---|------------------------|---------------------|---|---------------------|---|---------------------|---|---------------------|
| | Slope | Adj. R ² | Slope | Adj. R ² | Slope | Adj. R ² | Slope | Adj. R ² |
| I. COMPANY OPERATIONS & STRATEGY | | | | | | | | |
| Production Process Sophistication | 8184.71** | 0.806 | 964.66 | 0.087 | 4621.84** | 0.323 | 1027.15 | 0.017 |
| Nature of Competitive Advantage | 6111.00** | 0.754 | 997.38* | 0.117 | 3496.76** | 0.484 | -136.85 | 0.002 |
| Extent of Staff Training | 8263.19** | 0.751 | 797.71 | 0.065 | 3922.71** | 0.243 | 2088.32* | 0.157 |
| Extent of Marketing | 8091.45** | 0.716 | 1003.97** | 0.176 | 4158.14** | 0.271 | 727.71 | 0.011 |
| n Willingness to Delegate Authority | 8141.51** | 0.700 | 953.76 | 0.081 | 4017.67** | 0.236 | 1206.29 | 0.098 |
| Capacity for Innovation | 7396.04** | 0.687 | 782.33 | 0.066 | 3910.86** | 0.343 | 248.71 | 0.004 |
| Company Spending on R&D | 7606.92** | 0.677 | -187.31 | 0.003 | 4158.02** | 0.374 | 598.79 | 0.031 |
| Value Chain Presence | 6746.92** | 0.673 | 590.42 | 0.034 | 3264.57** | 0.281 | -316.66 | 0.009 |
| Breadth of International Markets | 6329.62** | 0.665 | 416.97 | 0.030 | 3249.32** | 0.348 | -940.91 | 0.065 |
| Uniqueness of Product Designs | 8023.89** | 0.658 | 365.66 | 0.011 | 2903.52* | 0.121 | -131.17 | 0.001 |
| Degree of Customer Orientation | 9746.03** | 0.653 | 637.65 | 0.061 | 4767.19** | 0.230 | 3734.92* | 0.170 |
| Control of International Distribution | 10553.50** | 0.647 | 646.69 | 0.032 | 5578.89** | 0.288 | 646.10 | 0.013 |
| Extent of Branding | 7194.89** | 0.638 | 921.85* | 0.101 | 4262.93** | 0.336 | -273.10 | 0.006 |
| Reliance on Professional Management | 7456.50** | 0.543 | 102.92 | 0.002 | 2822.89** | 0.145 | 1141.45 | 0.060 |
| n Extent of Incentive Compensation | 8365.11** | 0.528 | 56.64 | 0.000 | 4652.96** | 0.339 | 322.74 | 0.006 |
| Extent of Regional Sales | 6866.33** | 0.516 | 190.83 | 0.007 | 575.87 | 0.009 | -2283.83 | 0.067 |
| Prevalence of Foreign Technology Licensing | 6337.95** | 0.251 | 351.02 | 0.037 | 3878.54** | 0.199 | -1400.29 | 0.044 |
| II. NATIONAL BUSINESS ENVIRONMENT | | | | | | | | |
| A. FACTOR (INPUT) CONDITIONS | | | | | | | | |
| 1. Physical Infrastructure | | | | | | | | |
| Overall, Infrastructure Quality | 5380.61** | 0.740 | 1149.16** | 0.367 | 3017.68** | 0.333 | 744.41 | 0.066 |
| a. Basic | | | | | | | | |
| n Road Infrastructure Quality | 7314.57** | 0.308 | 468.29 | 0.027 | 1734.43 | 0.043 | 41.37 | 0.000 |
| Railroad Infrastructure Development | 3548.73** | 0.413 | 42.73 | 0.001 | 1739.60** | 0.224 | -519.64 | 0.085 |
| Port Infrastructure Quality | 5657.46** | 0.621 | 694.93** | 0.156 | 2345.19** | 0.211 | 375.47 | 0.011 |
| Air Transport Infrastructure Quality | 5751.99** | 0.519 | 1015.18** | 0.353 | 1514.00* | 0.109 | 1150.81 | 0.043 |
| b. Advanced | | | | | | | | |
| Telephone/Fax Infrastructure Quality | 4960.14** | 0.494 | 652.94** | 0.337 | 2708.61** | 0.250 | 769.29 | 0.007 |
| Availability and Cost of Cellular Phones | 7021.03** | 0.361 | 863.67** | 0.206 | 2437.21** | 0.144 | -450.81 | 0.001 |
| Speed and Cost of Internet Access | 6259.46** | 0.647 | 1938.23** | 0.571 | 2223.78** | 0.182 | 597.99 | 0.037 |
| 2. Administrative Infrastructure | | | | | | | | |
| Police Protection of Businesses | 5419.61** | 0.680 | 439.55 | 0.085 | 3123.24** | 0.496 | 1434.99 | 0.084 |
| Judicial Independence | 5046.87** | 0.631 | 93.67 | 0.004 | 2485.05** | 0.273 | 1014.93 | 0.053 |
| Administrative Burden for Start-Ups | 5731.16** | 0.331 | -77.02 | 0.001 | 1786.74* | 0.105 | 878.64 | 0.065 |
| Adequacy of Public Sector Legal Recourse | 5787.16** | 0.680 | 91.44 | 0.003 | 2696.93** | 0.239 | 1137.59 | 0.041 |
| Extent of Bureaucratic Red Tape | 13206.03** | 0.476 | -115.34 | 0.001 | 4547.71** | 0.168 | 1873.19 | 0.045 |
| 3. Capital Availability | | | | | | | | |
| Ease of Access to Loans | 7688.69** | 0.692 | 355.72 | 0.019 | 3610.15** | 0.253 | 1473.22 | 0.094 |
| Financial Market Sophistication | 5885.85** | 0.657 | 653.75 | 0.086 | 2022.18** | 0.155 | 403.85 | 0.012 |
| Local Equity Market Access | 4769.81** | 0.407 | -383.55 | 0.086 | 1973.30** | 0.199 | 891.39 | 0.022 |
| Venture Capital Availability | 7005.05** | 0.718 | -186.27 | 0.004 | 3815.33** | 0.403 | 865.22 | 0.052 |
| 4. Human Resources | | | | | | | | |
| Quality of Public Schools | 5006.30** | 0.673 | 714.45** | 0.184 | 2276.11** | 0.277 | 528.01 | 0.012 |
| n Quality of Math and Science Education | 5148.26** | 0.413 | 421.90 | 0.085 | 2027.69** | 0.164 | -1532.57 | 0.098 |
| n Availability of Scientists and Engineers | 6548.85** | 0.355 | 371.78 | 0.050 | 3055.10** | 0.166 | 2217.21 | 0.101 |
| Quality of Management Schools | 6351.34** | 0.485 | 442.69 | 0.047 | 1469.08 | 0.057 | 1004.14 | 0.070 |
| 5. Science & Technology | | | | | | | | |
| Patents per capita (2000) | 107.32** | 0.520 | 2544.00** | 0.198 | 54.12** | 0.277 | 16.50** | 0.228 |
| Quality of Scientific Research Institutions | 7726.51** | 0.660 | 34.59 | 0.000 | 4367.60** | 0.357 | 1531.69 | 0.090 |
| University/Industry Research Collaboration | 7849.99** | 0.685 | 61.71 | 0.001 | 4257.33** | 0.364 | 809.44 | 0.020 |
| B. DEMAND CONDITIONS | | | | | | | | |
| Buyer Sophistication | 7864.18** | 0.735 | 39.98 | 0.000 | 5400.97** | 0.529 | 1768.98 | 0.074 |
| Consumer Adoption of Latest Products | 8553.92** | 0.693 | 498.01 | 0.036 | 4813.36** | 0.413 | 1687.84 | 0.069 |
| Presence of Demanding Regulatory Standards | 7132.39** | 0.805 | 860.26* | 0.123 | 4886.87** | 0.422 | 1410.50 | 0.036 |
| Stringency of Environmental Regulations | 6170.81** | 0.809 | 991.30** | 0.165 | 4005.35** | 0.425 | 998.22 | 0.058 |
| n Government Procurement of Advanced Technology Products | 9967.47** | 0.528 | 167.40 | 0.004 | 5362.12** | 0.384 | 561.55 | 0.004 |
| n Laws Relating to Information Technology | 7368.22** | 0.742 | 880.41* | 0.121 | 3800.17** | 0.393 | 993.97 | 0.027 |

(cont'd.)

Table 2: Bivariate regression results, dependent variable: 2000 GDP per capita

| | All Countries (N = 75) | | Low GDP Countries GDP per capita < \$6,500 (N = 28) | | Moderate GDP Countries GDP per capita > \$6,500 and < \$23,000 (N = 28) | | High GDP Countries GDP per capita > \$23,000 (N = 19) | |
|--|------------------------|---------------------|---|---------------------|---|---------------------|---|---------------------|
| | Slope | Adj. R ² | Slope | Adj. R ² | Slope | Adj. R ² | Slope | Adj. R ² |
| II. QUALITY OF THE BUSINESS ENVIRONMENT (cont'd.) | | | | | | | | |
| C. RELATED AND SUPPORTING INDUSTRIES | | | | | | | | |
| Local Supplier Quantity | 11287.11** | 0.580 | 582.40 | 0.030 | 4903.60* | 0.129 | -26.16 | 0.000 |
| Local Supplier Quality | 9400.61** | 0.767 | 1785.27** | 0.257 | 4253.02** | 0.178 | 992.45 | 0.019 |
| State of Cluster Development | 7797.84** | 0.490 | 604.81 | 0.046 | 1909.25 | 0.078 | -539.17 | 0.012 |
| n Extent of Product and Process Collaboration | 10177.43** | 0.583 | 882.13 | 0.053 | 3405.46** | 0.156 | 546.58 | 0.009 |
| n Local Availability of Components and Parts | 5144.44** | 0.226 | 674.23** | 0.143 | 1215.54 | 0.029 | -613.71 | 0.033 |
| n Local Availability of Process Machinery | 4904.12** | 0.262 | 441.17 | 0.065 | 1104.88 | 0.027 | 3.39 | 0.000 |
| n Local Availability of Specialized Research and Training Services | 8286.02** | 0.603 | 714.08 | 0.059 | 2201.04 | 0.085 | 839.70 | 0.026 |
| n Local Availability of Information Technology Services | 8666.74** | 0.585 | 386.07 | 0.022 | 2824.35* | 0.114 | 1380.16 | 0.046 |
| D. CONTEXT FOR FIRM STRATEGY AND RIVALRY | | | | | | | | |
| Favoritism in Decisions of Government Officials | 7621.17** | 0.642 | 755.78* | 0.102 | 4344.58** | 0.403 | -217.08 | 0.002 |
| Extent of Irregular Payments | 7275.30** | 0.719 | 1337.44** | 0.350 | 3229.07** | 0.255 | 1888.55 | 0.077 |
| Extent of Distortive Government Subsidies | 6557.01** | 0.275 | 317.55 | 0.013 | 3278.33** | 0.215 | -1048.91 | 0.082 |
| Decentralization of Corporate Activity | 6597.65** | 0.545 | 234.49 | 0.016 | 2509.01* | 0.140 | 1158.65 | 0.085 |
| n Cooperation in Labor-Employer Relations | 6150.76** | 0.247 | 540.74 | 0.033 | 2098.02 | 0.092 | 410.53 | 0.018 |
| Tariff Liberalization | 9260.09** | 0.590 | 585.41 | 0.045 | 4475.84** | 0.276 | -2517.04 | 0.079 |
| Hidden Trade Barrier Liberalization | 6695.28** | 0.664 | 898.09* | 0.124 | 3318.45** | 0.321 | -927.23 | 0.038 |
| Intellectual Property Protection | 6446.12** | 0.834 | 1185.60** | 0.248 | 4550.83** | 0.505 | 1018.75 | 0.035 |
| Intensity of Local Competition | 8366.32** | 0.374 | -188.15 | 0.006 | 2295.62 | 0.045 | 667.94 | 0.012 |
| Extent of Locally Based Competitors | 7539.95** | 0.334 | -58.87 | 0.001 | 1787.01 | 0.038 | 825.18 | 0.019 |
| Effectiveness of Anti-Trust Policy | 7473.45** | 0.726 | 1432.50** | 0.230 | 3603.66** | 0.355 | 358.22 | 0.006 |
| Efficacy of Corporate Boards | 7344.27** | 0.430 | 946.92* | 0.125 | 2256.99* | 0.111 | 996.55 | 0.081 |

NOTE: * denotes $p < 0.10$, ** denotes $p < 0.05$, n denotes new question introduced into model in 2001.

Moving to the measures of the quality of the business environment, the findings again provide strong support for the relationship between all four dimensions of the competitive context and economic performance. Among factor conditions, overall infrastructure quality, venture capital availability, quality of public schools, adequacy of legal recourse, police protection of business, and university-business research collaboration have the strongest bilateral association with GDP per capita. Many of the most important influences are in institutions and rules, not in sheer accumulation of assets.

Measures of local demand conditions (IIB) perform particularly strongly in explaining the variation in GDP per capita. They range from buyer sophistication to consumer adoption of the latest products to the presence of stringent regulatory standards. These results run counter to the perceived wisdom that local demand and local markets are irrelevant in a global economy. Linkages among related industries and cluster development (IIC) are also important. These results suggest a powerful role of cluster linkages in competitiveness. Connections *across* entities and industries prove important to competitiveness, as do conditions within firms themselves. Finally, the rules and context governing competition itself are strongly related to measured productivity. The strongest are intellectual property protection and the application of antitrust that are particularly potent.

Of the new business environment variables, the quality of laws relating to IT has particularly great explanatory power. The local availability of components and parts proves to be an especially powerful predictor of GDP per capita in the low-income country group.

As in previous years, many of the individual variables are quite highly correlated with each other. This suggests that economic progress involves multiple dimensions of competitiveness moving together. Also evident is that individual elements have different influences at different levels of development, a subject we will turn to later in this chapter.

As with previous years' results, it is important to acknowledge that causality can be argued in both directions for some of the variables, though the Survey questions were worded to avoid spurious reverse causality. Note that the same causality issue applies in macroeconomic and economic growth analyses. The quality of scientists and engineers or the sophistication of buyers, for example, could be partly the result of high per capita GDP and not the cause. We provide provocative evidence of causality from microeconomic conditions to GDP per capita later in this chapter, but more years of surveying will be required to establish definitive cause and effect relationships.

Table 3: Significant changes in microeconomic conditions, 1998–2001

| | Improving International Microeconomic Conditions No. of countries | Worsening International Microeconomic Conditions No. of countries |
|--|--|---|
| Sophistication of Company Operations and Strategy | Reliance on Profess. Management 34 . . . l,m,h Extent of Regional Sales 28 . . . l,m,h Extent of Marketing 23 . . . h Degree of Customer Orientation 21 . . . h Uniqueness of Product Designs 11 . . . m Breadth of International Markets 8 . . . l,m,h | Value Chain Presence 27 . . . l,m Breadth of International Markets 21 . . . l,m,h Extent of Branding 20 . . . l,m Control of International Distribution 15 . . . h Uniqueness of Product Designs 10 . . . m |
| Quality of the Business Environment | Quality of Scientific Research Institutions 37 . . . l,m,h Overall, Infrastructure Quality 33 . . . m,h Availability and Cost of Cellular Phones 31 . . . l,m,h Road Infrastructure Quality 30 . . . l,m,h Railroad Infrastructure Development 30 . . . l,m,h Financial Market Sophistication 26 . . . m,h Extent of Locally Based Competitors 22 . . . h Port Infrastructure Quality 21 . . . m,h Air Transport Infrastructure Quality 19 . . . l,m University/Industry Research Collaboration 18 . . . m Effectiveness of Anti-Trust Policy 17 . . . m Quality of Management Schools 17 . . . m Administrative Burden for Start-Ups 17 . . . m,h Quality of Public Schools 17 . . . l,m,h Local Equity Market Access 15 . . . m Efficacy of Corporate Boards 13 . . . h Intensity of Local Competition 13 . . . h Venture Capital Availability 12 . . . l,m,h Favoritism in Decisions of Gov. Officials 12 . . . h | Venture Capital Availability 17 . . . l,m,h Extent of Distortive Government Subsidies 15 . . . h Intellectual Property Protection 15 . . . l,m Quality of Public Schools 12 . . . l,m,h |

NOTE: l (low), m (medium), and h (high) indicates 8 or more countries from this income group included in the total number

Patterns of competitive development in the global economy

Now that there are several years of consistent Survey data, analysis of the overall patterns of change in the individual dimensions of competitiveness between the 1998 Survey and the 2001 Survey are possible.^{vii} Table 3 identifies those areas where substantial changes in company practice and the quality of the business environment (either positive or negative) were reported in eight or more countries (about 10 percent). These data provide a picture of the evolution of microeconomic capability in the world economy. Overall, there is clear upgrading in national business environments, which means that the bar is rising. Among company operations and strategy, there are clear areas of broad progress, but signs of the growing intensity of competition.

The standard that must be met in terms of national business environments is clearly rising. The quality of physical infrastructure, especially, is improving in countries at all development stages. Nations at all income levels are working to improve research institutions. In middle-income countries, there are widespread improvements in antitrust policy, the sophistication of financial markets, the quality of management education, and the extent of

research collaboration between industry and universities. In high-income countries, there is widespread improvement in the vigor of local competition, upgrading of corporate boards, and improvements in the fairness and transparency of government.

Two areas of the business environment represent fault lines where some countries are progressing while others fall behind. The quality of public schools and the availability of venture capital are increasingly dividing countries. Broader challenges include the following: In low- and medium-income countries, protection of intellectual property rights is perceived as worsening in relative terms as competition moves to more knowledge-based activities. In high-income countries, the extent of distortive government subsidies is on the rise as governments are struggling to cope with international competition.

Companies are working to professionalize management in increasingly competitive markets, the single most widespread global development. Companies in nations at all levels of development are expanding sales within neighboring countries. In high-income countries, stepped-up marketing and a greater customer orientation are the rule.

While companies are improving in some respects, they are struggling to cope with tough international competition. Companies in many countries report a decreasing breadth of international markets. In low- and medium-income countries, companies are reporting narrower presence in the value chain and have difficulty building brands. Uniqueness of product designs is a strong differentiating factor in medium-income countries, with about an equal number of countries gaining versus falling back. In high-income countries, control of international distribution is weakening.

Measuring overall microeconomic competitiveness

To compute an overall measure of current competitiveness, we combine all the individual dimensions using common factor analysis to provide a single composite picture of the relative microeconomic competitiveness of each country.^{viii} Because many of the dimensions of company sophistication and the quality of the business environment tend to move together, the relatively small sample size means that the impact of individual variables cannot be statistically distinguished. Hence we use common factor analysis instead of multiple regressions.

One dominant factor was present that captured 69 percent of the covariance among the variables, representing a robust composite picture of the overall microeconomic environment. The first factor score is defined as the Current Competitiveness Index (CCI). Regressing the CCI against GDP per capita explains a very high 84.2 percent of the variance across countries. The explained variance is up slightly from the 83.8 percent from previous years' *Reports*, in spite of the addition of 17 developing countries to the sample. We again find a strong relationship between microeconomic circumstances and current national prosperity.

Figure 4 plots the CCI against 2000 GDP per capita for each country in the sample. The line through the center of the country data points is the regression line, while the bands above and below the regression line delineate the 95 percent confidence forecast region.^x The fit is tight, with only two countries (Norway and India) falling just outside the forecast region.

Countries lying above the regression line (overperformers) are those whose current GDP per capita *exceeds* that predicted by their microeconomic competitiveness, as measured by the CCI factor. This is a danger sign, because it means that a country's per capita income may be unsustainable.

Reasons for country overperformance seem to vary. For example, Norway, Iceland, Bolivia, and Canada have natural resource endowments that may be supporting unsustainable income levels. Ireland has had extraordinary recent income growth due to investments by multinationals, while the United States has extraordinary size, resources, and world influence. Greece and Argentina are experiencing deteriorating microeconomic conditions that will likely be reflected in future GDP per capita.

Countries lying below the regression line are those whose microeconomic competitiveness is *stronger* than current GDP per capita (underperformers). Underperformance bodes well for the future, because the platform is in place to support higher GDP per capita if macroeconomic, political, or other constraints can be eased.

The reasons for underperformance also seem to vary. Macroeconomic or political challenges such as in Turkey, Thailand, or Brazil are one reason. Egypt and Jordan face challenges due to regional turmoil in the Middle East. More encouragingly, rapidly improving nations such as Estonia or Finland experience lags in GDP per capita improvement that should correct themselves.

To analyze each country's competitive circumstances further, we computed separate common factors for those variables related to company operations and strategy and those variables related to the microeconomic business environment.^{xi} One of the central tenets of our theoretical framework is that the sophistication of company operations and strategies depend on the quality of the microeconomic business environment and vice versa. Statistical analysis supports this relationship—the correlation between the two subfactors is 0.929.

To explore the relative state of company sophistication versus the quality of the microeconomic business environments in countries, the normalized factors are plotted against each other in Figure 5. Company sophistication is plotted on the vertical axis and the quality of the business environment on the horizontal axis. Countries lying above the 45-degree line are those whose companies are more advanced than the state of their business environment, while those below the line are countries whose business environment is more advanced than the average sophistication of local companies and subsidiaries.

Figure 4: The relationship between current competitiveness and GDP per capita



Figure 5: The relative development of companies and the microeconomic business environment



Countries whose company development is ahead of the business environment include Japan, Italy, Paraguay, and, to a lesser extent, Switzerland, Germany, and Sweden. Significant changes in public policy are necessary in these countries to underpin future prosperity. Japan remains the country with the most glaring weaknesses in the business environment. The consequences for Japan's economic growth have been severe.^{xiii} The business environments of Thailand, Sweden, and Hungary have improved most in relative terms compared to the 2000 *Report*, while those of Greece, Singapore, and Denmark have worsened.

Countries whose business environment is ahead of company practice include Australia, Slovakia, Portugal, Singapore, Hong Kong, Canada, and New Zealand. Many of the leading companies in these countries are still heavily involved in natural resource extraction (eg, Australia, Canada, and New Zealand), while others (Singapore and Hong Kong) depend heavily on OEM production and the subsidiaries of foreign multinationals. Efforts to improve entrepreneurial and managerial practice as well as business education are high priorities in these countries.

Microeconomic competitiveness and the state of country development

The appropriate company strategy and operations practices, as well as the influence of particular elements of the business environment, will differ for countries at different levels of income (and productivity). We expect the transition to be particularly challenging as economies shift from Factor-Driven to Investment-Driven to Innovation-Driven, because the stages involve different bases of competitive advantage and modes of integration with the global economy.

To examine these issues, we divide the countries in the sample into three groups based on per capita GDP: low income, medium income, and high income. While the reported variables are statistically significant across the entire sample and strongly distinguish countries *across* the three groups, the question is which variables have the strongest influence *within* groups. Unfortunately, however, our ability to distinguish these differences faces statistical hurdles. Limitations on sample size and in the variation in the dependent variable within groups reduce statistical power in the low-income and high-income subgroups. Within these subgroups, only the most robust variables will rise to the level of statistical significance.

We proceed with a number of approaches. The right hand side of Table 2 presents regressions within the subgroups. We explore both the statistical significance of each variable as well as the differences in slope even where variables do not achieve statistical significance. We also examine alternative functional forms of the relationships in the entire sample to see which has the best fit. An exponential relationship implies a greater effect at higher levels of a variable, while a semi-log relationship implies a greater effect at lower levels. This provides some indication of which variables are particularly important earlier in development and which ones take greater prominence at later stages.

What follows is our composite interpretation of all this evidence.

Low-income countries

The ability to move beyond competing solely on cheap labor/natural resources is the essential company challenge in the low-income countries, as revealed in the regressions. In other words, the challenge is to become increasingly efficient as a Factor-Driven economy. To do so, improving production process sophistication, introducing marketing and brand development, and beginning to delegate authority are important steps in enhancing company sophistication. Advancing other dimensions of corporate strategy and operations is premature at this stage.

Supporting priorities in terms of improving the business environment at the low-income stage with a positive relationship with GDP per capita are improving transportation and communications infrastructure, improving public education and training of management, liberalizing trade, reducing corruption, protecting intellectual property, and introducing a meaningful antitrust policy. Improving the quality of suppliers and introducing tighter regulatory standards are also important, as is beginning to improve corporate governance via effective corporate boards. All these steps create a foundation of efficiency, transparency, and competitive pressure to improve Factor-Driven competition.

Plotting the regressions of Survey respondents by subgroup for each variable helps reveal these patterns, and Figures 6 through 9 provide some representative examples. Improving buyer sophistication and scientific research institutions are not yet important in low-income countries, for example.

Figure 6: Prevalence of foreign technology licensing

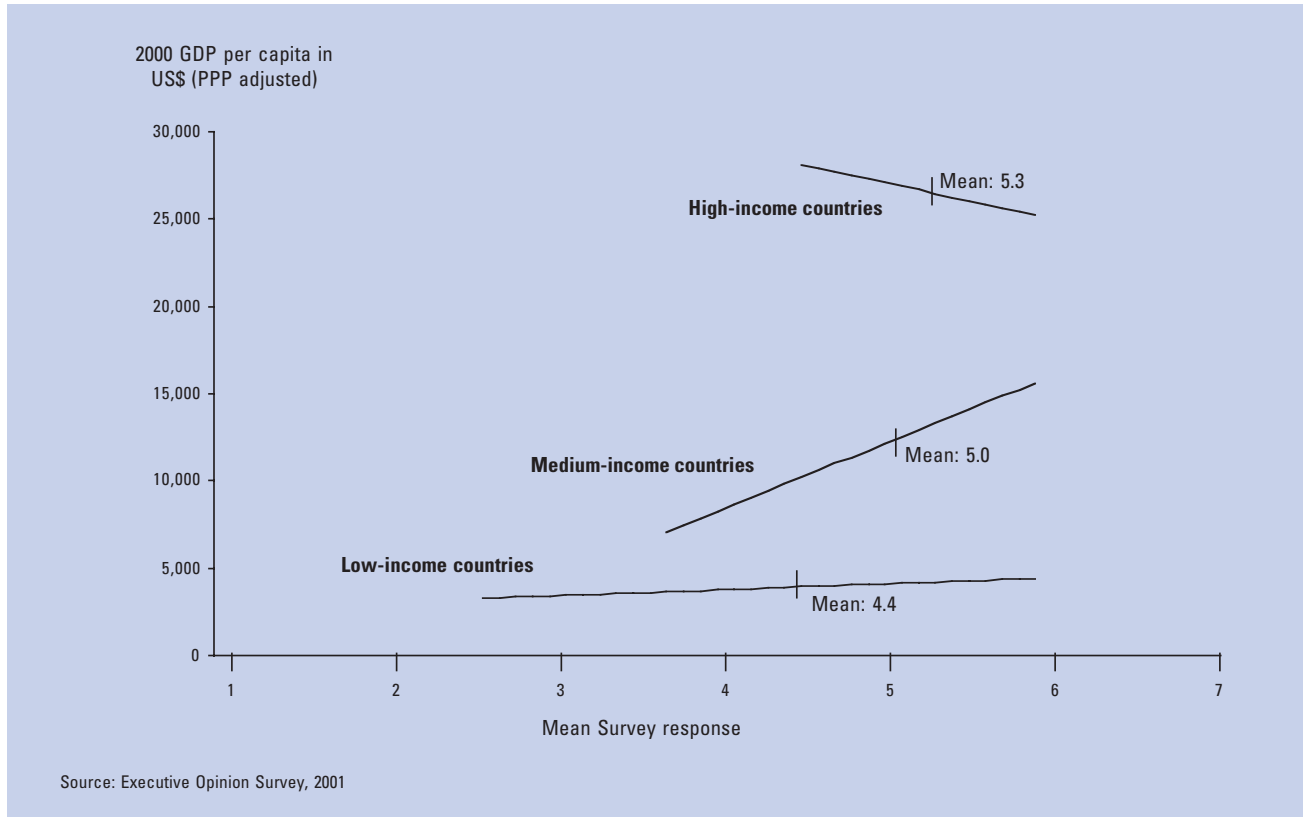


Figure 7: Buyer sophistication

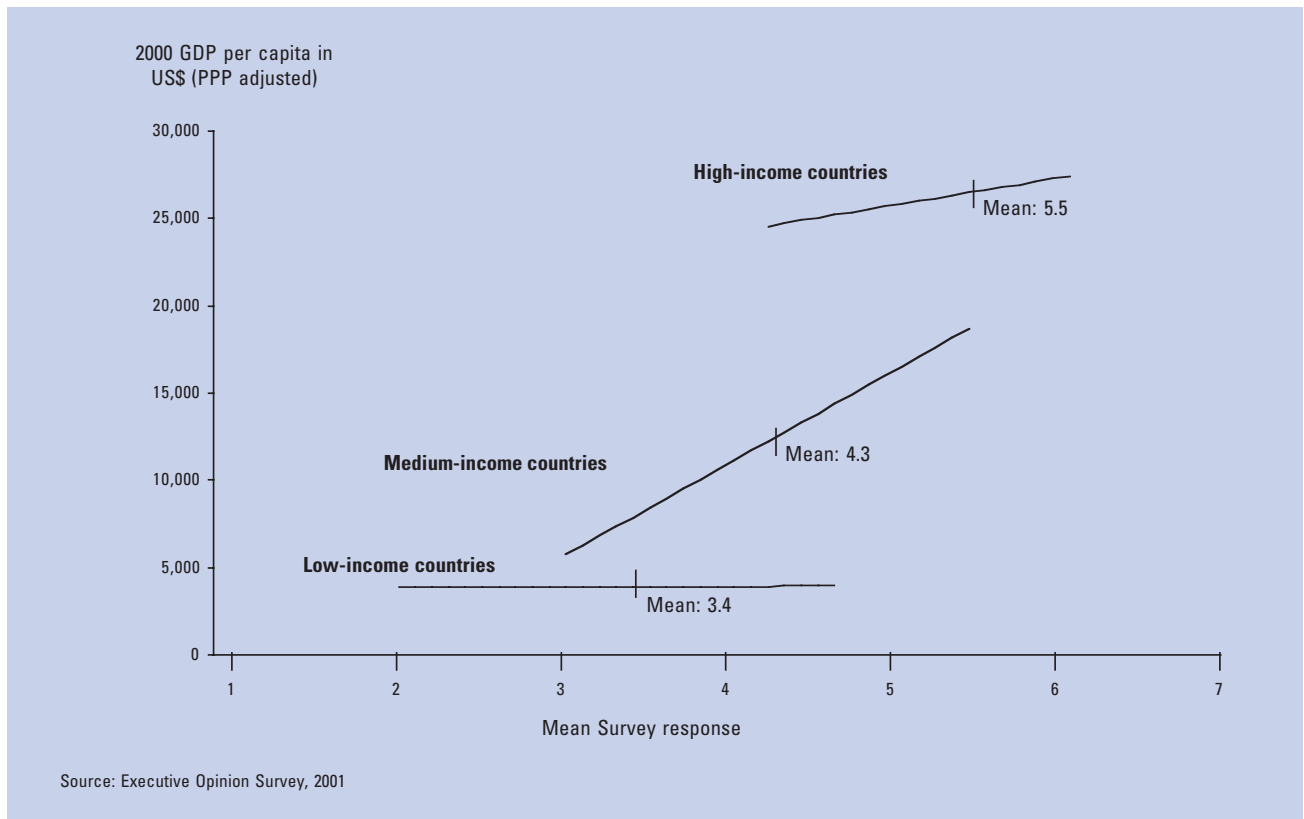


Figure 8: Quality of scientific research institutions

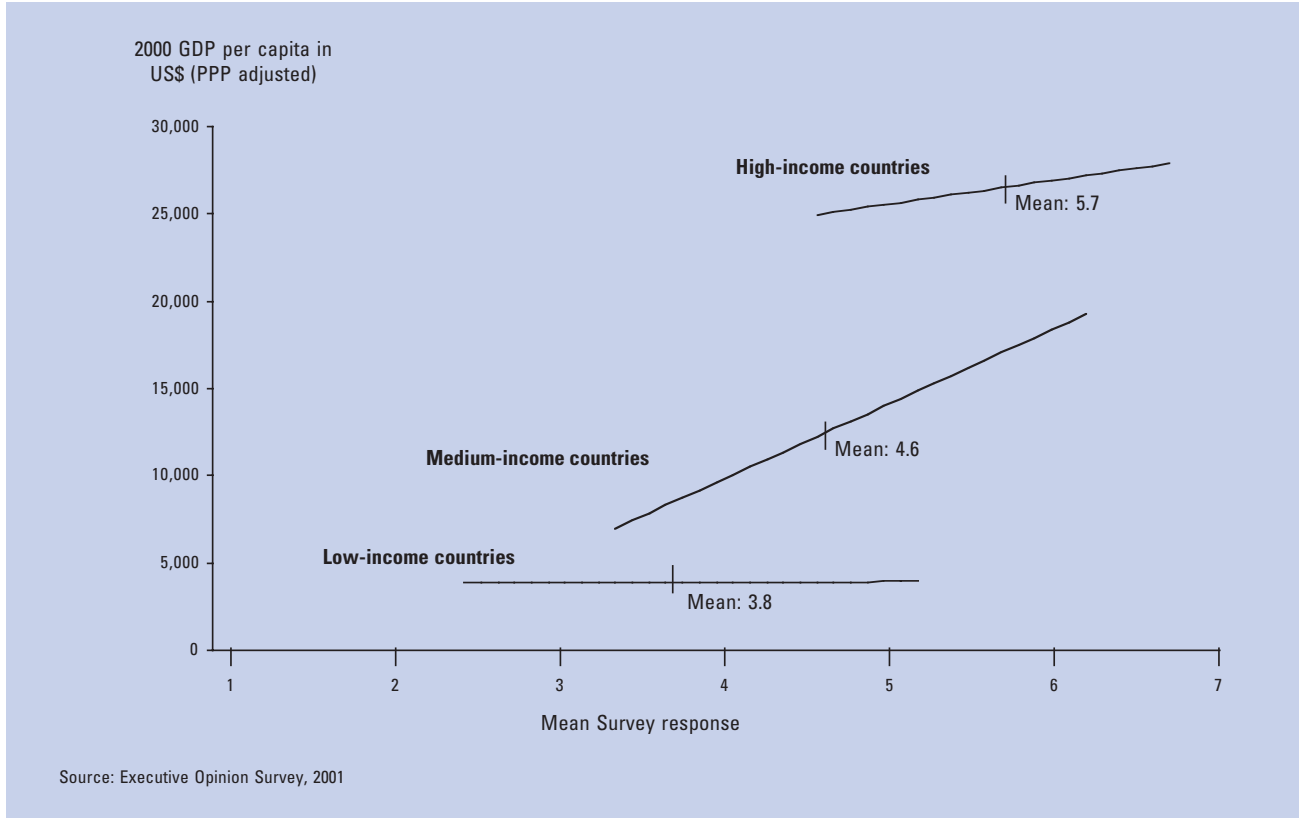
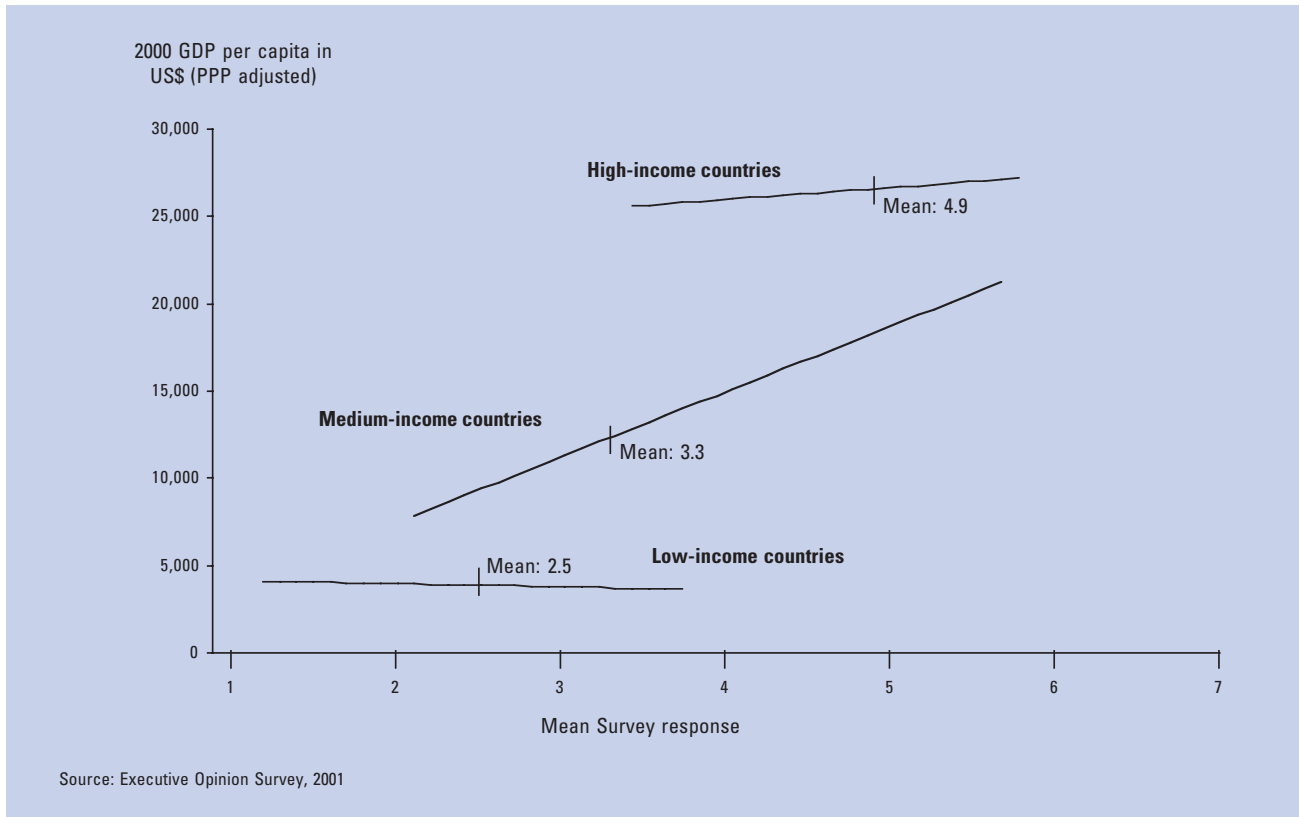


Figure 9: Venture capital availability



Medium-income countries

Moving into middle income, a series of new dimensions becomes essential. The challenge is to move beyond the Factor-Driven stage to the Investment-Driven stage.

The regressions suggest the following patterns: Corporate priorities expand to include the greater orientation to customers versus the previous stage where products were either commodities or designed by foreign OEMs.

Licensing foreign technology (Figure 6), developing the capacity to improve technology, and company spending on R&D become important. Gaining control of international distribution is essential to moving beyond the role of passive commodity or labor exporter. Introducing employee training is also important to enhance efficiency.

The Investment-Driven stage also creates new demands on the business environment. Reducing bureaucratic red tape and enhancing the legal system become important to enhance business efficiency. The financial markets become much more important to mobilize debt and equity capital. The Investment-Driven stage depends on a high rate of investment in products, processes, and acquisition of technology. Improving demand conditions are important to pressure improvements in producer quality (Figure 7). Full cluster development is needed to support higher levels of efficiency. As nations reach upper middle income, companies must utilize the best available foreign technology, produce products with quality levels at world standards, and organize at very high levels of efficiency.

High-income countries

To reach high-income status, further improvements in quality and efficiency are no longer enough. The hurdle is to move to the Innovation-Driven stage. The patterns of regressions suggest the following priorities: Companies must innovate at the world technology frontier, develop unique product designs, and sell globally. Reliance on foreign technology must fall in importance (Figure 6). In order to implement this transformation, a series of organizational changes becomes necessary. One is the complete professionalization of management, with a break from the family orientation common in the previous stage. Another organizational priority is the widespread adoption of incentive compensation to encourage risk taking. The ability to delegate authority remains important to whether a nation's firms achieve full Innovation-Driven capability.

Supporting enhancements in the business environment are also needed to achieve the Innovation-Driven stage. Some of the most important priorities are the emergence of truly world-class research institutions (Figure 8), strong research collaboration with universities, an improving supply of scientists and engineers, venture capital availability (Figure 9), truly sophisticated demand conditions, and intense local competition.

Microeconomic competitiveness and improvement in GDP per capita

The focus of the CCI is on measuring sustainable current competitiveness. However, many of the same microeconomic fundamentals also bear on the rate of productivity growth. Measures of the vitality of local competition, the environment for innovation, and demand side pressure, for example, boost current competitiveness as well as productivity growth. For example, the most influential single variable, not surprisingly, is the intensity of local competition, which was strongly associated with differences in GDP per capita growth across countries, especially in low- and high-income countries (not reported).

We briefly examined how *changes* in microeconomic conditions relate to changes in national income. We regressed the absolute change in GDP per capita 1997 to 2000 on *absolute changes* in microeconomic conditions between 1997 and 2000. A rising intensity of local competition has the strongest associations with increases in GDP per capita.

Finally, we explore the extent to which overperformance and underperformance versus microeconomic competitiveness relate to subsequent GDP per capita growth. A test of the causal influence of microeconomic conditions on GDP per capita is shown in Table 4. We calculated a measure (GAP), which is the difference between a country's *predicted* level and its *actual* level of 1997 GDP per capita based on its current competitiveness index for that year. In other words, GAP measures the degree to which a country was "overperforming" or "underperforming" its microeconomic fundamentals in 1997.

If microeconomic fundamentals cause GDP per capita, GAP should be related to GDP per capita growth in subsequent years. Countries with negative GAP, which were overperforming their fundamentals in 1997, would be expected to experience slower growth between 1997 and 2000, controlling for 1997 GDP per capita. The reverse should be true for countries underperforming their fundamentals in 1997. Hence we expect a positive sign. The strength of the effect may be modest, however, because of the relatively short time period and the susceptibility of GDP per capita growth to a myriad of transient and other disturbances.

Table 4: The relationship between predicted and actual income and change in subsequent GDP per capita

| Source | SS | df | MS | | |
|--------------|--------------------|-----------|--------------------|--------------------|-----------|
| Model | 0.037313189 | 2 | 0.018656595 | Number of obs | = 47 |
| Residual | 0.236362426 | 44 | 0.005371873 | F (2, 44) | = 3.47 |
| Total | 0.273675615 | 46 | 0.024028468 | Prob > F | = 0.0398 |
| | | | | R ² | = 0.1363 |
| | | | | Adj R ² | = 0.0971 |
| | | | | Root MSE | = 0.07329 |

| GDP pc growth, 1997–2000 | Coefficient | Std. Error | t | P > t | [95% Conf. Interval] | |
|--------------------------|-------------|------------|------|--------|----------------------|-----------|
| GAP, 1997 | 0.00000499 | 0.00000303 | 1.65 | 0.107 | –0.0000081 | 0.0000348 |
| GDP pc level, 1997 | 0.00000386 | 0.00000147 | 2.61 | 0.012 | –0.0000725 | 0.0000304 |
| Constant | 0.0067456 | 0.0244175 | 0.28 | 0.784 | –0.1603345 | 0.2846049 |

The results are consistent with the notion that microeconomic conditions *determine* the level of GDP per capita. Regressing 1997 to 2000 GDP per capita growth on GAP for the countries that have been included for all four years yielded positive coefficients overall and for all income categories. The coefficient was statistically significant at virtually the 90 percent level for the overall sample and is close to significant for low-income countries (not reported). Among low-income countries, GAP accounts for 21 percent of the variation in the subsequent change in GDP per capita, controlling for initial level. These results provide a tentative indication of causality from microeconomic conditions to changes in income.

Ranking microeconomic foundations

As noted earlier, competitiveness is not a zero-sum game. Many countries can improve productivity and prosperity. The Current Competitiveness Index tracks the performance of countries on this absolute level. However, the Index also supports comparisons among countries in their progress in building a productive economy, and hence has a relative component as well.

This year's overall CCI rankings are shown in Table 1, along with the last three years' rankings. Also included are the rankings across countries in company sophistication and the quality of the business environment. The inclusion of 17 new countries makes year-to-year comparisons difficult, especially for developing countries. Appendix B gives comparative rankings for the countries common to this and last year.

Finland again tops the United States as the leader in the CCI ranking, though the United States regained the number one company ranking. Advanced nations improving their current competitiveness rankings include the Netherlands, Sweden, Australia, Austria, France, and Iceland. Advanced countries slipping in the rankings include Germany, Denmark, Singapore, Belgium, Japan, and Hong Kong.

Developing nations improving their current competitiveness rankings on a comparable sample basis include Hungary, India, Thailand, Poland, China, Russia, and the Ukraine. Those falling in current competitiveness include Chile, Malaysia, Turkey, the Czech Republic, Greece, Jordan, Mauritius, and Peru.

Of the newly added countries, Estonia and Slovenia are the top-ranked performers. Estonia shows particular promise for future improvements in GDP per capita because it is underperforming its microeconomic potential. Bangladesh and several newly added Latin American countries register the greatest competitiveness challenges among our population of countries.

While each of the improving countries is different, there are some striking commonalities if one examines individual country patterns. Improving countries are ones where the effectiveness of antitrust policy is increasing, distortive government subsidies are declining, and weaknesses in physical infrastructure are being addressed. In the gaining countries, companies are becoming more customer oriented and more marketing savvy, improving the uniqueness of product designs, and upgrading production processes.

The countries that lost position exhibit a number of common characteristics: They are countries in which distortive government subsidies are becoming more prevalent, the quality of overall infrastructure is losing ground, the local supplier base is shrinking, and the extent of competition is falling. Companies in countries losing ground exhibit weakening regional sales, eroding control of their international distribution channels, and less distinctiveness in brands and product designs.

Please refer to the Country Profiles section of this *Report* for detailed descriptions of the competitive advantages and disadvantages of each country.

Further insight into the potential of each country can be gained from the analysis of overperformance and underperformance discussed previously. Table 5 lists countries in order of the divergence between actual GDP per capita and the expected GDP, given their microeconomic competitiveness. Underperforming countries are those with potential to improve GDP per capita over time—we term this *upside potential*. Countries whose actual and predicted GDP per capita are similar are termed *neutral*. Countries where predicted GDP per capita is lower than current GDP per capita are termed *overachievers*. Note that countries whose current competitiveness ranking has slipped modestly could still have upside potential, and vice versa.

Finland leads the advanced countries with upside potential. Its stunning turnaround in microeconomic competitiveness is still far from realized in terms of reported prosperity. Conversely, Norway, Iceland, and Ireland all continue to enjoy a level of prosperity that exceeds their microeconomic fundamentals. To a lesser extent this is also true for the United States and Canada.

Turkey, Brazil, and South Africa are among the middle-income countries that should be able to support a higher GDP per capita given their microeconomic fundamentals. The converse is true for Greece, Argentina, and Russia, which are among a group of countries whose levels of income will be unsustainable without substantial microeconomic reform. India heads the list of low-income countries with microeconomic capability that could be unlocked by microeconomic and political reform.

Table 5: GDP per capita relative to current competitiveness

| | Advanced Countries | Middle Countries | Developing Countries |
|---|--|---|---|
| | UPSIDE POTENTIAL | | |
| Current competitiveness would support a higher per capita income | Finland Sweden United Kingdom | South Africa Brazil Turkey Chile Taiwan Hungary Israel Malaysia | India Egypt Jordan China Thailand Indonesia Philippines Vietnam Ukraine Zimbabwe |
| | NEUTRAL | | |
| Income and competitiveness are balanced | Germany Netherlands France Switzerland Australia Denmark | Singapore New Zealand Poland Spain Slovakia | Colombia |
| | CURRENT OVERACHIEVERS | | |
| Per capita income is high relative to current competitiveness | Norway Iceland Ireland United States Canada Belgium Italy Hong Kong SAR Austria Japan | Greece Argentina Portugal Korea Russia Mauritius Czech Republic Mexico Costa Rica | Bolivia Ecuador Bulgaria Venezuela Peru El Salvador |

Conclusions

National prosperity depends on *competitiveness*, which reflects the productivity with which a nation uses resources. Competitiveness is rooted in a nation's microeconomic fundamentals and manifested in the nature of company operations and strategy and in the quality of the microeconomic business environment. Political stability and sound macroeconomic policies, accompanied by market opening and privatization, have long been considered the cornerstone for economic development. The results here suggest that they are necessary but not sufficient. We find strong evidence that microeconomic upgrading is a sequential process in which countries at different levels of development face distinctly different challenges.

While institutions such as the IMF have strongly encouraged macro reforms, our findings suggest that micro reforms are equally if not more important. Without micro reforms, growth in GDP induced by sound macro policies will be unsustainable and will not translate into improvements in GDP per capita. Appropriate micro reforms, which boost productivity and productivity growth, can also greatly ease the challenge of meeting government's fiscal obligations and reducing macroeconomic distortions.

A greater focus on microeconomic reforms will pay another essential dividend. While macro reforms almost inevitably inflict hardship in the short and medium run through raising interest rates and prices while cutting public expenditures, micro reforms can produce tangible and visible benefits for citizens. Breaking up local cartels and monopolies, for example, can lower the cost of food, housing, electricity, telephone service, and other costs of living. Regulatory reform can rapidly begin to ease inefficiencies, reduce pollution, raise product and service quality, and improve unsafe practices. Bold steps to improve education and training are particularly important, because they offer the hope of a better life for children. If citizens see businesses reforming themselves and having to confront tough competitive challenges, they themselves will be more willing to live with personal sacrifices and less likely to side with anti-reform interest groups. The political will and public support to make real economic change is elevated.

Our results again challenge the notion that microeconomic improvement is automatic if proper macroeconomic policies are instituted. While there may be a tendency for microeconomic conditions to improve because GDP per capita rises, *such improvement appears to be far from automatic*. Moreover, the rate of improvement in current competitiveness *can be affected* markedly by purposeful action in both government and the private sector. Microeconomic conditions can move ahead of or fall behind current GDP per capita, and we find evidence that this has an influence on subsequent economic growth.

Our findings indicate that it is unwise to view micro reforms only in terms of reducing the role of government and abolishing market distortions. Such steps remain a critical challenge for many countries to master. Yet government has a range of positive roles that are fundamental to prosperity, such as investments in human resources, building innovative capacity, and stimulating advanced demand via regulatory standards. Many nations need to move beyond first stage reforms and address these agendas. Also, the private sector has an important role in improving a nation's competitive platform through collective activities and cluster development initiatives. Second-stage micro reforms require a new perspective on the role of the private sector.

Our results also highlight the need to set a nation's economic priorities to be consistent with its level of development. We describe how the challenges are different for low-, medium-, and high-income countries. Especially challenging are the difficult transitions between development stages. Countries that have been very successful in one stage of development, such as Taiwan and Singapore in the Investment-Driven stage, need to recognize the multifaceted adjustments needed to manage the transition to the Innovation-Driven stage.

If there is to be continued momentum for economic reform in nations around the world, there is a pressing need to move to the next level of thinking and practice. Approaches centered largely on responding to international financial markets and ceding choices to impersonal global forces are producing a backlash that erodes the consensus for global economic progress and encourages populist national policies that are fundamentally self-defeating. Protests at international meetings should be a wake-up call that economic reform must move beyond now standard approaches and embrace domestic competition, stringent environmental standards, and policies that meaningfully boost the skills and opportunities of citizens.

Countries are converging on macroeconomic policies, and strong market forces penalize any nation that fails to reform in this arena. The central challenge to the world economy is now microeconomic reform, but reform that moves beyond past approaches. Progress in improving the sophistication of companies and the quality of the business environment is the only way to produce real improvements in efficiency, product quality, new business opportunities, and a rising standard of living for citizens.

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Notes

- i Elisabeth de Fontenay, Christian Ketels, Daniel Vasquez, and Weifeng Weng I would like to thank for their major role in the analyses reported here. Lyn Pohl provided able supervision of the final production of the paper.
- ii The proportion has grown modestly over the last several years as the model has been improved.
- iii Stages were first introduced in Michael E Porter, *The Competitive Advantage of Nations*, Macmillan Press, 1990.
- iv GDP per worker is employed as a productivity measure in some studies. We used the broader measure here because GDP per worker can be increased by high unemployment or low workforce participation, which do not increase wealth. Also, holders of capital, not only workers, contribute to national productivity. In comparing the United States and France, for example, the United States has absorbed a huge influx of new workers (higher workforce participation) over the last decade, while France has maintained high GDP per worker but with high unemployment and a large student population not counted as part of the potential workforce.
- v In the case of Ireland, we used GNP instead of GDP because of the size of dividend outflows to foreign investors. Ireland's GDP is about 20 percent higher than its GNP.
- vi Statistical significance at ** = 5 percent and * = 10 percent (all two-tailed tests) is noted in the table.
- vii This analysis covers the questions that have been common over the three years, which comprise the great majority of questions.
- viii Common factor analysis is a statistical technique for summarizing data by accounting for the common variance among all included variables. An alternative approach using a principal components analysis yielded similar qualitative results.
- ix No other factor accounted for more than 4.6 percent of the covariance.
- x The forecast region has wider bands than a 95 percent mean confidence region. The latter provides a confidence interval for a given level of competitiveness over repeated observations. The forecast region method, in contrast, reflects a higher degree of inherent uncertainty in predicting a single observation. As a result, interpretation of the proximity of data points to the regression line should be undertaken with appropriate caveats. Note that the forecast region widens slightly as it moves away from the "center" of the graph. The center is the point located at the intersection of the mean GDP per capita level and mean factor score.
- xi In each case, a statistically significant, dominant factor again explains the great majority of the variance (77.4 percent for company operations and strategy and 67.6 percent for the business environment).
- xii For a more detailed examination of Japan's competitive situation, see Porter et al (2000).

Appendix A: Survey Questions

I. COMPANY OPERATIONS & STRATEGY

Production Process Sophistication
Nature of Competitive Advantage
Extent of Staff Training
Extent of Marketing
Willingness to Delegate Authority New question
Capacity for Innovation
Company Spending on R&D
Value Chain Presence
Breadth of International Markets
Uniqueness of Product Designs
Degree of Customer Orientation
Control of International Distribution
Extent of Branding
Reliance on Professional Management
Extent of Incentive Compensation New question
Extent of Regional Sales
Prevalence of Foreign Technology Licensing

II. NATIONAL BUSINESS ENVIRONMENT

A. FACTOR (INPUT) CONDITIONS

1. Physical Infrastructure

Overall, Infrastructure Quality

a. Basic

Road Infrastructure Quality
Railroad Infrastructure Development
Port Infrastructure Quality
Air Transport Infrastructure Quality

b. Advanced

Telephone/Fax Infrastructure Quality
Availability and Cost of Cellular Phones
Speed and Cost of Internet Access

2. Administrative Infrastructure

Police Protection of Businesses
Judicial Independence
Administrative Burden for Start-Ups
Adequacy of Public Sector Legal Recourse
Extent of Bureaucratic Red Tape

3. Capital Availability

Ease of Access to Loans
Financial Market Sophistication
Local Equity Market Access
Venture Capital Availability

4. Human Resources

Quality of Public Schools
Quality of Math and Science Education New question
Availability of Scientists and Engineers New question
Quality of Management Schools

5. Science & Technology

Patents per capita (2000)
Quality of Scientific Research Institutions
University/Industry Research Collaboration

II. NATIONAL BUSINESS ENVIRONMENT (Cont'd.)

B. DEMAND CONDITIONS

Buyer Sophistication
Consumer Adoption of Latest Products
Presence of Demanding Regulatory Standards
Stringency of Environmental Regulations
Government Procurement of Advanced
Technology Products New question
Laws Relating to Information Technology New question

C. RELATED AND SUPPORTING INDUSTRIES

Local Supplier Quantity
Local Supplier Quality
State of Cluster Development
Extent of Product and Process Collaboration New question
Local Availability of Components and Parts New question
Local Availability of Process Machinery New question
Local Availability of Specialized Research
and Training Services New question
Local Availability of Information Technology Services New question

D. CONTEXT FOR FIRM STRATEGY AND RIVALRY

Favoritism in Decisions of Government Officials
Extent of Irregular Payments
Extent of Distortive Government Subsidies
Decentralization of Corporate Activity
Cooperation in Labor-Employer Relations New question
Tariff Liberalization
Hidden Trade Barrier Liberalization
Intellectual Property Protection
Intensity of Local Competition
Extent of Locally Based Competitors
Effectiveness of Anti-Trust Policy
Efficacy of Corporate Boards

Appendix B: The Current Competitiveness Index (Constant Country Sample)

| Country | CCI Ranking | | | | Company Operations and Strategy Ranking | | | | Quality of the National Business Environment Ranking | | | | 2000 GDP per Capita (ppp adjusted) |
|----------------------|-------------|------|------|------|---|------|------|------|--|------|------|------|------------------------------------|
| | 2001 | 2000 | 1999 | 1998 | 2001 | 2000 | 1999 | 1998 | 2001 | 2000 | 1999 | 1998 | |
| Finland | 1 | 1 | 2 | 2 | 2 | 3 | 7 | 8 | 1 | 1 | 2 | 2 | 24,864 |
| United States | 2 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 33,886 |
| Netherlands | 3 | 4 | 3 | 3 | 3 | 7 | 8 | 5 | 3 | 3 | 3 | 4 | 25,598 |
| Germany | 4 | 3 | 6 | 4 | 4 | 1 | 5 | 1 | 4 | 6 | 5 | 8 | 24,931 |
| Switzerland | 5 | 5 | 5 | 9 | 5 | 5 | 2 | 3 | 5 | 10 | 9 | 10 | 28,518 |
| Sweden | 6 | 7 | 4 | 7 | 6 | 6 | 3 | 4 | 6 | 11 | 7 | 9 | 23,884 |
| United Kingdom | 7 | 8 | 10 | 5 | 7 | 11 | 13 | 9 | 8 | 9 | 8 | 5 | 23,197 |
| Denmark | 8 | 6 | 7 | 8 | 9 | 8 | 9 | 10 | 9 | 4 | 6 | 7 | 27,120 |
| Australia | 9 | 10 | 13 | 15 | 22 | 20 | 19 | 22 | 7 | 7 | 10 | 12 | 25,758 |
| Singapore | 10 | 9 | 12 | 10 | 15 | 15 | 14 | 12 | 10 | 5 | 12 | 6 | 23,000 |
| Canada | 11 | 11 | 8 | 6 | 14 | 16 | 12 | 15 | 11 | 8 | 4 | 3 | 27,783 |
| Austria | 12 | 13 | 11 | 16 | 11 | 12 | 10 | 11 | 13 | 12 | 13 | 17 | 26,314 |
| France | 13 | 15 | 9 | 11 | 10 | 9 | 6 | 6 | 12 | 15 | 11 | 13 | 24,032 |
| Belgium | 14 | 12 | 15 | 19 | 12 | 10 | 11 | 13 | 14 | 13 | 15 | 18 | 26,958 |
| Japan | 15 | 14 | 14 | 18 | 8 | 4 | 4 | 7 | 18 | 19 | 19 | 19 | 25,796 |
| Iceland | 16 | 17 | 22 | 24 | 16 | 14 | 21 | 28 | 15 | 16 | 21 | 23 | 29,167 |
| Israel | 17 | 18 | 20 | 21 | 18 | 13 | 18 | 21 | 17 | 20 | 20 | 20 | 19,577 |
| Hong Kong SAR | 18 | 16 | 21 | 12 | 21 | 23 | 24 | 17 | 16 | 14 | 18 | 11 | 24,448 |
| Norway | 19 | 20 | 18 | 14 | 24 | 21 | 23 | 14 | 19 | 18 | 16 | 15 | 29,500 |
| New Zealand | 20 | 19 | 16 | 17 | 19 | 22 | 16 | 19 | 20 | 17 | 14 | 16 | 20,010 |
| Taiwan | 21 | 21 | 19 | 20 | 20 | 18 | 17 | 16 | 21 | 21 | 22 | 21 | 17,223 |
| Ireland ^y | 22 | 22 | 17 | 13 | 17 | 19 | 20 | 18 | 22 | 22 | 17 | 14 | 25,200 |
| Spain | 23 | 23 | 23 | 22 | 23 | 24 | 22 | 23 | 23 | 23 | 23 | 22 | 19,202 |
| Italy | 24 | 24 | 25 | 26 | 13 | 17 | 15 | 20 | 24 | 26 | 27 | 27 | 23,304 |
| South Africa | 25 | 25 | 26 | 25 | 25 | 26 | 28 | 33 | 26 | 25 | 25 | 25 | 9,189 |
| Hungary | 26 | 32 | 33 | 31 | 29 | 34 | 36 | 39 | 25 | 31 | 33 | 31 | 12,335 |
| Korea | 27 | 27 | 28 | 28 | 26 | 25 | 27 | 24 | 29 | 28 | 30 | 28 | 17,311 |
| Chile | 28 | 26 | 24 | 23 | 28 | 27 | 26 | 25 | 27 | 24 | 24 | 24 | 9,187 |
| Portugal | 29 | 28 | 29 | 33 | 33 | 35 | 37 | 48 | 28 | 27 | 26 | 30 | 16,882 |
| Brazil | 30 | 31 | 35 | 35 | 27 | 29 | 32 | 27 | 32 | 32 | 37 | 39 | 7,389 |
| Turkey | 31 | 29 | 31 | 29 | 38 | 28 | 33 | 26 | 30 | 29 | 32 | 29 | 6,870 |
| Czech Republic | 32 | 34 | 41 | 30 | 35 | 41 | 55 | 31 | 31 | 34 | 36 | 33 | 13,721 |
| India | 33 | 37 | 42 | 44 | 37 | 40 | 48 | 50 | 33 | 37 | 43 | 42 | 2,403 |
| Malaysia | 34 | 30 | 27 | 27 | 32 | 30 | 25 | 34 | 35 | 30 | 31 | 26 | 8,924 |
| Thailand | 35 | 40 | 39 | 37 | 36 | 47 | 43 | 37 | 36 | 40 | 39 | 36 | 6,469 |
| Slovakia | 36 | 36 | 48 | 36 | 49 | 31 | 51 | 40 | 34 | 36 | 47 | 37 | 11,035 |
| Poland | 37 | 41 | 37 | 41 | 46 | 36 | 38 | 38 | 37 | 41 | 38 | 40 | 8,971 |
| Greece | 38 | 33 | 36 | 38 | 43 | 32 | 45 | 32 | 39 | 33 | 34 | 38 | 16,326 |
| Jordan | 39 | 35 | 32 | 32 | 48 | 46 | 44 | 42 | 38 | 35 | 28 | 32 | 4,079 |
| Egypt | 40 | 39 | 43 | 40 | 31 | 44 | 49 | 47 | 40 | 39 | 42 | 35 | 3,602 |
| China | 41 | 44 | 49 | 42 | 34 | 38 | 31 | 35 | 41 | 45 | 50 | 44 | 3,953 |
| Costa Rica | 42 | 43 | 38 | — | 30 | 39 | 35 | — | 45 | 42 | 41 | — | 9,236 |
| Mauritius | 43 | 38 | 30 | — | 41 | 37 | 29 | — | 42 | 38 | 29 | — | 9,512 |
| Mexico | 44 | 42 | 34 | 39 | 40 | 42 | 30 | 29 | 44 | 43 | 35 | 41 | 8,914 |
| Argentina | 45 | 45 | 40 | 34 | 45 | 45 | 39 | 30 | 43 | 44 | 40 | 34 | 12,314 |
| Philippines | 46 | 46 | 44 | 45 | 39 | 43 | 34 | 41 | 46 | 46 | 46 | 45 | 3,956 |
| Indonesia | 47 | 47 | 53 | 51 | 42 | 51 | 47 | 52 | 47 | 47 | 52 | 51 | 3,014 |
| Colombia | 48 | 48 | 52 | 49 | 44 | 48 | 40 | 43 | 49 | 48 | 53 | 49 | 5,923 |
| Russia | 49 | 52 | 55 | 46 | 47 | 33 | 42 | 45 | 48 | 53 | 55 | 47 | 8,213 |
| Ukraine | 50 | 56 | 56 | 52 | 51 | 52 | 50 | 51 | 50 | 56 | 56 | 52 | 3,693 |
| Vietnam | 51 | 53 | 50 | 43 | 52 | 50 | 41 | 36 | 53 | 52 | 49 | 43 | 1,974 |
| Peru | 52 | 49 | 46 | 47 | 53 | 53 | 56 | 49 | 51 | 51 | 44 | 46 | 4,797 |
| El Salvador | 53 | 51 | 47 | — | 54 | 57 | 46 | — | 52 | 50 | 48 | — | 4,477 |
| Zimbabwe | 54 | 50 | 45 | 48 | 50 | 56 | 54 | 46 | 56 | 49 | 45 | 48 | 2,697 |
| Venezuela | 55 | 54 | 51 | 50 | 55 | 49 | 53 | 44 | 55 | 55 | 51 | 50 | 5,677 |
| Bulgaria | 56 | 55 | 54 | — | 56 | 54 | 52 | — | 54 | 54 | 54 | — | 5,469 |
| Ecuador | 57 | 57 | 57 | — | 57 | 55 | 57 | — | 57 | 58 | 57 | — | 3,068 |
| Bolivia | 58 | 58 | 58 | — | 58 | 58 | 58 | — | 58 | 57 | 58 | — | 2,408 |