

## Moving to a New Global Competitiveness Index

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*The Global Competitiveness Report* (GCR) has long been a globally recognized ranking of country competitiveness and a tool for benchmarking country strengths and weaknesses. In an effort to continually introduce the best available methodology in preparing the rankings, there has been a series of improvements in the methodology over the years. An important milestone was reached in 2000, when Professor Jeffrey Sachs introduced the Growth Competitiveness Index, based on a stronger academic foundation in economic growth theory. Professor Michael Porter joined the effort in 2000, introducing a companion Business Competitiveness Index (BCI) focused on the microeconomic drivers of prosperity. In 2004, Professor Xavier Sala-i-Martin created a Global Competitiveness Index (GCI), which included both macroeconomic and microeconomic factors of competitiveness. Since 2004, the GCI has been published in the GCR alongside the BCI.

This year, the World Economic Forum and Professor Porter have embarked on another important stage in the development of the GCR. Under Professor Porter's leadership, the aim is another step-change improvement in both the Index methodology and the quality of the Executive Opinion Survey (the Survey), which provides many proprietary data used in preparing the *Report*. This chapter previews the upcoming changes in the Index, while Chapter 2.1 discusses the considerable improvements that have already been implemented in the Survey process.

The aim of the New Global Competitiveness Index (New GCI) is to create a single, fully integrated index to replace the two indexes published in recent years. The New GCI will be based on a single model that is firmly grounded in the latest academic research while designed to extend research and yield practical insights for policy-makers. The New GCI will also create a stable methodological platform for the years to come.

The New GCI will concentrate on the determinants of the productivity level that a national economy can sustain, which is the ultimate driver of national prosperity. Data will continue to be drawn from a mix of public sources and the unique and proprietary annual Survey of many thousands of business executives from around the world. The majority of the individual indicators used in the previous indexes will be incorporated into the new index.

While many of the elements stay the same, the New GCI incorporates them in a new and more robust conceptual structure. It will also employ a new and more rigorous statistical methodology.

To develop the new index, Professor Porter assembled a team of scholars including Professor Scott Stern

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of Northwestern University, Professor Antonio Ciccone of Universitat Pompeu Fabra, Professor Mercedes Delgado of Temple University, and Dr. Christian Ketels of the Institute for Strategy and Competitiveness at Harvard Business School. The New Index is largely developed, and will be rigorously tested over the coming year. An advisory group of outside experts will review the New Index and make recommendations for improvements. The official launch of the New GCI will coincide with the 2009 *Global Competitiveness Report*.

Assessing a country's competitiveness is a challenging task because of the sheer number and variety of influences on national productivity. Correlation among many of the indicators makes disentangling the impact of individual indicators complex from a statistical standpoint. It is precisely because of these challenges, as well as the fact that most studies highlight a subset of influences rather than seek a comprehensive model, that the academic literature has not achieved consensus on the causes of productivity. Different datasets and alternative econometric approaches have led to different and often conflicting claims about the specific drivers of competitiveness.<sup>1</sup> The aim of the New GCI is to deal with these challenges in a way that is rigorous, pragmatic, and designed to inform policymakers at a detailed level.

This chapter provides an overview of the New Index, its structure and methodology, and some of its overall findings. While the details will evolve, we wanted to provide a preview to inform scholars and practitioners of the new approach and invite dialog about the proposed methodology and its implications.

### The foundation of competitiveness

Prosperity is determined by the productivity of an 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 these products can be produced. Productivity supports high wages, a strong currency, and attractive returns to capital—and with them a high standard of living.<sup>2</sup> Competitiveness, then, is measured by productivity.

The world economy is not a zero-sum game. Many nations can improve their prosperity if they can improve productivity. Improving productivity will raise the value of goods produced and improve local incomes, expanding the global pool of demand to be met. Globalization has increased the returns to productivity by opening up large new markets for competitive countries. Globalization has also raised the costs of low productivity, by reducing the ability to sustain low-productivity companies or provide high-paying jobs for less-skilled employees. The central challenge for any economy is to create the con-

ditions in which companies and employees throughout the economy can upgrade their productivity.

Identifying the drivers of productivity (and ultimately prosperity) across countries is one of the oldest occupations of economic research. Theoretical models initially concentrated on the role of capital accumulation in economic growth.<sup>3</sup> Over the last decades, they have focused increasingly on the role of knowledge.<sup>4</sup>

Empirical research, enabled by new datasets covering an ever increasing range of indicators, has tested the impact of a wide range of these possible productivity drivers. Important categories of productivity drivers highlighted have included the role of institutions, openness to trade and investment, geographic location, and the quality of the business environment. While there is broad agreement on some general findings, no consensus model has yet emerged on the specific drivers of productivity and their relative importance. Results tend to be highly dependent on the specifics of the sample of countries chosen and the actual measures used.<sup>5</sup> These findings have led to debate about policy implications.<sup>6</sup>

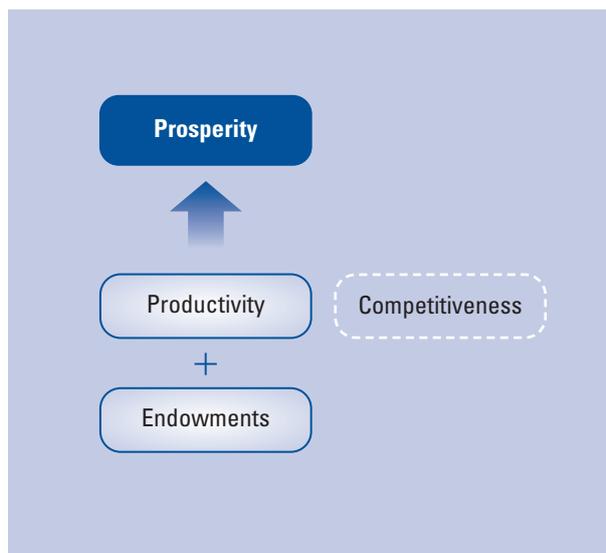
The New GCI framework is grounded in this literature, but aims to provide an integrative overall framework while capturing detailed local circumstances at the country level that are actionable by policymakers. Much academic work focuses on a minimum set of root causes that statistically explain the differences in current prosperity levels across countries, such as a nation's colonial past. The New GCI aims to identify the proximate drivers of current prosperity at a level that can be addressed by policy, even if these drivers may have been influenced by history.

Theory and empirical evidence suggest that many things matter for competitiveness. The New GCI framework incorporates a comprehensive set of these factors, rather than isolating a few factors that are econometrically most efficient in predicting prosperity levels. Our aim is to capture the rich set of influences on productivity that will allow policymakers to understand country strengths and weaknesses and craft a policy agenda.

Some national conditions, such as the quality of public institutions, are general conditions that create opportunities for higher productivity across the economy that may or may not be realized. Other factors, such as the average skill level of the labor force, directly affect productivity. Differences in the mechanism of influence often coincide with the policy process that governs them: general conditions affecting productivity tend to be under the control of national governments, while many direct productivity drivers are often the result of involvement by many parts of government, the private sector, academia, and other institutions.

Within broad categories, such as physical infrastructure or financial market sophistication, we find that there is a high degree of correlation between individual factors. Thus, improving a country's position is a matter of improving groups of interrelated factors, not just

Figure 1: Defining competitiveness



influencing one or two isolated weaknesses. The New GCI framework deals with this issue through an econometric approach that reveals the common movements of related factors instead of imposing weights that treat factors as separate.

### Elements of the New GCI framework

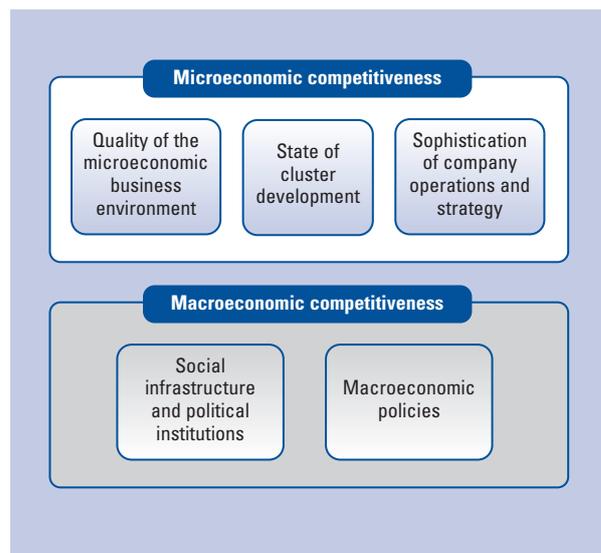
The aim of the New GCI is to reveal the underlying causes of productivity. There are three overall building blocks of the framework: endowments, macroeconomic competitiveness, and microeconomic competitiveness. Endowment affects prosperity directly through inherited natural resources, geographic location, or a large home market. Endowment is a control variable in explaining prosperity.

Competitiveness is what determines the productivity with which a nation's endowments are used to create goods and services. Competitiveness arises from both macroeconomic and microeconomic factors. These are captured in detail in the New GCI.

### Productivity

The dependent variable used in estimating the New GCI model is the level of GDP per capita, adjusted for purchasing power parity (PPP). GDP per capita is the broadest measure of national productivity and is strongly linked over time to a nation's standard of living. It is the single best summary measure of country performance available across all countries. It provides continuity with the BCI model of previous years. The focus on productivity reflects our goal of identifying the determinants of sustainable prosperity, whether they operate through inputs such as skills and capital or through the efficiency with which these inputs are employed. Focusing on

Figure 2: Foundations of productivity



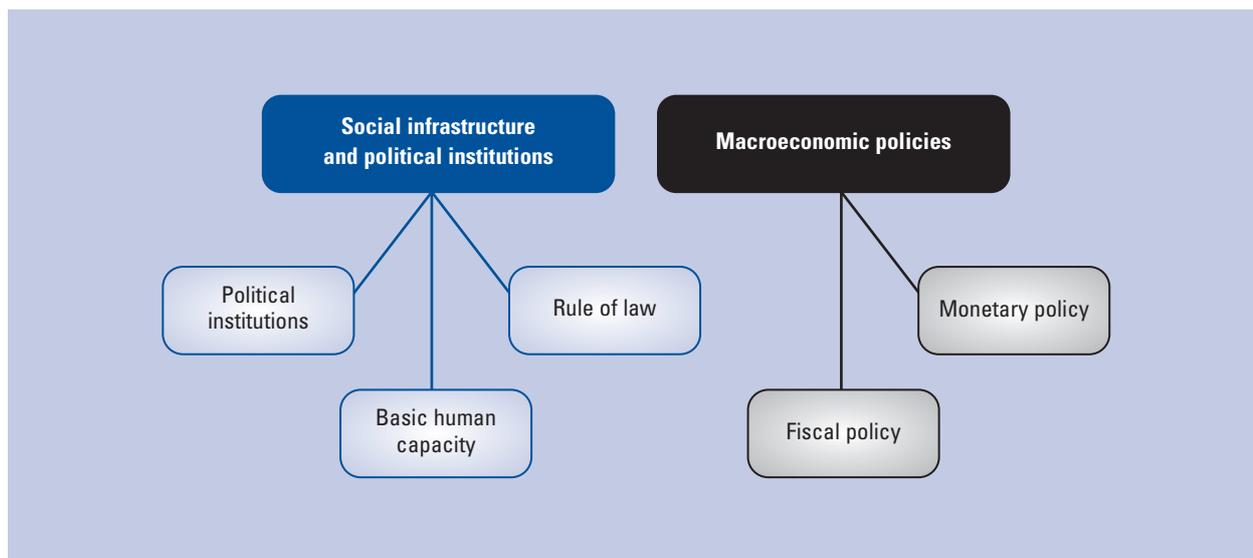
inputs and efficiency separately is problematic because of conceptual as well as practical issues. Conceptually, they are not determined independently.<sup>7</sup> Practically, the calculation of inputs and efficiency levels is subject to significant data limitations.

### Endowments

The New Index explains productivity rather than becoming co-mingled with resource abundance. Controlling for endowments allows the New GCI to distinguish between prosperity and productivity. Inherited prosperity from, for example, oil resources, is captured in the control. The competitiveness indicators then explain the created wealth from productive economic activity that adds value to available labor and natural assets.

The empirical growth literature has generally revealed a negative influence of natural resource abundance on prosperity levels, summarizing the evidence using the term *resource curse*.<sup>8</sup> The traditional justification for this counterintuitive finding—access to valuable resources seemingly should have a positive effect on prosperity—has been the Dutch Disease. Here, revenues from natural resource exports lead to an appreciation of the real exchange rate that, in turn, drives factors of production into local activities such as retailing that have lower long-term potential for productivity growth. An additional justification for the resource curse is the role of institutions: natural resource wealth has a negative effect on the quality of political institutions and economic policy, eroding competitiveness over time.<sup>9</sup>

A country's geographic location is another endowment that has been discussed as a possible external factor influencing wealth. Location can affect the ease with which countries can engage in trade, for example, because of having a long coastline,<sup>10</sup> or because of distance from

**Figure 3: Macroeconomic competitiveness**

large markets.<sup>11</sup> Another locational dimension of endowments is the proximity to the equator and climatic conditions that expose a country to tropical diseases and might lead to lower agricultural productivity.<sup>12</sup>

Finally, there is a widespread view that another type of endowment, country size and population, affects prosperity. While there is little empirical evidence on direct effects of country size on growth, there is evidence of some effects such as the greater effect of openness to trade on prosperity for small countries than for large countries.<sup>13</sup> Some evidence suggests that the level of agglomeration is related to prosperity for poor countries, but the findings are not yet very robust.<sup>14</sup>

### Macroeconomic competitiveness

Macroeconomic factors operate indirectly to affect the productivity of firms in an economy. They are necessary, but not sufficient, for higher productivity.

The New GCI framework distinguishes two broad areas of macroeconomic competitiveness: macroeconomic policy (MP) and social infrastructure and political institutions (SIPI). These areas reflect two key strands in the macroeconomic growth and prosperity literature. Macroeconomic policy has dominated the debate for a long time,<sup>15</sup> while recent literature has put more emphasis on institutions.<sup>16</sup> There is an emerging consensus that institutions have a strong effect on productivity, especially when accounting for their endogenous effects on other economic and social policies.

Macroeconomic factors are heavily the province of central governments. In most areas of macroeconomic competitiveness, there is broad consensus on best practices in managing the policy levers available. Achieving high levels of macroeconomic competitiveness is thus largely a matter of achieving these best practices and

sustaining them over time, often in the face of political opposition by interest groups hoping to benefit from different policies.

*Macroeconomic policy* has been the central focus of the economic policy debate in most countries.<sup>17</sup> Fiscal and monetary policy, each a separate area of academic research, are included in the New GCI framework. Although many countries achieve similar levels of performance on fiscal and monetary policies, differences exist and can sometimes persist.<sup>18</sup>

Fiscal policy—that is, government spending and financing decisions—is primarily discussed in terms of its impact on short-term fluctuations of economic activity. In terms of its impact on long-term differences in productivity across locations, researchers have distinguished between the role of the absolute size of the government and the growth of government spending, and the patterns of raising government revenues over time. More prosperous countries tend to have a larger share of government spending in GDP, a relationship first noted by German economist Adolph Wagner in the 19th century.<sup>19</sup> This is true because the demand for public goods such as infrastructure and social security systems increases with overall prosperity. However, there is significant variance of government budgets among countries at similar stages of development. Recent analysis has focused more on the nature of financing, notably the impact of different patterns of taxation on overall prosperity.<sup>20</sup> The literature suggests that, within normal parameters, the overall size of government (and implicitly the level of taxes) is less important than the way government spends money (government efficiency) and the way taxation is structured (distortiveness and bureaucratic burden of taxes).

The sustainability of government financing over time is another factor with potential impact on productivity levels. High debt levels ultimately have to be financed by increasing taxation or reducing spending. Or, if governments have the power to do so, they can use monetary policy to induce inflation as a way to reduce their debt burden. Expectations in these directions, triggered by high government debt burdens or excessive deficit financing of budgets, can distort investment decisions and thus lower the potential for higher productivity. The impact of fiscal policy on the business cycle could also have an impact on productivity: more cyclicalities can increase the periods of time in which companies with financing constraints are unable to finance otherwise-profitable long-term investments. Overall, however, the empirical literature suggests that the impact of fiscal policy on long-term productivity differences is weak, especially after controlling for the quality of political institutions.<sup>21</sup>

Monetary policy, especially the level of the money supply, is also normally treated primarily in the context of short-term fluctuations in economic activity. But monetary policy can also have longer-term effects: high and volatile inflation can, for example, render price signals hard to interpret and thus distort decisions away from investments that lead to higher productivity. While the empirical literature tends to support this view for very high rates of inflation, there is less conclusive evidence of the impact of moderate levels of inflation on long-term productivity growth.<sup>22</sup> Nevertheless, there is a broad policy consensus on the need for monetary policy to support low inflation.<sup>23</sup>

Social infrastructure and political institutions (SIPI) have become the focus of much academic analysis and policy attention in the last two decades.<sup>24</sup> New datasets have been created to compare policies and institutions across countries and test systematically for their impact on prosperity levels.<sup>25</sup> Given this literature, the policy debate shifted toward an “augmented” Washington consensus, combining solid macroeconomic policy with a stronger focus on social infrastructure and political institutions.<sup>26</sup>

The new GCI captures three dimensions of SIPI, each of which has been the focus of different types of research: basic human capacity, political institutions, and rule of law. Countries tend to achieve similar levels of performance along these different dimensions, but deviations exist and can sometimes continue for extended periods of time.

Basic human capacity, such as basic education, health care, and a clean environment, is necessary to enable individuals to effectively engage in economic activity.<sup>27</sup> The presence of malaria or an HIV/AIDS epidemic, for example, means that large segments of society must concentrate on sustaining their basic health, which lowers productivity.<sup>28</sup> If large parts of the population

have no basic reading and writing skills, their ability to achieve higher productivity is also severely limited.

The nature of political institutions is important because it affects the content and the predictability of the rules and regulations that set the overall context of the economy. The empirical literature finds no simple relationship between specific political systems and economic outcomes,<sup>29</sup> and whether democratic reforms are more sustainable before or after economic reforms is equally contested.<sup>30</sup> Generally accepted is that all (or almost all) economies with high levels of prosperity are democracies.

The rule of law, especially the existence of property rights and the ability to protect legal rights against private and public interests, has an important influence on the incentives to engage in economic activity, especially transactions with others.<sup>31</sup> If property rights are weak, assets cannot be brought to their best economic use and productivity suffers.<sup>32</sup> But even when property rights do exist, corruption can reduce their economic value by making it harder to establish them in a court of law or allowing harmful economic policies.<sup>33</sup> The rule of law can also be threatened by military conflicts or high levels of crime. War, especially civil war, substitutes the use of power for the market.<sup>34</sup> If the population is engaged in fighting or must devote resources to protecting their livelihood, the opportunities for higher productivity are naturally limited. Crime raises the costs of doing business and reduces the incentives to make investments that enable higher levels of productivity. Empirical support of the relationship of security and productivity, however, is limited.<sup>35</sup>

The empirical growth literature has found SIPI to have a strong impact on prosperity levels. In fact, much research identifies SIPI as the most important (if not the only) factor that matters for long-term differences in prosperity.<sup>36</sup> But differentiating the impact of institutions from other factors econometrically, especially geographic location, is complex because of high levels of correlation. There are still many skeptics about the interpretation of findings.<sup>37</sup>

### Microeconomic competitiveness

Microeconomic factors operate directly on firms in affecting productivity. These factors are influenced by multiple discrete stakeholders. Government is an important player, but many different agencies and administrative units at several levels of geography with differing degrees of autonomy, not just the central government, are involved in decision making and policy action. Companies, academic institutions, and many business associations and other mixed groups organized to facilitate collaborative action, are essential in defining the microeconomic environment in which business takes place.

Microeconomic factors are so numerous and multifaceted that simultaneous progress across all of them is

rarely feasible. Each country will have its own unique strengths and weaknesses. In any given country at a particular point in time, a subset of microeconomic conditions will represent the most pressing barriers to reaching higher levels of productivity.<sup>38</sup> At specific transitions, countries need to make many simultaneous changes across a broad number of policy areas to enter a new stage of economic development. Unless these evolving constraints to productivity are addressed, productivity growth will not occur. This logic reveals the mistake of competitiveness policies based on political ideology—for example, the “right” always arguing for lower taxes and more privatization, the “left” always arguing for more investments in skills and infrastructure. It also calls into question any theory that suggests generic answers to economic development rather than those tailored heavily by country. Because the constraints change over time, governments need to review and update priorities in intervals that might not coincide with the political cycle.

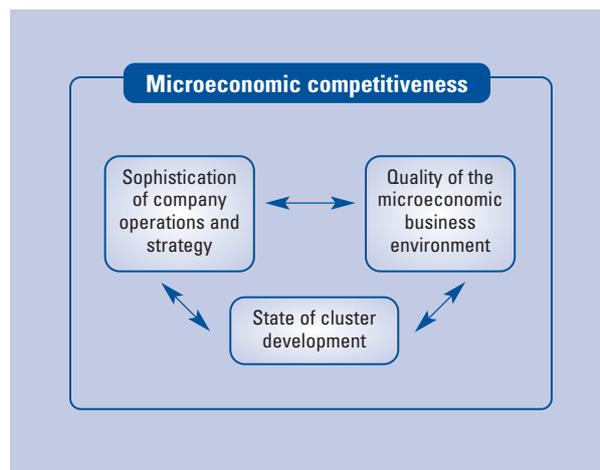
The New GCI framework distinguishes two broad areas of microeconomic competitiveness (Figure 4): the sophistication of company operations and the quality of the business environment. A third category—the state of cluster development (agglomeration economics)—is conceptually distinct, but data limitations preclude independent measurement. Cluster variables are included as part of the business environment. The microeconomic components of the New GCI builds on the foundations laid in the BCI of recent years.

*Company sophistication*, measured by company strategies and operational practices, is an area that has been largely neglected in the traditional literature on economic growth. Yet the productivity of a country is ultimately set by the productivity of its companies. An economy cannot be competitive unless companies operating there are competitive, whether they are domestic firms or subsidiaries of foreign companies. The heterogeneity of firm productivity within countries has a significant impact on overall productivity differences across countries.<sup>39</sup>

The productivity of companies depends in part on the sophistication with which companies compete. Productivity rises as a company improves the operational effectiveness of its activities and assimilates global best practices. Productivity also rises as companies achieve distinctive strategies, involving unique products and innovative means of production and service delivery. Conversely, competing using low factor input costs at low productivity methods does little to contribute to sustainable prosperity.

The productivity of companies is affected by corporate governance structures. The presence of large, highly diversified business groups, common in developing countries, can retard productivity because of lack of focus, monopoly power, and government favoritism. If business groups are instruments of market power or

**Figure 4: Microeconomic competitiveness**



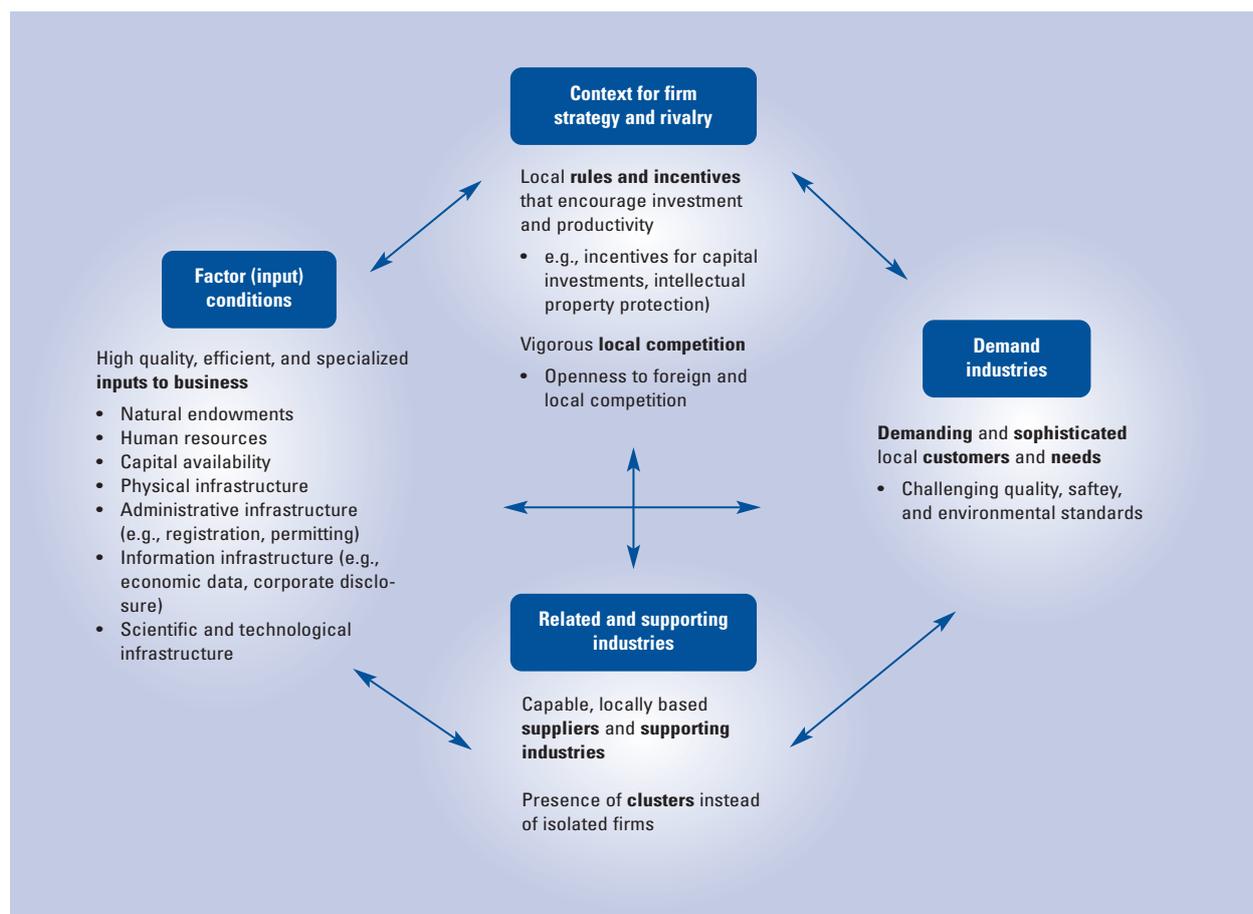
preferential political access, they can generate private profitability but hinder public prosperity.

Differences in the sophistication of company operations and strategy across countries have received scant coverage in the traditional empirical growth analysis. Company factors have been essentially taken as endogenous once business environment and macroeconomic factors were accounted for. Many standard models assume that best practices will be quickly implemented by profit-maximizing companies. But more recent analyses indicate significant differences in operating practices and capabilities, even across countries at similar stages of overall economic development. Researchers, notably those from a management or industrial organization tradition, have started to compare aspects of company sophistication across countries.<sup>40</sup> Yet there are still few datasets with broad country coverage in this area.

*Business environment quality* has a strong impact on the productivity of companies. More productive company strategies and operating practices require more highly skilled people, more efficient administrative infrastructure, improved physical infrastructure, better suppliers, more advanced research institutions, and more intense competitive pressure, and so on. A higher-quality business environment, including the presence of well-developed clusters, significantly affect the capabilities that a company can access, the competitive choices it can make, and the productivity that it can generate using its internal assets.

Moving to more sophisticated ways of competing depends on parallel improvements in the microeconomic business environment. The business environment can be understood in terms of four interrelated dimensions: the quality of factor (input) conditions, the context of rules in which for firm strategy and rivalry take place, the quality of local demand conditions, and the presence of the related and supporting industries, most strongly

Figure 5: Business environment quality: The diamond



Source: Porter, 1990.

represented by deep clusters.<sup>41</sup> Because of their graphical representation, the four areas have collectively become referred to as the “diamond” (see Figure 5).

Factor conditions have long been recognized as an important element affecting the productivity of companies. Physical infrastructure plays an important role in productivity, though there remains debate about the size of its effect.<sup>42</sup> Globalization and the resulting increase in trade flows have increased the demands on transportation and communication infrastructure for countries at all levels of development.

Efficient access to capital is important for companies to make long-term investments that raise productivity levels. A large literature has developed that analyzes the impact of financial market development on prosperity.<sup>43</sup> Some researchers focus on the role of equity markets while others address the availability of credit. Although there is no clear evidence that either bank- or equity-based financial systems are preferable, more-developed financial markets are conducive to growth.

Both the quantity of and quality of training and higher education in an economy has been found to have a positive impact on prosperity levels.<sup>44</sup> There is also increasing evidence that globalization has increased skill

premia in both advanced and developing economies.<sup>45</sup> But at the same time, there is no simple relation between increased spending on education and productivity: some countries have seen the share of people reaching higher education levels rise considerably over the last few decades, while productivity rates remain low.<sup>46</sup>

Science and technology infrastructure is important for productivity growth. In advanced economies, it becomes the source of new ideas that drive the frontier of knowledge outward. In countries further behind, it improves the absorptive capacity needed to draw on the knowledge others have already generated, thus enabling catch-up.<sup>47</sup> But innovative capacity is not only a matter of spending on research and development (R&D); microeconomic competitiveness has to be sufficiently high across many dimensions of business environment quality and company sophistication in order for R&D spending to generate more patenting and other innovative output.<sup>48</sup>

The impact of red tape (or the bureaucratic burden) and the costs associated with administrative practices have recently gained more systematic attention in studies of competitiveness.<sup>49</sup> The time spent dealing with public agencies reduces the overall productivity of companies

by reducing the returns on investment and limiting entry by new companies, often a key driver of productivity growth.

The context of rules and incentives that govern firm strategy and rivalry is an important influence on how companies draw on the factor conditions that they face. High levels of competition on local markets prove to be especially crucial for high performance.<sup>50</sup> Competition drives the entry of new firms, the exit of underperforming firms, and levels of performance differences across existing firms. Because competition is so central, the impact of government—through competition laws, tax incentives and subsidies, and the conditions governing state-owned or -related companies—is essential to productivity. The ownership structure of companies (private or state-owned; conglomerate) is another factor that is important for the type of competitive interaction.<sup>51</sup> Broader measures of the freedom to engage in economic activity are consistent with this view, but tend to mix a large number of different policy dimensions.<sup>52</sup>

A key aspect of context for strategy and rivalry is a country's openness to foreign trade and investment. Openness enables countries to exploit their comparative advantages, a direct boost to economy-wide productivity. It enables access to more advanced ideas and technology from abroad, and exposes local companies to higher levels of competitive pressure. The empirical literature on the impact of openness on long-term differences in productivity and growth, however, provides mixed results. A number of researchers have found a relationship between openness and prosperity growth,<sup>53</sup> or verified the role of trade with advanced economies, as a means to tap into the knowledge stock.<sup>54</sup> Other studies are equivocal and debate the specific data and econometric approach used.<sup>55</sup> Some suggest that it might be the interplay among openness and other factors, such as strong institutions, that creates the positive effects,<sup>56</sup> while others maintain that trade has an independent positive effect.<sup>57</sup>

Demand conditions have also received less consideration in the economics literature. Consumer protection and environmental regulation especially are normally seen as costly from the firm perspective; if more environmentally friendly products would fetch higher prices or lead to lower production costs, companies are assumed to have produced them without the need for regulation. The business literature has for some time argued that this is a simplistic view: with large amounts of uncertainty about future technologies, consumer needs, and regulations, stringent regulation that anticipates future changes in other markets can lead companies to make early investments in profitable technologies. And it is not unusual that these new technologies provide direct productivity benefits that companies had otherwise neglected.<sup>58</sup> In the management literature, there is also an increasing focus on the importance of

demanding lead customers as partners in the innovation process.

*Clusters* provide an intermediate unit of productivity drivers between the general business environment quality and firm level sophistication. Clusters are geographic agglomerations of companies, suppliers, service providers, and associated institutions in a particular field, linked by externalities and complementarities of various types.<sup>59</sup> Clusters, such as consumer electronics in Japan or high-performance cars in Germany, are often concentrated in a particular region within a larger nation, and sometimes in a single town. Clusters are a natural manifestation of the role of specialized knowledge, skills, infrastructure, and supporting industries in enhancing productivity.

Clusters play an increasing role in a global economy where the most competitive firms can serve wider markets unprotected by national borders. As competition has become more global, companies have more freedom to choose the location of their activities based on economic efficiency, not just market access.<sup>60</sup> Perhaps paradoxically, this has increased the importance of clusters as their productivity advantages become more important. National economies tend to specialize in a subset of clusters, in which they develop a particularly favorable business environment. Such clusters often account for a disproportionate share of a nation's traded output. Conversely, lower levels of regional specialization tend to be associated with lower levels of prosperity.<sup>61</sup>

The nature and depth of clusters varies with the state of development of the economy. In developing or emerging economies, clusters are less developed and firms perform relatively less advanced activities in the cluster.<sup>62</sup> Clusters normally lack many supporting industries and institutions. Firms compete primarily based on cheap labor or local natural resources, and depend heavily on imported components, machinery, and technology. Specialized local infrastructure and institutions, such as educational programs and industry associations, are absent or inefficient. In more advanced economies, clusters usually deepen to include suppliers of specialized inputs, components, machinery, and services; specialized infrastructure emerges from public and private investment; and institutions arise that provide specialized training, education, information, research, and technical support.

The role of the business environment in competitiveness has been addressed by an increasing number of empirical assessments over the last two decades. For example, the World Bank's Investment Climate Survey covers about 50 countries.<sup>63</sup> Other assessments cover regulations affecting business.<sup>64</sup> For smaller groups of industrial countries, the OECD has generated rich assessments of the business environment, from investments in R&D to product market regulation.<sup>65</sup> Statistical studies on clusters across regions and countries are emerging.<sup>66</sup>

The limited available data on clusters do not allow us to separate the role of clusters from the more general business environment that affects the economy more broadly. However, we included available cluster measures as parts of the national business environment in the New GCI.

### Stages of economic development

Successful economic development is a process of successive upgrading, in which a nation's business environment evolves to support and encourage increasingly sophisticated and productive ways of competing by firms (including subsidiaries of multinational corporations) located there. Nations at different levels of development face distinctly different competitiveness challenges, where the relative importance of different dimensions of microeconomic and macroeconomic competitiveness for sustainable prosperity is changing.

As nations develop, modes of competing and nature of competitive advantages move through several characteristic stages, though rates of progress and the specific development path will vary by country.<sup>67</sup> In the factor-driven stage, basic factor conditions such as low-cost labor and unprocessed natural resources represent the dominant basis of competitive advantage and sources of exports. Firms produce commodities or relatively simple products or components of products designed in other, more-advanced countries. Technology is assimilated through imports, supply agreements, foreign direct investment, and imitation. In this stage, companies compete on price and normally lack direct access to foreign consumers. Companies have limited roles in the value chain, focusing on assembly, labor-intensive manufacturing, and resource extraction. Factor-driven economies are highly sensitive to world economic cycles, commodity prices, and exchange rate fluctuations, mitigated only in very large countries such as China, which have a large internal market to attract investment independent of export potential.

In the investment-driven stage, a country's advantage comes from producing more advanced products and services highly efficiently. Heavy investment in efficient infrastructure, business-friendly government administration, strong investment incentives, improving skills, and better access to investment capital allow major improvements in productivity. The products and services produced are not globally differentiated, however, with technology and designs still largely coming from abroad. Technology is accessed through licensing, joint ventures, foreign direct investment, and imitation. Nations at this stage normally assimilate foreign technology but also begin to develop the capacity to improve technology themselves. Companies extend capabilities more widely in the value chain, and serve a wider mix of original equipment manufacturer (OEM) customers and end users. An investment-driven economy is concentrated on manufactured goods and outsourced service exports. It

remains susceptible to financial crises and external, sector-specific demand shocks, but competitiveness is more stable than in countries depending on commodity cycles and factor prices.

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 parts of the diamond, including sophisticated demand conditions and deep supporting industries. Competitiveness emerges in an array of clusters where knowledge, supporting industries, and specialized inputs are present. Institutions and incentives that enable innovation are well developed. Companies compete with unique strategies that are often global in scope. An innovation-driven economy is characterized by distinctive producers and a high share of services in the economy and is quite resilient to external shocks.

The sequential process of building interdependent microeconomic capabilities, improving incentives, evolving company strategies, and increasing rivalry creates important pitfalls in economic policy. The influence of one part of the business environment depends on the state of another. Lack of improvement in any important area can lead to a plateau in productivity growth and stalled development. Worse yet, key weaknesses in the diamond can undermine the entire economic reform process. For example, 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 also begins to reveal why countries find the transition to a new stage of development so difficult. Such inflection points require wholesale transformation of many interdependent aspects of competition, not just marginal improvements in individual policy areas.

We incorporate stages of development into the New GCI to capture the fact that different determinants of competitiveness will be the binding constraints of countries' progress.

### Ranking competitiveness

The academic literature and previous indexes provide a foundation for the selection of indicators and guidance in developing an overall architecture for organizing them in an integrated framework. We include microeconomic factors because of our access to unique data.

Whether or not individual factors are included in the New GCI, and how strongly they are weighted in measuring competitiveness, is determined by the data. Our approach thus minimizes the role of conceptual priors and subjective assessments.

The robustness of the results of the New GCI to modifications in individual indicators and estimation procedures has been extensively tested. The aim is to

ensure that the New GCI is capturing basic insights about country performance, rather than artifacts of a single econometric approach or subjective weighting scheme. The findings are presented in a way that highlights the implications for decision makers in governments and companies.

### Data

The model draws on a wide range of data from the Executive Opinion Survey (more on the Survey in Chapter 2.1 in this *Report*) as well as extensive hard data and survey indicators from other internationally recognized data sources. The use of survey data in economic analysis is growing despite skepticism among some researchers. Our survey data are timely and offer many unique measures not otherwise available. The survey data used here are based on the *informed judgments of the actual participants* in the economies of the countries examined. These survey responses are important in their own right, because they reflect the attitudes of the decision makers that ultimately determine economic activity.

The data used for the development of the New GCI model cover 130 countries for up to 7 years (2001–07), the longest period possible given the data sources. The academic literature often examines longer time periods, but covers a far narrower set of indicators. In subsequent years, the stability of the model over longer time periods will be examined.

### Dependent variable

The New GCI model is derived from statistical estimations explaining GDP per capita adjusted for purchasing power, the best overall measure of prosperity.<sup>68</sup> Statistical testing using a clearly defined dependent variable is the only way to allow a rigorous development of the model, in contrast to arbitrary specification of indicators, data groupings, and weights that characterize most other index efforts.

GDP per capita is the broadest measure of national productivity and is strongly linked over time to a nation's standard of living. It is the best single, summary measure of competitiveness performance available across all countries.<sup>69</sup>

More direct measures of productivity, such as GDP per labor force, are desirable. However, they are not feasible given unreliable labor force data in many low income countries. Other measures, such as GDP per employee or GDP per hour worked, are useful indicators of productivity but fail to capture the ability of an economy to mobilize the overall workforce. Total Factor Productivity suffers from significant data limitations that compromise its ability to accurately measure capital utilization and skill accumulation across countries in a consistent manner.

### Endowments

GDP per capita will reflect a country's particular endowments (we term this "inherited prosperity"), not only its productivity in using these endowments ("created prosperity"). Controlling for endowments allows the New GCI to distinguish between prosperity and productivity, rather than co-mingling productivity with resource abundance.

Natural endowments can have an indirect impact on competitiveness if they encourage specific policy choices that benefit or harm macroeconomic or microeconomic competitiveness. The New GCI model makes it possible to distinguish the direct (positive) prosperity effect of natural endowments from their indirect (potentially negative) effect on competitiveness.

The New GCI controls for natural resources endowments by using per capita unprocessed natural resource exports. The revenues from natural resource exports constitute a direct source of prosperity. Endowments in terms of geographical location are captured by the percentage of land area within 100 kilometers of ice-free coast or navigable rivers as a control for location. Direct access to maritime transport allows countries to fully engage in global trade without the need for a transit country. The academic literature also examines the impact of being close to the equator as a locational influence, and as a proxy for exposure to tropical diseases. We recognize this potential, but measure instead the effectiveness of the policy responses to them (e.g., health system effectiveness) elsewhere in the model.

The size of a country can also be seen as an endowment. Larger countries might more easily attract investment just because of their local market potential, even if they are not more competitive. Size might also foster economies of scale in areas such as R&D. We include population size as a control, instead of size of GDP. GDP size is the result of competitiveness, not an independent measure.

### Competitiveness indicators

Many things matter for competitiveness, and consequently a wide range of data is incorporated into the model. Because the model is designed to guide specific action priorities for countries, multiple indicators are used even if they are highly correlated in the overall sample. Although indicators may be correlated overall, individual countries often lead or lag in particular policies that are salient for designing development priorities. This inclusion of many variables differentiates the GCI model from many models in the academic literature that aim to identify the minimum number of indicators that explain prosperity.

The selection of indicators is pragmatic. Candidate indicators are identified that capture aspects suggested by theory. The New GCI model requires the availability of recurring annual data for a very large number of

countries, in contrast to a one-time analysis covering a limited number of countries.

Each indicator is then tested for a statistically significant relationship to GDP per capita adjusted by purchasing power (log), controlling for endowments (see Table 1).<sup>70</sup> Some of the indicators that are most strongly correlated with GDP per capita include mobile phone and fixed line penetration, regulatory quality, the quality of electricity supply, and per capita patenting in the United States. Such indicators capture basic or advanced dimensions of the microeconomic business environment. Conversely, indicators of MP exhibit the weakest correlations with prosperity.

In selecting indicators, two areas of policy—taxation and labor market regulations—deserve special discussion because they have no simple linear relationship to prosperity. Taxation levels tend to be higher in countries with stronger institutions and that invest more heavily in public infrastructure and education. This endogenous positive effect of effective spending on competitiveness is econometrically hard to distinguish from the direct negative incentive effect of higher taxation. In the model, we include direct measures of the incentive effect and the administrative burden associated with taxation that are less affected by these problems, rather than the overall level of taxes in GDP.

The challenge with measuring labor market conditions is that labor markets tend to be more regulated in countries with highly developed institutions. Thus there is no simple relationship between the level of regulation and the actual level of labor market flexibility and work practices. Again, we use a direct measure of labor market flexibility, rather than broader institutional characteristics of the labor market.

### Grouping indicators

Because many things matter, countries often get bogged down in their efforts to improve competitiveness by tackling too many individual issues in parallel. The challenge is to identify those areas where action can unlock higher productivity at a given point in time. Priorities are country-specific and change over time.

The New GCI aims to offer a framework to inform overall policy while establishing priorities at the specific policy level. The model groups the numerous influences on competitiveness into categories that capture different mechanisms of influence. These groupings are organized hierarchically so that each part of the model sums to the whole (Figure 6). Other indexes tend to treat numerous variables independently, without an understanding of the how they relate to each other.

The **New Global Competitiveness Index (NGCI)** is the overall ranking of country competitiveness, incorporating all factors. The NGCI score is designed to be the best overall predictor of productivity across all countries.

At the second level, rankings are presented on **macroeconomic competitiveness** and **microeconomic competitiveness**. Macroeconomic competitiveness indicators create opportunities for productivity but are not sufficient for high productivity to emerge. Microeconomic competitiveness indicators have a direct impact on company productivity.

At the third level, rankings are presented on four subindexes of macroeconomic and microeconomic competitiveness. In the macroeconomic area, indicators of **macroeconomic policy (MP)** capture economic policies that have a strong impact on short-term fluctuations of economic activity and can have long-term consequences for productivity. **Social infrastructure and political institutions (SIPI)** collects indicators of more general human conditions and institutions. In the microeconomic area, subindexes cover the **sophistication of company operations and strategy (COS)** and the overall **quality of the national business environment (NBE)**.

At the fourth level, rankings are provided for subcategories of the third level. In the MP category, indicators are grouped by **fiscal policy** and **monetary policy**. In the SIPI category, indicators are grouped into **basic human capacity** (basic health and education), **political institutions** (decision making and efficiency of the executive), and the **rule of law** (corruption and efficiency of the legal process). In the NBE category, indicators distinguish the four elements of the diamond framework<sup>71</sup>—that is, **factor conditions**, **context for strategy and rivalry**, **demand conditions**, and **related and supporting industries/clusters**.

At the fifth level, some areas of microeconomic competitiveness are further differentiated into narrower subcategories to better target policy responses. Under factor conditions, indicators are grouped by **logistical infrastructure**, **communications infrastructure**, **administrative infrastructure**, **capital market infrastructure**, and **innovation infrastructure**. Under COS, indicators are grouped by **strategy and operational effectiveness**, **organizational practices**, and **internationalization of firms**.

In most cases, the allocation of individual indicators to categories is clear (see Table 1). For a limited number of indicators, however, the allocation of a particular measure requires a judgment based on the nature of the indicator's primary effect on competitiveness together with its statistical properties.<sup>72</sup> For *education*, primary education is allocated to SIPI (macroeconomic competitiveness) while the quantity and quality of advanced and specialized levels of education are allocated to the NBE (microeconomic competitiveness). We view primary education as a broad indicator of the ability of individuals to participate in society, and a foundation for further education and skill development. For *trade barriers*, all indicators, including the average tariff rate on imports, are allocated to NBE. Trade barriers are primarily an

Table 1: Relationship of indicators to GDP per capita (log) while controlling for endowments

Regression on GDP per capita, PPP-adjusted (log)		Regression on GDP per capita, PPP-adjusted (log)		
	Beta	R <sup>2</sup>	Beta	R <sup>2</sup>
<b>Microeconomic competitiveness (MICRO)</b>				
<b>Company operations and strategy (COS)</b>				
<i>Strategy and operational effectiveness</i>				
Firm-level technology absorption.....	0.558	0.717		
Company spending on R&D.....	0.487	0.729		
Nature of competitive advantage.....	0.440	0.745		
Value chain breadth.....	0.492	0.784		
Capacity for innovation.....	0.512	0.761		
Production process sophistication.....	0.615	0.817		
Extent of marketing.....	0.623	0.770		
Degree of customer orientation.....	0.660	0.748		
<i>Organizational practices</i>				
Extent of staff training.....	0.501	0.729		
Willingness to delegate authority.....	0.450	0.703		
Extent of incentive compensation.....	0.538	0.707		
Reliance on professional management.....	0.341	0.665		
<i>Internationalization of firms</i>				
Prevalence of foreign technology licensing.....	0.474	0.691		
Control of international distribution.....	0.709	0.739		
Extent of regional sales.....	0.404	0.710		
Breadth of international markets.....	0.484	0.775		
<b>Factor (input) conditions</b>				
<i>Logistical infrastructure</i>				
Quality of roads.....	0.371	0.759		
Quality of railroad infrastructure.....	0.306	0.745		
Quality of port infrastructure.....	0.351	0.728		
Quality of air transport infrastructure.....	0.421	0.731		
Quality of electricity supply.....	0.463	0.812		
Quality of domestic transport network: business.....	0.571	0.791		
<i>Communications infrastructure</i>				
Quality of telephone infrastructure.....	0.456	0.777		
Internet access in schools.....	0.471	0.816		
Mobile telephone subscribers per 100 population.....	0.023	0.833		
Personal computers per 100 population.....	0.026	0.773		
Internet users per 100 population.....	0.031	0.774		
Telephone lines per 100 population.....	0.036	0.848		
<i>Administrative infrastructure</i>				
(Low) Burden of customs procedures.....	0.497	0.741		
(Low) Burden of government regulation.....	0.364	0.659		
Ease of starting a new business.....	0.317	0.668		
(Low) Number of procedures required to start a business.....	0.076	0.660		
(Low) Time required to start a business.....	0.381	0.682		
Doing Business, Paying Taxes (Low) Payments number (WB) <sup>a</sup> .....	0.016	0.681		
<i>Capital market infrastructure</i>				
Regulation of securities exchanges.....	0.384	0.729		
Financial market sophistication.....	0.424	0.749		
Soundness of banks.....	0.326	0.673		
Ease of access to loans.....	0.490	0.722		
Venture capital availability.....	0.509	0.732		
Financing through local equity market.....	0.242	0.664		
Protection of minority shareholders' interests.....	0.287	0.652		
Doing Business, Getting Credit Legal rights index (WB) <sup>b</sup> .....	0.089	0.637		
Domestic credit to private sector (WB) <sup>c</sup> .....	0.009	0.741		
<i>Innovation infrastructure</i>				
Quality of scientific research institutions.....	0.448	0.709		
University-industry research collaboration.....	0.488	0.727		
Quality of the educational system.....	0.383	0.706		
Quality of math and science education.....	0.363	0.698		
Quality of management schools.....	0.453	0.706		
Availability of scientists and engineers.....	0.469	0.707		
(Low) Brain drain.....	0.469	0.740		
Tertiary enrollment.....	0.022	0.742		
Utility patents per million population.....	0.256	0.825		
<b>Demand conditions</b>				
Government procurement of advanced technology products.....	0.493	0.681		
Government success in ICT promotion.....	0.318	0.659		
Laws relating to ICT.....	0.532	0.763		
Buyer sophistication.....	0.540	0.762		
Presence of demanding regulatory standards.....	0.569	0.784		
Stringency of environmental regulations.....	0.426	0.735		
<b>Supporting and related industries and clusters</b>				
Availability of latest technologies.....	0.485	0.775		
Local supplier quantity.....	0.778	0.756		
Local supplier quality.....	0.685	0.787		
<b>Microeconomic competitiveness (MICRO) (cont'd.)</b>				
Local availability of process machinery.....	0.600	0.779		
Local availability of specialized research and training services.....	0.617	0.763		
State of cluster development.....	0.541	0.720		
Extent of collaboration in clusters.....	0.506	0.755		
Extent of cluster policy.....	0.417	0.712		
<b>Context for strategy and rivalry</b>				
Cooperation in labor-employer relations.....	0.388	0.663		
Pay and productivity.....	0.463	0.687		
FDI and technology transfer.....	0.181	0.623		
Quality of competition in the ISP sector.....	0.441	0.723		
(Low) Impact of taxation on incentives to work and invest.....	0.185	0.632		
(Low) Distortive effect of taxes and subsidies on competition.....	0.455	0.679		
Intellectual property protection.....	0.422	0.753		
Restrictions on capital flows.....	0.306	0.724		
Strength of auditing and reporting standards.....	0.447	0.706		
Prevalence of trade barriers.....	0.631	0.730		
Prevalence of foreign ownership.....	0.331	0.652		
Business impact of rules on FDI.....	0.371	0.653		
Intensity of local competition.....	0.661	0.723		
Effectiveness of antitrust policy.....	0.459	0.723		
(Low) Extent of market dominance (by business groups).....	0.447	0.707		
Efficacy of corporate boards.....	0.349	0.645		
Low market disruption from state-owned enterprises.....	0.430	0.723		
Strength of investor protection.....	0.128	0.641		
(Low) Rigidity of employment.....	0.004	0.619		
Regulatory quality.....	0.851	0.841		
(Low) Tariff rate.....	0.067	0.695		
<b>Social infrastructure and political institutions (SIPI)</b>				
<i>Human capacity</i>				
Quality of primary education.....	0.410	0.755		
Quality of healthcare services.....	0.345	0.773		
Accessibility of healthcare services.....	0.429	0.768		
Health expenditure.....	0.129	0.677		
Life expectancy.....	0.068	0.793		
(Low) Malaria incidence.....	0.111	0.753		
(Low) Tuberculosis incidence.....	0.413	0.743		
(Low) Infant mortality.....	0.023	0.762		
Primary enrollment.....	0.027	0.660		
Secondary enrollment.....	0.025	0.770		
<i>Political institutions</i>				
Effectiveness of law-making bodies.....	0.319	0.687		
Public trust of politicians.....	0.301	0.697		
(Low) Wastefulness of government spending.....	0.363	0.678		
(Low) Favoritism in decisions of government officials.....	0.377	0.692		
Government effectiveness in reducing poverty and inequality.....	0.329	0.687		
Transparency of government policymaking.....	0.333	0.669		
Decentralization of economic policymaking.....	0.334	0.674		
Freedom of the press.....	0.341	0.694		
Voice and Accountability (WB) <sup>d</sup> .....	0.605	0.742		
<i>Rule of law</i>				
Reliability of police services.....	0.350	0.724		
(Low) Business costs of crime and violence.....	0.308	0.712		
(Low impact of) Organized crime.....	0.272	0.675		
Judicial independence.....	0.303	0.715		
Efficiency of legal framework.....	0.331	0.710		
Property rights.....	0.451	0.745		
(Low occurrence of) Diversion of public funds.....	0.379	0.749		
(Low occurrence of) Irregular payments by firms.....	0.549	0.782		
(Low) Business costs of corruption.....	0.457	0.739		
Ethical behavior of firms.....	0.511	0.727		
Control of Corruption (WB) <sup>e</sup> .....	0.612	0.798		
Rule of Law (WB) <sup>f</sup> .....	0.678	0.811		
<b>Macroeconomic policy (MP)</b>				
Government surplus/deficit.....	0.094	0.631		
Government debt.....	0.068	0.615		
Inflation.....	0.355	0.707		
Interest rate spread.....	0.526	0.700		

a World Bank 2008b.

b World Bank 2008b.

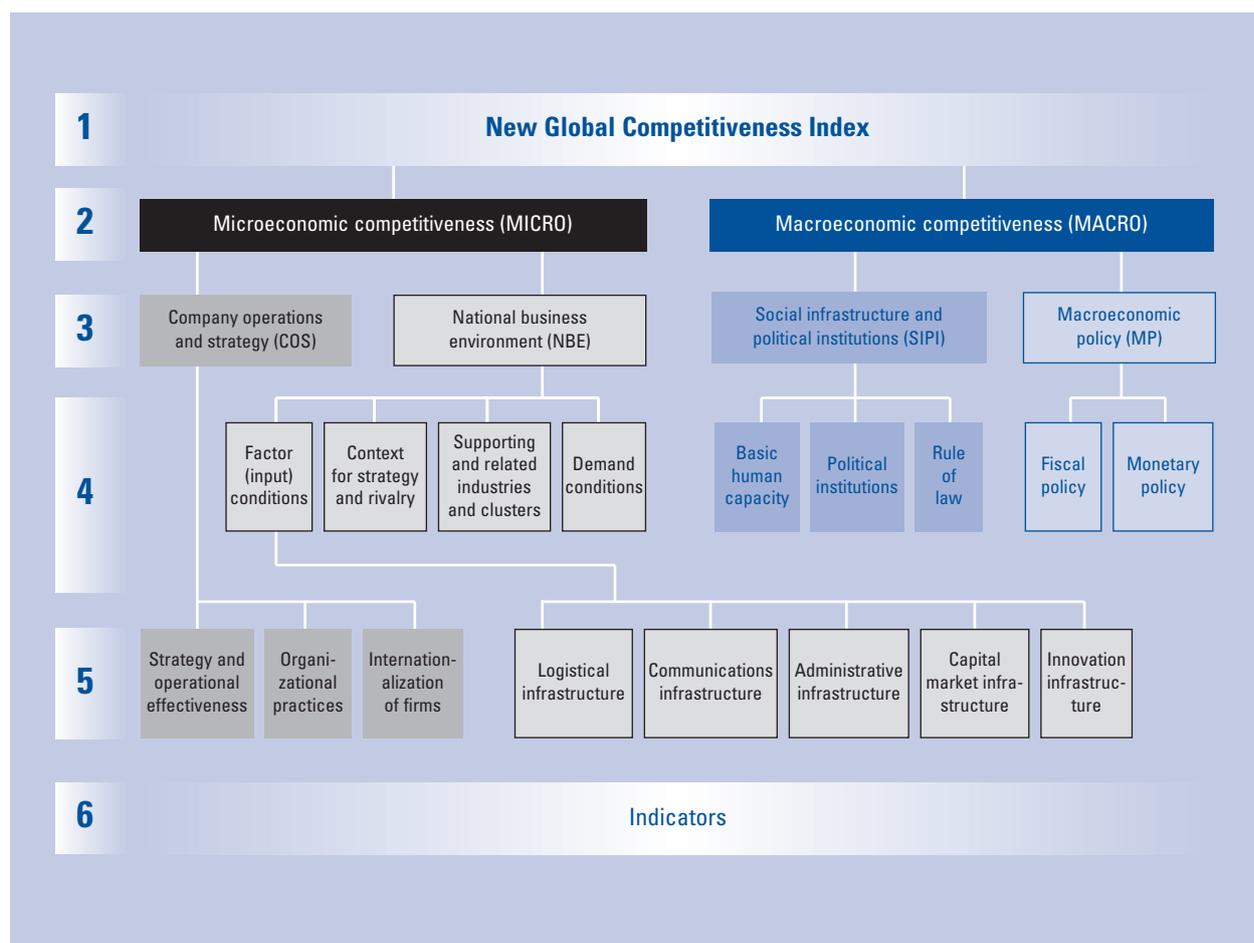
c World Bank, World Development Indicators.

d World Bank governance indicator. See Kaufmann et al. 2008.

e World Bank governance indicator. See Kaufmann et al. 2008.

f World Bank governance indicator. See Kaufmann et al. 2008.

Figure 6: Six levels of measurement



indicator of the competitive pressure from foreign rivals, even though they are also relevant as a measure of general openness of an economy. The direct relationship of tariff rates to productivity of firms is akin to other indicators in the NBE, in contrast to the more general MP indicators. For *taxation*, measures of taxation effectiveness are also allocated to the NBE. Although it has a relation to fiscal policy (MP), effective taxation mechanisms are best seen as an indicator of general administrative infrastructure.

### Stages of development

To reach higher levels of economic development, countries experience systematic changes in the relative importance of different aspects of competitiveness for prosperity. Understanding these broad patterns is important in understanding the challenges faced by policymakers in a given country.

The New GCI model uses SIPI as a proxy for overall stage of economic development. Countries are ranked by their average SIPI score (using 2001–07 data) as well as by their score for each of the three SIPI components (human capacity, rule of law, and political stabil-

ity). The countries falling into the top tercile for each of the SIPI components as well as the aggregate SIPI measure are assigned to the high stage of development group. Countries that fall into the top tercile for the overall SIPI index or its human capacity component (a group of indicators that is particularly robust to short-term policy changes) but rank lower on other SIPI components are assigned to the middle group. The remaining countries are assigned to the low stage of development group.<sup>73</sup>

A country's SIPI score provides a good indication of the opportunities of companies to compete at more sophisticated levels. More developed social infrastructure and political institutions make it more likely that companies can compete on efficiency or even on innovation. Weaknesses in SIPI, in contrast, often relegate companies to compete on resources or cheap labor.

Other indicators of development stage are possible, but testing reveals that using SIPI is the most revealing statistically. A number of studies have used GDP per capita to identify country groups, but we reject this because defining subgroups using the dependent variable introduces a serious estimation bias.

**Table 2: Countries by stage of development**

HIGH		MIDDLE	LOW		
Australia	Spain	Bahrain	Albania	Georgia	Nigeria
Austria	Sweden	Brunei Darussalam	Algeria	Ghana	Pakistan
Barbados	Switzerland	Chile	Argentina	Guatemala	Panama
Belgium	Taiwan, China	Costa Rica	Armenia	Guyana	Paraguay
Canada	Tunisia	Czech Republic	Azerbaijan	Honduras	Peru
Cyprus	United Kingdom	Hungary	Bangladesh	India	Philippines
Denmark	United States	Jordan	Benin	Indonesia	Poland
Estonia		Korea, Rep.	Bolivia	Jamaica	Romania
Finland		Kuwait	Bosnia and Herzegovina	Kazakhstan	Russian Federation
France		Latvia	Botswana	Kenya	Senegal
Germany		Malaysia	Brazil	Kyrgyz Republic	Serbia
Greece		Mauritius	Bulgaria	Lesotho	South Africa
Hong Kong SAR		Montenegro	Burkina Faso	Libya	Sri Lanka
Iceland		Oman	Burundi	Lithuania	Suriname
Ireland		Puerto Rico	Cambodia	Macedonia, FYR	Syrian Arab Republic
Israel		Saudi Arabia	Cameroon	Madagascar	Tajikistan
Italy		Slovak Republic	Chad	Malawi	Tanzania
Japan		United Arab Emirates	China	Mali	Thailand
Luxembourg		Uruguay	Colombia	Mauritania	Timor-Leste
Malta			Côte d'Ivoire	Mexico	Trinidad and Tobago
Netherlands			Croatia	Moldova	Turkey
New Zealand			Dominican Republic	Mongolia	Uganda
Norway			Ecuador	Morocco	Ukraine
Portugal			Egypt	Mozambique	Venezuela
Qatar			El Salvador	Namibia	Vietnam
Singapore			Ethiopia	Nepal	Zambia
Slovenia			Gambia, The	Nicaragua	Zimbabwe

### Estimating the New GCI model

The appropriate weighting of individual indicators in determining overall competitiveness is a crucial part of any index model.<sup>74</sup> The New GCI model calculates weights based on a regression of the pooled dataset on country GDP per capita. The stability of the model is tested by reallocating individual indicators and assessing the stability of the weights and the overall score. Other similar indexes have almost invariably set weights based on subjective priors based on the literature. Yet differences in opinion in the academic literature leave the door open for different choices that can compromise the resulting rankings.

The New GCI is generated in a two-stage process. First, the weights for aggregating individual indicator scores to an overall country score are obtained using panel data for over 130 countries and up to 7 years (2001–07). The weights obtained from estimating the model are going to be kept constant over time. Additional years of data will be used to check the stability of the model over time. Second, the index score for a particular country in a given year is calculated by summing its weighted indicator values.

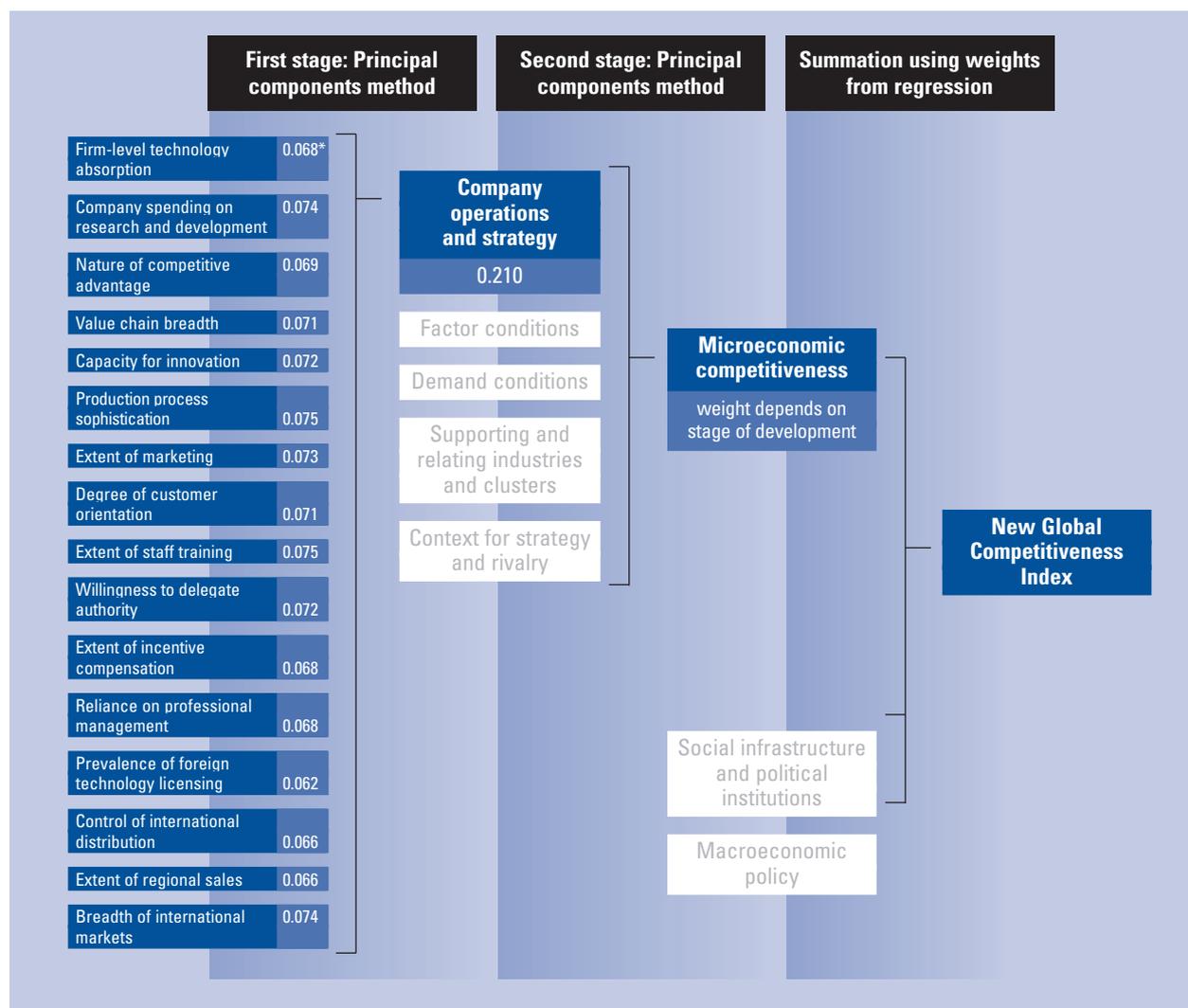
The New GCI model uses principal component analysis (PCA) to aggregate individual indicators (or categories of indicators). The premise of the PCA method is that within a “conceptual category,” indicators

are highly correlated and related to the underlying phenomenon that is being measured. Within the area of microeconomic competitiveness, the degree of correlation between indicators is very high. The New GCI model thus applies a two-step PCA procedure. First, a separate aggregation is computed for COS and for each of the four components of the NBE. Second, these five components are aggregated into an overall score for microeconomic competitiveness.<sup>75</sup> Figure 7 provides a sample calculation, showing the specific scores calculated for the indicators in company operations and strategy using the current specification of the new GCI model.

Within the area of macroeconomic competitiveness, the degree of correlation between indicators is relatively high within SIPI and MP but not across them, because they capture distinct concepts. The new GCI model thus uses PCA to calculate a score for SIPI and a score for MP, but does not use PCA for further aggregation.

The second step in computing the New GCI is to measure the contribution to country competitiveness of MICRO, SIPI, and MP. We specify a comprehensive regression that uses GDP per capita purchasing power adjusted (log) as the dependent variable, with scores for MICRO, SIPI, and MP for each country and year as the main explanatory variables, controlling for with endowments and year effects. The model allows the coefficients to vary by country stages of development by interacting

Figure 7: Calculation of the New GCI: Sample results



\* Numbers shown are weights.

the explanatory variables with a dummy indicating the country's stage (see the section on "Stage of development").<sup>76</sup> The core econometric specification is as follows:

$$\begin{aligned} \log \text{GDPpc}_{c,t} = & \alpha_0 + \delta \text{HIGH-SIPI}_c + \beta_{\text{MICRO}} \text{MICRO}_{c,t-1} \\ & + \delta_{\text{MICRO}} \text{HIGH-SIPI}_c \times \text{MICRO}_{c,t-1} \\ & + \beta_{\text{SIPI}} \text{SIPI}_{c,t-1} + \delta_{\text{SIPI}} \text{HIGH-SIPI}_c \times \text{SIPI}_{c,t-1} \\ & + \beta_{\text{MP}} \text{MP}_{c,t-1} + \delta_{\text{MP}} \text{HIGH-SIPI}_c \times \text{MP}_{c,t-1} \\ & + \alpha_{\text{END}} \text{ENDOWMENTS}_{c,t-1} \\ & + \delta_{\text{END}} \text{HIGH-SIPI}_c \times \text{ENDOWMENTS} \\ & + \alpha_t \text{year}_t + \delta_t \text{HIGH-SIPI}_c \times \text{year}_t + \varepsilon_{c,t} \end{aligned}$$

The estimated coefficients are then scaled into weights for microeconomic competitiveness, SIPI, and MP that vary for low-, middle-, and high-SIPI countries. Table 3 reports the weights derived with the current specification of the model.<sup>77</sup>

Table 3: Subindex weights by countries' stage of development

Subindex	Stage of development			Linear model (all economies)
	Low (%)	High (%)	Medium (%)	
MICRO	0.21	0.48	0.35	0.31
SIPI	0.49	0.36	0.42	0.41
MP	0.30	0.16	0.23	0.28
	1.00	1.00	1.00	1.00

The New GCI model explains 85 percent of the variation of prosperity across countries, a remarkable result in such a dataset covering a large number of countries at highly varying levels of economic development. It shows, for the first time, that both microeconomic and macroeconomic competitiveness have an independent effect on productivity, even when controlling for the other. Many previous analyses have looked at individual measures without putting them in a broader framework.

The growth literature, in particular, has tended to argue that macroeconomic competitiveness, especially institutional factors (SIPI in the New GCI model), dominate and predict differences not only in prosperity but also in microeconomic competitiveness. Instead, the New GCI results support an independent role for each of them.

The weights of the broad drivers of competitiveness change systematically across stages of development. At lower levels of development, SIPI matter most, followed by MP, followed by microeconomic competitiveness. At higher levels of development, microeconomic competitiveness dominates, followed by SIPI and then MP.

### Calculating and interpreting the Index

For each country, the calibrated weights are applied to the set of indicator values to generate an overall Index score,<sup>78</sup> as well as scores for each broad category, subcategory, and narrow subcategory of competitiveness determinants.

The overall New GCI ranking provides a powerful summary of each country's competitiveness relative to peers. The patterns of strengths and weaknesses across the different categories of competitiveness provide robust information with which to set country-specific action priorities.

Changes in the New GCI ranking and indicator scores provide an important insight into a country's competitiveness trajectory over time. The relationship among the New GCI score, endowment controls, and actual GDP per capita level bear on the sustainability of a country's prosperity. Prosperity levels that are explained neither by competitiveness nor endowments are a cause for concern. Such levels may well be the consequence of short-term growth spurts with, for example, high consumption or investment in areas such as real estate that are not sustainable over time. Prosperity levels that are largely driven by endowments, especially natural resource deposits, suggest specific steps to overcome the negative economic and policy risks associated with inherited wealth in hindering future competitiveness.

The relationship of the New GCI score to other economic performance indicators, such as wages, provides further insights. Competitiveness depends not on costs, but on productivity. The prevailing wages relative to competitiveness will make a country more or less attractive as an investment location. Low wages can be a sign of low competitiveness, instead of a competitive advantage. High wages, if they are justified by high productivity, mean that a country represents an excellent value as a business location. Some countries have wages that are significantly above or below the expected wage level given the country's New GCI value. This can occur for a variety of reasons, ranging from strong unions and inflexible labor markets to recent competitiveness improvements that run ahead of wage increases.

### Comparing the New GCI with the current Index

The New GCI model builds on the foundations in previous years' GCI as well as the BCI.<sup>79</sup> The overall rankings derived in our preliminary application of the New GCI model are broadly similar to the current GCI, underlining the continuity of the methodology. However, differences exist and are revealing in many ways.

The largest single source of rank differences between the New GCI and the current Index is the higher weighting in the New GCI associated with macroeconomic competitiveness. This greater importance is derived from the actual data. For the most advanced economies, macroeconomic competitiveness (SIPI and MP) together account for about 45 percent of the overall New GCI score, compared with 23 percent in the current GCI. For developing economies, the change is even more pronounced, with macroeconomic competitiveness accounting for 83 percent vs. 38 percent in the current model. Macroeconomic factors, especially institutional strength, have been identified in the literature as an important element of long-term prosperity differences and this importance is revealed in our regressions.

Another important difference is the role of market size. Market size, which accounted for between 6 and 8 percent of the overall score in the current GCI, is now included as a control rather than as a dimension of competitiveness. Market size can have an impact on productivity and lead to FDI inflows above the level otherwise expected, especially when the market is very large. But, as previously discussed, the literature on this point has not come to conclusive results. China, Brazil, and India will be ranked lower on competitiveness because they do not get a bonus for country size independent from their fundamental conditions.

The New GCI model also utilizes an improved set of indicators in the MP area compared to the current macroeconomic pillar. The most important change is that the savings rate is no longer included in the model, since the growing globalization of financial markets makes it increasingly less realistic that the local savings rate determines the amount of capital available.<sup>80</sup> These changes have a limited impact on the overall rankings. The United States will rank higher in the new MP area than in the current macroeconomic pillar, for example, largely because it is no longer penalized for its low savings rate.

Finally, the New GCI weights the aspects of microeconomic competitiveness based on the data. For example, the current GCI model gave about 60 percent of the overall business environment weight to measures of factor conditions, largely because there were more indicators available in this area. The New GCI, with no priors about the relative weights, has a lower influence of factor conditions. The impact of the weighting differences on the overall ranking is modest.

## Conclusion

The *Global Competitiveness Report* has long been an important tool for measuring competitiveness across countries. Our decision to develop a new approach for calculating the Global Competitiveness Index reflects our desire for excellence. The ambition to continuously integrate new thinking must be balanced with the need for a framework that has the stability needed for consistent rankings and to earn the trust of policymakers and the wider public. Hence we will introduce the New GCI in 2009, after almost two years of testing and refinement. As we finalize the New GCI, we will seek input from policymakers, business leaders, and scholars to ensure that the New GCI not only meets the highest standards of academic research but also serves the needs of practitioners.

The New GCI promises to reveal important new insights into the causes of competitiveness. It will disentangle the relationships between prosperity, endowments, and competitiveness, giving countries a way to separate the impact of externally given conditions from their own policy choices. It will help countries to identify whether macroeconomic or microeconomic competitiveness, each of which requires a very different policy process, should be at the forefront of policy action.<sup>81</sup> And it will give individual countries better insights into their relative strengths and weaknesses, their position compared with that of their peers, and their trajectory over time. All of these are critical elements for prioritizing policy actions in a way that targets the unique challenges any country faces at a given point in time.

## Notes

- 1 Ciccone and Jarocinski 2008.
- 2 Unit labor costs (wages relative to labor productivity), a measure often used by international financial institutions, is a misleading indicator of competitiveness. It is helpful to understand the capacity for exports, much more so than pure wage costs per se. But it does not have an unambiguous relationship to prosperity and is often used to motivate policies that manage wages rather than raise productivity.
- 3 Solow 1956.
- 4 Romer 1990; Lucas 1988; see also Warsh 2006.
- 5 See, for example, Sala-i-Martin et al. 2004; Levine and Renelt 1992; Easterly 2001; Sala-i-Martin 1997; Mankiw et al. 1992; and Barro 1991.
- 6 Rodrik 2008; World Bank 2008a; Easterly 2008; Rodrik 2007; and World Bank 2005.
- 7 Mankiw et al. 1992.
- 8 Papyrakis and Gerlagh 2004; Sachs and Warner 2001, 1999.
- 9 Arezki and van der Ploeg 2007; Gylfason et al. 1997.
- 10 Gallup et al. 1998.
- 11 OECD 2008a; Boulhol et al. 2008.
- 12 Gallup et al. 1998; Nordhaus 1994.
- 13 Alesina et al. in Aghion and Durlauf 2005.
- 14 Brühlhart and Sbergami 2008.
- 15 Fischer 1993.
- 16 Acemoglu et al. 2001; Hall and Jones 1999.
- 17 Fischer 1993.
- 18 Williamson 1990.
- 19 Mourmouras and Rangazas 2008.
- 20 Johansson et al. 2008.
- 21 Acemoglu et al. 2003.
- 22 Levine and Renelt 1992; Temple 2000; Barro 2002b.
- 23 Goodfriend 2007.
- 24 North 1990.
- 25 Kaufmann et al. 2008.
- 26 Rodrik 2006.
- 27 Sachs 2005.
- 28 Lorentzen et al. 2008; Weil 2007.
- 29 Persson and Tabellini 2007; Persson 2005; Brunetti 2002; Tavares and Wacziarg 2001; Barro 1996.
- 30 Bremmer 2006; Wacziarg and Rodrik 2005; Glaeser et al. 2004.
- 31 La Porta et al. 1998.
- 32 de Soto 2000.
- 33 Pelligrini and Gerlagh 2004; Mauro 1995; Shleifer and Vishny 1991.
- 34 Collier 1999.
- 35 Stone 2006.
- 36 Rodrik et al. 2004; Glaeser et al. 2004; Acemoglu et al. 2001; Hall and Jones 1999; La Porta et al. 1998.
- 37 Auer 2008; Dixit 2007.
- 38 Hausmann et al. 2005.
- 39 Alfaro et al. 2008.
- 40 Bloom and van Reenen 2007; Porter and Ketels 2003.
- 41 Porter 1990.
- 42 Calderon and Servén 2004; Garcia-Milà et al. 1996; Gramlich 1994; Aschauer 1989.
- 43 Ang 2008; Aghion et al. 2007; Levine 2005a; King and Levine 1993; Rajan and Zingales 1998.
- 44 Barro 2002a; Krueger and Lindahl 2001.
- 45 Council on Competitiveness 2007; Goldberg and Pavcnick 2007.
- 46 Easterly 2001.
- 47 Griffith et al. 2004; Jones 1995; Coe and Helpman 1995; Fagerberg 1994; Lichtenberg 1992.
- 48 Furman et al. 2002.
- 49 World Bank 2008b; Ciccone and Papaioannou 2007; Conway et al. 2005; Nicoletti and Scarpatta 2003.
- 50 Carlin et al. 2005; Lewis 2004; Porter and Sakakibara 2004; Nickell 1996.
- 51 Megginson and Netter 2001.
- 52 Heritage Foundation 2008; Gwartney and Lawson 2007; De Haan et al. 2006; Berggren 2003.
- 53 Baldwin 2003; Dollar and Kraay 2002; Frankel and Romer 1999; Sachs and Warner 1995.
- 54 Coe and Helpman 1995.
- 55 Rodrigues and Rodrik 2000.
- 56 Dollar and Kraay 2003.
- 57 Alcalá and Ciccone 2004.
- 58 Porter and van der Linde 1995; Jaffe 1995.
- 59 Porter 1998b; Porter 1990.

- 60 Berger 2006.
- 61 Delgado et al 2007.
- 62 Ketels and Sölvell 2006.
- 63 In 29 of these countries in Eastern Europe, Central Asia, and Turkey, the survey was conducted jointly with the EBRD as the EBRD-World Bank Business Environment and Enterprise Performance Survey (BEEPS).
- 64 World Bank 2008a; Heritage Foundation 2008; Gwartney and Lawson 2007.
- 65 Conway et al. 2005.
- 66 See Institute for Strategy and Competitiveness 2008; Institute for Competitiveness and Prosperity 2008; and Center for Strategy and Competitiveness 2008.
- 67 Porter 1990.
- 68 We used this approach already in developing the BCI.
- 69 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.
- 70 All results reported here and later in the chapter are for the current definition of indicators and the current specification of the model. While these specific results might change with further refinements of the model, we want to share the current results to enable a meaningful debate about our approach.
- 71 Porter 1990.
- 72 We have tested these choices statistically and found the overall ranking is highly stable to recategorization of specific indicators.
- 73 Exceptions of countries that come close to these cut-offs and are still assigned to the middle group are Latvia, Mauritius, and Saudi Arabia. In addition, Italy and Greece are assigned to the high group because they are EU members even though they fail the SIPI test. Brunei is assigned to the middle group because of its focus on natural resources; it otherwise meets the high SIPI test.
- 74 Lall 2001.
- 75 In order to measure microeconomic competitiveness, we aggregate COS and the four components of the NBE using PCA. Using the factor analysis, each component gets roughly the same weight. Specifically, the microeconomic competitiveness of country  $c$  in year  $t$  is computed as follows:

$$\begin{aligned} \text{MICRO}_{ct} = & 0.21 \times \text{COS}_{ct} + 0.21 \times \text{NBE-Factor Conditions}_{ct} \\ & + 0.21 \times \text{NBE-Demand}_{ct} \\ & + 0.20 \times \text{NBE-Related Industries}_{ct} \\ & + 0.20 \times \text{NBE-Context}_{ct} \end{aligned}$$

- 76 While a model that takes into account country stages is our goal, a linear model that generates meaningful results is an important test for the stability of the approach. Thus we also estimate the following linear model to have a useful benchmark:
- $$\begin{aligned} \log \text{GDPpc}_{c,t} = & \alpha_0 + \beta_{\text{MICRO}} \text{MICRO}_{c,t-1} + \beta_{\text{SIPI}} \text{SIPI}_{c,t-1} \\ & + \beta_{\text{MP}} \text{MP}_{c,t-1} + \alpha_{\text{END}} \text{ENDOWMENTS}_{c,t-1} \\ & + \alpha_1 \text{year}_t + \varepsilon_{c,t} \end{aligned}$$
- 77 For the regression, countries in the first tercile of SIPI ranks are assigned to the "high" group and all other countries to the "low" group. The dataset does not generate significant results if we divide countries into three groups. The regression generates coefficients for the "high" and "low" stage of development. For the calculation of the Index, we divide countries into three groups as discussed in the text. For the "high" and "low" group of countries, we use the coefficients derived in the regression. For the "medium" stage of development countries, we compute weights by averaging the estimated weights for the high-SIPI and low-SIPI countries.

- 78 The index for a particular country  $c$  in year  $t$  is calculated by summing its weighted microeconomic and macroeconomic components:

$$\text{GCI}_{c,t} = \omega_{\text{micro}}^S * \text{MICRO}_{c,t} + \omega_{\text{SIPI}}^S * \text{SIPI}_{c,t} + \omega_{\text{MP}}^S * \text{MP}_{c,t};$$

S=High, middle, or low stage of development

- 79 See Porter et al. 2007.
- 80 The new model also uses a different scaling approach for some of the other indicators. Instead of scaling linearly with some upper cut-off points, we use the log of the indicator.
- 81 Porter and Ketels (2008) analyze this for the case of Russia where centralization of power has benefited macroeconomic stabilization but made progress on microeconomic competitiveness elusive.

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