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ADVANCE EDITION

Global Development Horizons 2011

# **Multipolarity: The New Global Economy**





Global Development Horizons 2011

# Multipolarity: The New Global Economy

ADVANCE EDITION



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1818 H Street NW  
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Telephone: 202-473-1000  
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# Foreword

**T**HE WORLD ECONOMY IS IN THE midst of a transformative change. One of the most visible outcomes of this transformation is the rise of a number of dynamic emerging market countries to the helm of the global economy. It is likely that, by 2025, emerging economies—such as Brazil, China, India, Indonesia, and the Russian Federation—will be major contributors to global growth, alongside the advanced economies. As they pursue growth opportunities abroad and encouraged by improved policies at home, corporations based in emerging markets are playing an increasingly prominent role in global business and cross-border investment. The international monetary system is likely to cease being dominated by a single currency. Emerging-market countries, where two-thirds of official foreign exchange reserves are currently held and whose sovereign wealth funds and other pools of capital are increasingly important sources of international investment, will become key players in financial markets. In short, a new world order with a more diffuse distribution of economic power is emerging—thus the shift toward multipolarity.

Throughout the course of history, major economic transitions have always presented challenges, as they involve large uncertainties surrounding identification of emerging global issues of systemic importance and development of appropriate policy and institutional responses. It is in this context that the World Bank is launching a new report, *Global Development Horizons (GDH)*.<sup>1</sup> The new report serves as a vehicle for stimulating new thinking and research on

anticipated structural changes in the global economic landscape. To retain this forward-looking orientation and to serve the World Bank Group's mandate of development and poverty alleviation, it is envisaged that future editions of GDH will be dedicated to themes of importance to the emerging development agenda and global economic governance, including changing global income inequality, increasing economic insecurity, global population aging, and the future shape of development finance.

The inaugural edition of GDH addresses the broad trend toward multipolarity in the global economy, particularly as it relates to structural changes in growth dynamics, corporate investment, and international monetary and financial arrangements. Multipolarity, of course, has different interpretations within different spheres of contemporary international relations. In international politics, where much of the discussion has been focused, the debate centers on the potential for a nonpolar world, in which numerous national concentrations of power exist but no single center dominates (as opposed to the bipolar global political environment that defined the Cold War era). In the realm of international economics, multipolarity—meaning more than two dominant growth poles—has at times been a key feature of the global system. But at no time in modern history have so many developing countries been at the forefront of a multipolar economic system. This pattern is now set to change. Within the next two decades, the rise of emerging economies will inevitably have major implications for the global economic and geopolitical landscape.

1. GDH now contains the thematic analysis that previously appeared in *Global Development Finance* and *Global Economic Prospects*. *Global Economic Prospects* will continue to be produced, but without the thematic chapters, and *Global Development Finance* will be focused on data.

In a world of progressively more multipolar economic growth and financial centers, policy makers will need to equip themselves with the tools and capabilities to effectively capitalize on opportunities while simultaneously safeguarding their economies against the risks that remain stubbornly high as the global economy struggles to find a stable footing. Within the realm of immediate concerns, the tragic earthquake and tsunami that hit Japan in March 2011, the political turmoil gripping much of the Middle East and North Africa, and the financial tremors emanating from the European sovereign debt crisis are all likely to exact a heavy toll on global financial markets and growth. Seen against the backdrop of a sub-par global growth trajectory, high levels of unemployment in many advanced and developing economies, and rising inflationary pressures in many emerging and low-income economies, these events call for further bold, concrete actions to shore up confidence and establish the underpinning for bankers to lend, and for businesses to invest in equipment and technology that will boost productivity, create jobs, and generate long-term growth. Indeed, it is through rising investment and economic growth that productive jobs will be created to absorb the large youth cohort in the Middle East and North Africa region and elsewhere, that earthquake-shattered parts of Japan will be rebuilt, and that fiscal consolidation in the United States and Europe will become more achievable.

The transformation of global patterns of economic growth is also driving a change in the international monetary system. At the current juncture, the U.S. dollar remains the most important international currency, despite a slow decline in its role since the late 1990s and abandonment nearly forty years ago of the Bretton Woods system of fixed exchange rates (in which the dollar officially anchored the world's currencies). But the dollar now faces growing competition in the international currency space. Chief within this space is the euro, which has gained ground in recent years as a currency in which goods are invoiced and official reserves are held, while the yen and pound represent only single digit shares of official reserves. In the longer term,

the size and dynamism of China's economy and the rapid globalization of its corporations and banks will position the renminbi to take on a more important international role. By 2025, the most probable global currency scenario will be a multipolar one centered around the dollar, euro, and renminbi. This scenario is supported by the likelihood that the United States, the euro area, and China will constitute the three major growth poles by that time, providing stimulus to other countries through trade, finance, and technology channels and thereby creating international demand for their currencies.

The potential for rising competition among power centers that is inherent in the shift to a more multipolar world makes strengthening policy coordination across economies—developing and developed—critical to reducing the risks of political and economic instability. In the years leading up to the financial crisis, the role of international economic policy making was confined to managing the symptoms of incompatible macroeconomic policies, such as exchange rate misalignments and payments imbalances. As capital markets have been liberalized and exchange rates made more flexible, balance of payments constraints on national economies have been considerably eased, shifting policy coordination toward the more politically sensitive spheres of domestic monetary and fiscal policy.

For its part, the international financial community must recognize that it has a complex burden to shoulder in ensuring that the least developed countries (LDCs) are guarded against the volatility that could accompany the transition to a multipolar order. Many LDCs are heavily reliant on external demand for growth and, hence, their ability to manage their external relations becomes critical. For those with floating exchange rate regimes, a critical element would be the development of the necessary institutional policy frameworks, market microstructure, and financial institutions that can ensure the smooth functioning of foreign exchange markets. Aid and technical assistance from international financial institutions have the potential to cushion volatility in these economies as they adapt to the global forces involved in the transition to a multipolar world.

Finally, the World Bank believes that a publication geared toward stimulating new thinking and research on the implications of a changing global landscape should embed change in its own format and design. Thus, GDH will consist of both a hard copy publication and a companion website (<http://www.worldbank.org/GDH2011>) that will serve as an extension of the paper publication. This website will be a platform for the report's underlying data, methodology, blog postings, and relevant background papers. The site will also include an interactive feature that will allow visitors to explore the scenarios described in GDH. This is in line with the Bank's agenda to "democratize" development via our Open Data

Initiative and greater emphasis on open knowledge exchange (<http://data.worldbank.org>). In the future, the site will also serve as a repository of related research papers from the broader development community, as well as a vehicle for interactive debate and networking with various think tanks, business associations, and policy establishments concerned with long-term global economic change and its implications for development policy and discourse.

Justin Yifu Lin  
Chief Economist and Senior Vice President  
The World Bank



# Overview

**S**WEEPING CHANGES ARE AFOOT in the global economy. As the second decade of the 21st century unfolds and the world exits from the 2008–09 financial crisis, the growing clout of emerging markets is paving the way for a world economy with an increasingly multipolar character. The distribution of global growth will become more diffuse, with no single country dominating the global economic scene.

The seeds of this change were planted some time ago. Over the past two decades, the world has witnessed emerging economies rise to become a powerful force in international production, trade, and finance. Developing countries' share of international trade flows has risen steadily, from 30 percent in 1995 to an estimated 45 percent in 2010. Much of this rise has been due to an expansion of trade not between developed countries and developing countries, but among developing countries. Similarly, more than one-third of foreign direct investment in developing countries currently originates in other developing countries. Emerging economies have also increased their financial holdings and wealth. Emerging and developing countries now hold two-thirds of all official foreign exchange reserves (a reversal in the pattern of the previous decade, when advanced economies held two-thirds of all reserves), and sovereign wealth funds and other pools of capital in developing countries have become key sources of international investment. At the same time, the risk of investing in emerging economies has declined dramatically. Borrowers such as Brazil, Chile, and Turkey now pay lower interest rates on their sovereign debts than do several European countries.

As investors and multinational companies increase their exposure to fast-growing emerging economies, international demand for

emerging-economy currencies will grow, making way for a global monetary system with more than one dominant currency. The growing strength of emerging economies also affects the policy environment, necessitating more inclusive global economic policy making in the future.

This broad evolution under way in the global economy is not without precedent. Throughout the course of history, paradigms of economic power have been drawn and redrawn according to the rise and fall of states with the greatest capability to drive global growth and provide stimulus to other countries through cross-border commercial and financial engagements. In the first half of the second millennium, China and India were the world's predominant growth poles. The Industrial Revolution brought Western European economies to the forefront. In the post–World War II era, the United States was the predominant force in the global economy, with Germany and Japan also playing leading roles.

In more recent years, the global economy has begun yet another major transition, one in which economic influence has clearly become more dispersed than at any time since the late 1960s. Just as important, developing countries have never been at the forefront of multipolarity in economic affairs. During the forecast period of *Global Development Horizons (GDH) 2011*—from 2011 to 2025—the rise of emerging economies will inevitably have major implications for the global economic and geopolitical hierarchy, just as similar transformations have had in the past.

Increased diffusion of global growth and economic power raises the imperative of collective management as the most viable mechanism for addressing the challenges of a multipolar world economy. The key differences that the management of a multipolar global economy will present

relative to the postwar era of the U.S.-centered global economic order relate to the distribution of the costs and responsibilities of system maintenance and the mechanisms for sharing the special privileges and benefits associated with being a global growth pole. In the postwar era, the global economic order was built on a complementary set of tacit economic and security arrangements between the United States and its core partners, with developing countries playing a peripheral role in formulating their macroeconomic policies and establishing economic links with an eye toward benefiting from the growth dynamism in developed countries. In exchange for the United States assuming the responsibilities of system maintenance, serving as the open market of last resort, and issuing the most widely used international reserve currency, its key partners, Western European countries and Japan, acquiesced to the special privileges enjoyed by the United States—seigniorage gains, domestic macroeconomic policy autonomy, and balance of payments flexibility.

Broadly, this arrangement still holds, though hints of its erosion became evident some time ago. For example, the end of the postwar gold exchange standard in 1971 heralded a new era of floating currencies (formalized by the Jamaica Agreement in 1976), a trend that has not been limited to developed countries. Particularly since the East Asian financial crisis of 1997–98, developing countries have increasingly floated their currencies. Changes in currency use have also occurred. As Europe has followed a trajectory of ever-increasing economic integration, the euro has come to represent a growing proportion of international transactions and foreign exchange reserve holdings. At the same time, developing economies' increased trade flows and the gradual opening of their economies to foreign capital have benefited developing economies handsomely, boosting their growth potential and tying their economic and financial stakes to the continuation of a liberal global order. In the unfolding global economic environment, in which a number of dynamic emerging economies are evolving to take their place at the helm of the global economy, the management of multipolarity demands a reappraisal of three pillars of the conventional approach to global economic governance—the

link between economic power concentration and stability, the North-South axis of capital flows, and the centrality of the U.S. dollar in the global monetary system. Such a reappraisal offers much in advancing the debate on the future course of international development policy and discourse.

In anticipation of the shape of the future global economy, this first edition of *Global Development Horizons* aims to map out the emerging policy agenda and challenges that an increasingly multipolar world economy poses for developing countries.

## Emerging Growth Poles Will Alter the Balance of Global Growth

The coming decades will see global economic growth increasingly being generated in emerging economies. By 2025, global economic growth will predominantly be generated in emerging economies. Although many high-income countries are only gradually recovering from the financial crisis, most developing countries have swiftly returned to their fast precrisis growth trend. China was one of the first economies to emerge from the crisis, and it returned quickly to around 10 percent growth. India experienced a stronger contraction, but also attained more than 10 percent growth in 2010, and the government is putting in place an ambitious new Five Year Plan (with improved policies and necessary investment programs) to keep growth at that level. Latin America sharply rebounded in 2010, after contracting sharply in 2009. Even Sub-Saharan Africa is expected to return quickly to almost 6 percent annual growth, similar to its performance in the years before the crisis. Even in the absence of such exceptionally high growth rates in the developing world, the balance of global growth is expected to shift dramatically.

The changing role of developing countries will come with major transformations to their economies, corporate sectors, and financial systems. These changes are likely to occur in a wide variety of scenarios. The baseline scenario considered in *GDH 2011*—which is derived from longer-term historical trends and from forward-looking



components such as anticipated changes in demography, labor force growth, saving patterns, and educational levels—offers a lens into the possible transformations to come. This scenario envisions average growth over the next 15 years that will be substantially lower than the highs of 2010. However, emerging economies will still, collectively, expand by an average of 4.7 percent per year (more than twice the developed world's 2.3 percent rate) between 2011 and 2025. (Given the considerable uncertainty underlying long-term growth projections, the baseline scenario includes error bands to emphasize the wide range of possible outcomes). By 2025, six major emerging economies—Brazil, China, India, Indonesia, the Republic of Korea, and the Russian Federation—will collectively account for more than half of all global growth. Several of these economies will become key drivers of global growth, alongside advanced economies. This new global economy, in which the centers of growth are distributed across both developed and emerging economies, is what *GDH 2011* envisions as a multipolar world.

***Altering this balance calls for productivity growth in emerging economies and realignment of demand away from external sources***

Even with a moderation of growth in developing countries, successful realization of the baseline scenario presented in *GDH 2011* is dependent on several important changes to the character of growth in emerging economies. In particular, strong future growth performance of emerging markets depends critically on these economies' ability to sustain improvements in technological dynamism—often referred to as total factor productivity (TFP)—and to successfully transition toward internal sources of demand.

Historically, economic progress in emerging economies has followed one of two paths. The first, which characterizes economies such as China, India, and Russia, is one in which TFP growth is a major contributor to economic growth. The second path, which has recently been common among the economies of Latin America and Southeast Asia, is one in which growth is led by the rapid mobilization of factors of production. Yet even in the former case, TFP

growth has been largely due to the rapid adoption of existing technologies, economywide factor reallocation, and improvements in institutional governance, rather than progress in pure innovative capacity. The long-run viability of fast-paced growth in emerging economies will thus depend, in part, on the ability of emerging economies to enhance their indigenous innovation through investments in human capital and through the creation of appropriate institutional mechanisms to stimulate expenditure on research and development (R&D).

Innovation and innovative capacity are already rising in emerging economies. Since 2000, China and India have invested heavily in R&D; expenditures on R&D accounted for 1.4 percent of gross domestic product (GDP) in China and 0.8 percent in India, about an order of magnitude greater than that shown by peer economies in their respective income groups. The siting of major research facilities in China by Microsoft, the invention of the Nano microcar by Indian firm Tata, and the continued string of aeronautical breakthroughs in Russia suggest the emerging-economy giants' strong potential for fostering growth through technological advancement.

Rapid growth in the major emerging economies will also need to be accompanied by a realignment of growth away from external sources and toward internal demand—a process that is under way in many cases. In China, for example, consumption is projected to rise from the current 41 percent of national income to 55 percent by 2025, much closer to the level of developed countries. Similar increases are also likely to occur in the emerging economies of Eastern Europe. Latin American economies, where the consumption share of income is already 65 percent and is expected to remain at that level, will be the exception to this trend. The sharpest declines in savings rates are likely in East Asian and Eastern European economies, where population aging will be at a more advanced stage. In Eastern Europe, rising levels of consumption are likely to occur concomitantly with relative declines in investment shares, consistent with the declining labor force in several countries. As a result, current account deficits could narrow in

those countries. Conversely, account surpluses in several Asian countries could be reduced with the declining savings rates. Together with rising domestic savings in the United States after the financial crisis, the more prominent role of emerging economies coincides with a narrowing of global imbalances, which indeed is part of the baseline scenario.

Sustaining higher consumption shares of output in emerging economies will be key in consolidating the transition from externally driven to internally driven growth and will require an expansion of the middle class, which, in turn, will call for emerging-market policy makers to usher in broad financial sector development and to improve domestic social safety nets. To meet demand for more diverse consumption goods, increasing numbers of small and medium enterprises are required, together with open trade relations.

***As the international trade shares of the emerging and developed world converge, global wealth and asset holdings will shift toward emerging economies***

As a group, emerging economies are likely to experience significant increases in their international trade flows by 2025, in terms of both imports and exports. The value of Indonesia's exports, for example, is likely to double between 2010 and 2025, while the value of its imports is expected to be more than one-and-a-half times higher by 2025. Global trade is forecast to expand as a share of global output over the same time period, from 49.9 percent of output to 53.6 percent.

These current account paths mean that major emerging economies are likely to collectively take on a large and rising net asset international position (albeit at a diminishing rate) in their holdings of investments in developed economies (which, in turn, are expected to build equally large net liability positions). Global wealth and asset holdings will thus shift further toward emerging economies with surpluses, such as China and major oil exporters in the Middle East. This adjustment is already reflected in the current financial landscape: International reserves held by emerging economies topped \$7.4 trillion

in 2010 (approximately three times the \$2.1 trillion in reserves held by advanced economies), and the share of cross-border mergers and acquisitions (M&A) by firms based in emerging economies in 2010 was 29 percent (\$470 billion) of the global total.

The road ahead for emerging economies—while cautiously positive—will nevertheless entail downside risks of both a short- and a long-term nature. If economies with historically low TFP contributions are unable to raise their productivity levels through institutional reform and technological innovation, the existing two-track global economy may fracture even further into a slowly divergent growth path between advanced economies, low-productivity developing economies, and high-productivity developing economies. Similarly, if outward-oriented emerging economies with weak internal demands are not successful in increasing their consumption share, capital in these economies may eventually be channeled toward increasingly unproductive, low-yielding investments. The run-up in commodity prices since 2003 may also become persistent, which could potentially derail growth in developing countries that are especially commodity intensive. On the upside, if emerging economies successfully navigate their rising per capita incomes, provide necessary infrastructural improvements, and facilitate corporate sector reform, the baseline scenario may underestimate emerging economies' future growth potential. Finally, unexpected economic and geopolitical developments may introduce fundamental uncertainty of a nature that is impossible to develop scenarios for.

## **Emerging-Market Multinationals Becoming a Potent Force in Reshaping the Process of Industrial Globalization**

Long relegated to second-tier status, emerging-market companies are becoming powerful forces and agents of change in the global industrial and financial landscape. Trends in foreign direct investment (FDI) flows are one indication of this shifting status. Between 1997 and 2003,

companies based in emerging economies engaged in cross-border investment through M&A deals of \$189 billion, or 4 percent of the value of all global M&A investments over the period. Between 2004 and 2010, that amount increased to \$1.1 trillion—17 percent of the global total. Since 2003, approximately 5,000 firms based in emerging markets have established a global presence through 12,516 greenfield investments of \$1.72 trillion. More than one-third of FDI inflows to developing countries now originate in other developing countries: Of the 11,113 cross-border M&A deals announced worldwide in 2010, 5,623—more than half—involved emerging-market companies, either as buyers or as take-over targets by advanced-country firms. As they venture overseas, companies based in emerging markets tend to seek assets that will help them accomplish one or more of several goals: diversification of their growth, a larger global market share, exploitation of growth opportunities not available in their domestic economies, or freedom from an unfavorable domestic economic climate.

As they pursue growth opportunities abroad, corporations based in emerging markets play an increasingly prominent role in global business, competing with firms based in advanced countries for natural resources, technology, and access to international markets. Many emerging-market firms often have an advantage over advanced-country firms in navigating difficult policy environments in other developing countries, because they have experienced similar conditions in their home countries. These two trends, together with the overall strengthening of South-South trade links, will ensure that South-South investment continues to expand. Further, M&A activity by emerging-market firms in developing countries is on the rise and is becoming an important source of FDI. Because such transactions typically occur within close geographical proximity, they will not only deepen regional economic ties, but also accelerate the integration of low-income countries into the global economy. Emerging-market firms have also been active in South-North acquisitions, especially in advanced economies with sophisticated equity markets and favorable growth prospects. The annual value of cross-border M&A transactions undertaken by

emerging-market firms is forecast to more than double by 2025, while the annual number of cross-border M&A deals is expected to more than triple (from fewer than 2,500 in 2011 to almost 8,000 in 2025). This trend outpaces the underlying GDP growth rates in emerging-market firms' home countries.

The development of emerging-market firms into a potent force for globalization in their own right will have important implications for cross-border capital formation, technology generation and diffusion, and financing of commercial activities. A number of innovative and dynamic emerging-market firms are on a path toward dominating their industrial sectors globally—much in the same way that companies based in advanced economies have done over the past half century. Many emerging-market firms have already begun overtaking their advanced-country competitors in terms of the priority accorded to developing innovative technologies and industrial processes, with 114 firms from emerging economies ranking among the top 1,000 firms worldwide by R&D spending as of 2009, twice as many as five years earlier. This is a particularly noteworthy accomplishment given that the private sector traditionally has not been the main financier of R&D in developing countries. In 2025, a luxury sedan is as likely to be a Hyundai or Tata as a Mercedes or Lexus, is as likely to be powered with fuel from Lukoil or Pertamina as from ExxonMobil or BP, and is as likely to be financed by China's ICBC (Industrial and Commercial Bank of China Ltd.) or Brazil's Itaú as by Citi or BNP Paribas.

***There are strong signs of mutually reinforcing links between commercial and financial globalization***

The shift in economic and financial power toward the developing world is also reshaping cross-border corporate finance, transforming emerging-market firms into significant participants in international capital markets. The progress of a growing number of developing countries in improving the soundness and transparency of domestic institutions and policies has enabled their firms to gain increased access to international bond and equity markets, and at better terms, in their efforts to expand globally. Nearly two-thirds of emerging-market

firms that have been active acquirers since the late 1990s—those firms that have undertaken 10 or more acquisitions—have tapped international markets to access one or more forms of financing through syndicated loans, bond issues, and equity listings. As evidence of the mutually reinforcing links between commercial and financial globalization, a growing number of emerging-market firms undertake at least one cross-border acquisition within two years of accessing international capital markets. International bond issuance, in particular, by borrowers based in emerging markets has grown dramatically since the mid-1990s and is now one of the main sources of capital inflows for those countries. Since 1995, a large number of emerging private companies have engaged in high-profile global bond market transactions, with 80 of them issuing bonds over \$1 billion each, of which 10 were issuances of over \$2 billion. Some prominent issuers include Petrobras International Finance Company of Brazil, América Móvil of Mexico, Novelis Inc of India, and VTB bank of Russia. Over the next decade and beyond, there is likely to be significant scope for emerging-market companies to further expand their access to international capital markets and at more favorable terms.

In emerging-market economies such as Brazil, Chile, and Mexico, where local capital markets have seen considerable growth and maturity in recent years, companies have the capacity to fund their growth through a more balanced mix of local and international capital market issuance. Furthermore, in some emerging growth poles, particularly those in Asia, signs already exist that their local capital markets are evolving into regional financing hubs. During the next decade and beyond, as local consumer demand continues to rise in the fastest-growing emerging markets and as local capital markets in those countries become deeper and better regulated, manufacturing and consumer goods firms based in developed countries can be expected to also seek access to capital markets in emerging markets. Cross-listings of securities by developed-country firms, although initially motivated by the desire to raise their firms' brand recognition, will be followed by issues that tap large pools of available savings in emerging markets.

From a policy perspective, the growing role and influence of emerging-market firms in global investment and finance may make it more possible—and indeed, critical—to move forward with the sort of multilateral framework for regulating cross-border investment that has been derailed several times since the 1920s. In contrast to international trade and monetary relations, no multilateral regime exists to promote and govern cross-border investment. Instead, the surge of bilateral investment treaties (BITs)—more than 2,275 BITs were in place in 2007, up from just 250 in the mid-1980s—has provided the most widely used mechanism for interstate negotiation over cross-border investment terms, including access to international arbitration of disputes. Though BITs have proven to be suboptimal from an economic point of view, there are reasons to believe that their proliferation and the associated experience of formulating, negotiating, and implementing them across a large number of developed and developing countries have set the stage for transition into a multilateral framework. The elimination of investment restrictions through BITs, for example, may be supportive of more general multilateral liberalization efforts. Moreover, BITs have also set the stage for complementary institutional advancements at the global level. Indeed, the International Centre for the Settlement of Investment Disputes (ICSID) has experienced growing demand for cross-border investment dispute settlement services—cases registered with the ICSID averaged 25 per year between 2001 and 2010, up from an average of about two cases per year between 1981 and 1990. This increase in demand has allowed the maturation of an institutional infrastructure that is well positioned to serve as an important foundation, especially on legal aspects, for a multilateral framework in the future.

### **Multipolar International Economy to Lead to a Larger Role for the Euro and, in the Long Term, for the Renminbi**

Rapid growth in emerging-market economies has led to enormous wealth creation and substantial

accumulation of their net claims on the rest of the world, raising the profile of emerging markets in the international financial system as a result. Developing and emerging countries held two-thirds of the world's \$9 trillion of official foreign exchange reserves as of late 2010, compared to only 37 percent of reserves held at the end of 2000. Sovereign wealth funds and other pools of capital in developing countries have become a major source of international investment. Between 2010 and 2025, the collective net international investment position of major emerging markets is projected to rise to a surplus of more than \$15.2 trillion (in 2009 dollars) under the baseline scenario presented in *GDH 2011*, offset by a corresponding deficit in today's advanced economies.

Even though the role of emerging markets in international finance is growing, there is a great disparity between their economic size and their role in the international monetary system. At present, no emerging economy has a currency that is used internationally—that is, one in which official reserves are held, goods and services are invoiced, international claims are denominated, and exchange rates are anchored—to any great extent. Virtually all developing countries are exposed to currency mismatch risk in their international trade and investment and financing transactions. Addressing these disparities in the international monetary system needs urgent attention, in terms of both the management of the system (here, the International Monetary Fund [IMF] continues to play a leading role) and the understanding of long-term forces shaping the future workings of the system.

International currency use exhibits considerable inertia and is subject to network externalities, rendering currencies already in widespread use the most attractive. For now, the U.S. dollar remains the chief international currency, despite a slow decline in the proportion of global reserves held in dollars since the late 1990s. But the dollar now faces several potential rivals for the role of international currency. At present, the euro is the most credible of those alternatives. Its status is poised to expand, provided the euro area can successfully overcome the sovereign debt crises currently faced by several of its member countries

and can avoid the moral hazard problems associated with bailouts of countries within the European Union.

Looking further ahead, as emerging economies account for an ever-growing share of the global economy and participate more actively in cross-border trade and finance, one sees that their currencies—particularly the renminbi—will inevitably play a more important role in the international financial system. A larger role for the renminbi would help resolve the disparity between China's great economic strength on the global stage and its heavy reliance on foreign currencies. On one hand, China is the world's largest exporting country and holds the largest stock of foreign exchange reserves by far (\$2.9 trillion held as of end 2010). On the other hand, China faces a massive currency mismatch because transactions by its government, corporations, and other entities with the rest of the world are almost entirely denominated in foreign currencies, primarily U.S. dollars. With private entities in China not able to directly address the currency mismatch, the task falls to the government. In moving to address such issues, Chinese authorities have undertaken the internationalizing of the renminbi on two fronts: (1) developing an offshore renminbi market and (2) encouraging the use of the renminbi in trade invoicing and settlement. Such initiatives are beginning to have an effect in laying the foundation for the renminbi taking on a more important global role.

Building on this unfolding reality, *GDH 2011* presents three potential scenarios for the future of the international monetary system: a status quo centered on the U.S. dollar, a multicurrency system, and a system with the Special Drawing Right (SDR) as the main international currency. The most likely of the three scenarios is the multicurrency system. Under this scenario, the current predominance of the U.S. dollar would end sometime before 2025 and would be replaced by a monetary system in which the dollar, the euro, and the renminbi would each serve as full-fledged international currencies. This expected transition raises several important questions. First, how will developing countries, the majority of which will continue to use foreign currencies in trade of goods and assets, be affected by a move to a

multicurrency system? Second, can a multipolar economic system—with its dangers of instability—be managed within the existing institutional arrangements, or is a more fundamental reform of the system necessary? Third, what can be done to smooth the transition to multipolarity, short of fundamental reform of the international monetary system?

***A more multipolar international monetary system will still involve currency risks for most developing countries***

The dollar-based international monetary system of the present and the likely multicurrency system of the future share a number of defects inherent to a system based on national currencies. The fundamental problem is an asymmetric distribution of the costs and benefits of balance of payments adjustment and financing. Countries whose currencies are key in the international monetary system benefit from domestic macroeconomic policy autonomy, seigniorage revenues, relatively low borrowing costs, a competitive edge in financial markets, and little pressure to adjust their external accounts. Meanwhile, countries without key currencies operate within constrained balance of payment positions and bear much of the external adjustment costs of changing global financial and economic conditions. This asymmetric distribution of the cost of adjustment has been a major contributor to the widening of global current account imbalances in recent years. It has also produced a potentially destabilizing situation in which (a) the world's leading economy, the United States, is also the largest debtor, and (b) the world's largest creditor, China, assumes massive currency mismatch risk in the process of financing U.S. debt. Another shortcoming of the current system is that global liquidity is created primarily as the result of the monetary policy decisions that best suit the country issuing the predominant international currency, the United States, rather than with the intention of fully accommodating global demand for liquidity. This characteristic means that the acute dollar shortage that developed in the wake of the Lehman Brothers collapse in 2008, which affected non-U.S. banks particularly hard, was in many respects worse than the dollar shortage of the 1950s.

In a multipolar global economy, it is likely that dissatisfaction with a national currency-based system will deepen. But from a monetary policy perspective, the creation of a system in which global currency decisions are made on a truly multilateral level—that is, with the explicit agreement of a large number of countries—is not likely; as such, a new system would require countries to cede national sovereignty over their monetary policy. The great deal of inertia in the current international monetary system based on national currencies is also a factor, as is the expectation that a more diffuse distribution of global economic power is likely to render cooperation on any sort of economic policy across borders more difficult.

In the years leading up to the financial crisis, the role of international economic policy making was confined to managing the symptoms of incompatible macroeconomic policies, such as exchange rate misalignments and payments imbalances. As capital markets have been liberalized and exchange rates made more flexible, balance of payments constraints on national economies have been considerably eased, shifting policy coordination toward the more politically sensitive spheres of domestic monetary and fiscal policy. Unless a country's borrowing and trade are concentrated in one of the three key currencies, instability in exchange rates between the key currencies will lead to fluctuations in competitiveness and the value of assets and liabilities, impeding that country's economic policy making and potentially jeopardizing the welfare of its residents. Thus, countries without leading currencies will need to step up their efforts to hedge against exchange rate volatility. This will be the case for developing countries, in particular.

Some of the challenges facing the international monetary system could possibly be managed through increased use of the SDR. Established by the IMF in the 1960s as an international reserve asset and unit of account, the SDR is currently valued in terms of a basket of four major international currencies—the euro, Japanese yen, pound sterling, and U.S. dollar. Enhancing the role of the SDR in the international monetary system could help address both the immediate risks to global financial stability and the ongoing costs of currency volatility. From an operational

perspective, there are two main ways to increase use of the SDR. The first would be to encourage official borrowing denominated in SDRs. A second avenue would be to formalize central bank currency swap facilities using the SDR, which would be useful during a financial crisis, or perhaps to adjust the composition of the SDR basket to include the renminbi or other major emerging-market currencies. Over time, the SDR could serve as a natural hedge, especially for low-income countries that lack developed financial markets.

***Nevertheless, a multilateral approach will remain the best way to manage global economic policy making***

In a world of progressively more multipolar economic growth and financial centers, interdependency will be the operating norm even more than at the present, bringing new challenges for economic diplomacy, national economic policy making, and management of transnational capital channeled across national borders. The potential for rising competition among power centers that is inherent in the shift to a more multipolar world makes it especially important to improve the design of policy coordination across economies—both developing and developed. More generally, as global economic integration increases, so, too, do spillovers of monetary and fiscal policies across countries. Thus, policy coordination is needed not only to improve the average performance of the global economy, but also to avert the attendant risks. Countries should move quickly to better coordinate their responses to global imbalances, to improve financial regulation, and to expand mutual surveillance of macroeconomic policies. To the extent that the vulnerability that comes with interdependence can be managed through appropriate responses by international institutions and multilateral agreements—such as the provision of emergency financial assistance and commitments to open-door policies to ensure access to international markets—interdependence can lead to a shared increase in global prosperity.

Even in the absence of fundamental reform in international policy coordination, a number of concrete steps could be taken to further the

coordination framework put into place by the Group of 20 (G-20) and to preserve the gains made in central bank collaboration and harmonization of financial regulations during the 2008–09 financial crisis. Importantly, coordination should focus on outcomes that would be mutually beneficial to a large number of countries—that is, on international public goods, such as environmentally friendly technologies—rather than on zero-sum variables, in which a gain for one country implies a loss for another. Only by recognizing that multilateral coordination has welfare-enhancing benefits for all will countries voluntarily take into account the concerns of other countries.

## **Multipolarity to Bring Benefits and New Challenges to the Developing World**

A more multipolar global economy will, on balance, be positive for developing countries as a whole—though not necessarily for each of them individually. Growth spillovers—flowing from trade, finance, migration, and technology channels—will induce technological transfer, spur demand for exports, and improve the terms of trade in developing countries as well as enable them to develop their domestic agricultural and manufacturing industries. For example, since 1990, bilateral trade flows between the least developed countries (LDCs) and the major emerging economies have increased threefold; trade with emerging economies now accounts for a greater share of LDCs' bilateral trade flows than their trade with major advanced economies. Moreover, a more diffuse distribution of global growth will also create new external growth drivers, meaning that idiosyncratic shocks in individual growth pole economies will have less impact on the volatility of external demand in those countries than at present. This characteristic was evident in the aftermath of the 2008–09 financial crisis, when cross-border M&A originating in emerging economies accounted for more than a quarter of the value of all deals in 2009 and 2010. Greater multipolarity could also have a tangible effect on patterns of foreign aid, as increased aid

disbursements by emerging economies push official development assistance to even greater shares of gross national income in LDCs.

The effect of an increasingly multipolar global economy is likely to differ across countries, however, and LDCs—many of which are heavily reliant on external demand for growth—are at the greatest risk of not being able to adapt to risks created by the transformation. LDCs that are net importers of commodities and mineral resources may face higher global prices because of increased global demand for raw materials. Even in cases where LDCs are net commodity or resource exporters, export-biased growth in LDC economies runs the risk of immiserizing growth. For LDCs with floating exchange rate regimes, critical elements of their response to a more multipolar global economy will be development of institutional policy frameworks, market microstructure, and financial institutions that can ensure the smooth functioning of foreign exchange markets.

Multilateral institutions can play a role in ushering in this new multipolar world by providing technical assistance and promoting policy-learning forums that enhance understanding of the process of transition to a multipolar world economic order. Efforts to raise awareness and equip policy makers in developing countries with the necessary policy tools and financial capacity would help the policy makers to better position their countries in response to expected future challenges and risks, while capitalizing on their countries' strengths and opportunities. Aid and technical assistance from international financial institutions to LDCs also have the potential to cushion the economic shocks and lessen volatility in the LDCs' economies as they seek to adapt to the global forces involved in this transition.

Furthermore, cross-border investment could also benefit from a multilateral framework similar to the World Trade Organization. Meanwhile, the IMF is well positioned to take the lead in guiding reforms in the international monetary system, including providing support for the design of coordination mechanisms for a multicurrency regime that would limit currency volatility and, hence, help LDCs mitigate external exchange rate risks.

Major transitions such as the one currently underway in the global economy always present challenges, because they involve large uncertainties and necessitate complex policy responses. The transition at hand is not just a matter of leaving behind old economic paradigms. Rather, it is about establishing the appropriate mindset and the proper policy and institutional responses—in developing countries, developed countries, and multilateral institutions—to facilitate the transition to, among other matters, better development outcomes. Developing countries have made considerable progress in integrating themselves into, and expanding their profile within, the traditional channels and institutions of international trade and finance. But much work remains to ensure that developing economies adapt to the transition now under way in the global economy in a manner that allows them to share the burden of system maintenance commensurate with their increased stakes in an open international system. It is also critical that major developed economies simultaneously craft policies that are mindful of the growing interdependency associated with the increasing presence of developing economies on the global stage and leverage such interdependency to derive closer international cooperation and prosperity worldwide.







# Changing Growth Poles and Financial Positions

THE GLOBAL ECONOMY OF 2025 IS likely to look significantly different from that of 2011. Today's emerging economies will, in real terms, account for 45 percent of global output, compared with about 37 percent in 2011 and 30 percent in 2004. These countries will account for about as great a volume of international trade and investment flows as the developed world, and the drivers of global growth will be not only developed giants, but also major developing countries such as China and India, which are likely to experience rapid growth between 2011 and 2025. Emerging economies also will hold a greater proportion of global wealth, as measured by net international investment positions (IIPs).

Shifts in global economic power are not new. Throughout the trajectory of economic history, each phase of global growth has been driven by a small set of countries. From the start of China's Tang dynasty to the Ming dynasty (600–1600), China was a dominant force in the global economy, accounting for a quarter of its output and as much as a third of its growth. The Renaissance saw the beginning of the rise of economies in Western Europe—beginning with Italy, Portugal, and Spain and then, with the advent of the Industrial Revolution, Belgium, France, and Great Britain—accompanied by a transformation of incomes, production, and trade. In the decades following World War II, the mutually reinforcing engines of American innovation and strong consumer demand propelled the United States to the position of the world's foremost economic power, with Germany, Japan, and the former Soviet Union also playing leading roles.

As the world exits the 2008–09 financial crisis, the global economy appears poised to transition to a new set of growth poles—defined in

this book as an economy that significantly drives global growth—with some hitherto “emerging” economies prominent among them. Although growth in the advanced economies remains sluggish—a phenomenon that has been described as a “new normal” (El-Erian 2009)—developing economies have recovered from the crisis and are exhibiting robust growth. Global growth in the first quarter of the 21st century thus is likely to be driven by the sustained rise of China, India, and other emerging economic powerhouses. This chapter explores the economic and financial implications of this shift in greater detail. The main messages of chapter 1 are as follows:

- *Under the most likely baseline global economic scenario presented here, emerging economies will become increasingly important engines of global growth between 2011 and 2025. The combined real output of six major emerging economies—Brazil, the Russian Federation, India, Indonesia, China, and the Republic of Korea (the BRIICKs)—will match that of the euro area by 2025. Growth in emerging markets will, in this scenario, average 4.7 percent over 2011–25, compared with the developed world's growth of 2.3 percent, and will be accompanied by a significant realignment of consumption, investment, and trade shares. The shares of global trade flows accounted for by emerging and advanced economies will converge rapidly, with each group accounting for roughly half of all global trade by 2025, contrary to the current situation in which the advanced economies represent the majority of both exports and imports. In some major*

emerging economies, these structural changes are already under way.

- *The changing landscape of growth drivers in the world economy points toward a distribution of economic size and growth that is more diffuse: a multipolar world.* In the 2004–08 period, the United States, the euro area, and China served as the world’s main growth poles. By 2025, emerging economies, including Brazil, India, Indonesia, and Korea—along with advanced economies such as Japan and the United Kingdom—are likely to join these three poles in accounting for much of the world’s growth activity. But to sustain their growth momentum and serve as true growth poles, emerging economies will need to undertake structural changes that will generate self-sustaining, internally driven growth through a combination of sustained productivity advances and robust domestic demand. This undertaking calls for saving rates consistent with investment opportunities, capital that is efficiently allocated and utilized, and the ability not only to adopt new technologies but also to drive innovation.
- *The potential emerging economy growth poles are far from a monolithic group, with their rapid rise to power characterized by the diversity of their development pathways.* East Asian growth poles, such as China and Korea, historically have been heavily reliant on exports to drive growth, whereas in Latin American growth poles, such as Brazil and Mexico, domestic consumption has been more important. With the emergence of a substantial middle class in developing countries and demographic transitions underway in several major East Asian economies, stronger consumption trends are likely to prevail, which in turn can serve as a source of sustained global growth. Strong investment trends also have the potential to drive global growth going forward, and to increase productivity in emerging economies. In many large emerging economies, the structural changes that will drive changes in their consumption and investment trends are already under

way. Just as important, variations in aggregate demand brought about by changes in the configuration of the world’s growth poles may have significant impacts on the prospects of least developed countries (LDCs), which are often reliant on external demand for their growth.

- *As a group, potential emerging economy growth poles are having an ever-greater impact on global investment, trade flows, and external imbalances.* There have already been tangible shifts in global trade and investment patterns, most notably in the greater volume of South-South flows. Yet the unfolding dynamics of global imbalances will depend as much on the policies adopted by governments as they do on private trade and capital flows responding to such policies. Efforts to promote financial market development, for example, can help reduce oversaving behavior and facilitate adjustment in countries running very large current account surpluses; similarly, enhancing the business environment for exporting can help deficit countries rein in their current accounts.

## Growth Poles and the Global Macroeconomy in the Postcrisis Era

### The emergence of new poles

In the years leading up to the global financial crisis of 2008–09, many developing economies were beginning to display their economic vitality and dynamism. Emerging developing-world powerhouses such as Brazil, Russia, India, and China—the so-called BRIC economies (O’Neill 2001)—began to challenge the economic power of the G-7, accounting for an ever-increasing share of global trade, finance, and labor flows.

The financial crisis has accelerated this trend. With postcrisis economic performance in developing countries undeniably stronger than in developed countries (developing economies as a whole grew by 1.5 percent in 2009, compared to a decline of 3.4 percent in developed countries) and near-term growth forecasts suggesting that

developing and emerging economies will continue to expand considerably faster than their high-income counterparts, the global growth poles are beginning to expand beyond developed economies.

China and India are likely to be the main flag bearers among emerging market growth poles in the years ahead. This is especially so for China, which overtook Japan as the world's second-largest economy in 2010 and Germany as the world's largest exporter in 2009. In the medium term, the proportion of global economic growth represented by other emerging countries such as Brazil, Indonesia, Korea, and Russia likely will increase dramatically. Together with China and India, these countries—epitomized by the BRIC economies but not limited to them—will increasingly become the world's major consumers, investors, and exporters, affecting both the developed world and the LDCs with which they interact.

### **From poles to the periphery: Channels by which poles drive global growth**

Although widely used in the policy community, the term “growth pole” remains somewhat ambiguously defined (box 1.1). This book conceives of a growth pole as an economy whose growth spills over to—and thus helps drive—the growth process in other economies. To that end, this book applies a quantitatively based definition that depends on the contribution of the economy to global growth, adjusted by the strength of linkages from domestic to global growth.<sup>1</sup> In this fashion, a growth pole not only is a hive of economic activity, but also is able to stimulate economic activity in the countries with which it has strong links.

Because the focus of this chapter is on the transmission of real economic growth (and associated implications of this growth for economic policy), the definition of a growth pole employed here departs from definitions of polarity and distribution of power that are more commonly found in fields of study such as political science and international relations (Felsenthal and Machover 1998; Mansfield 1993).<sup>2</sup> The distribution of economic influence, nonetheless, has

practical implications for issues of international policy coordination, policy choices, and international monetary relations, all of which are addressed in chapter 3.

A number of economic transmission channels are supported by both theory and empirical evidence. Since technological progress is a key driver of sustainable, long-run growth (Romer 1990; Solow 1956), channels of technological diffusion are central to growth spillovers. These channels include flows of knowledge through trade, finance, and migration, as well as more direct transfers of technology embedded in physical capital and technological knowledge embodied in human capital (figure 1.1). For example, foreign direct investment (FDI) from the United States to China may lead to indirect technology transfer via the building of U.S.-designed manufacturing plants and equipment, although a more direct transfer of know-how may occur in the use of capital-intensive technology; through training of operational line workers, back-office staff, and management; and through learning by local suppliers.

In addition to technological diffusion, growth spillovers can be promoted through the transfer of institutional advances that shape incentives to develop or adopt new technologies, or through the release of constraints that prohibit the adoption of technologies (Acemoglu, Johnson, and Robinson 2005; Rodrik, Subramanian, and Trebbi 2004). Although such transfer of institutional practices is undoubtedly important, the transfer tends to come about slowly and often is difficult to measure accurately.

To some extent, the transfer of institutional practices can be captured indirectly in data on a potential growth pole's growth rate and economic size. It is plausible that when reform of economic institutions promotes growth, people in other countries take notice and demand similar reforms of their governments. Moreover, the larger the economy in which the reforms and growth take place, and the more rapid the growth, the more conscious people in other countries likely will be of these events, assuming all else is held constant. Trade, capital flows (particularly FDI), and international migration also may facilitate some transfer of institutional advances, reinforcing the more

### BOX 1.1 What is a growth pole? Defining poles in theory and practice

In this book, a growth pole is defined as an economy whose domestic growth helps drive the growth process in other economies. This definition is motivated in part by a desire to focus on the importance of economic dynamism and progress—the “growth” part of the expression—while capturing the important role of spillover externalities, knowledge transfer, and gains from exchange (the “pole” part of the term). However, given the lack of consensus on the definition of a “growth pole,” it is useful to examine alternative conceptualizations of the term.

The term “growth pole” was first introduced in the context of economic growth by François Perroux in 1949. Initially, the expression was used in reference to agglomerations of firms or industries in which growth is concentrated and that had linkages to each other and to peripheral firms. Since then, the term has been applied to an increasingly varied set of related concepts, with “growth pole” quickly taking on a spatial or geographic dimension. These concepts differ mainly in terms of the space in which poles are identified. In discussions of regional development policy, for example, cities where economic growth is concentrated came to be known as growth poles, with the aspects of vertical linkages and external economies of scale remaining central to the concept. In fact, the study of tensions between forces supporting greater agglomeration versus specialization spawned the field of economic geography (Fujita, Krugman, and Venables 1999; World Bank 2009b).

The idea of growth polarity then became extended to the global scale, while simultaneously becoming somewhat enmeshed with the concept of polarity—sites of concentration of geopolitical power and influence—being developed in the international relations literature. This connection is due in part to the intuitive idea that geopolitical influence stems ultimately from

economic size; still, to clearly define a “growth pole,” the concept must be unlinked from that of geopolitical influence per se. The concept of *global growth poles* also differs somewhat from the idea of growth poles conceptualized in regional, national, or geographic space, to the extent that the nature of international economic linkages differs from linkages within national or regional economies, and not merely in terms of scale.

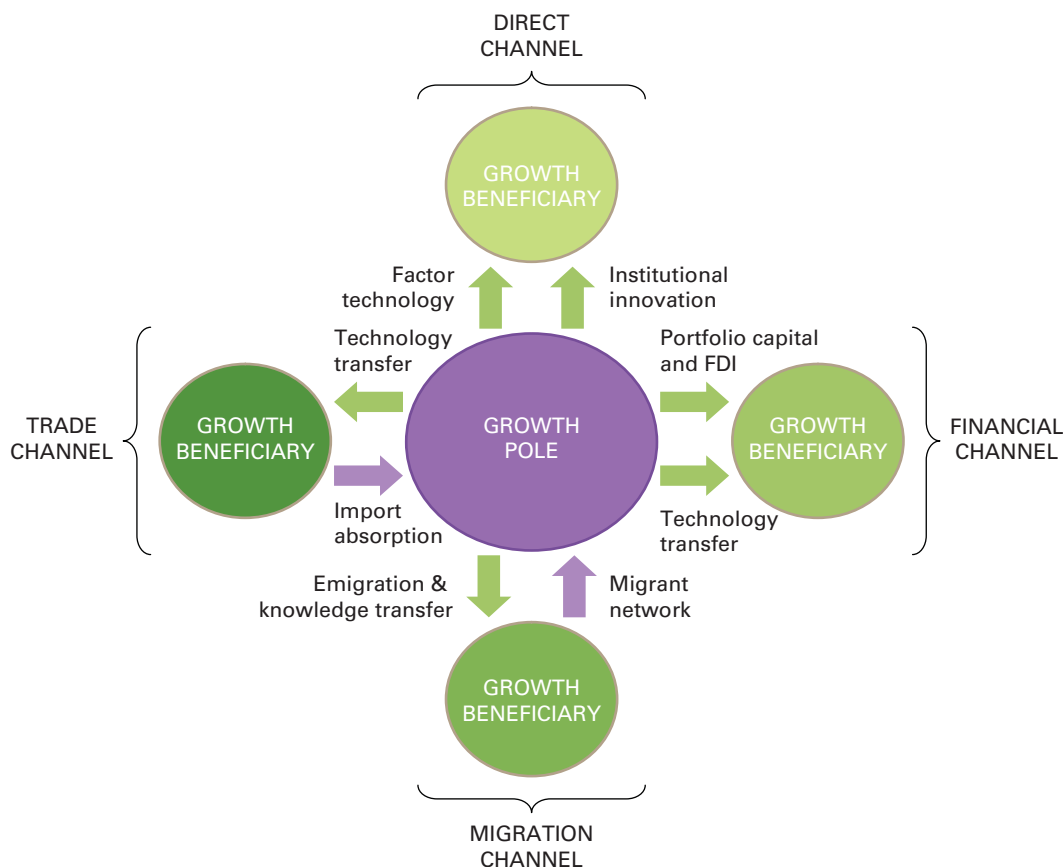
Even when a global scale is specified, the expression “growth pole” is not always used consistently. Some generalizations, however, can be made as to the term’s qualitative meaning. In this book, a global growth pole is broadly defined as an economy in which global growth is significantly concentrated and that drives growth in other economies sufficiently to have an impact on the growth of the world economy as a whole. Thus, a quantitatively based definition of a global growth pole depends on the growth rate of the economy relative to the growth rate of the world economy, and on the strength of linkages between domestic and global growth (see annex 1.1).

In establishing this definition for identifying global growth poles, countries are the natural units to consider, mainly due to aggregation of relevant data at the country level. However, in some special cases in which a group of countries is highly integrated—as is the case for an economic and monetary union, for example—it is probably justifiable to consider the entire group as a potential pole. If this approach is taken, clearly defined criteria are required to group countries consistently. This book aggregates the economies of the euro area, the two CFA franc zones (independently), the Eastern Caribbean dollar zone, and the South African Multilateral Monetary Area as single economic units. In addition, China and its special administrative regions of Hong Kong and Macao are classified as a single economic unit.

traditional knowledge and technological transfer roles of these channels.

Trade is a major channel by which growth is propagated from growth poles to periphery economies. The more commercial exchange domestic firms have with foreign firms, the more industrial and technological knowledge the domestic firms

acquire; hence, the evolution of technological progress and comparative advantage are interlinked and jointly determined (Grossman and Helpman 1991a). Trade in intermediate goods may function as a channel of technology diffusion and spillover in a second, weaker way: intermediate goods embody technologies, so importation

**FIGURE 1.1** Channels of growth spillovers from a growth pole

Source: World Bank staff calculations.

Note: Arrows point to direction of flow, whereby growth from a pole can influence growth elsewhere, while annotations indicate the specific growth stimuli transferred to the beneficiary of the pole.

of intermediate goods can reduce costs of product development and production of new products (Eaton and Kortum 2002; Grossman and Helpman 1991b; Rivera-Batiz and Romer 1991).

The broad implication that trade is an important channel of technology diffusion is supported by a small body of empirical research. For example, in East Asian economies, firm openness is associated with subsequent advantages in firm-level productivity (Hallward-Driemeier, Iarossi, and Sokoloff 2002). Although empirical support is greater for importation than for exportation as a significant channel of technology diffusion to the country in question, a growth pole nevertheless may drive growth in a periphery economy simply by absorbing its exports and driving expansion of exporting industries. Exportation

also is associated with intraindustry reallocation of production from low-productivity firms to high-productivity firms and, in some industries, with market size effects stemming from increasing returns to scale (Krugman 1979; Melitz 2003). Thus, it is possible that growth is driven by bidirectional trade—that is, by importing from a growth pole and by exporting to a pole.

Capital flows, particularly FDI, have the potential to be an important channel of technological diffusion. FDI flows from multinational parent companies to subsidiaries (or greenfield investments) have the potential to directly transfer technological knowledge, or at least result in indirect knowledge transfers from subsidiaries to other firms in the host country through labor turnover or technology embedded in intermediate

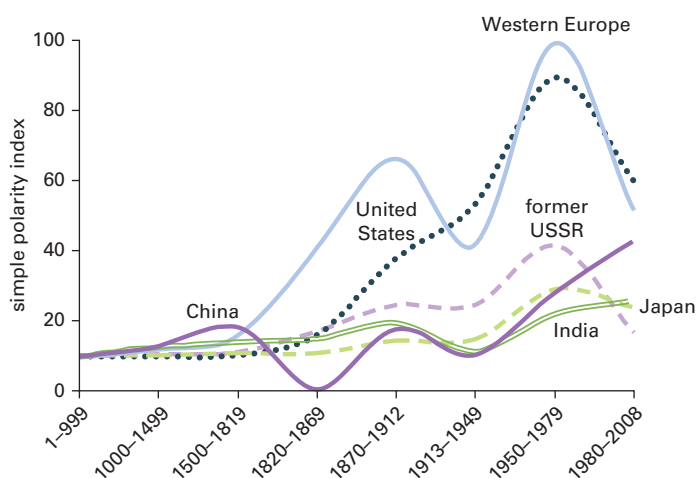
goods and services (Du, Harrison, and Jefferson 2011; Ethier 1986; Fosfuri, Motta, and Rønde 2001; Markusen 2004; Rodríguez-Clare 1996). FDI also may promote growth through channels other than technology diffusion, such as reallocation of production to the most productive sectors within an economy or to the most productive firms within sectors. More broadly, financial openness can promote growth, especially when such liberalization is combined with complementary institutional reform, which spurs domestic financial market development and fosters growth (Beck and Levine 2005; Quinn and Toyoda 2008). Thus, capital flows, indeed, can be another important channel through which growth poles drive global growth.

The empirical evidence that FDI is an important channel of technological diffusion is somewhat mixed. Large intraindustry spillovers are found primarily in case studies of high-technology FDI projects, as in the case of microchip-maker Intel in Costa Rica (Larraín, López-Calva, and Rodríguez-Clare 2001) and other technology sectors (Keller and Yeaple 2009). Firm-level studies using broader industry samples typically find evidence of only small intraindustry spillovers

(Griffith, Redding, and Simpson 2004; Haskel, Pereira, and Slaughter 2007). In some cases, there is also evidence of vertical spillovers. In Lithuania, for example, technological spillovers from FDI occur through backward linkages from partly foreign-owned firms to their domestic suppliers, but not from fully foreign-owned firms (Javorcik 2004).

Given that technological knowledge is difficult or impossible to codify fully, meaning that some technological knowledge is transferred only from person to person, the mobility of labor also plays a role in promoting knowledge spillovers. Empirical evidence supports the hypothesis that both migration and short-term business travel facilitate diffusion of tacit technological knowledge. International labor mobility promotes not only knowledge flows to the firms that hire immigrants, but also knowledge spillovers to other firms in the economy (Hovhannisyan and Keller 2010; Kim, Lee, and Marschke 2009; Oettl and Agrawal 2008). The stock of migrants may induce network effects from increased trade and knowledge transfer (Kerr 2008; Kerr and Lincoln 2010; Rauch 2001) and serve as a source of growth for the recipient nation, as migrants tend to be self-selected as industrious and seeking opportunity (McCraw 2010). Historically, emigration has been associated with the onset of modern economic growth in Europe—a phenomenon sometimes termed the “mobility transition” (Hatton 2010).

**FIGURE 1.2** Historical evolution of simple growth polarity, selected economies, 1–2008



Source: World Bank staff calculations, from Maddison 2003.

Note: The simple polarity index was calculated from size-weighted (compound) GDP growth rates measured in 1990 international Geary-Khamis dollars normalized to the maximum and minimum of the full 1–2008 period.

## Evolving growth poles in the global economy

Over the course of two millennia, large swings in global growth leadership have occurred. Until the first half of the second millennium, China and India were the world’s predominant growth poles.<sup>3</sup> Starting in the 1500s, Western Europe began its unrelenting rise, accounting for a rising share of total global output (Maddison 2007) and playing a growing role in shaping global growth dynamics. This is evident from examining these countries’ *simple polarity index*, which measures a country’s contribution to global growth (figure 1.2).<sup>4</sup>

Although Western Europe retained its position as the predominant growth pole through much of the first half of the 20th century—in large part



due to robust growth in France and Germany—countries such as Japan, the United States, and the former Soviet Union also became growth poles during that time. Also evident in figure 1.2 is the general upward trend in the simple growth polarity index, a reflection of the long-run acceleration in global growth that began in the mid-millennium and persisted until the 1970s.

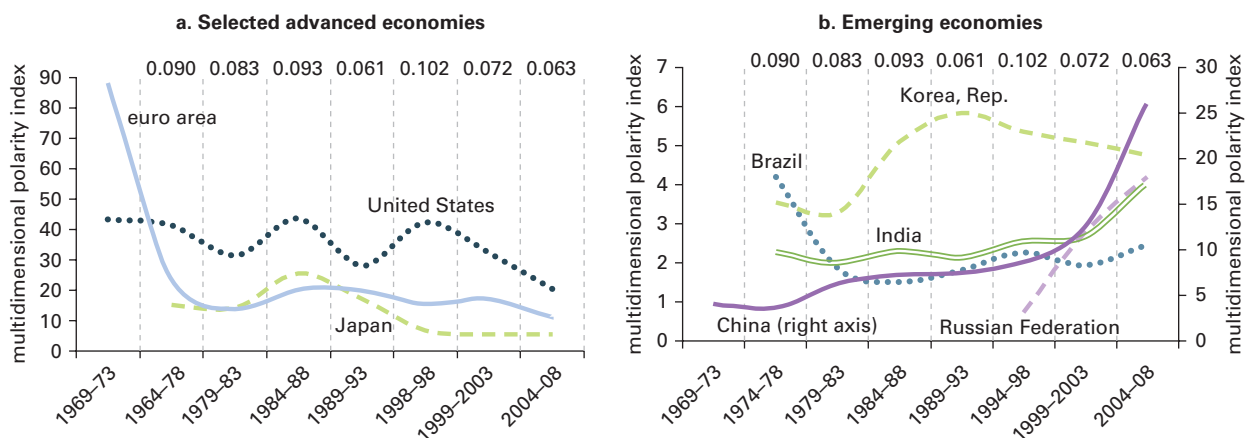
Though the large industrial economies of today were undeniably the drivers of global growth during the 20th century, this trend appears to be changing. Using a measure of polarity that captures growth spillovers via trade, finance, and technology channels—defined as a country's *multidimensional polarity index*—the downward trend in the indexes of large advanced economies is evident (figure 1.3, panel a). Japan's multidimensional polarity index fell sharply after the bursting of its asset bubble in the early 1990s and never again approached its previous level. In a similar fashion, the polarity indexes of the United States and the euro area moderated during the late 1990s and 2000s.

In contrast, the multidimensional polarity indexes of key emerging countries appear to be

synchronously rising (figure 1.3, panel b). With the exception of China, however, these polarity indexes are still one to two orders of magnitude smaller than those of advanced countries. Nevertheless, China's polarity exceeded, in absolute terms, that of the euro area and the United States in the 2004–08 period, and the combined value of the real multidimensional polarity indexes for the five highest-ranked emerging countries (China, Korea, Russia, India, and Singapore) was about the same as that of the five highest-ranked advanced economies (table 1.1, column 1).

What is most striking about potential growth poles among the emerging economies is the distinction of China: the only emerging economy that undeniably can be classified as a current growth pole. This is the case regardless of whether growth is measured according to alternative metrics; China, for instance, has a slightly lower relative polarity if one corrects for changes to a country's real exchange rate over time (table 1.1, column 2),<sup>5</sup> but has much greater relative polarity when growth is adjusted to capture actual purchasing power (table 1.1, column 3).

**FIGURE 1.3 Modern evolution of multidimensional growth polarity, selected advanced and emerging economies, 1969–2008**



Sources: World Bank staff calculations, from IE Singapore, IMF Direction of Trade Statistics (DOT), IMF International Financial Statistics (IFS), World Bank World Development Indicators (WDI), and WIPO Patentscope databases.

Note: The multidimensional polarity index was generated from the first principal component of trade, finance, and technology-weighted growth shares, measured in constant U.S. dollars. The numbers correspond to concentration indexes for the top 15 countries, computed from the multidimensional polarity measure for each corresponding five-year period (the first period was omitted because of insufficient observations).

**TABLE 1.1** Multidimensional polarity index, top 15 economies, 2004–08 average

| Economy            | Real index | Economy            | HBS index | Economy            | PPP index |
|--------------------|------------|--------------------|-----------|--------------------|-----------|
| China              | 26.20      | Euro area          | 47.34     | China              | 63.70     |
| United States      | 20.33      | China              | 41.54     | United States      | 51.26     |
| Euro area          | 10.86      | United States      | 30.51     | Euro area          | 40.15     |
| Japan              | 5.59       | Russian Federation | 25.60     | Japan              | 28.15     |
| United Kingdom     | 5.51       | Canada             | 22.61     | Russian Federation | 26.02     |
| Korea, Rep.        | 5.41       | United Kingdom     | 22.49     | Korea, Rep.        | 24.57     |
| Russian Federation | 4.79       | Korea, Rep.        | 20.49     | United Kingdom     | 24.01     |
| India              | 4.62       | Australia          | 20.26     | India              | 23.38     |
| Singapore          | 4.30       | Brazil             | 19.48     | Singapore          | 22.95     |
| Canada             | 4.08       | Norway             | 19.25     | Canada             | 22.92     |
| Australia          | 3.27       | Saudi Arabia       | 19.18     | Saudi Arabia       | 21.33     |
| Malaysia           | 3.12       | Turkey             | 19.17     | Turkey             | 21.33     |
| Turkey             | 3.07       | India              | 19.14     | Mexico             | 21.27     |
| Mexico             | 2.94       | Singapore          | 19.11     | Malaysia           | 21.19     |
| Saudi Arabia       | 2.94       | Poland             | 18.76     | Australia          | 21.14     |

Sources: World Bank staff calculations based on data from IE Singapore, IMF DOT, IMF IFS, World Bank WDI, and WIPO Patentscope databases.  
 Note: HBS = Harrod-Balassa-Samuelson; PPP = purchasing power parity. The shaded region indicates potential, as opposed to current, poles, with the cutoff determined by the first significant break on the index (from below). The multidimensional index was generated from the first principal component of trade-, finance-, and technology-weighted growth shares, normalized to the maximum and minimum of the 1969–2008 period. Real, HBS, and PPP-adjusted indexes indicate growth rates calculated from, respectively, GDP data in real 2000 U.S. dollars, nominal local currency converted to U.S. dollars at current exchange rates and deflated by U.S. prices, and 2005 international PPP-adjusted dollars.

China's tremendous growth spillover effects also have been documented by studies employing other approaches (Arora and Vamvakidis 2010a).

Other emerging economies that are potential growth poles include India and Russia—two of the BRIC economies—along with several other fast-growing emerging markets, such as Korea, Malaysia, Singapore, and Turkey, some of which are included in the group of Next-11 emerging countries (O'Neill et al. 2005). Although identification of these countries as potential poles is not surprising given their economic size, it is notable that several large developing economies do not feature as potential poles in the 2004–08 period—Indonesia, for example—and that countries such as Poland and Russia enter several notches higher than their economic sizes alone would suggest. Furthermore, Latin American economies—such as Brazil and Mexico—tend to appear in lower positions than would be expected by their economic size, as their patterns of international engagement means that

the spillover effects from their growth are limited. Finally, some regional economic heavyweights, such as the Arab Republic of Egypt and South Africa, do not appear in table 1.1, because they are relatively small economies at the global level, and their growth spillovers tend to be contained within their respective regions. This does not, however, rule out the possibility that such economies may serve as *regional* growth poles (box 1.2).

Also evident is the highly uneven distribution of growth polarity when measured at the global level—the top three countries (China, the euro area, and the United States) account for almost 80 percent of total global polarity, as measured by the real index for 2004–08. This metric has an interesting parallel in economic geography, where a small fraction of physical space often accounts for a disproportionately large share of economic activity. And like regional growth poles, growth polarity here appears to follow a power law relationship (a relationship that has been termed Zipf's law).

## BOX 1.2 Growth poles at the regional level

The definition of growth pole used in this book focuses on the spillover effects that an economy's growth induces on the global level. One implication of such a definition is that smaller or less globally integrated economies that may well be significant drivers at a regional level—but exert a relatively marginal impact at the global level—will not generally be identified as growth poles. While this exclusion is entirely appropriate for examining the phenomenon of global multipolarity, it is nevertheless interesting to explore growth polarity within geographical regions, especially since regional poles can have a strong influence on the economic prospects of LDCs.

Table B.1.2.1 summarizes these regional indexes. As might be expected, economies that drive growth at the global level tend to appear as growth poles for their regions as well. However, since the relative importance of an economy in driving regional growth may differ from its global impact, the relative positions of economies—as measured by regional growth polarity—may not correspond to their global ones. For example, Brazil appears to be more important in Latin America than Mexico, even though Mexico places higher globally, as reported in table 1.1.

The most notable aspect of the information presented in the table below is that economies that are otherwise “crowded out” in terms of their role as *global*

growth poles can nevertheless play an important role at the *regional* level in driving growth. South Africa, for example, is far and away the most important regional growth pole in the Sub-Saharan Africa region, a finding that has been echoed in the literature (Arora and Vamvakidis 2010b). Indeed, for the 2004–08 period, South Africa's simple polarity index is one-and-a-half times more than that of the next-largest regional growth pole in Sub-Saharan Africa, Nigeria. Another factor that is important when taking into account regional considerations is how regional economic blocs may, if sufficiently integrated, serve as growth poles in their own right. While this topic is not explored in detail in this book, it is entirely conceivable that an integrated economic grouping, such as the Gulf Cooperation Council, may be a regional (or even global) growth pole.

These findings underscore the importance of understanding the distinction between a global growth pole and a regional one. Since the channels of growth spillovers may differ from one region to another, and from a regional to a global level, economies that are important at one level may be less so at another. Also important is that these differences suggest that spillovers in growth are complex and dynamic, and hence any given “ranking” of growth poles, including the ones reported here, should be treated as suggestive in the context that they are defined.

**TABLE B1.2.1 Regional simple polarity index, top three countries, 2004–08 average**

| Country                                | Simple index | Country                             | Simple index | Country                                | Simple index |
|--|--------------|-------------------------------------|--------------|--|--------------|
| <b>Sub-Saharan Africa</b>              |              | <b>East Asia and Pacific</b>        |              | <b>Eastern Europe and Central Asia</b> |              |
| South Africa                           | 63.90        | China                               | 98.87        | Russian Federation                     | 69.44        |
| Nigeria                                | 41.42        | Korea, Rep.                         | 12.68        | Turkey                                 | 64.18        |
| Angola                                 | 27.57        | Indonesia                           | 5.70         | Czech Republic                         | 48.95        |
| <b>Latin America and the Caribbean</b> |              | <b>Middle East and North Africa</b> |              | <b>South Asia</b>                      |              |
| Brazil                                 | 45.60        | Saudi Arabia                        | 28.26        | India                                  | 100.00       |
| Argentina                              | 33.84        | Iran                                | 26.12        | Bangladesh                             | 10.96        |
| Mexico                                 | 24.42        | Egypt, Arab Rep.                    | 25.71        | Pakistan                               | 8.52         |

Source: World Bank staff calculations based on data from World Bank WDI database.

Note: The regional multidimensional index was generated from the size-weighted growth rate calculated from GDP data in real 2000 U.S. dollars, by region, normalized to the maximum and minimum of the 1969–2008 period. To minimize distortion of the index, the normalization for ECA excludes Russian data for 1994–96. The values reported for South Asia should be interpreted with caution, since data limitations mean that the indexes are calculated only for four economies. Indexes are not comparable across regions.

### BOX 1.3 Proximate and fundamental factors related to multidimensional growth polarity

The most natural candidates for explanatory variables to include in any regression of growth polarity are those that have been identified in the cross-country growth literature. However, there are dozens of such potential regressors, with little consensus on which variables are the most important. Such factors can be classified into two broad categories: proximate and fundamental.

As many as a quarter of all proximate factors examined in the literature have been identified as significantly and robustly related to growth, *per se*. The strongest evidence, as suggested by an augmented Solow growth model, comes from population growth, physical capital investment, and level of schooling (Mankiw, Romer, and Weil 1992). Other proximate factors that have been found to be relatively more important include the quality of a country's infrastructure, the health of its population, the dependency ratio, and the size of its government (Sala-i-Martin, Doppelhofer, and Miller 2004).

The set of fundamental factors, while smaller and possibly more eclectic, often are regarded as more central to explaining long-run income patterns. The case has variously (and convincingly) been made that factors such as institutional quality, economic integration, geography, ethnolinguistic fractionalization, human capital, and social capital matter (Acemoglu, Johnson, and Robinson 2005; Alesina et al. 2003; Frankel and Romer 1999; Gallup, Sachs, and Mellinger 1999; Glaeser et al. 2004; Knack and Keefer 1997; Rodrik, Subramanian, and Trebbi 2004).

By and large, econometric analysis (described in detail in annex 1.3) finds that the most reliable correlate of multidimensional growth polarity at the proximate level is educational attainment. This result is consistent with the theoretical literature that stresses the centrality of human capital for the growth process (Bils and Klenow 2000; Mankiw, Romer, and Weil 1992). Physical capital investment also appears to contribute positively to a country being a growth pole,

Like economic growth itself, growth polarity is influenced by both proximate and fundamental factors. In determining what factors are supportive of growth polarity, therefore, it is useful to disentangle these distinct classes of influences. Proximate factors include the standard ingredients that one might expect to be associated with strong economic growth, such as increased capital accumulation and population growth. Underlying these factors are "deeper" structural factors, such as the strength of the country's institutions and the extent to which a country's geography favors growth. Formal econometric analysis (reported in box 1.3) suggests that the proximate factors of importance include physical capital, education attainment, the dependency ratio, and the population's health, while institutional quality and economic integration are key fundamental factors.

### Changing multipolarity in the world economy

What do the changing polarities mean for the distribution of economic influence in the global economy as a whole? To the extent that growth polarity is an accurate measure of such influence, it is possible to compute a concentration index that summarizes the degree of multipolarity in the global economy.<sup>6</sup> Such a *multipolarity index*—calculated from shares of growth polarity and scaled between 0 (totally diffused growth polarity) and 1 (fully concentrated growth polarity)—suggests that multipolarity increased steadily through the end of the Cold War, fell during the final decade of the 20th century, before finally rising again in the first decade of the 21st century. Indeed, over the past decade, the world has attained some of the most diverse distributions since 1968 (figure 1.4).<sup>7,8</sup>

### BOX 1.3 (continued)

while population growth has little effect. Variables that appear to be negatively correlated with growth polarity are poor health outcomes—which can be seen as another aspect of human capital—and the burden of a nonproductive population (measured by the old-age dependency ratio).

Two fundamental determinants appear to be central in influencing multidimensional growth polarity. High-quality institutions appear to be significant, both statistically and economically. Again, this result is broadly consistent with the academic literature, which finds that institutions tend to trump other fundamental factors in determining levels and growth of per capita income (Decker and Lim 2008; Rodrik, Subramaniam, and Trebbi 2004). Interestingly, economic integration appears to exert a *negative* drag on growth polarity. This is likely for two reasons. First, the polarity measure is (by construction) a function of economic size. The

negative influence of integration simply may reflect the fact that small countries—which are much more likely to exhibit greater degrees of trade openness—are less likely to be growth poles. Second, a successful growth pole is likely to rely on internal, rather than external, demand as an engine of growth.

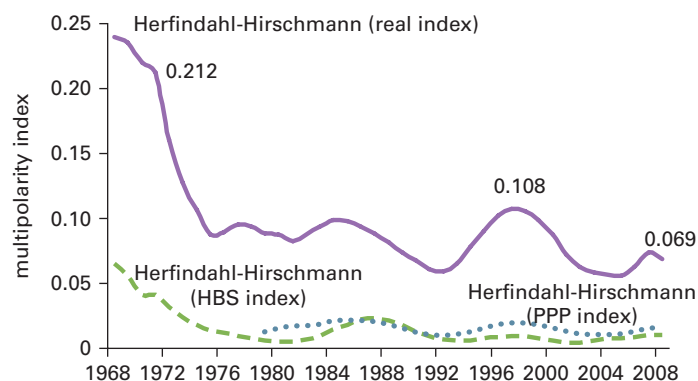
Overall, the analysis paints a picture in which a successful growth pole is a country that possesses a relatively young, educated population and that generates internally driven growth through investment in physical and human capital. Moreover, a successful growth pole also tends to have a strong institutional framework that is supportive of economic activity. Just as important, a growth pole can consolidate its position by ensuring that key elements of its institutional environment are strong: ensuring that there is adequate respect for the rule of law, that corruption is under control, and that the government fosters social and political stability.

Since the turn of the 21st century, the world has thus become increasingly multipolar. This rising multipolarity has occurred in concert with the expansion of globalization. History tells us that successive waves of economic globalization typically have wrought periods of greater economic multipolarity, along with concomitant frictions due to changes in the global configuration of geopolitical power (Findlay and O'Rourke 2007).

Concurrent with this rising multipolarity has been a shift away from the G-7 economies as global growth drivers, and toward the economies of the developing world (figure 1.5). This shift partly explains why the post-financial crisis global environment has been marked by a renewal in international economic tensions, with heightened protectionist sentiment and talk of trade collapse and currency wars.

Yet a deeper examination of the growth polarity indexes underlying figure 1.4 suggests that the dynamics of what is captured in the figure are due not so much to a decline of developed economies (although some absolute decline, especially in the early 1970s, indeed occurred), but rather to a

**FIGURE 1.4 Evolution of multipolarity, alternative indexes, 1968–2008**

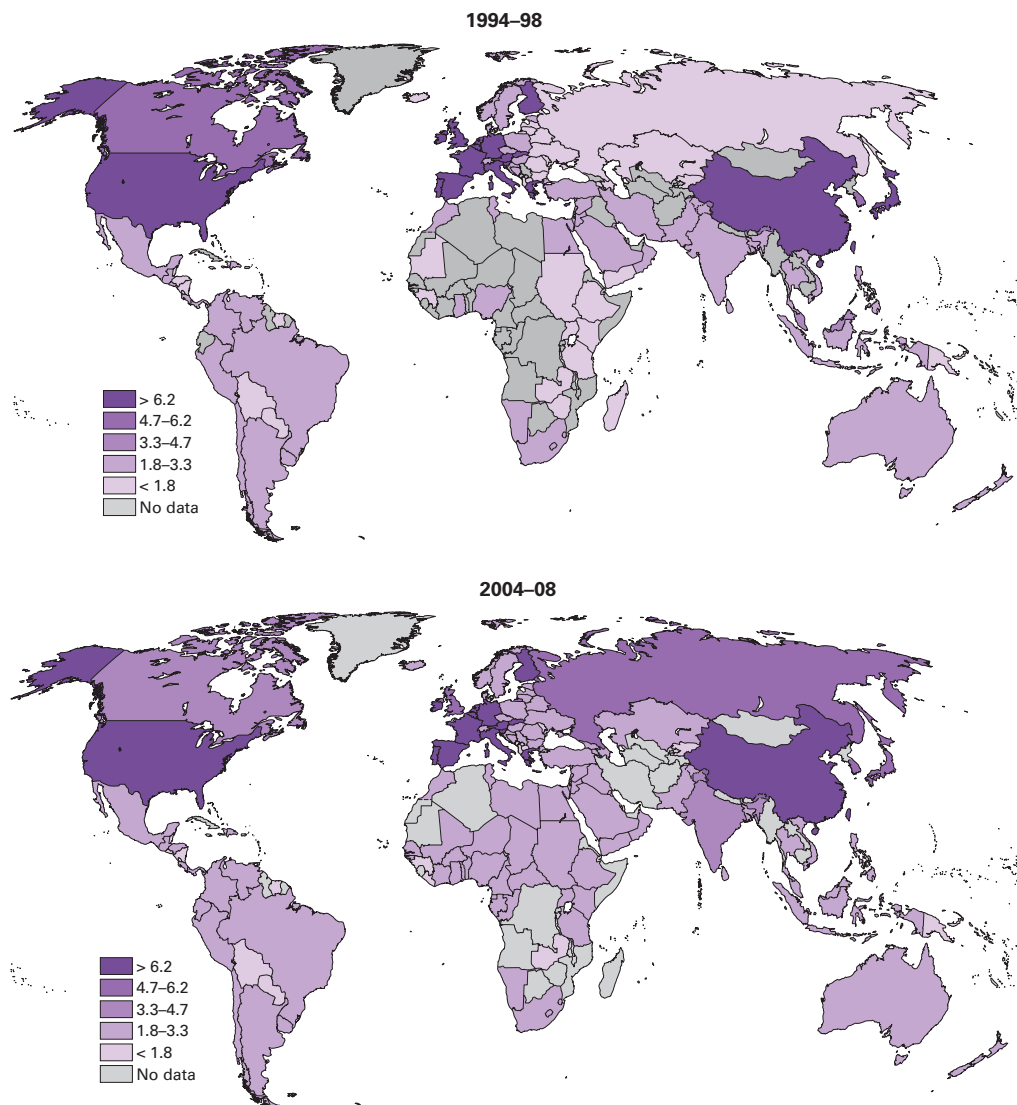


Source: World Bank staff calculations.

Note: Multipolarity index calculated as the normalized Herfindahl-Hirschman index of the respective multidimensional polarity index shares of the top 15 economies, computed over rolling 5-year averages.

rise in the growth polarities of developing economies. Moreover, while structural changes in both the advanced and emerging world may alter this dynamic, the overall trend toward a more multipolar global economic order seems unlikely to change.

**FIGURE 1.5** Global distribution of growth poles, 1994–98 and 2004–08



Source: World Bank staff calculations.

Note: Multipolarity index calculated as the normalized Herfindahl-Hirschman index of shares of the top 15 economies using the real multidimensional polarity index. The choice of brackets was arbitrary, but reflects the overall trend of increased distribution of growth polarity.

### The Character of Growth in the Potential Emerging Economy Poles

#### The granularity of growth in the potential emerging economy growth poles

How potential growth poles in the emerging world will generate self-sustaining, internally

driven growth is a matter of much concern. The East Asian economic “miracle” has been called a story of rapid factor accumulation premised on export-led growth strategies, with modest levels of total factor productivity (TFP) growth (Young 1995). Moreover, since the late 1990s, global growth has been heavily dependent on U.S. productivity advances and increasing consumer demand. Given the financial crisis and

subsequent recession in the United States, however, U.S. consumers are unlikely to sustain this pattern of strong demand in the foreseeable future.

In the long run, an economy will continue to be a growth pole only if it is able to nurture its innovative and productive capacity—which drives its growth process—while simultaneously developing its sources of internal demand, so that its growth will also support growth elsewhere. Consequently, sustainable growth in the potential emerging economy growth poles will require both that TFP make a significant contribution to growth and that domestic consumption or investment be maintained at strong but sustainable levels. Only when growth matures in this balanced fashion can growth poles be resilient to global shocks and continue to drive the global economy forward during turbulent times.

The task ahead of the potential emerging economy poles is formidable. Between 2005 and 2009, the TFP contribution to growth in many of the East Asian tiger economies has been modest at best (and negative in some cases). Demand in China, India, and Korea also appears to be more, rather than less, reliant on external sources over time; for example, the net export share of GDP in China averaged 7 percent between 2005 and 2009, compared with 2.4 percent between 2000 and 2004.

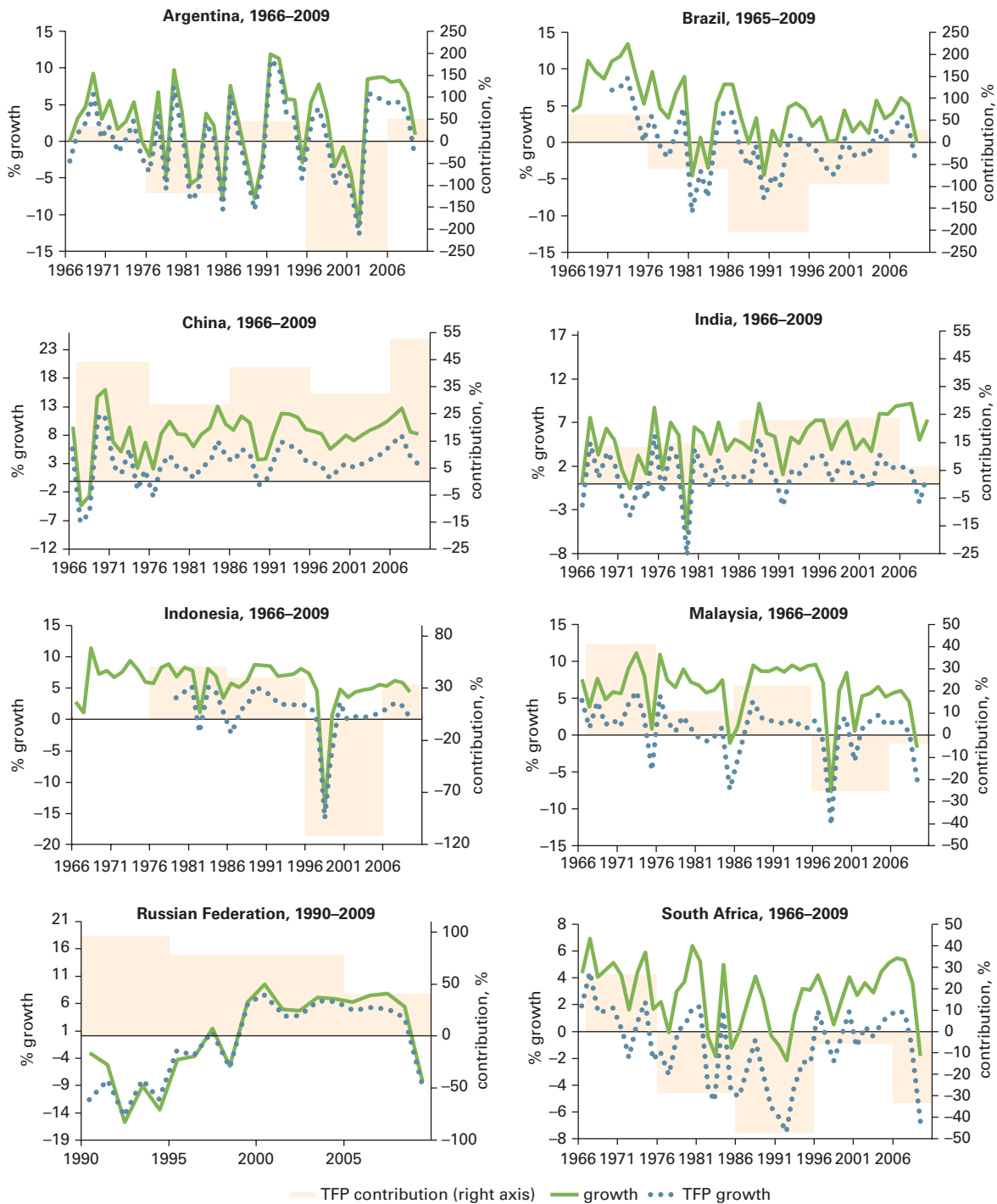
Yet the historical data suggest that shifting growth toward more domestically oriented sources is possible. In India, gross fixed capital formation was 24 percent of GDP in 1989; by 2009, that share had increased to 35 percent (moreover, the contribution of investment growth to GDP growth over 2000–09 was about one-half). In Brazil, the consumption contribution to output has been a robust 60 percent over the same period (remaining resilient through the crisis). Even in China, rapid growth did not preclude a substantial contribution of consumption to growth over certain periods: between 1990 and 1999, for example, consumption represented about 42 percent of growth, while exports represented about 46 percent.<sup>9</sup>

## The evolution of total factor productivity in the potential emerging economy poles

The distinct trends in technological and resource utilization, efficiency, and innovation among the potential emerging economy poles belie the broad advances that have been made in terms of growth by the group as a whole. China (and, to a lesser extent, India) has seen substantial contributions from TFP to its growth since the mid-1960s, and, during their recent histories, so have Poland and Russia. Similar contributions have not prevailed in Latin American economies, however, and also have been relatively modest in emerging economies such as Indonesia, Malaysia, and South Africa (figure 1.6). In Argentina and Brazil, contributions of TFP to growth have routinely tipped into negative territory (with contributions over the entire period averaging –8 percent and –37 percent, respectively). In Indonesia and Malaysia, the *growth rate* of TFP was relatively low over most of the period.<sup>10</sup> The laggard contribution of TFP in many of these fast-growing emerging markets has been repeatedly pointed out in the literature (Cole et al. 2005; Young 1995).<sup>11</sup>

To better understand the disparate TFP performance of emerging economies, it is useful to draw a distinction between technological innovation and technological adoption. In the context of growth, innovation is probably best understood as advances in science and technology that enhance productivity and growth by moving the production possibilities frontier outward. The sort of innovation typically produced by scientists and engineers often generates spillover effects to the larger economy and, as such, is well captured by measures of research activity. In contrast, adoption of innovations involves the use of existing technologies that induce improvements in technical efficiency. Adoption generally falls within the domain of entrepreneurs and businesses, and usually has aggregate growth benefits only when it is sufficiently widespread across the economy (when diffusion is high).<sup>12</sup> Technological adoption and diffusion are likely better measured by the distance between the economywide deployment of a given technology to the research frontier, whether

**FIGURE 1.6 Total factor productivity contribution to growth, selected potential poles**



Sources: World Bank staff calculations, from IMF IFS and World Bank WDI databases.

Note: The total factor productivity contribution is defined as the share of growth not attributable to either physical capital or human capital-adjusted labor inputs, assuming a Cobb-Douglas production function with constant returns, for 10-year periods. Depreciation, returns to education, and the income share of capital are assumed to be 0.06, 0.1, and 0.33, respectively, for all countries. Growth indicates growth rates calculated from GDP data measured in constant 2000 U.S. dollars. Because of data limitations, Indonesian TFP calculations begin only in the second period. The negative contributions for Argentina (1995–2004) and South Africa (1985–94) were –2,932 percent and –479 percent, respectively, but were not fully plotted because of the severe distortion to the presentation of the axes.



measured in terms of the time to uptake or the margin of adoption.

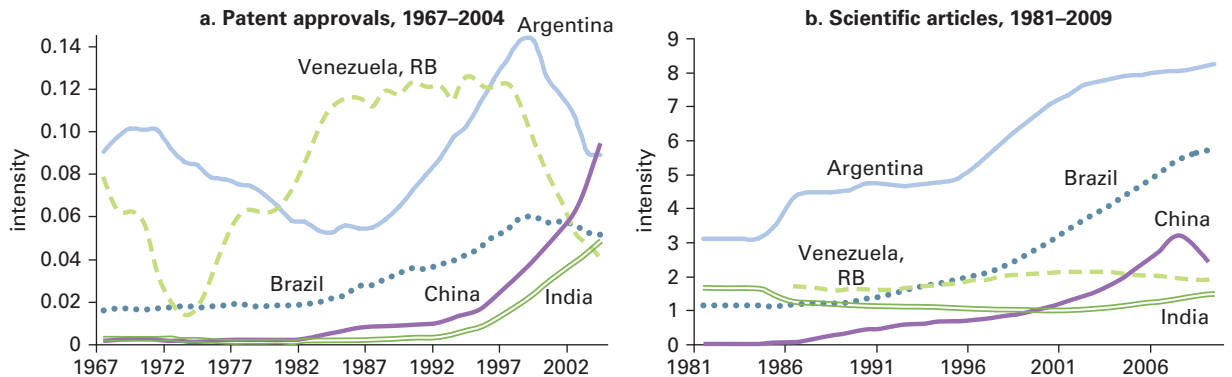
Taking into account this distinction suggests that China's and India's relatively strong TFP contributions<sup>13</sup> probably are due less to pure innovative capacity than to a combination of rapid adoption and diffusion of technologies from global technological leaders, along with the gains from factor reallocation within these economies. Historically, measures of technological innovation in those two potential poles have consistently lagged those of Latin American economies (measured in per capita terms),<sup>14</sup> although the measures have shown a noticeable uptick since the late 1990s (figure 1.7). This trend is further corroborated by evidence that innovative activity in China and India, to the extent that it occurs, tends to be incremental in nature (Puga and Treffer 2010). If the relatively superior TFP performances in China and India are to be explained, the explanation is unlikely to be found in technological innovation alone.

A much more likely reason for the relatively superior TFP performance in China and India is catch-up growth through technology adoption, especially when accompanied by the movement of resources from less productive to more productive sectors of the economy. For many technologies, the rate of technology adoption and diffusion

in China, India, and Russia appears to be more rapid than for equivalent Latin American economies (figure 1.8). The lag of technology adoption in India relative to the United States, for example, averaged 14.1 years between 1971 and 2001, compared to lags of 16.2 years for Brazil and 20.7 years for Argentina. The relative adoption intensity of technologies within these countries can be even greater. After 1981, for instance, China saw a sharp spike in the economic size-adjusted use of technologies relative to the countries at the leading edge of the technological frontier. More generally, lags in technology usage and rates of diffusion are likely to account for much of the observed differences in cross-country TFP and, hence, in growth performances (Comin and Hobijn 2010; Comin, Hobijn, and Rovito 2008; Eaton and Kortum 1999).

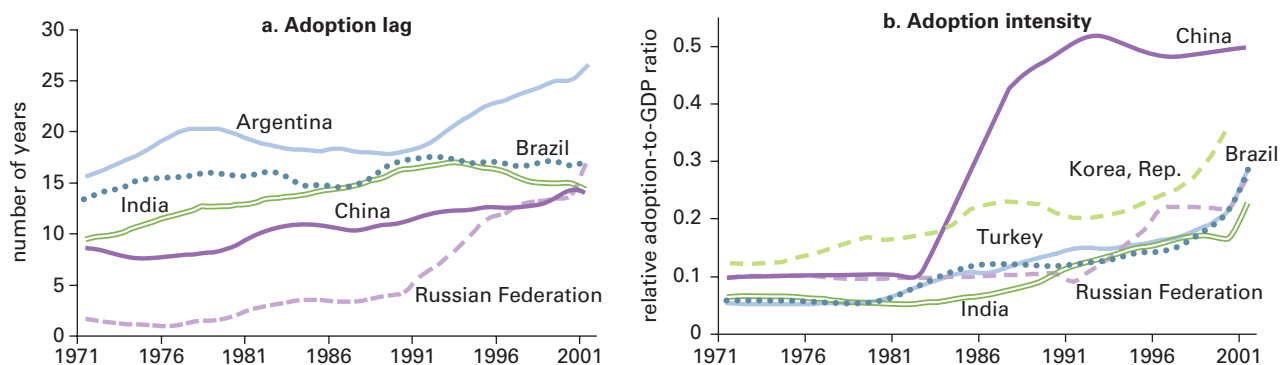
However, differential rates of adoption and diffusion are insufficient to explain the relatively low TFP growth rates in Southeast Asian economies. To understand this, one needs to look to the reallocation of factors and resources stemming from structural transformation in China (since the period of economic reform beginning in the late 1970s) and India (following the economic reforms of the early 1990s), which explains the distinct historical TFP performances of these two potential emerging economy poles. Despite their

**FIGURE 1.7** Technological innovation, selected potential emerging economy poles



Sources: World Bank staff calculations, from World Bank WDI and WIPO Patentscope databases.

Note: Intensity of patent approvals and scientific articles published were measured as a share of 100,000 of population. Missing observations were dropped, and the series then were smoothed by taking the 5-year moving average of available annual data.

**FIGURE 1.8 Technological adoption, selected potential emerging economy poles, 1971–2003**

Sources: World Bank staff calculations, from *Cross-Country Historical Adoption of Technology* and the WDI database.

Note: Adoption lag is measured as the time taken for a follower country to attain the usage intensity, normalized by GDP, of the technology in a benchmark country (the United States). The total adoption lag aggregates adoption times across 12 different technologies across eight sectors, as well as three general-purpose technologies, smoothed by taking the 5-year moving average of available annual data. Relative adoption is measured as the coverage of the technology in the follower country, normalized by GDP, relative to the peak coverage in the lead country in that technology (not necessarily the United States), across 12 different technologies across eight sectors, as well as three general-purpose technologies, smoothed by taking the 5-year moving average of available annual data. Total adoption lags tend to increase over time partly because they include lags in some technologies that were invented relatively recently and, as a result, the measured lags do not have sufficient time to exceed the number of years that have elapsed since the technology's first use in the United States.

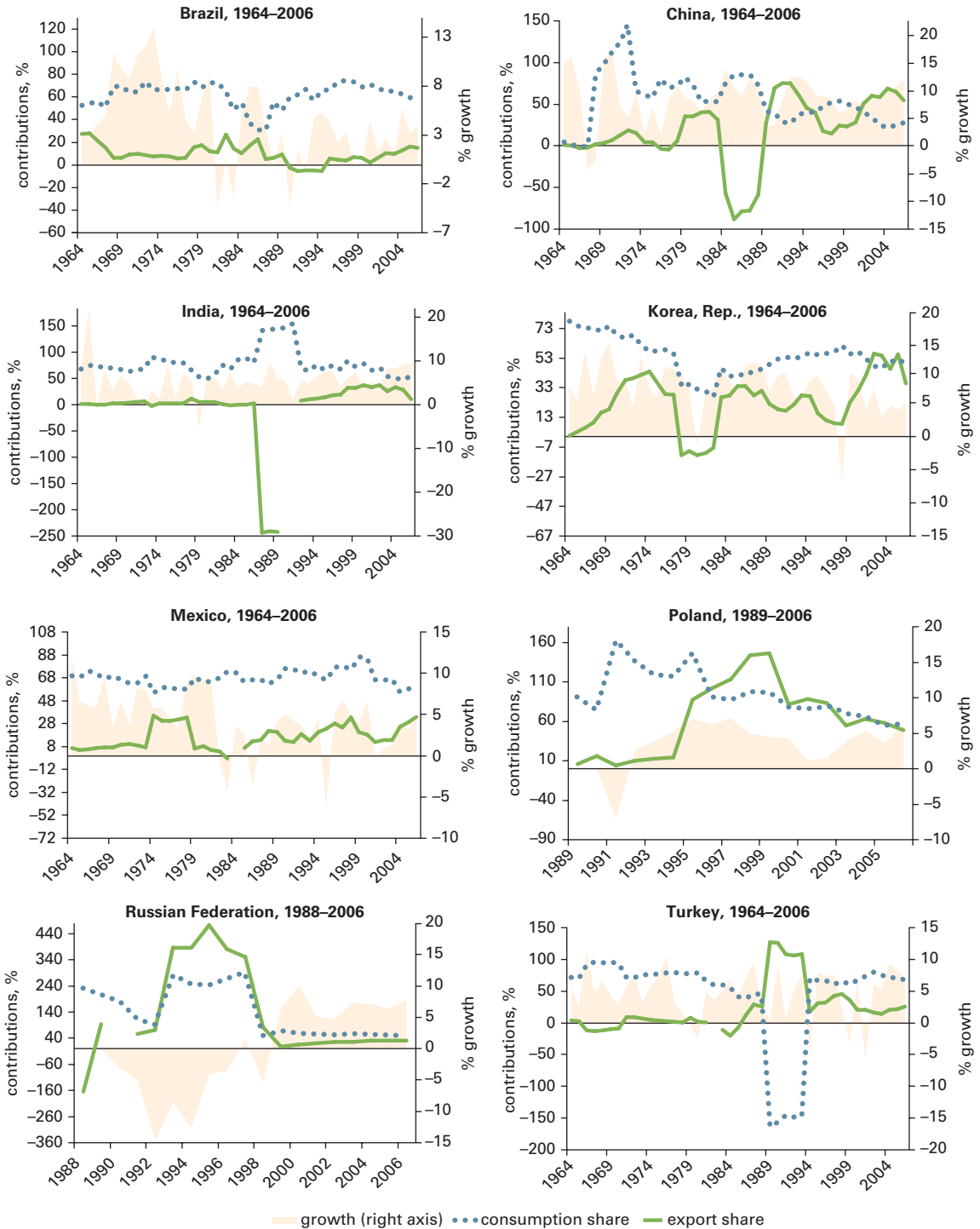
long-standing presence, these gains have not been fully exhausted; studies of the manufacturing sector suggest that TFP gains of as much as 50 percent (China) and 60 percent (India) could be attained in these countries by factor reallocations in the future (Du, Harrison, and Jefferson 2011; Hsieh and Klenow 2009). Such misallocations, more broadly, may also account for much of the differences in TFP contributions to Latin American and African growth relative to that of Asia (McMillan and Rodrik 2011).

An important factor behind TFP improvements is institutional reform that relaxes constraints on technology adoption, innovation, or resource reallocation (Parente and Prescott 2000). Some of the potential emerging economy growth poles showed statistically significant improvements in government effectiveness between 1998 and 2008, and there has been a positive, though modest, trend in governance indicators for emerging economies more generally (Kaufmann, Kraay, and Mastruzzi 2010). To the extent that trends toward institutional reform strengthen over the coming years, such trends will translate into higher TFP growth in the future.

### The changing character of internal demand in the potential emerging economy poles

The patterns of consumption, absorption, and exports evident in the potential emerging economy poles appear to be conspicuously related to those countries' choice of industrialization strategies in the past. Brazil and Mexico, both of which relied on import substituting industrialization (ISI) starting in the first half of the 20th century, display consistently strong contributions from consumption growth, whereas countries such as Korea (and later China) having pursued export-oriented industrialization (EOI) from the mid-1960s have seen their consumption contribution fall in concert with their rise in export contributions (figure 1.9).<sup>15</sup> Indeed, as formerly closed economies such as India and Russia have opened to increased trade and export orientation, their growth patterns have shown a greater compression in the spread between consumption and export contributions (figure 1.10). China, in particular, has seen a sharp fall in the consumption-export differential in its growth performance.<sup>16</sup>

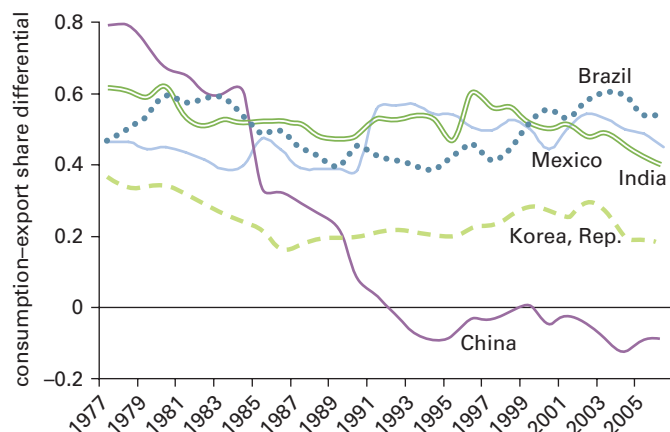
**FIGURE 1.9 Export and consumption contribution to growth, selected potential poles**



Sources: World Bank staff calculations, from IMF IFS and World Bank WDI databases.

Note: The consumption (export) contribution is defined as the annual change in consumption (export) divided by the annual change in output, smoothed by taking the 5-year moving average. Observations with a positive change in the numerator and a negative change in the denominator were dropped. Growth indicates growth rates calculated from GDP data measured in constant 2000 U.S. dollars. The anomalous patterns for India (1987–91) and Turkey (1989–94) were due to negative output growth as a result of severe economic disruptions (including financial crises), before economic and financial liberalization episodes.

**FIGURE 1.10** Dominance of consumption to exports in growth, selected potential emerging economy poles, 1977–2006



Sources: World Bank staff calculations, from IMF IFS and World Bank WDI databases.

Note: The consumption–export differential is defined as the difference between consumption and export shares of output growth. Observations with a positive change in the numerator and a negative change in the denominator were dropped, and the series then were smoothed by taking the 15-year moving average of available annual data.

Such patterns do not necessarily constitute a case for or against the use of EOI or ISI strategies,<sup>17</sup> and there is nothing in these historical choices that constrains an open economy from reducing its reliance on export-led growth.<sup>18</sup> Indeed, a case can be made for reorienting growth in the EOI countries toward higher, albeit sustainable, levels of internal demand, after these economies have sufficiently matured. This reorientation would require raising the share of consumption and investment in output growth, which would result from, respectively, a reduction in the saving rate or the user cost of capital. Thus, an understanding of the deeper, structural determinants of high saving and investment, both at the household and corporate level, is necessary.

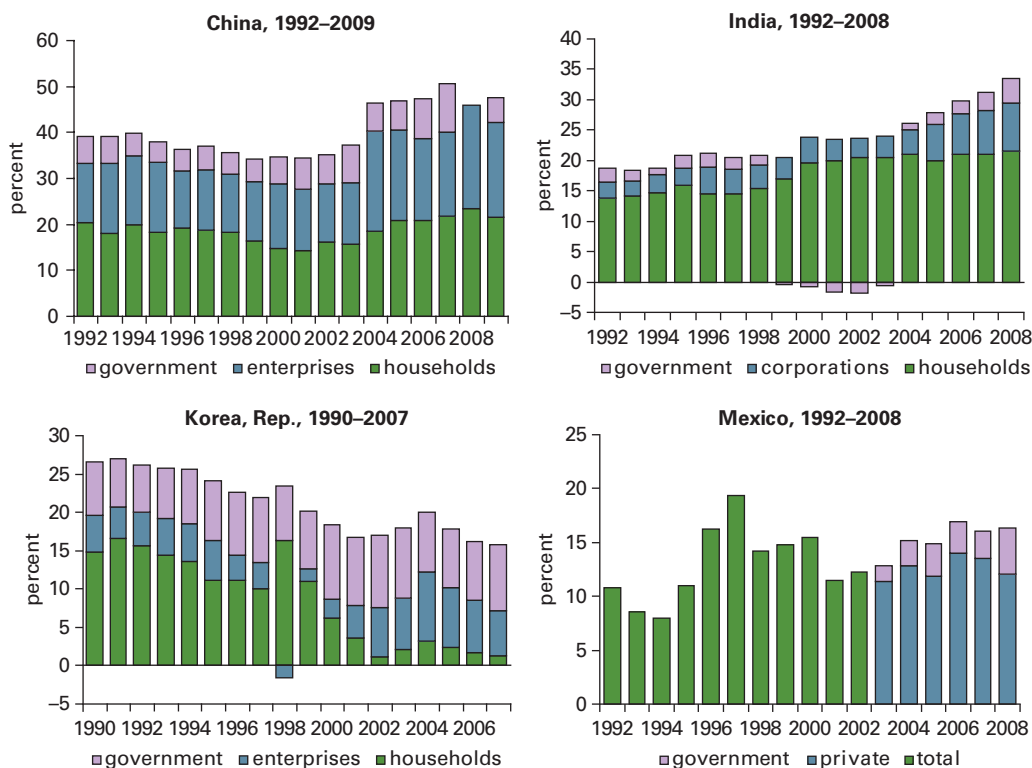
**Consumption and saving behavior in emerging economies.** Consumption theory, either along the traditional lines of a permanent income life-cycle model or a more modern intertemporal consumption-leisure interpretation, suggests that factors such as disposable income and private wealth can affect household saving behavior. Moreover, for developing countries, liquidity constraints can come into play. At the macroeconomic level, these microdeterminants

of saving are likely to translate into observable macroeconomic factors, such as the real interest rate, income growth rate, and demographic structure of the economy (Attanasio and Weber 2010; Loayza, Schmidt-Hebbel, and Servén 2000; Schmidt-Hebbel, Webb, and Corsetti 1992).

In contrast to household saving, decisions about optimal corporate saving are deeply interwoven with decisions about optimal corporate financing. In a perfectly frictionless world, standard theory asserts that the capital structure of a firm is irrelevant (Modigliani and Miller 1958). In reality—and especially in developing countries—real and financial frictions are likely to be pervasive, and so the mode of financing indeed may be important (Dailami 1992). In turn, the mode of financing often is affected by the pre-existing business, financial, and macroeconomic environment. The relatively immature financial structure and widespread agency problems in developing-country financial markets, for example, may induce a greater reliance on internal funding, thus increasing the incentive for firms to save (Allen et al. 2010).

Moderating the saving rate in the potential emerging economy growth poles is a nontrivial problem, especially given the steady rise in saving in these poles in recent years. China, in particular, has seen its private and public saving rise from, respectively, 33.3 percent and 5.7 percent of GDP in 1992 to an estimated 44.7 percent and 6.7 percent in 2008 (figure 1.11).<sup>19</sup> The causes of China's high saving rates, however, have been the subject of much debate, with literature pointing to structural concerns such as a weak social safety net and underdeveloped financial sector, life-cycle smoothing in response to the current high growth rate, industrialization policies that are biased against consumer spending, and even signaling motives as a result of its highly competitive marriage market (Bayoumi, Tong, and Wei 2010; Blanchard and Giavazzi 2006; Horioka and Wan 2007; Kuijs 2006; Modigliani and Cao 2004; Wei and Zhang 2009).

China is not alone. India also possesses high and rising levels of national saving, and since the start of the 21st century, India's growth has been accompanied by a doubling of corporate saving (from 3.1 percent of GDP in 2002 to 7.8 percent of GDP in 2008). This is somewhat worrisome,

**FIGURE 1.11 Evolution of saving, selected potential growth poles, by sector**

Sources: World Bank staff calculations, from All China Data Center database (China), Organisation for Economic Co-operation and Development StatExtracts database (Korea, Mexico), and Central Statistical Organisation, National Accounts Statistics (India).

Note: For China, 2009 household and enterprise saving are imputed from their respective 2008 shares of 2009 total private saving. For India, 2007 data are provisional and 2008 are estimates, and household saving is defined as the sum of household financial saving and household physical saving.

because India's high corporate saving is less likely to be due to optimal household responses to the introduction of new saving instruments than it is to be an indication of possible dysfunction in the development of financial markets, especially with regard to the ease of access of firms to financing. Nevertheless, higher overall saving in India may actually be optimal for its stage of development, if investment opportunities are present and financing constraints are otherwise binding.

In other potential emerging economy poles, the shares of saving in GDP are more modest and are of less concern—indeed, financing the increasing number of investment opportunities in these countries may even call for higher domestic saving, especially if access to international finance is uncertain. In Mexico, for example, saving has steadily crept up since 2001, increasing by 42 percent to top 16 percent of

GDP in 2008. Russia also has seen a rise in saving since 2002, although to a lesser extent. Much of the increase in Russia has been due to government rather than private saving, however, with the share of government saving accounting for more than half of all national saving since 2005. Korea appears to be an exception to this trend among the potential growth poles, demonstrating falling national saving over time, especially among households. This downward trend in Korea is likely due to expansion of household contributions to the social safety net, the aging population, deteriorating terms of trade, and expansion of credit available to households at low interest rates (IMF 2010d).

In China, too, demographic change in the coming decades—namely, a rising old-age dependency ratio—will affect the household saving rate. As working-age adults account for a shrinking

share of the population, there should be a synchronous decline in China's household saving rate. India is experiencing a similar demographic shift, although its relatively young working-age population suggests that the country may still reap a demographic dividend in the years ahead.<sup>20</sup>

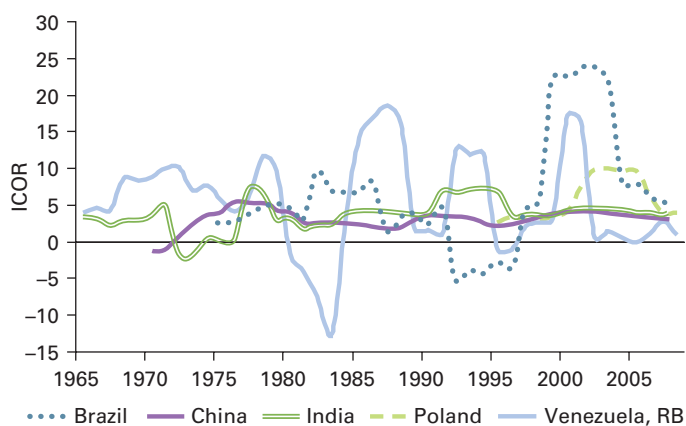
**Investment and capital usage efficiency in emerging economies.** Of course, the character of growth is affected not only by consumption and saving trends, but also by investment. Undeniably, investment trends tend to be much more volatile than consumption trends. Yet both theory (capital accumulation is at the heart of classical and endogenous growth models) and empirics (that investment is strongly pro-cyclical with output in most countries is a stylized fact) point to the central role that investment plays in the growth process.

Even so, the relationship between *changes* in investment and growth is much weaker, at least in the short run. Indeed, in some potential emerging economy growth poles, such as Korea and Mexico, such investment changes are correlated only moderately with income growth.<sup>21</sup> Part of

the reason for this lies in the fact, discussed in the previous section, that the TFP changes explain a much larger share of the realized growth path. Furthermore, economies also may differ in their efficiency of capital usage, as proxied by the incremental capital-output ratio (ICOR).<sup>22</sup> In some cases, this ratio may be even higher than in China and India, the TFP leaders among the potential emerging economy poles (figure 1.12). Indeed, this heterogeneity underscores the possibility that countries have exploited several different paths to supporting their historical growth patterns.

As a consequence, long swings in the contribution of investment to growth—as are evident for China and Malaysia, for example—generally are more difficult to reconcile with standard business cycle movements and may not always be translated into growth (figure 1.13). Nevertheless, it is important to recognize that the growth spurts in China since 1990 and in Malaysia in the 1980s and 1990s, for example, can in fact be heavily attributed to gross fixed capital formation (a phenomenon first observed by Young 1995 and more recently emphasized by Bardhan 2010). Owing to diminishing returns, however, growth reliant on capital accumulation alone ultimately is not sustainable.

**FIGURE 1.12 Incremental capital-output ratios, selected potential emerging economy poles, 1965–2008**



Sources: World Bank staff calculations, from IMF IFS and World Bank WDI databases.

Note: The ICOR is defined as investment in the previous period, divided by the annual change in output. Observations for which investment and growth differ by more than two orders of magnitude, and persist for only one year, were treated as outliers and dropped; the series then were smoothed by taking the 5-year moving average of available annual data. ICORs for Brazil, China, India, Mexico, Poland, and the República Bolivariana de Venezuela, for the full period are 5.69, 2.80, 3.86, 5.14, and 5.12, respectively.

## Implications of different growth patterns for sustained future global growth

The differing historical nature of growth among the potential emerging economy growth poles, on both the supply and demand sides, hold differing implications for whether their growth patterns are sustainable into the future. In particular, the ability to develop indigenous innovative capacity and the ability to successfully transition toward greater internal sources of demand constitute the primary risks to strong future emerging-market growth performance.

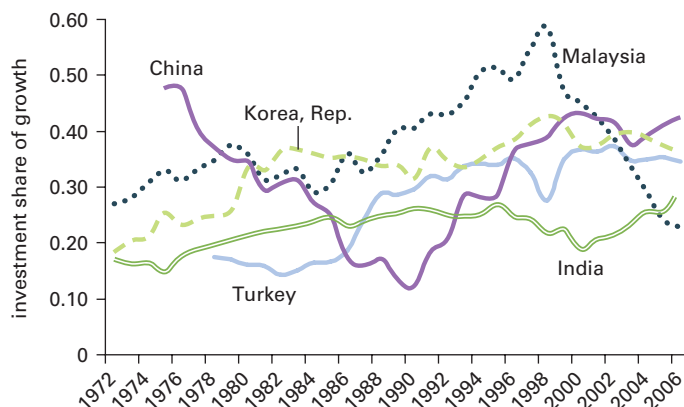
**Future TFP growth must rely more on technological innovation, not adoption.** With gradual technological catch-up, the gains to TFP growth from technological adoption cannot continue indefinitely. What, then, are the prospects for the potential emerging economy poles to begin innovating in the future? Enhancing innovative

as well as adoptive capacity requires investment in both human capital and research and development (R&D) (Eaton and Kortum 1996; Griffith, Redding, and van Reenen 2004), coupled with enhancing the institutional environment that, among other things, supports TFP growth via these channels. Both investments are linked closely to per capita incomes, especially when countries approach high-income status (figure 1.14).<sup>23</sup> As incomes rise in such economies, it is very likely that their ability to develop indigenous technological advances will rise. Indeed, as discussed in chapter 2, evidence for increased innovative activity in emerging economies can already be seen at the firm level.

Investment in R&D also holds the promise of being an engine for endogenous growth (Aghion and Howitt 1997; Romer 1986, 1990). Furthermore, growth premised on such knowledge accumulation can spill over to other countries; as such, potential emerging economy growth poles that rely on such mechanisms will serve to further strengthen their positions as growth poles. This is especially true for China and India, but also for Russia; all three countries have demonstrated strengths in various aspects of R&D related to information and communications technology.

***Future internal demand growth will need to be supported by a growing middle class.*** To the extent that there are concerns about successfully increasing the contribution of consumption to growth in developing countries excessively reliant on export-oriented growth, several medium- and long-term trends could facilitate such a switch. One important supporting trend is the rise of the so-called global middle class, which in turn could be a source of sustained growth and a strong channel for poverty reduction at the global level (Banerjee and Duflo 2008; Doepke and Zilibotti 2005; Easterly 2001; World Bank 2007).<sup>24</sup> Among emerging markets, this expansion of the middle class has thus far been led by China and India, which—together with the rest of East and South Asia—collectively accounted for about 970 million new entrants to the global middle class between 1990 and 2005.<sup>25</sup>

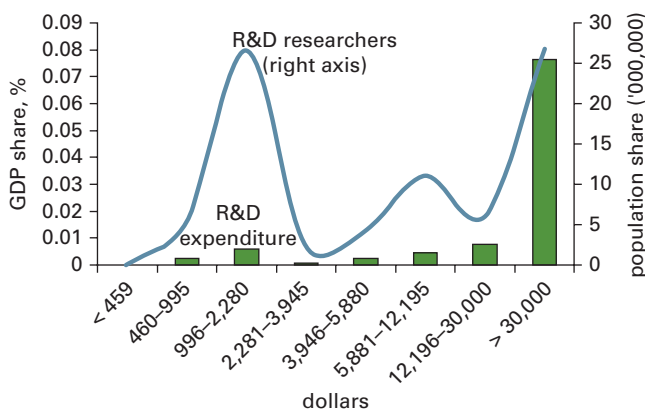
**FIGURE 1.13** Investment shares of growth, selected potential emerging economy poles, 1972–2006



Sources: World Bank staff calculations, from IMF IFS and World Bank WDI databases.

Note: The investment share is defined as the annual change in investment divided by the annual change in output. Observations with a positive change in the numerator and a negative change in the denominator were dropped, and the series then were smoothed by taking the 10-year moving average of available annual data.

**FIGURE 1.14** Global distribution of research and development expenditure and researcher shares, average over 2004–08

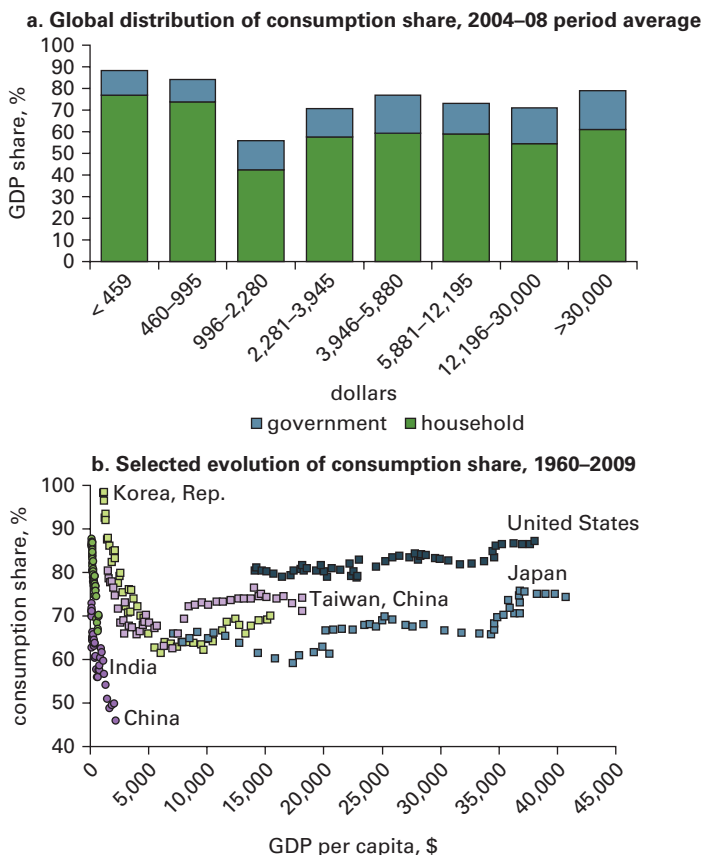


Source: World Bank staff calculations, from World Bank WDI database.

Note: The figure depicts R&D expenditure share of GDP and R&D researcher share of population, weighted respectively by GDP and population within each respective bracket. Brackets are given in gross national income (GNI) per capita, calculated using the Atlas method, and chosen to yield two groups within each of the World Bank's 2009 income categories (low income, \$995 or less; lower middle income, \$996–\$3,945; upper middle income, \$3,946–\$12,195; and high income, \$12,196 or more).

This trend is likely to continue, as global income inequality is generally forecast to fall in the future (Sala-i-Martin 2006; Wilson and Dragusanu 2008; World Bank 2007). Because

**FIGURE 1.15 Global distribution and selected evolution of consumption share by per capita income**



Sources: World Bank staff calculations, from IMF IFS and World Bank WDI databases.

Note: Household and government consumption shares are measured as shares of GDP, and weighted by GDP in U.S. dollars within each respective bracket. Brackets are given in GNI per capita, calculated using the Atlas method, and chosen to yield two groups within each of the World Bank's 2009 income categories (low income, \$995 or less; lower middle income, \$996–\$3,945; upper middle income, \$3,946–\$12,195; and high income, \$12,196 or more). Total consumption share is the sum of household and government consumption, measured as a share of GDP, and GDP per capita is measured in constant 2000 U.S. dollars.

the middle class typically stands at the forefront of consumption demand, a larger middle class will tend to reinforce changes in consumption patterns. This, in turn, will lead to a stronger consumer in the emerging economies, thereby increasing the contribution of consumption to growth within the potential emerging economy growth poles. Multiplier effects from increases in the size of the middle class could lead to GDP levels of 8 to 15 percent higher than otherwise, as has been estimated for China (Woetzel et al. 2009). Furthermore, if rising incomes and consumption

are spent on not just domestic but also foreign goods and services, expanding middle classes in the potential emerging economy growth poles can raise demand for exports from LDCs.

Ultimately, rising levels of per capita income are likely to consolidate the transition to greater consumption-driven growth in developing countries (figure 1.15, panel a),<sup>26</sup> as has been the case for high-income countries on average, even in Asia (figure 1.15, panel b). Some developing countries have in fact made such successful transitions, and their experiences suggest that transitions can be stable and sustainable (box 1.4).

How long it will take for this transition to play out, however, remains unclear. In China, at least, steps are under way to address the structural challenges that may have artificially held down consumption growth.<sup>27</sup> But for developing countries in general, ushering in such transitions has taken on a new urgency due to the slowdown of demand in the United States and Europe as a result of the financial crisis.

The flip side of increased consumption is reduced saving and—owing to the Feldstein-Horioka observation that domestic saving and investment are highly correlated—reduced investment. Consequently, any shift toward consumption-driven growth is likely to be accompanied by a reduction in investment levels. Whether investment continues to be an important driver of growth then depends on the likelihood that, going forward, these lower levels of investment can nevertheless increase labor productivity.

This outcome, in turn, depends on whether such investments are channeled toward the appropriate sectors of the economy. While the literature has begun to explore systematic methodologies for selecting sectors that would be beneficial targets for investment (Lin 2010), considerable uncertainty remains about the growth outcomes that would result from such directed investments. Investment in green technology production, for example, could lead to productivity gains for a broader segment of the labor force, compared to investment in an economy based on knowledge products. Moreover, the implications of such investment choices for the rest of the world will also be different. This is especially important for



### BOX 1.4 Suggestive evidence of successful transitions to consumption-driven growth

Many countries have experienced export-led growth in the recent decades, but very few of these have subsequently transitioned to consumption-driven growth. Even in the cases in which such a transition appears in the data, the switch to consumption-led growth has occurred because of slowdowns in growth or sharp deteriorations in export performances, or are too brief to justify a permanent structural change. Two African success stories, however, appear to provide a tantalizing glimpse of how such a transition may be realized: Botswana and Mauritius (figure B1.4.1).

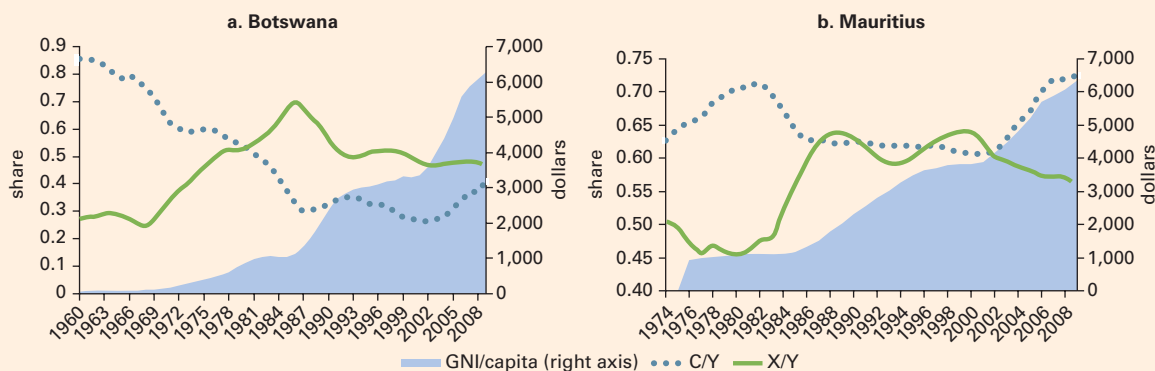
Following independence in 1968, Mauritius has undergone two major transformations—first from a sugar-based economy to an industrial exporter of textiles and apparel, and then from an industrial exporter to a mainly service-based economy (services accounted for roughly 67 percent of GDP as of 2009). Sustained economic growth brought gross national income (GNI) per capita from \$1,112 in 1984 to \$6,340 in 2009. In the early 1980s, the export share of GDP began to rise and the consumption share began to fall, setting the stage for a period of export-driven accelerated growth from the mid-1980s through the 1990s. But in 2001 or 2002, a switch occurred, with exports falling from 64 percent to 56 percent of GDP by 2009 and private consumption

rising from 61 percent to 73 percent of GDP. This consumption-driven phase of growth occurred simultaneously with a further acceleration of economic growth and was accompanied by rapid expansion of domestic credit, development of financial markets more broadly,<sup>a</sup> and growth of the service sector.

In Botswana, diamond mining has played a leading role in Botswana’s economy throughout its period of growth, during which GNI per capita rose from \$88 at independence in 1966 to \$6,280 in 2009. Between the late 1960s and the 1980s, Botswana experienced export-driven growth, driven almost exclusively by diamonds, with exports rising as a fraction of GDP and the consumption share falling. A transition began in the late 1980s, however, with Botswana’s export share falling from a high of 70 percent and eventually leveling off at less than 50 percent. Meanwhile, in the 2000s, consumption rose steadily, from 26 percent in 2002 to 41 percent in 2009. As in Mauritius, this rise in Botswana’s consumption occurred during a period of not only rapid economic growth, but also of significant financial market development, expansion of domestic credit, and growth of the services sector.

Outside of Africa, three economies have transitioned to consumption-driven growth in the past several decades, although the evidence in these cases is more

**FIGURE B1.4.1 Evolution of consumption and export shares, Botswana and Mauritius**



Sources: World Bank staff calculations, from World Bank WDI database.

(continued)

## BOX 1.4 (continued)

tenuous. Oman and Saudi Arabia appeared to have experienced such a transition in the 1970s, although they subsequently reverted to export-reliant growth. The Syrian Arab Republic, as well, now shows some tentative signs of making a transition from export-driven to consumption-driven growth. Like Botswana and Mauritius, Syria's transition appears to have occurred alongside an expansion of domestic credit and growth of the service sector, following economic liberalization.

It would be premature to draw strong conclusions from these few cases; nonetheless, they do provide some corroborative evidence that transitions from export- to consumption-driven growth are associated with financial market development, credit expansion, and growth in the service sector. During the periods when the transition occurred, these countries' governments all undertook programs to liberalize and diversify their economies, and this has included financial market liberalization.

How might such a transition play out in the export-dependent emerging economies, especially China? If the historical evidence is anything to go by, a central part of the story would be the continued development of domestic financial markets, especially with regard to

consumer credit and financing for small and medium enterprises (SMEs), both of which tend to lead to expansion of the service sector from the demand and supply sides. There is certainly room for such developments. China's consumer credit access, at 13 percent of GDP, currently lags behind other East Asian economies, such as Malaysia (48 percent) and Korea (70 percent) (Woetzel et al. 2009). Regulations surrounding access to credit for SMEs place China at 65 out of 183 economies globally, behind comparator countries such as India (32), Korea (15), and Mexico (46) (World Bank 2010a). Finally, gradual real exchange rate appreciation will also likely play a role in expanding consumers' purchasing power and will facilitate the overall transition process.

- a. It is important to draw a distinction between promoting financial market *development* versus *liberalization*. While greater competition and innovation in the financial sector can certainly support its growth, liberalization should be accompanied by a strengthening of the relevant regulatory institutions and legal frameworks, so that the sector does not outrun the capacity of host governments to monitor abuse and limit excesses.

commodity-exporting LDCs, whose exports and terms of trade are critically dependent on the specific raw materials demanded.

Caution must be exercised in outlining the strategy for moving toward higher levels of domestic absorption. Importantly, the expansion of domestic consumption and investment in the emerging East Asian growth poles should not fall into the trap of purely shifting factor inputs into the (typically) less productive service sector, but rather should ensure that the internal reallocation of resources goes toward high-productivity sectors, whether at the primary, secondary, or tertiary level. In this regard, the shifts of greatest concern are those that are channeled inordinately toward construction or finance, which increases the risk of fueling asset price bubbles.

## Dynamics of New Growth Poles: Implications for Domestic Output, Trade Flow Patterns, and Global Payments Imbalances

### Charting the future of the growth poles

Seen from the contemporary perspective of global markets, shifting drivers of global economic growth will induce structural changes in key industries. This outcome suggests that balance-of-payments measurements will need to be approached in the context of a much-longer-run structural global growth perspective that integrates the real and financial dimensions of external account balances in a coherent way, while recognizing that persistent large imbalances inevitably will translate into a huge buildup of

gross external asset and liability positions of surplus and deficit countries. Such financial account positions also will interact with growth dynamics to change the pattern of gross trade flows.

Much of the existing literature, however, either focuses on the real side aspects—trade balances, along with their domestic macroeconomic counterparts, investment-saving balances—or has taken an asset market approach, assessing the prospects for foreign financing of accumulating external debt or the opportunities for investment of accumulating assets. Different global growth scenarios, however, will imply different global macroeconomic equilibrium and external payments imbalance scenarios (Caballero, Farhi, and Gourinchas 2008). Moreover, changes in growth paths and external balances are likely to affect exchange rate outcomes (McDonald 2007), which in turn will mean changes in the flow of exports and imports. Indeed, the shift in trade toward potential emerging economy growth poles is well under way and is likely to intensify in the future with China as the hub (Wang and Whalley 2010). Keeping in mind these important interactions, the baseline scenario provided here offers a lens into the future evolution of the global economy.

### **The baseline scenario for the future of the global macroeconomy**

In the wake of the financial crisis, the global macroeconomy seems poised to follow a two-track course in the short term, with developed countries growing at a much more sluggish pace than developing countries. Low- and middle-income countries are expected to contribute about half (49 percent) of all global growth in 2010. Owing to postcrisis drag, economic activity in the high-income economies, as well as in many of the developing economies of Eastern Europe, will remain sluggish in 2011, only reaching their long-run averages in 2012 (2.8 percent and 4.4 percent for high-income economies and Eastern Europe, respectively). In contrast, economic performance among the developing countries, which had been robust until 2010, likely will moderate as demand stimuli are retracted and output gaps trend toward zero (the developing world excluding

Eastern Europe is expected to average 6.1 percent growth for 2012) (World Bank 2011).

Whether such a two-track world persists depends, in part, on the speed of the deleveraging cycle in developed countries and the extent to which the effects of the 2007–08 financial crisis and the sovereign debt and fiscal crises in several European countries are absorbed. Avoiding an ongoing two-track global economy also depends on whether developing countries are able to manage rising inflationary pressures—originating both from pipeline commodity-related demand pressures and from the imported effects of loose monetary policy in several major advanced economies—while maintaining productivity advances, alongside a redirection of externally driven to internally generated growth.

In this book, the baseline scenario adopted is one in which (1) stabilization and restructuring policies are successfully implemented in both advanced economies and the developing economies of Eastern Europe; (2) absent further exogenous shocks, the cyclical downturn in these economies fades away by the end of 2012;<sup>28</sup> and (3) developing economies other than those in Eastern Europe, especially the potential emerging economy growth poles, successfully manage the surge in capital inflows and inflation in the short run. The baseline scenario also assumes that current policy tensions over exchange rates and trading arrangements do not erupt into economic conflict.

In the medium to long run—through 2025, the end of this book's modeling horizon—this book assumes a convergence of each economy toward its respective potential output in all countries. This convergence is premised on the assumption that structural reforms in advanced economies are successful in the medium term, and that institutional and structural changes occur in developing economies that lead to realignment of growth away from external to internal sources. Scenario projections from 2013–25 are generated on the assumption that economies operate on the trend path of their respective levels of potential output.

In addition to these internal adjustments, the baseline scenario also envisions external adjustments that are consistent with a likely medium-term (through 2015) path of fiscal balances,

### BOX 1.5 Modeling the current account and growth process

The baseline scenario outlined in this book relies on two separate models: a current account model that generates medium-term balance of payments projections, and a growth model that generates long-term growth projections, based in part on input from the current account model.

The current account model (described in detail in annex 1.5) deployed relies on the strand of the literature concerned with the medium-term structural determinants of saving-investment differentials (Chinn and Ito 2007; Chinn and Prasad 2003; Gagnon 2010; Gruber and Kamin 2007). The main explanatory variables are the fiscal balance, official financial flows, net foreign assets, and net energy exports. Using five-year averages across 145 countries for the period 1970–2008, the current account model estimates region-specific coefficients for six country groupings: advanced economies; developing Asia, Africa, Latin America, and Middle East economies; and transition economies.

The model-predicted estimates are then compared with historical data and further adjusted to match actual 2004–08 current account balances. Initial current account projections for 2011 through 2015 then are obtained by using annual forecast data obtained from other sources, such as the International Monetary Fund's *Fiscal Monitor* (fiscal balance forecasts) and the International Energy Agency's *World Energy Outlook* (energy forecasts). Current account numbers from 2016 onward are simple linear projections of the path of

current account balances to the 2025 value implied by a given scenario. These projections were then fed into the World Bank's Linkage model (World Bank 2007) to develop the growth numbers.

The Linkage growth model (described in detail in van der Mensbrugghe 2005) was designed to capture the complex growth dynamics behind a large set of countries of interest. The model is a dynamic, global computable general equilibrium (CGE) growth model that allows for this flexibility, while using the current account scenarios developed as a key input. The model includes 22 country-regions, eight sectors, and as many as eight possible factors and intermediate inputs to production. The growth process is an augmented Solow-style neoclassical production function, taking as given labor force evolution, productivity processes, and saving-investment decisions (themselves a function of demographic factors).

Finally, model-generated trade flow patterns and consumption-investment patterns are used to obtain baseline numbers corresponding to each scenario. Variations to the baseline result are obtained from changing the parameters that govern the behavior of major variables, such as the rate of growth of factor and energy productivity, population, and labor supply. Given the emphasis of this chapter on growth, however, the path taken by TFP for a given country is especially important, and alternatives to the growth baseline alter parameters that would generate meaningful variations in TFP.

foreign asset accumulation, and energy needs. The resulting medium-term fluctuations in the current account will then give way to a long-run path of external imbalances that gradually adjust toward globally sustainable levels. This (linear) 10-year glide path is one where, by 2025, non-energy-exporting countries adopt a  $\pm 3$  percent surplus/deficit target if their 2015 current account balances exceed these bounds (countries within this  $\pm 3$  percent band are assumed to simply maintain their 2015 levels).<sup>29</sup> Energy-exporting countries, owing to their generally larger export patterns, will instead target a current account surplus ceiling of 10 percent of GDP.

This baseline scenario, along with the scenario analyses to follow, relies on a combination of a medium-term current account model and a long-term growth model (described in detail in box 1.5).

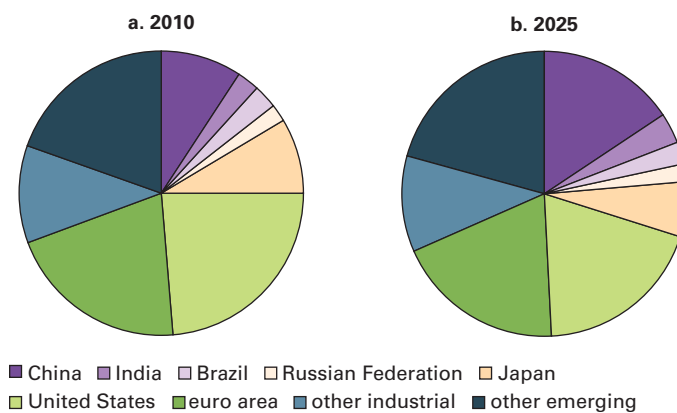
**Output and growth patterns.** Under the baseline scenario, emerging economies' share of global output will expand, in real terms, from 36.2 percent to 44.5 percent between 2010 and 2025 (figure 1.16). This impressive rise will be led by China. A simultaneous decline in investment and rise in consumption means that China will

average a growth rate of about 7 percent throughout the period.<sup>30</sup> This growth rate will occur against a backdrop of a rising old-age dependency ratio—expected to almost double between 2010 and 2025—which is the primary factor behind China’s rising consumption share. In spite of those demography-driven changes, China is expected to retain its strong comparative advantage in manufacturing, with labor productivity in the sector continuing to grow through 2025.

In the baseline scenario, consistent with long-term historical productivity trends, India’s annual growth in 2011 and 2025 are 8.7 and 5.4 percent respectively, with 8–9 percent in the earlier years and lower growth later on.<sup>31</sup> This growth outcome is a consequence of a combination of gradually rising consumption—in line with India’s growing middle class and a lower reliance on foreign saving—and a corresponding decline in investment (of an estimated 32 to 28 percentage points of GDP). In the baseline, India’s relatively favorable demographics, implying a growing labor force, is tempered in part by relatively low levels of schooling.<sup>32</sup> For India to be able to maintain the recently-achieved high growth rates of 9 percent, it would need to be able to mobilize domestic saving and channel saving to long-term productive investments, especially in infrastructure. Among other potential emerging economy poles, Indonesia and Singapore post strong real output growth performances, averaging 5.9 percent and 5.1 percent in this scenario, respectively.

In spite of how growth in developing economies will outpace that of advanced economies in the coming years, in the baseline scenario there is no convergence in real output between these two groups within the horizon of 15 years.<sup>33</sup> Nevertheless, though advanced economies will continue to account for a sizable share of the global economic output in 2025, emerging economies will be the drivers of growth. On average, advanced economies as a whole will grow at 2.3 percent over 2011–25, compared with 4.7 percent for emerging economies (figure 1.17). This growth translates, in terms of average income, to a world in which China and Brazil will share similar real GDP per capita numbers (which will be about two-thirds that of Russia and one-fifth that

**FIGURE 1.16** Global real output shares, 2010 and 2025, baseline scenario



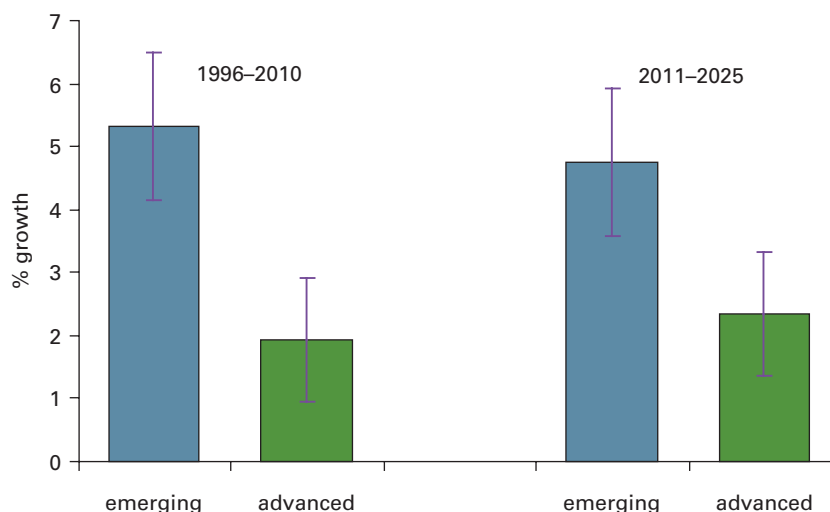
Source: World Bank staff calculations.

Note: Real shares are expressed in terms of constant 2009 U.S. dollar prices.

of Korea). Overall, the scenario suggests that the process of income convergence, which definitively began in the past decade, appears set to continue into the next decade (although the process need not be irreversible, and several risks that could derail the expected growth process are discussed in the final section of this chapter).

Several other studies have argued that India’s real growth rate will overtake that of China by 2025 (Maddison 2007; O’Neill and Stupnytska 2009; OECD 2010; Wilson and Purushothaman 2003), whereas the baseline scenario here has China growing slightly faster than India (the actual growth rates for India in these other studies are, however, similar to the numbers in this book).<sup>34</sup> The difference in the baseline here is due to several reasons. The nature of the general equilibrium model employed here may capture feedback effects that are not taken into account by other modeling approaches. Moreover, the baseline scenario posits a limited increase in India’s current account deficit, an outcome that is consistent with India’s experience since its balance of payments crisis in 1991 (which has averaged 0.8 percent of GDP between 1991 and 2009). Unless India is able to attract substantial, stable inflows of capital that would provide the necessary international financing—at levels that would be historically unprecedented—domestic saving

**FIGURE 1.17** Output growth for emerging and advanced economies, 15-year average, 1996–2010 (historical) and 2011–25 (baseline scenario)



Source: World Bank staff calculations, from model projections and World Bank WDI database.

Note: Fifteen-year averages reported could significantly understate projected growth rates for any given year, with additional uncertainty from modeling errors. To emphasize the wide range of possible outcomes surrounding the baseline scenario, average growth rates are accompanied by error bars corresponding to the historical 95 percent confidence interval.

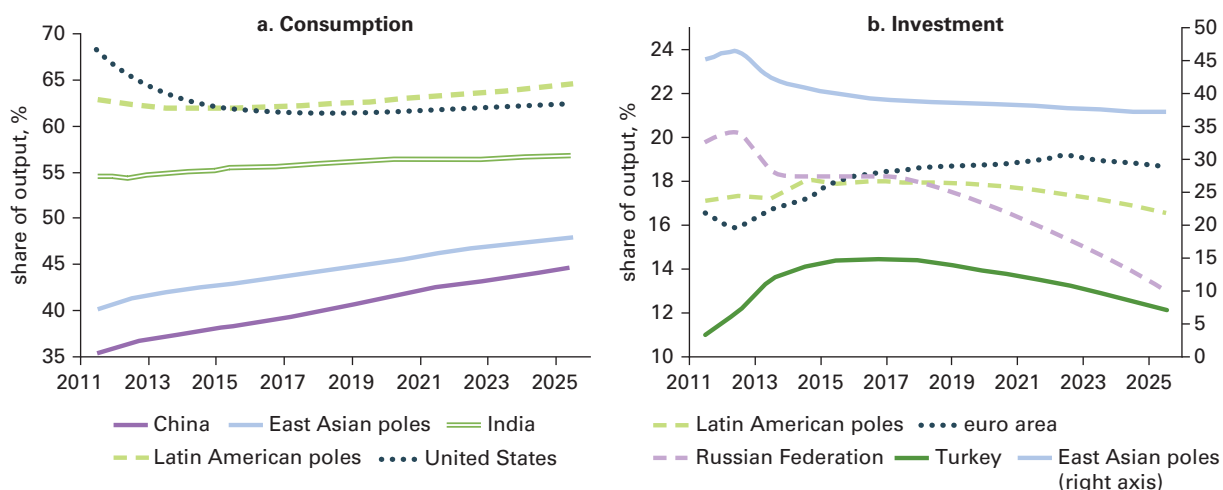
will be inadequate for achieving growth rates significantly higher than the baseline.

The baseline scenario also has a relatively slower-growing Russia over 2011–25. Thus, in spite of anticipated improvements to Russian labor productivity and expected robust global energy demand, domestic political economy concerns in Russia—including eroding confidence in the rule of law and property rights—will hold back an otherwise solid growth picture.

**Consumption, investment, and current account patterns.** In the baseline scenario, consumption and investment trends will demonstrate significant shifts over the 15-year modeling horizon (figure 1.18, panel a). East Asian economies, especially China, will raise their consumption shares in national output to levels close to those of the United States and India. For China, in particular, this increased consumption share will be noteworthy: a rise from 41 percent to 55 percent of GDP. Although it is presently difficult to imagine such a sharp rise in consumption by the chronically underconsuming East Asian

economies, anticipated demographic changes—especially an uptick in the old-age dependency ratio in many of these countries—will mean that increased consumption is a largely inexorable process. Indeed, the consumption-output share in the East Asian poles could even exceed that of the United States by 2022, owing in part to increasing pressure on the latter to raise savings to meet debt obligations, as well as accommodate a likely decline in its current account deficit.<sup>35</sup>

This increased consumption will occur alongside a fall in investment, again most notably among East Asian economies (figure 1.18, panel b). China's investment will decline modestly (from 45 percent of GDP to 39 percent). This decreasing trend is likely to be echoed by other East Asian economies; however, such declines will be somewhat more limited than the declines experienced in some other potential emerging economy poles, such as Russia (where investment will fall by more than 9 percent of GDP). The concern here is that in some emerging economies, the decline in investment may be more than is optimal, given their stage of development.

**FIGURE 1.18 Consumption and investment shares of output, current and potential growth poles, 2011–25 baseline**

Source: World Bank staff calculations.

Note: Latin American poles refer to the potential emerging economy poles (Argentina, Brazil, Mexico, and the República Bolivariana de Venezuela) with the highest multidimensional polarity indexes in the region. East Asian poles refer to the actual (China) and potential (Indonesia, Korea, and Malaysia) emerging economy poles with the highest multidimensional polarity indexes in the region. Shares are computed from levels measured in terms of constant 2009 U.S. dollars.

Together, these long-term trends provide some reassurance that structural transformations in the potential emerging economy poles, were they to occur, can provide a solution to the current imbalances in the global economy. With emerging economies picking up a greater share of global absorptive capacity through internally driven aggregate demand, the sustainability of their growth is far more certain, and ultimately this is a boon not only to the emerging world, but also to advanced countries and, importantly, to LDCs, as demand for their exports will increase with the expansion of the middle class in the emerging world.

Such trends will start becoming evident in the medium term, during which time current account surpluses in many of the larger emerging economies will gradually soften from their recent historical highs, although the major surplus economies—the energy-exporting Middle East and Russia, and China—will maintain significant, positive current account positions (table 1.2). Although these current account positions suggest that tensions surrounding China's trade balance may persist during this period, if

**TABLE 1.2 Current account balances, current and potential growth poles, 2004–25**

| Economy            | 2004–08 | 2011–15 | 2020 | 2025 |
|--------------------|---------|---------|------|------|
| Australia          | -5.6    | -5.9    | -4.0 | -3.0 |
| Canada             | 1.4     | -0.2    | 0.5  | 0.5  |
| Euro area          | 0.3     | -0.1    | 0.2  | 0.2  |
| Japan              | 3.9     | 2.9     | 3.2  | 3.0  |
| United Kingdom     | -2.5    | -2.4    | -0.9 | -0.9 |
| United States      | -4.5    | -6.0    | -4.5 | -3.0 |
| Brazil             | 0.6     | 2.0     | 2.8  | 2.8  |
| China              | 8.2     | 8.1     | 5.6  | 3.0  |
| India              | -1.1    | -1.1    | -0.7 | -0.7 |
| Korea, Rep.        | 1.2     | 1.3     | 1.7  | 1.7  |
| Mexico             | -0.8    | -1.4    | -1.5 | -1.5 |
| Poland             | -3.6    | -3.2    | -2.7 | -2.7 |
| Russian Federation | 8.5     | 4.9     | 4.1  | 4.0  |
| Saudi Arabia       | 26.0    | 17.4    | 12.9 | 10.0 |
| Turkey             | -5.2    | -5.2    | -3.9 | -3.0 |

Sources: World Bank staff calculations, from IMF IFS, IMF Fiscal Monitor, USEIA International Energy Outlook (IEO), and IEA World Energy Outlook (WEO) databases.

Note: All values are percentages of GDP. The light-shaded region indicates model projections, and the dark-shaded region indicates scenario-dependent implied values. Data for 2004–08 are the historical period average and data for 2011–15 are the projected period average. Projections were performed using a current account model with the fiscal balance, official financial flows, net foreign assets, and net energy exports, with region-specific coefficients and calibrated to the actual current account balance for 2004–08. To satisfy the global adding-up constraint, residual balances were assigned to unreported regions according to GDP.

domestic rebalancing occurs more quickly than anticipated, the surplus will be even lower than projected. Unexpected policy changes in China could also have a dramatic effect. For example, a reversal in policy toward official foreign investments—the largest driver of its surplus—would rapidly bring the projected surplus closer to the 5 percent range.

The majority of advanced economies, in contrast, are projected in the baseline scenario to run current accounts that are either in deficit or flat between 2011 and 2015, with the notable exception of Japan. To the extent that there are marked deviations from historical averages, these can generally be reconciled. For example, Canada’s expected deficit between 2011 and 2015 is due to the sharp expected deterioration in its fiscal balances during that time (this worsening of the government’s fiscal position, in turn, resulted from cyclical worsening as a result of the mild recession it experienced in 2008–09).

The other major (nonenergy exporting) emerging economies exhibit, in the baseline scenario, either small surpluses or deficits, largely in line with their historical experience. Brazil, for example, will run a small surplus averaging 2 percent of GDP between 2011 and 2015, while India will run a small deficit averaging 1.1 percent over the same period (since 1991, India has maintained fairly small balance of payments deficits,

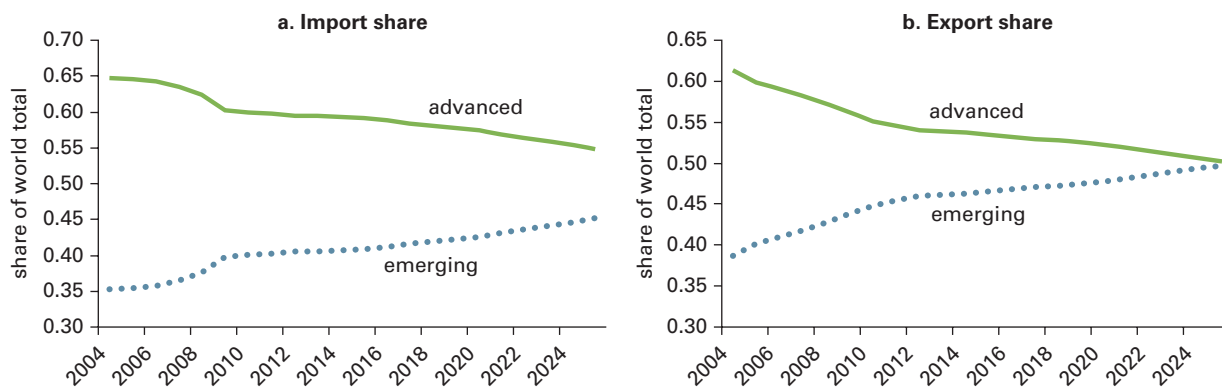
exceeding 2 percent only in 2008, and averaging 0.8 percent annually between 1991 and 2009).

In the long run, increasing internal demand in the emerging economy growth poles will not preclude the continued expansion of the external sector of these economies. Potential emerging economy growth poles will, in the baseline, experience significant increases in their flows of international trade, in terms of both imports and exports. Brazil and Indonesia, for example, will see their exports more than double in absolute terms, to \$245 billion and \$316 billion, respectively, under the baseline scenario (their respective export shares of output, however, will be approximately constant).

Emerging economies also will import more. India and Indonesia will import 109 percent and 160 percent more, respectively, in 2025 than they did in 2010, reflecting the rapid increases in the GDP of those economies. Over time, emerging economies’ share of global trade gradually will converge with that of advanced economies; in the case of exports, the former will almost equalize with the latter in terms of global shares (figure 1.19). Global trade will expand, as a share of global output, from 49.9 percent to 53.6 percent in 2025.

These different possible current account paths naturally imply different prospects for countries’ international investment positions—that is, these countries’ external assets net of liabilities. In

**FIGURE 1.19 Global import and export shares of global trade, advanced and emerging economies, 2004–25 baseline**

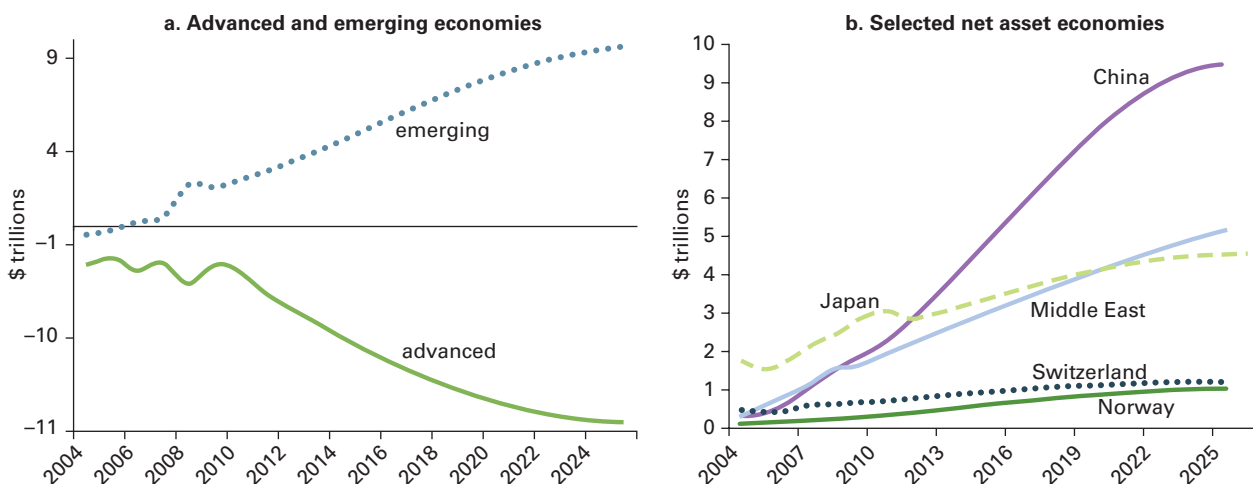


Source: World Bank staff calculations.

Note: Shares are computed from levels measured in constant 2004 prices relative to the basket of OECD exports in the same year.



**FIGURE 1.20** Net international investment positions, advanced and emerging economies, and selected net asset countries, 2004–25 baseline



Source: World Bank staff calculations.

Note: The figures depict the baseline scenario. The net IIPs of the two groups do not net to zero because only the top 26 multidimensional polarity index economies were used in the computation. Advanced (emerging) economies thus include only the respective constituent economies within each category. The Middle East includes Mashreq Middle East and North Africa economies, of which Saudi Arabia is the largest economy. Net IIP calculations assume constant asset prices in U.S. dollars and a constant capital account-to-GDP ratio and are measured in constant 2004 prices relative to the basket of OECD exports (for emerging and advanced aggregates) and 2009 U.S. dollars (for individual countries). The net IIP for the Middle East economies was imputed from Saudi Arabia's historical current account and reserve asset positions and scaled up based on Saudi Arabia's GDP share within the group, and the net IIP for Japan reflects a 10 percent reduction as a consequence of the 2011 Tōhoku earthquake and tsunami (based on the upper bound of Japanese government estimates of reconstruction costs, assuming that all costs are borne by reductions in foreign asset positions due to repatriation, and imputing all costs to one year).

particular, the potential emerging economy poles are likely to collectively take on a large and rising net IIP (figure 1.20, panel a). This will be largely offset by the large and rising net liability position among advanced economies.

Although the contrast is dramatic, it is important to realize that these respective positive and negative positions are largely driven by the accumulation patterns of China and the United States (graphs of the two countries' net IIPs are essentially identical to figure 1.20, panel a, albeit with slightly smaller values on the axes). Japan and the Middle Eastern economies account for other large positive net IIP positions (figure 1.20, panel b).

### Alternative future scenarios

Although the baseline scenario has painted a relatively sanguine picture of the future evolution of the global economy, there are clear risks that may derail this baseline. From the point of view of potential emerging economy growth poles, the most significant considerations were outlined above: the potential challenge of growth through

technological innovation rather than just adoption, uncertainty over progress on institutional reform (and its impact on productivity), and a successful transition toward growth driven by internal demand. Moreover, the path of external balances may deviate from the smooth convergence anticipated in the baseline.

Thus, it is useful to consider several alternative scenarios in addition to the baseline. Informed by the previous discussion on the changing character of growth in the potential emerging economy growth poles, this section considers three possible deviations to the baseline outcome (table 1.3).

- *Divergent productivity paths.* As discussed earlier, the strong growth performances of many potential emerging economy poles—with the exception of China, India, Poland, and Russia—have not been matched by equally impressive TFP contributions. This scenario—which can be considered a variant of the pessimistic picture painted by Krugman (1994)—considers the possibility that these four economies

**TABLE 1.3** Key perturbations for alternative growth and external balance scenarios

| Economy            | 2004–08  | 2020 | 2025 | 2004–08   | 2020 | 2025 |
|--------------------|--|------|------|---|------|------|
|                    | <b>Divergent productivity<br/>(productivity growth, %)</b>       |      |      | <b>Unbalanced growth<br/>(domestic saving, % GDP)</b> |      |      |
| Euro area          | 0.4  | 1.8  | 0.8  | 22.0  | 23.8 | 22.8 |
| Japan              | 0.6  | 1.1  | 1.1  | 27.0  | 22.7 | 22.2 |
| United States      | -0.1   | 0.1  | -0.1 | 13.0  | 21.3 | 20.5 |
| United Kingdom     | 0.6  | 2.7  | 1.2  | 14.5  | 9.9  | 9.1  |
| Brazil             | 3.1  | 0.7  | 1.2  | 19.1  | 19.0 | 17.3 |
| China              | 6.1  | 4.1  | 6.0  | 49.5  | 46.8 | 47.1 |
| India              | 4.2  | 2.0  | 4.4  | 29.0  | 28.9 | 28.1 |
| Korea, Rep.        | 1.2  | 2.6  | 2.3  | 30.8  | 24.0 | 24.0 |
| Malaysia           | 1.8  | 0.3  | -0.5 | 41.1  | 33.4 | 33.4 |
| Mexico             | 1.4  | 0.5  | -0.3 | 20.2  | 17.1 | 14.7 |
| Poland             | 5.1  | 4.7  | 5.4  | 16.3  | 10.3 | 8.5  |
| Russian Federation | 10.1   | 3.5  | 4.5  | 29.1  | 20.1 | 15.7 |
| Singapore          | 6.5  | 2.7  | 1.7  | 44.2  | 35.6 | 35.9 |
| Thailand           | 3.6  | 7.5  | 11.4 | 30.8  | 20.5 | 20.7 |
|                    | <b>Continued imbalances<br/>(current account balance, % GDP)</b> |      |      | <b>Total rebalancing</b>                              |      |      |
| Australia          | -4.6   | -4.9 | -4.9 | -4.6  | -2.5 | 0.0  |
| Canada             | 0.4  | 0.5  | 0.5  | 0.4   | 0.3  | 0.0  |
| Euro area          | 1.3  | 0.2  | 0.2  | 1.3   | 0.1  | 0.0  |
| Japan              | 3.9  | 3.4  | 3.4  | 3.9   | 1.7  | 0.0  |
| United Kingdom     | -1.5   | -0.9 | -0.9 | -1.5  | -0.4 | 0.0  |
| United States      | -4.5   | -5.4 | -5.9 | -4.5  | -2.9 | 0.0  |
| Brazil             | 0.6  | 2.8  | 2.8  | 0.6   | 1.4  | 0.0  |
| China              | 8.2  | 8.2  | 8.2  | 8.2   | 4.0  | 0.0  |
| India              | -1.1   | -0.7 | -0.7 | -1.1  | -0.4 | 0.0  |
| Korea, Rep.        | 1.2  | 1.7  | 1.7  | 1.2   | 0.8  | 0.0  |
| Mexico             | -0.3   | -1.5 | -1.5 | -0.3  | -0.7 | 0.0  |
| Poland             | -2.6   | -2.7 | -2.7 | -2.6  | -1.3 | 0.0  |
| Russian Federation | 8.5  | 4.1  | 4.1  | 8.5   | 2.0  | 0.0  |
| Saudi Arabia       | 26.0   | 15.7 | 15.8 | 26.0  | 7.8  | 0.0  |
| Turkey             | -5.2   | -4.7 | -4.8 | -5.2  | -2.4 | 0.0  |

Source: World Bank staff calculations.

Note: Productivity is measured as the growth rate of (services) labor productivity, rather than TFP directly. This is because TFP is defined as the residual in a growth decomposition, but a computable general equilibrium model does not generally embed such residuals, so productivity changes are typically attributed to labor instead. It can be shown that there is a close link between TFP growth and labor productivity growth (Barro 1999), especially if labor quality and the return on capital do not vary much. The (baseline) unperturbed productivity growth rates for China, India, Poland, and Russia are 2.9, 0.9, 3.5, and 2.3 percent for 2020, respectively, and 3.7, 2.1, 3.1, and 2.2 percent for 2025, respectively. The (baseline) unperturbed saving rates for China, Korea, Malaysia, Singapore, and Thailand are 42.6, 22.0, 32.0, 29.0, and 16.4 percent for 2020, respectively, and 39.1, 20.0, 29.9, 20.5, and 12.0 percent for 2025, respectively.

manage to attain high levels of TFP growth (and, implicitly, make the transition from technological adoption to greater innovative capacity), whereas other emerging economies exhaust the gains from factor accumulation and reallocation, and

languish in lower levels of TFP growth. In effect, the emerging world fractures into a “two-speed” world, with four economies continuing to grow rapidly in economic size and influence and the others settling into a lower growth path.

- *Unbalanced internal growth.* As mentioned previously, a transition to strong, sustainable absorption among the emerging economy potential growth poles is central to realigning these economies away from external sources of growth. This scenario considers the possibility that internal reforms designed to support higher levels of internal demand in outward-oriented economies—China, Korea, Malaysia, Singapore, and Thailand—do not result in a substantive increase in consumption shares, and the scenario explores the implications of such continued high saving on investment. To incorporate the possible effects of capital leakage, the scenario allows for external accounts to either follow the baseline path or to hold constant at 2015 levels from 2016 onward.
- *Global external balances.* A final set of scenarios traces the two polar outcomes for global imbalances. The first possibility is a situation in which imbalances persist, resulting in a continuation of current account balances along the medium-term path (the assumption imposes 2015 levels of the current account through 2025). This could be due to policy inaction, such as unwillingness to undertake major fiscal adjustments. Under this scenario, financial development in developing economies remains sluggish, while advanced economies maintain their comparative advantage in investment opportunities (Dooley, Folkerts-Landau, and Garber 2009).

Under the second external balance scenario, a major reversal in the pattern of global external balances occurs, with a total rebalancing by 2025, when all current account balances reach zero (the actual adjustment path to zero is assumed to be linear). This reversal could result from distinct improvements in the investment opportunities available in surplus emerging economies, occurring in concert with rapid financial market development, along with acute fiscal consolidation in advanced economies. Another, admittedly extreme, possibility is that international

trading relations break down, forcing external accounts toward autarky.

A detailed analysis of these scenarios is undertaken in annex 1.7. The main lessons are as follows:

- The *divergent productivity* scenario suggests that the two-track global economy may fracture even further, into a slowly divergent path for growth between advanced economies, low-productivity developing economies, and high-productivity developing economies. Whether this occurs depends on whether economies such as Argentina, Brazil, Indonesia, and Korea are able permanently to raise their TFP performances.
- The *unbalanced internal growth* scenario suggests that successfully navigating the internal realignment process toward domestic sources of growth depends not only on internal structural adjustment policies, but also on successful external accounts management. This interdependence points to the need for surplus nations to effect internal and external rebalancing efforts simultaneously.
- The *global external balances* scenarios suggest that the evolution of domestic investment, in particular, depends on the manner by which global imbalances unfold. Imposing total rebalancing on surplus economies (such as China, Russia, and the oil-exporting economies of the Middle East) tends to lead to a relatively slower rate of decline (or an actual increase) in those countries' investment shares, with the converse holding true for deficit economies such as India, Poland, and Turkey.

## Growth Poles and Multipolarity in the Future World Economy

The world of 2025 truly will be multipolar. Using the baseline numbers for 2021–25, it appears that the current three growth poles will be joined by India (table 1.4). Indeed, the top seven economies—China, the euro area, the United

**TABLE 1.4 Measures of growth poles, top 15 countries, 2021–25 baseline average**

| Economy            | Output (constant 2009 \$, trillions) | Contribution to global growth (%) | Simple growth polarity index | Alternate growth polarity index |
|--------------------|--------------------------------------|-----------------------------------|------------------------------|---------------------------------|
| China              | 13.9                                 | 0.94                              | 96.46                        | 72.96                           |
| Euro area          | 18.3                                 | 0.38                              | 38.95                        | 37.93                           |
| United States      | 18.8                                 | 0.24                              | 24.36                        | 29.56                           |
| India              | 3.0                                  | 0.17                              | 17.26                        | 13.21                           |
| Japan              | 6.3                                  | 0.09                              | 9.15                         | 10.01                           |
| United Kingdom     | 3.4                                  | 0.07                              | 7.53                         | 8.68                            |
| Indonesia          | 1.2                                  | 0.07                              | 7.46                         | 6.46                            |
| Brazil             | 2.4                                  | 0.06                              | 6.21                         | 4.57                            |
| Russian Federation | 2.0                                  | 0.04                              | 4.12                         | 2.94                            |
| Canada             | 2.1                                  | 0.04                              | 4.01                         | 3.91                            |
| Korea, Rep.        | 1.4                                  | 0.04                              | 4.00                         | 5.55                            |
| Australia          | 1.5                                  | 0.03                              | 3.50                         | 4.55                            |
| Middle East        | 1.8                                  | 0.03                              | 3.16                         | 1.88                            |
| Sweden             | 0.8                                  | 0.03                              | 3.08                         | 3.37                            |
| Turkey             | 1.0                                  | 0.03                              | 2.64                         | 1.73                            |

Source: World Bank staff calculations.

Note: The shaded region indicates potential poles, with the cutoff determined by the first significant break on the index (from below). The simple index was generated from size-weighted GDP growth rates normalized to the maximum and minimum of the full 1968–2025 period. The alternate index was generated from the absorption-weighted growth share and normalized to the maximum and minimum of the 2006–25 period. Both indexes use output levels calculated from data in constant 2009 U.S. dollars. The Middle East includes Mashreq Middle East and North Africa economies, of which Saudi Arabia is the largest economy. The top 15 countries in the alternate index exclude the Middle East and Turkey, but include Argentina (2.19) and South Africa (2.12).

States, India, Japan, the United Kingdom, and Indonesia—are the same whether measured by the simple polarity index (table 1.4, fifth column), or if computed from an alternative measure that better captures the trade channel of growth spillovers (table 1.4, sixth column).<sup>36</sup> This mix, comprising both advanced and emerging economies, underscores how different the distribution of economic power is likely to be in the future, compared to just a decade ago, or even today.

China tops both polarity indexes in 2025, a reflection of the expected continued dynamism of its economy and its increasingly large relative economic size. China will contribute about one-third of global growth at the end of the period, far more than any other economy. Nevertheless, advanced economies, especially the United States and the euro area, will continue to serve as engines for the global economy. This outcome is likely to occur even in the presence of a decline in the consumption share of the United States (and, to a lesser extent, the euro area) and modest growth rates relative to emerging economies.

Under the baseline scenario, India will join China as an emerging economy growth pole. In

spite of its smaller size relative to advanced economies such as Japan and the United Kingdom, India's robust growth through the end of 2025 will mean that its contribution to global growth will surpass that of any individual advanced economy (except the United States). Together, the simple polarity indexes of China and India will be nearly twice that of the United States and the euro area by 2025.

The remainder of the potential growth poles is likely to be a mix of advanced and emerging economies. Japan and the United Kingdom, for example, will play important supporting roles in global growth dynamics, alongside Indonesia and Brazil. Indonesia's prominence in growth polarity is somewhat of a surprise, appearing higher in the indexes than Brazil, Canada, or Russia (economies that will be almost twice Indonesia's size). Depending on the index, there is some movement in and out of the top 15 countries closer to the bottom.

Current discussions often assert that the world of the future will be more multipolar. Insofar as the distribution of economic *activity* is concerned, this undoubtedly will be the case. An

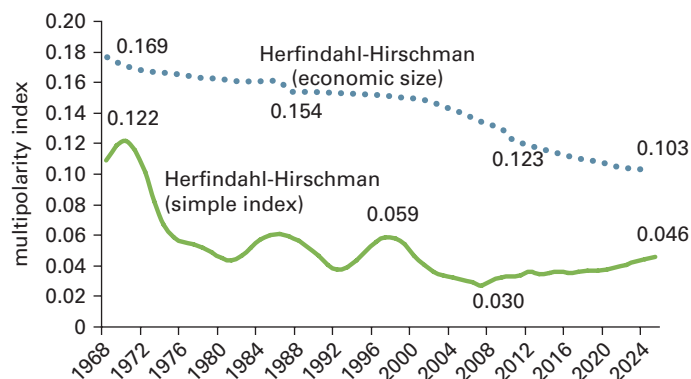
index of multipolarity that is based on economic size clearly points to a world that has gradually become more multipolar since 1968, and will become even more so in the future (figure 1.21): the normalized concentration index calculated from shares of GDP falls steadily by more than 40 percent from 1968 to 2025. In a significant way, then, the trend of increasing multipolarity is likely to continue.

However, a more diffused distribution of global economic activity does not in fact imply a more balanced distribution of economic growth contributions. While growth polarity in the 2021–25 period will continue to be more diffused than in the 20th century—the normalized concentration index based on the simple polarity measure in 2025 is 0.046, compared with 0.059 at the end of the 1990s and more than twice that in the early 1970s (figure 1.21)—the declining trend in the index reaches a minimum of 0.030 around 2008, pointing to the likelihood that the global economic impact of growth spillovers in 2025 may in fact emanate from fewer countries than today (at least by this measure).<sup>37</sup>

The notion that the postcrisis global economic environment will be fundamentally different from the environment of the past has gained considerable ground in some academic and policy circles. The reality of the multipolar world of the future is likely to be somewhat more nuanced. Advanced countries will continue to play a central role in the global economy in 2025, and while they are expected to grow more sluggishly than developing countries, the economic size of advanced countries (in real terms) will counterbalance this slower rate of growth. Still, size is not everything, and the economic influence of the large emerging economies will be increasingly palpable.<sup>38</sup> The financial crisis could well have marked a certain turning point in international economic relations, paving the way for a larger role for developing countries as the global economy becomes more multipolar.

Thus, in spite of the severe pain caused by the global financial crisis, the event may well have consolidated transformations in the global economy that will ensure its future resilience. A more diffuse distribution of growth poles will mean a world that better weathers shocks and is more resilient to crises; indeed, the fairly rapid recovery

**FIGURE 1.21 Evolution of multipolarity, economic size and simple polarity index, 1968–2025 (projected)**



Source: World Bank staff calculations.

Note: Multipolarity index calculated as the normalized Herfindahl-Hirschman index of GDP and simple polarity index shares of the top 15 economies, computed over rolling 5-year averages.

of the nonindustrialized nations from the financial crisis may well attest to the start of a trend decoupling that is likely to grow stronger as the emerging world continues to mature (Canuto and Giugale 2010). Such diversification bodes well for the new multipolar world.

## Policy Challenges and the Development Agenda

### Challenges and risks to sustained growth in the potential emerging economy poles

The forward march of the potential emerging economy growth poles is likely to be accompanied by the continued evolution of productive capacity and internal demand, which in turn is reliant on domestic developments in these economies. The recent strong growth performance in the emerging economies may, however, mask the significant domestic development challenges of any given potential pole. These challenges are quite real and, as such, pose risks that can derail a potential growth pole's otherwise robust growth performance. Such challenges are closely related to the underlying factors that influence their growth polarities: institutions, demographics, and human capital.

The first set of challenges involves successful institutional reform in the different

potential emerging economy poles. In order for these emerging economies to adapt to the changes inherent in their new global roles, domestic institutions—broadly defined to include governance structures in the economic, financial, and social sectors—will need to reflect the new economic realities. China, India, Indonesia, and Russia all face distinct institutional and governance challenges, and maintaining flexibility in terms of institutional reform is critical for establishing and consolidating their positions as growth poles.

Several of the potential emerging economy growth poles also face demographic concerns. This is especially the case for China, Korea, and Singapore, all of which will face a rising old-age dependency ratio in the years ahead. Absent productivity improvements, especially in the development of indigenous innovative capacity, the burden of older populations will likely be a drag on the vitality of their economies. This point has not been lost on policy makers in these three countries, as evidenced by the very high levels of R&D expenditure undertaken in recent years, along with national initiatives aimed at enhancing domestic innovation.

Finally, human capital is a concern in some potential growth poles, particularly in Brazil, India, and Indonesia. Reducing educational gaps and ensuring access to education is central, since promoting such an enabling environment would

further enhance human capital and stimulate domestic technological adaptation, innovative capacity, and knowledge generation. Successfully negotiating these changes also holds the potential to spur the growth of other economies—in Latin America, South Asia, and elsewhere.

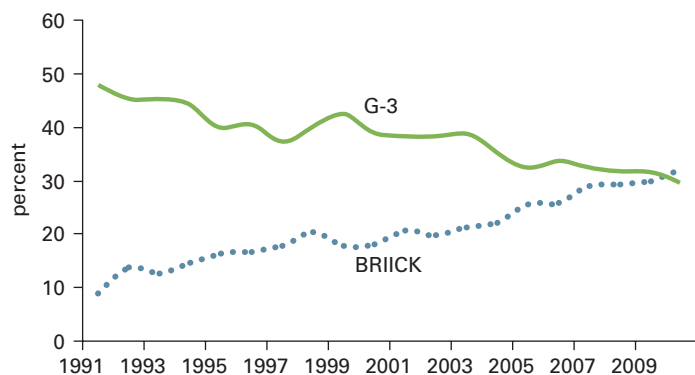
## Development impacts and LDCs

Although the multipolar world is ultimately about the realignment of economic poles away from advanced economies and toward developing economies, some countries nonetheless will remain in the periphery of the system. This is especially the case for LDCs, which have struggled to sustain growth in a global economy over which the LDCs have little influence or control. It is important to recognize, therefore, that the new multipolar world may raise a new set of development issues that are unique to the fact that many of the new major drivers of the world economy are also developing economies.

In and of itself, multipolarity should be positive for economies that are not growth poles. A more diffuse distribution of global growth should help mitigate volatility from idiosyncratic shocks experienced in any given pole. Consequently, economies that are not growth poles can enjoy greater stability of external demand. Moreover, some LDCs may well benefit from having new external drivers (from emerging economies) stimulating their domestic growth. Such growth will ultimately accrue to the poor living in those LDCs (Dollar and Kraay 2002), as well as to the poor within the potential emerging economy growth poles.

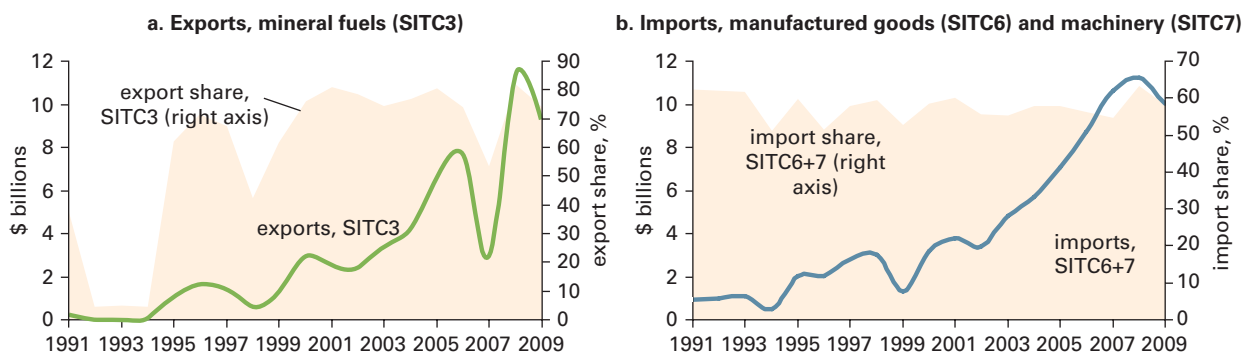
Such growth spillovers are likely to occur via the trade channel. The expansion of South-South trade in the future will continue the consolidation of trade-induced growth. Over the past decade, the economic complementarities between the large potential emerging economy growth poles and LDCs—the former tend to have comparative advantage in manufactures, and the latter in commodity inputs—have undergirded both rising intensity in bilateral trade (figure 1.22) and rapid growth (IMF 2011). Such complementarities, which are clearly evident from the distinct dominant categories of LDC imports and exports

**FIGURE 1.22** Shares of total LDC bilateral trade, selected advanced and emerging economies, 1991–2010



Source: World Bank staff calculations, from IMF DOT database.

Note: LDCs include all LDCs except Bhutan, Eritrea, Lesotho, and Timor-Leste (due to data limitations). G-3 economies are the euro area, Japan, and the United States; BRIICK economies are Brazil, Russia, India, Indonesia, China, and Korea.

**FIGURE 1.23** Dominant LDC merchandise exports to and imports from selected emerging economies

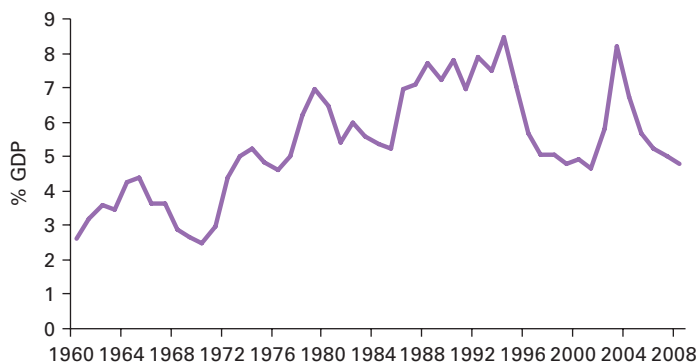
Source: World Bank staff calculations, from UN COMTRADE database.

Note: SITC = Standard International Trade Classification. The selected emerging economies are Brazil, China, India, Indonesia, Korea, and Russia. Dominant flow selected on the basis of export/import share rank for the majority of years.

vis-à-vis the major emerging economies (figure 1.23), suggest that the resulting impact on LDCs' terms of trade has been an overall improvement.

The financing channel can also be important, especially in terms of South-South FDI flows. As discussed in detail in chapter 2, merger and acquisition and greenfield activity can spur natural resource (and some manufacturing) production capacity in LDCs, stimulate local employment, and promote technology transfer. Since the sectoral composition of FDI outflows from the potential emerging economy poles is likely to differ from those of the advanced economy poles, LDCs could benefit from the diversification of their economies that results from such direct investment flows.

Multipolarity could also have a tangible impact on international foreign aid patterns. Official development assistance (ODA) to LDCs from Development Assistance Committee (DAC) countries has been fairly static since the 1980s, fluctuating between 4.5 and 8.5 percent of LDC GDP (figure 1.24). Over time, increased ODA disbursements by the potential emerging economy poles may well push ODA to greater shares. Bilateral ODA from Saudi Arabia, for example, increased by a factor of almost thirty in the decade between 1998 and 2009, rising from \$107 million to \$2.9 billion. Turkey's bilateral ODA has similarly increased by an order of magnitude

**FIGURE 1.24** Net ODA from DAC countries to LDCs as share of LDC GDP, 1960–2008

Source: World Bank staff calculations, from OECD DAC and World Bank WDI databases.

Note: ODA disbursements from OECD DAC member countries to LDCs, shown as a percentage of total LDC GDP.

over the same period. China's LDC aid in 2009 constituted about 40 percent of their total disbursements, with the largest share of this destined for Sub-Saharan Africa.

However, there is considerable nuance in the actual impact for a given country. For instance, the nature of global demand for the main exports from many LDCs—typically commodities and mineral resources—could change substantially, and LDCs that are net importers of those goods may face rising global prices (box 1.6). Even when an LDC possesses a comparative advantage in the

### BOX 1.6 Multipolarity and commodities

The causes of high commodities prices are multifaceted and interact in complicated ways. The combination of changes in the global climate (and associated weather-related shocks), increased financialization in commodities markets, energy policy (especially with regard to biofuels such as ethanol), and rising incomes in developing countries all play a role in inducing price spikes in commodities markets. Rising price pressures can also be compounded by government policies: food and oil subsidies, export bans, tariff barriers, precautionary hoarding, and even macroeconomic policies (such as monetary and exchange rate policies).

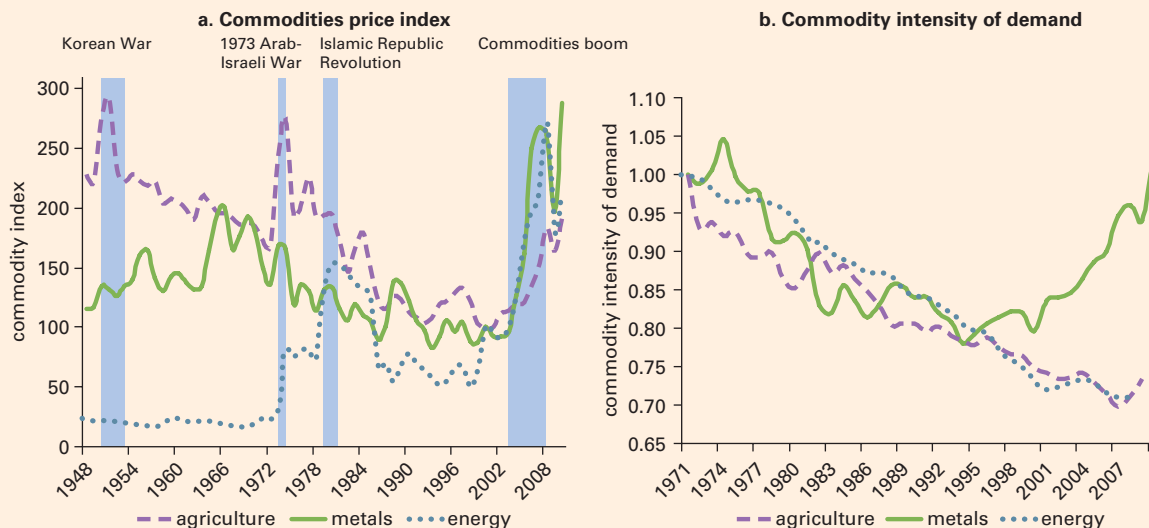
Historically, high prices have not been persistent across time. Most past episodes of rising commodities prices have often been relieved as geopolitical shocks fade and supply responses—such as increased exploration, technological innovation, and expanded inputs—react to high prices (figure B1.6.1, panel a). Moreover, previous cases of high commodity prices had led to

peaks for certain commodity classes that were higher, in real terms, than they are today.

However, the nature of multipolarity may mean that the traditional mechanisms that have relieved price pressure in the past may not be operative, at least for some commodity classes. The run-up in commodities prices from 2003–08 was both more sustained and much more broad-based than in the past. This may well have been due to a much more persistent demand component (especially in extractive commodities)—owing to the rise of potential emerging economy poles—and, hence, raises questions of whether supply responses can keep up.

This is especially the case for metals. While substantial yield gaps exist for agricultural outputs—especially in African economies—the ability to raise mineral extraction rates may be more limited, especially if rising energy prices render marginal extractions from the resource base economically infeasible. The commodity intensity of metal use has steadily increased since

**FIGURE B1.6.1** Commodities price index, 1948–2010, and commodity intensity of demand, 1971–2010



Sources: World Bank staff calculations, using FAOSTAT, IEA World Energy Outlook (WEO), and WBMS World Metal Statistics databases.  
 Note: The respective commodities indexes are real, manufactures unit value–deflated aggregates, with 2000 prices as the base year. The commodity intensity of demand is defined as commodity use per unit of GDP, each respectively normalized to 1971 values as the base year.



**BOX 1.6** (continued)

1994 (figure B1.6.1, panel b), primarily due to demand from China (World Bank 2009a).

As economies such as India undergo structural transformations of their own, their demand for metals may well follow a similar pattern, thus maintaining upward price pressures in those commodities, even as demand from China eases as a result of moderations in both its investment rate and manufacturing capacity growth.

More generally, the rise in real metals prices may reflect a supercycle phenomenon (Cuddington and Jerrett 2008) that has occurred several times before over the past 150 years, resulting from large economies undergoing major structural transformations due to mass industrialization and urbanization. To the extent that China, India, and other potential emerging economy

poles will undergo such structural changes in the future, high metals prices may be more persistent than prices for agricultural or energy commodities (which also display more substitutability over the longer run).

The bottom line is that, in a more multipolar world, the large, fast-growing emerging economies will be more important participants in global commodity markets. Principally, this means that demand pressures from such economies may matter more at the margin. Rapid growth in emerging economies may also have secondary effects, possibly through their impact on the environment (and thus affecting supply). As a result, policy approaches of the past—such as changing government policies with respect to ethanol, or limiting hoarding behavior—may have less of an impact on future commodity prices.

export of a given commodity or resource in high global demand, if its future growth is export-biased, its terms of trade could deteriorate and, in the worst case, that LDC could suffer from immiserizing growth.

Moreover, the actual long-term market impact of such rising demand depends on global supply responses. If other potential emerging economy poles increase their production of these goods—for example, if Argentina, Brazil, and Russia raise their agricultural output to cater to higher demand—LDCs may find themselves unable to capitalize on the spillover effects of growth in, say, China and India. This inability is compounded by the fact that the effect of reduced growth volatility from trade openness is conditioned by the degree of export diversification (Haddad, Lim, and Saborowski 2010). Thus, economies that are relatively open but not well diversified, such as Malawi or Zambia, may in fact experience greater volatility of output as their trade with the potential emerging economy growth poles intensifies.

**Annexes****Annex 1.1: Growth pole computation**

The most straightforward measure of a growth pole is a given economy's contribution to global growth:

$$P_{it} = \frac{\Delta y_{it}}{Y_{t-1}},$$

where  $y_{it}$  is the GDP of country  $i$  at time  $t$ ;  $Y_t$  is global GDP, which is an aggregation of GDP for all countries in the same period; and  $\Delta y_{it} \equiv y_{it} - y_{it-1}$  is the change in the output of economy  $i$ . The above equation can be rewritten as follows:

$$P_{it} = s_{it-1} \cdot g_{y,it},$$

where  $s_{it} \equiv y_{it}/Y_t$  is the global share of economy  $i$  at time  $t$  and  $g_{y,it}$  is its GDP growth rate, which means that a growth pole as defined above is simply the size-adjusted growth rate of the economy.

Although the above definition is the most intuitive and direct approach to decomposing the relative contribution of each country to global growth, such a measure is incomplete, as it fails to embody the manner by which growth poles exert their *polarity*, in the sense of capturing the transmission and spillover mechanisms for the country's growth to others in its economic space.

The natural extension is then to allow for such alternative channels of growth transmission. This includes poles that capture trade-related spillovers:

$$P_{it}^T = \frac{m_{it}}{X_t} \cdot g_{y,it},$$

where  $m_{it}$  is the total imports of country  $i$  at time  $t$ , and  $X_t$  is total global exports. Such a pole would not only have the direct effect of increasing their trading partners' growth through export expansion, but would also have an indirect effect of facilitating technology transfer through trade linkages. A broader measure of demand would be premised on domestic absorption:

$$P_{it}^{Tr} = \frac{d_{it}}{X_t} \cdot g_{y,it},$$

where absorption  $d_{it} = c_{it} + i_{it} + g_{it}$  is composed of consumption  $c$ , investment  $i$ , and government spending  $g$ , all for country  $i$  at time  $t$ .

The natural counterpart to a trade-weighted growth measure is to utilize financial flows as weights instead:

$$P_{it}^F = \frac{f_{o,it}}{FI_t} \cdot g_{y,it},$$

where  $f_{o,it}$  is the capital outflows from country  $i$  at time  $t$ , and  $FI_t$  is aggregate global capital inflows. In this case, a country serves as a growth pole by sending investment capital abroad, which serves to directly ease liquidity constraints in recipient economies, while also providing indirect benefits from increased leverage along with technology transfer.

Given the importance of foreign direct investment flows in knowledge and technology transfer, however, a natural (albeit narrower) alternative measure to the above is as follows:

$$P_{it}^{F'} = \frac{fdi_{it}}{FDI_t} \cdot g_{y,it},$$

where  $fdi_{it}$  is total FDI (inflows and outflows) for country  $i$  at time  $t$ , and  $FDI_t$  is total global FDI. The use of bidirectional FDI flows is consistent with the empirical evidence that FDI promotes technology transfer, regardless of its direction.

Growth poles can have a spillover influence through labor movement, especially (but not limited to) the migration of skilled workers. The migration channel not only serves to alleviate potential labor supply shortages—while equilibrating domestic wages with global levels through factor price equalization—but also can carry valuable human capital and embedded knowledge across borders. Migration-weighted poles are defined as follows:

$$P_{it}^M = \frac{em_{it}}{IM_t} \cdot g_{y,it},$$

where  $em_{it}$  is the net emigration from country  $i$  at time  $t$ , and  $IM_t$  is the sum of net immigration across countries. Alternatively, it is possible to focus on only the *stock* of migrants—as a proxy for knowledge spillovers and network effects emanating from a pole country to the migrants' home country—in which case the relevant measure would use, as a weight, the country's immigrant stock share instead:

$$P_{it}^{M'} = \frac{\pi_{it}}{\Pi_t} \cdot g_{y,it},$$

where  $\pi_{it}$  is the immigrant stock resident in country  $i$  at time  $t$ , and  $\Pi_t$  is the sum of all migrants worldwide.

Finally, it is possible to attempt to directly measure the effect of technological spillovers from a pole:

$$P_{it}^A = \frac{a_{it}}{A_t} \cdot g_{y,it},$$

where  $a_{it}$  is a measure of technological spillovers by country  $i$  at time  $t$ , and  $A_t$  is technological spillovers for the world as a whole. By and large,  $T_{it}$  is not directly observable. Nonetheless, it can be proxied by various indicators of innovation and technology.

The simple polarity measure used in this book uses only relative GDP share as a weight, which serves as a proxy for all the different spillover channels. The benchmark multidimensional

polarity measure used in this book introduces separate weights for the trade, finance, and technology channels, measured respectively by imports as a share of global exports, capital outflows as a share of global inflows, and patents as a share of global patents. The imports measure corrects for reexports for the major entrepôt economies of Hong Kong SAR, China; Singapore; and the United Arab Emirates, and also nets out intramonetary union trade using bilateral trade flows data. The capital outflows measure includes FDI and portfolio capital but excludes derivative transactions. The patents measure utilizes patent approvals to all national patent bodies reporting to the World Intellectual Property Organization. The expanded polarity measure additionally includes weights for the migration channel, as measured by immigrant stock as a share of global immigrants.

The three alternative growth measures relied on GDP data adjusted in three different ways: (1) real, (2) adjusted to account for Harrod-Balassa-Samuelson effects by removing U.S. inflation from countries' nominal growth rates, and (3) adjusted for purchasing power parity across countries. The cyclical component of the growth series then was removed by taking only the trend component after application of a Hodrik-Prescott filter ( $l = 6.25$ ).

To provide more definitiveness to the selection of growth poles (and reduce overreliance on a single dimension), the first principal component for the collection of measures described above was used to compute a composite index. This index was normalized to a scale of 0–100 for each of the three GDP variants, and is reported in table 1A.1. The bottom panel of the table shows these growth poles calculated without the inclusion of migration.<sup>39</sup> Here, the measure including and excluding migration is reported.

Other measures of growth spillover effects have been proposed in the literature. One class of studies incorporates third-country variables into growth regressions to identify the influence of these third countries on growth elsewhere (see, for example, Arora and Vamvakidis 2005, 2010a, 2010b). In principle, estimated coefficients can be aggregated to obtain a country's global spillover effect. Studies employing such

a framework suffer from three shortcomings. First, the methodology identifies correlations; a country whose growth cycles strongly comove with that of a large, influential country may be erroneously identified as a growth driver. So while the approach is valuable for case studies motivated by a priori driver countries, it is less useful for agnostic identification of growth poles. Second, it is much more difficult to flexibly incorporate multiple spillover channels, especially when bilateral flow data are not available. Third, the methodology is more data intensive and so is less useful for forecasting purposes, in which case estimates of the future values of variables are typically much more difficult to come by.

Another class of models adopts the tools of spatial econometrics to study growth spillovers (see Rey and Janikas 2005 for a recent review). However, these studies tend to limit their focus to physical rather than economic space. Many papers (such as Keller 2002) tend to be focused mainly on one or, at most, two channels. Finally, many studies focus on negative, rather than positive, spillovers—for example, the negative economic effects of civil wars on neighboring countries (Murdoch and Sandler 2002).

## Annex 1.2: Alternative measures of concentration

The fields of political science and international relations have long been interested in the study of the distribution of power. Within economics, the subfields of development, industrial relations, and international trade also have developed several measures of economic concentration and inequality, which can be applied to approximate the distribution of power as well.

There are three common measures of economic concentration, or resource-based power. The most popular of these is the Herfindahl-Hirschman index (Hirschman 1964), which is a sum of the squared market shares:

$$H_r = \sum_N s_{it}^2,$$

**TABLE 1A.1 Principal components index (with and without migration subindex) for growth poles, top 10 economies, 2004–08 average**

| Economy                  | Real Index | Economy            | HBS Index | Economy            | PPP Index |
|--------------------------|------------|--------------------|-----------|--------------------|-----------|
| <b>Without migration</b> |            |                    |           |                    |           |
| China                    | 26.20      | Euro area          | 47.34     | China              | 63.70     |
| United States            | 20.33      | China              | 41.54     | United States      | 51.26     |
| Euro area                | 10.86      | United States      | 30.51     | Euro area          | 40.15     |
| Japan                    | 5.59       | Russian Federation | 25.60     | Japan              | 28.15     |
| United Kingdom           | 5.51       | Canada             | 22.61     | Russian Federation | 26.02     |
| Korea, Rep.              | 5.41       | United Kingdom     | 22.49     | Korea, Rep.        | 24.57     |
| Russian Federation       | 4.79       | Korea, Rep.        | 20.49     | United Kingdom     | 24.01     |
| India                    | 4.62       | Australia          | 20.26     | India              | 23.38     |
| Singapore                | 4.30       | Brazil             | 19.48     | Singapore          | 22.95     |
| Canada                   | 4.08       | Norway             | 19.25     | Canada             | 22.92     |
| <b>With migration</b>    |            |                    |           |                    |           |
| China                    | 27.63      | Euro area          | 49.88     | China              | 62.94     |
| United States            | 26.12      | China              | 36.73     | United States      | 59.41     |
| Euro area                | 17.52      | Russian Federation | 35.89     | Euro area          | 44.42     |
| Russian Federation       | 15.11      | United States      | 29.38     | Russian Federation | 32.80     |
| India                    | 13.61      | Canada             | 22.11     | India              | 25.71     |
| United Kingdom           | 11.56      | Ukraine            | 22.05     | Japan              | 25.06     |
| Japan                    | 11.09      | United Kingdom     | 20.77     | United Kingdom     | 22.26     |
| Korea, Rep.              | 11.01      | Saudi Arabia       | 20.67     | Saudi Arabia       | 21.44     |
| Saudi Arabia             | 10.92      | Australia          | 20.20     | Canada             | 21.44     |
| Singapore                | 10.90      | India              | 19.78     | Korea, Rep.        | 21.41     |

Sources: World Bank staff calculations, from IMF DOT, IMF IFS, World Bank WDI, and WIPO Patentscope databases.

Note: The index was generated from the share-weighted combination of the first two principal components of trade, finance, and technology-weighted growth shares, with and without migration-weighted growth shares, normalized to the maximum and minimum of the 1969–2008 period. Real, HBS, and PPP-adjusted indicate growth rates calculated, respectively, from GDP data in real 2000 U.S. dollars, nominal local currency converted to U.S. dollars at current exchange rates and deflated by U.S. prices, and 2005 international PPP-adjusted dollars.

where  $s_{it}$  is the market share of firm  $i$  at time  $t$ , and  $N$  is the total number of firms operating in the market. This index may be normalized so that the index is bound by  $[0, 1]$  by applying the following formula:

$$H_t^* = \frac{H - \frac{1}{N}}{1 - \frac{1}{N}},$$

The two other related concentration/distribution indexes are the Theil, which weights market shares relative to the mean market share, and the Gini, which captures the relative mean difference in shares between two firms selected randomly from the market.

In international relations, the most well-known measure of interstate power distribution

is the Ray-Singer concentration index (Ray and Singer 1973), popularized by Mansfield (1993). The index is actually an application of the normalized Herfindahl-Hirschman index to the measurement of the share of aggregate capabilities,  $c_{it}$ , held by major power  $i$  at time  $t$ :

$$C_t = \sqrt{\frac{\sum_N c_{it}^2 - \frac{1}{N}}{1 - \frac{1}{N}}},$$

where  $N$  is the total number of powers in consideration.

The technical difficulties associated with the concentration measures are well known.<sup>40</sup> Moreover, the share of state capabilities,  $c_{it}$ , often is not very well defined. Finally, even if reasonable

proxies for economic power were chosen (such as export share in global exports, for example), concentration indexes based on power shares per se do not capture the effect of a state's relative growth rate or its influence on other states.

In positive political theory, two classical power indexes are used to measure influence over voting, or bargaining power. The Penrose-Banzhaf index (Banzhaf 1965; Penrose 1946) is the share of the total swing votes,  $v_{it}$ , held by an entity  $i$  at time  $t$ :

$$B_{it} = \frac{v_{it}}{\sum_N v_{it}},$$

where  $N$  is the total number of voting members. In contrast to the concept of swing votes, the Shapley-Shubik index (Shapley and Shubik 1954) is based on that of pivotal votes and is given by the a priori probability that a given entity is in a pivotal position:

$$S_{it} = \frac{p_{it}}{n!},$$

where  $v_{it}$  is the number of pivotal votes held by entity  $i$  at time  $t$ , and  $n!$  is the number of possible permutations of voting members.

Voting indexes have technical problems of their own, which likewise are well recognized.<sup>41</sup> In the context of international economic relations, however, the biggest drawback is that voting indexes require a voting mechanism to be operational or relevant, which may not be the case in many forms of international interactions. Like concentration indexes, voting indexes likewise do not capture relative growth rate or spillover effects.

A third form of power distribution would involve a measure of indirect or sociocultural influence, or "soft" power (Nye 2004). However, soft power is (almost by definition) difficult to quantify. Although proxies may be available—such as the global spread of a country's language, education institutions, or national values and philosophy—no systematic measure has emerged from the literature.

### Annex 1.3: Growth polarity regression details

The data set for the regressions were *country-level* data for five-year averages over the period

1971–2005. The dependent variable was the growth polarity index, measured with real GDP growth rates, excluding the migration subindex. This was rescaled with support [0, 100], using the maximum and minimum of the series, and subsequently log transformed. The independent variables were sourced variously from the World Bank's *World Development Indicators* (World Bank 2010b) and the IMF's *Direction of Trade Statistics* and *International Financial Statistics* (IMF 2010a, 2010c) databases (proximate economic variables); Barro and Lee (2010) and Lindert (2004) (education); Rodrik, Subramanian, and Trebbi (2004) (fundamental economic variables); ICRG (*International Country Risk Guide*; PRS Group 2010) (institutions); Alesina and colleagues (2003) (ethnolinguistic diversity); and WVSA (2009) (social capital). Natural logarithms were also taken for all the independent variables.

Population growth is the rate of population, investment share is investment as a share of GDP, and education attainment is the average years of schooling in the population aged 25 and older (the measure of human capital utilizes the same indicator). Infrastructure is proxied by mobile cellular subscriptions per 100 people (replacing this with the percentage of paved roads yields qualitatively similar results, but halves the sample size); poor health is proxied by the under-5 mortality rate (using life expectancy switches the sign of the coefficients on the health variable, as expected, but yields qualitatively similar results for the other variables); the dependency ratio is the population above age 65 as a share of working-age population; and government size is government consumption as a share of GDP.<sup>42</sup>

Trade exposure is total imports and exports as a share of GDP, geography is a country's distance from the equator, and institutional quality is an index generated from the share-weighted combination of the first three principal components of 11 institutional variables from the ICRG (excluding democratic accountability). Ethnolinguistic fractionalization is an index calculated as the simple average of ethnic and linguistic fractionalization (substituting this with ethno-linguistic-religious fractionalization yields qualitatively similar results), and democracy is the democratic

accountability variable from the ICRG (using the Polity IV measure of democracy yields qualitatively similar results).

The proximate determinants regressions were performed using both error components (EC) and linear generalized method of moments (GMM). Random effects (RE) were chosen over fixed effects (FE) if justified by a Hausman test, or if FE estimates were precluded due to the presence of time-invariant variables. Similarly, system GMM was chosen over difference GMM if Hansen tests suggest that the instruments are valid, otherwise difference GMM was implemented. These regressions are reported in table 1A.2, which includes the relevant key diagnostic tests.

The fundamental determinants regressions were run using instrumental variables (IV) and system GMM. The IV estimates are for the

2001–05 period; estimates for other periods were qualitatively similar. IV instruments used were settler mortality (IV-1) and fraction of European language-speaking population (IV-2) (institutions), gravity-predicted trade volume (integration), historical enrollment data from 1900 (human capital), and predicted level of democracy (democracy). These regressions are reported in table 1A.3, which includes the relevant key diagnostic tests.

### Annex 1.4: Business cycle stylized facts

Table 1A.4 tabulates correlation coefficients for consumption (C), investment (I), exports (X), and output (Y), along with changes in these variables, for 15 economies with high values of the multidimensional polarity index.

**TABLE 1A.2** Estimates for proximate determinants of growth polarity

|                            | (1)              |                  | (2)                |                  | (3)              |                    | (4)                 |                    | (5)              |                  |
|----------------------------|------------------|------------------|--------------------|------------------|------------------|--------------------|---------------------|--------------------|------------------|------------------|
|                            | EC               | GMM              | EC                 | GMM              | EC               | GMM                | EC                  | GMM                | EC               | GMM              |
| Population growth          | 0.043<br>(0.89)  | 2.627<br>(3.02)  | 0.169<br>(0.51)    | 1.664<br>(1.85)  | 0.017<br>(0.91)  | 4.168<br>(3.89)    | -0.055<br>(0.86)    | 2.466<br>(3.18)    | -0.484<br>(1.02) | 2.744<br>(2.69)  |
| Investment share           | 1.052<br>(0.56)* | -0.774<br>(1.00) | 0.908<br>(0.23)*** | -0.620<br>(0.73) | 1.073<br>(0.57)* | 1.486<br>(0.71)**  | 0.922<br>(0.50)*    | 0.130<br>(0.80)    | 0.994<br>(0.53)* | 0.476<br>(0.53)  |
| Schooling                  | 0.124<br>(0.07)* | 0.220<br>(0.14)* | 0.103<br>(0.04)*** | 0.070<br>(0.10)  | 0.132<br>(0.07)* | 0.072<br>(0.08)    | 0.077<br>(0.06)     | 0.151<br>(0.12)    | 0.107<br>(0.07)  | 0.180<br>(0.10)* |
| <b>Additional controls</b> |                  |                  |                    |                  |                  |                    |                     |                    |                  |                  |
| Infrastructure             |                  |                  | -0.002<br>(0.00)   | -0.001<br>(0.00) |                  |                    |                     |                    |                  |                  |
| Poor health                |                  |                  |                    |                  | 0.012<br>(0.08)  | -0.143<br>(0.06)** |                     |                    |                  |                  |
| Dependency ratio           |                  |                  |                    |                  |                  |                    | -0.401<br>(0.17)*** | -0.324<br>(0.16)** |                  |                  |
| Government size            |                  |                  |                    |                  |                  |                    |                     |                    | -0.118<br>(0.08) | 0.110<br>(0.07)* |
| $R^2$                      | 0.160            |                  | 0.121              |                  | 0.163            |                    | 0.205               |                    | 0.089            |                  |
| $F$                        |                  | 1.69*            |                    | 1.52             |                  | 1.45               |                     | 2.02**             |                  | 1.83*            |
| Hansen $J$                 |                  | 34.53            |                    | 38.42            |                  | 40.85              |                     | 43.95              |                  | 41.55            |
| AR(2) $z$                  |                  | -1.14            |                    | -1.02            |                  | -1.04              |                     | -1.28              |                  | -1.16            |
| Observations               | 526              | 439              | 479                | 392              | 523              | 523                | 526                 | 439                | 526              | 439              |

Sources: World Bank staff calculations, from IE Singapore, IMF DOT, IMF IFS, World Bank WDI, and WPIO Patentscope databases.

Note: GMM = generalized method of moments. Logarithms were applied to all variables. All error component models were estimated with fixed effects, except for specification (2), which was estimated with random effects. All linear GMM models were estimated as difference GMM, with the exception of specification (3), which was estimated as system GMM. Standard errors robust to heteroskedasticity (all specifications) and autocorrelation (GMM only) are reported in parentheses. A lagged dependent variable (GMM only), period dummies, and a constant term (all specifications) were included in the specifications, but not reported.

\* indicates significance at the 10 percent level, \*\* indicates significance at the 5 percent level, and \*\*\* indicates significance at the 1 percent level.

**TABLE 1A.3** Estimates for fundamental determinants of growth polarity

|                            | (1)                |                     |                    | (2)                |                     |                   | (3)                |                    |                    | (4)              |                     |                  | (5)              |                   |                    |
|----------------------------|--------------------|---------------------|--------------------|--------------------|---------------------|-------------------|--------------------|--------------------|--------------------|------------------|---------------------|------------------|------------------|-------------------|--------------------|
|                            | IV-1               | IV-2                | GMM                | IV-1               | IV-2                | GMM               | IV-1               | IV-2               | GMM                | IV-1             | IV-2                | GMM              | IV-1             | IV-2              | GMM                |
| Integration                | -0.399<br>(0.17)*  | -0.522<br>(0.18)*** | 0.098<br>(0.13)    | -0.332<br>(0.17)*  | -0.578<br>(0.20)*** | 0.084<br>(0.13)   | -0.542<br>(0.26)** | -0.857<br>(0.39)** | 0.050<br>(0.10)    | -1.642<br>(1.63) | -0.695<br>(0.25)*** | -0.007<br>(0.14) | -0.944<br>(0.63) | -0.401<br>(0.20)* | 0.062<br>(0.10)    |
| Institutions               | 1.929<br>(0.63)*** | 1.794<br>(1.00)*    | 0.828<br>(0.31)*** | 1.929<br>(0.61)*** | 2.311<br>(1.17)*    | 0.825<br>(0.32)** | 2.090<br>(0.77)*** | 4.802<br>(2.85)*   | 0.895<br>(0.28)*** | 2.167<br>(2.02)  | 1.622<br>(1.20)     | 0.471<br>(0.36)  | 0.666<br>(2.36)  | 3.321<br>(3.90)   | 0.717<br>(0.25)*** |
| Geography                  | -0.082<br>(0.07)   | -0.083<br>(0.10)    | 0.013<br>(0.04)    | -0.044<br>(0.07)   | -0.087<br>(0.10)    | 0.023<br>(0.03)   | -0.145<br>(0.10)   | -0.338<br>(0.26)   | 0.011<br>(0.03)    | -0.180<br>(0.26) | -0.017<br>(0.16)    | -0.127<br>(0.10) | -0.479<br>(0.61) | -0.519<br>(0.61)  | 0.017<br>(0.03)    |
| <b>Additional controls</b> |                    |                     |                    |                    |                     |                   |                    |                    |                    |                  |                     |                  |                  |                   |                    |
| Fractionalization          |                    |                     |                    | 0.357<br>(0.32)    | 0.440<br>(0.43)     | 0.109<br>(0.25)   |                    |                    |                    |                  |                     |                  |                  |                   |                    |
| Democracy                  |                    |                     |                    |                    |                     |                   | -0.252<br>(0.34)   | -0.836<br>(0.57)   | -0.050<br>(0.11)   |                  |                     |                  |                  |                   |                    |
| Social capital             |                    |                     |                    |                    |                     |                   |                    |                    |                    | 0.317<br>(0.43)  | 0.151<br>(0.17)     | 0.334<br>(0.20)  |                  |                   |                    |
| Human capital              |                    |                     |                    |                    |                     |                   |                    |                    |                    |                  |                     |                  | 0.990<br>(0.87)  | 0.105<br>(0.99)   | 0.099<br>(0.12)    |
| F                          | 4.05***            | 4.11***             | 2.39**             | 3.33**             | 2.90**              | 2.27**            | 2.38*              | 1.59               | 2.14**             | 0.750            | 2.700**             | 1.45             | 1.31             | 2.53*             | 2.40**             |
| Hansen J                   |                    |                     | 70.33              |                    |                     | 69.37             |                    |                    | 73.11              |                  |                     | 45.47            |                  |                   | 73.16              |
| AR(2) z                    |                    |                     | -0.42              |                    |                     | -0.40             |                    |                    | -0.60              |                  |                     | -0.03            |                  |                   | -0.34              |
| Observations               | 42                 | 75                  | 359                | 41                 | 74                  | 354               | 39                 | 70                 | 359                | 20               | 47                  | 230              | 15               | 33                | 357                |

Sources: World Bank staff calculations, from IE Singapore, IMF DOT, IMF IFS, World Bank WDI, and WIPO Patentscope databases.

Note: IV = instrumental variables. Logarithms were applied to all independent variables. Geography and social capital were always treated as exogenous. Standard errors robust to heteroskedasticity (all specifications) and autocorrelation (GMM only) are reported in parentheses. A lagged dependent variable (GMM only), period dummies, and a constant term (all specifications) were included in the specifications, but not reported.

\* indicates significance at the 10 percent level, \*\* indicates significance at the 5 percent level, and \*\*\* indicates significance at the 1 percent level.

## Annex 1.5: Current account model details

The data set for the regressions were *country-level* data for five-year averages over the period 1970–2008. The dependent variable was the current account balance, measured as a share of GDP. The independent variables were the fiscal balance, net official flows, net foreign assets, and net energy exports. The variables were sourced from the World Bank's *World Development Indicators* (World Bank 2010b) and the IMF's *International Financial Statistics* (IMF 2010c) databases, with the exception of the fiscal balance data, which were obtained from the IMF fiscal affairs department, and missing values for net foreign assets, which were complemented with data from Lane and Milesi-Ferretti (2006). Following Gagnon (2010), official flows were adjusted to include reserve assets from both the asset and liabilities side.

The regressions were performed using fixed effects regressions to obtain coefficients for each country group (only time, but not country,

fixed effects were included), which are reported in table 1A.5. The model-predicted estimates were then fitted to historical data from the 2004–08 period average and further calibrated to match actual 2004–08 current account balances by adding a country-specific fixed effect.

The data set for projections for the independent variables for 2011–15 were from the IMF's *Fiscal Monitor* (IMF 2010b) (fiscal balance forecasts), the IEA's (International Energy Agency) *World Energy Outlook* (IEA 2010) (energy production and consumption forecasts), and the USEIA's (U.S. Energy Information Administration) *International Energy Outlook* (USEIA 2010) (current energy profiles). Fiscal balances for 2012 and 2013 were linear projections between 2011 and 2014 (where data were available). Official flows were maintained at 2008 levels through the projection period, and net foreign assets applied the five-year lagged annual values through 2013, and maintained this value for 2014 and 2015. Net energy exports differenced production and

**TABLE 1A.4 Correlations for consumption, investment, and exports with output, and changes in consumption, investment, and exports with change in output, current and potential pole**

| Economy            | Correlations |       |       |                      |                      |                      |
|--------------------|--------------|-------|-------|----------------------|----------------------|----------------------|
|                    | C,Y          | I,Y   | X, Y  | $\Delta C, \Delta Y$ | $\Delta I, \Delta Y$ | $\Delta X, \Delta Y$ |
| Euro area          | 0.999        | 0.998 | 0.982 | 0.503                | 0.490                | 0.719                |
| United States      | 0.999        | 0.997 | 0.992 | 0.961                | 0.537                | 0.586                |
| China              | 0.990        | 0.997 | 0.994 | 0.870                | 0.953                | 0.910                |
| Russian Federation | 0.995        | 0.983 | 0.926 | 0.853                | 0.879                | 0.459                |
| United Kingdom     | 0.999        | 0.997 | 0.996 | 0.515                | 0.361                | 0.695                |
| Japan              | 0.999        | 0.985 | 0.952 | 0.120                | -0.002               | 0.373                |
| Brazil             | 0.998        | 0.985 | 0.932 | 0.562                | 0.538                | 0.736                |
| Canada             | 0.999        | 0.993 | 0.979 | 0.758                | 0.689                | 0.684                |
| Australia          | 0.999        | 0.993 | 0.994 | 0.700                | 0.711                | 0.818                |
| India              | 0.996        | 0.987 | 0.969 | 0.597                | 0.738                | 0.832                |
| Korea, Rep.        | 0.999        | 0.991 | 0.975 | 0.368                | 0.294                | 0.790                |
| Turkey             | 0.999        | 0.990 | 0.991 | 0.690                | 0.534                | 0.874                |
| Mexico             | 0.999        | 0.996 | 0.984 | 0.541                | 0.556                | 0.727                |
| Poland             | 0.999        | 0.986 | 0.992 | 0.865                | 0.858                | 0.926                |
| Saudi Arabia       | 0.915        | 0.978 | 0.961 | 0.664                | 0.645                | 0.619                |

Sources: World Bank staff calculations, IMF IFS, and World Bank WDI databases.

Note: Cross-correlations reported for the full time period for which data are available, typically between 1965 and 2008 for most countries.

consumption of only oil and coal (due to data limitations) and scaled this upward by the ratio of total energy consumption to oil and coal consumption. Countries with no forecast energy data were imputed from regional aggregate forecasts, using their current energy profiles. Values were calculated with commodity price projection data from the World Bank's Development Prospects Group (World Bank 2011).

In addition to the 15 economies reported in table 1.2, current account balances were estimated for an additional 13 countries with high values of the multidimensional polarity index. These are reported in table 1A.6 (for projections only).

## Annex 1.6: Hypothetical nominal output scenarios

The GDP projections in the main text are presented in terms of real GDP (measured by using 2009 U.S. dollars as the numeraire). Although this presentation provides an accurate depiction of the evolution of output after correcting for the possible distortionary effects arising from inflation, exchange rate valuation differences, and the ambiguity of estimating Harrod-Balassa-Samuelson effects, readers may be more accustomed to the GDP comparisons in terms of the nominal values often presented in the press. To the extent that monetary units in a common currency are an accurate representation of potential global economic power and influence, such a presentation may offer a slightly different picture from that presented in the main text.

Indeed, undertaking such an exercise suggests that, after adjusting the implied real growth rates from the growth model to account for reasonable assumptions regarding inflation and exchange rate appreciation, China potentially could overtake the United States in nominal terms by 2020 if a limited, gradual revaluation of the renminbi were to occur, and by 2024, if the exchange rate remains stable at 2009 levels (figure 1A.1, panel a). By a similar token, India could overtake both Japan and the United Kingdom in 2014 and 2020, respectively.

It is important to stress that such overtaking scenarios are meant to be illustrative, and should

**TABLE 1A.5 Estimates for empirical current account balances model, by country group**

|                    | Advanced economies | Developing Asia    | Africa             | Latin America      | Middle East        | Transition economies |
|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|----------------------|
| Fiscal balance     | 0.400<br>(0.13)*** | 0.240<br>(0.18)    | 0.300<br>(0.08)*** | 0.430<br>(0.18)**  | 0.640<br>(0.22)*** | 0.340<br>(0.27)      |
| Official flows     | 0.210<br>(0.37)    | 0.690<br>(0.24)*** | 0.370<br>(0.08)*** | 0.390<br>(0.12)*** | 0.240<br>(0.16)    | 0.210<br>(0.25)      |
| Net foreign assets | 0.070<br>(0.01)*** | 0.037<br>(0.01)*** | 0.037<br>(0.01)*** | 0.035<br>(0.01)*** | 0.019<br>(0.01)    | 0.001<br>(0.02)      |
| Net energy exports | 0.060<br>(0.10)    | 0.100<br>(0.10)    | 0.130<br>(0.03)*** | 0.280<br>(0.05)*** | 0.040<br>(0.06)    | 0.100<br>(0.06)      |
| R <sup>2</sup>     | 0.51               | 0.66               | 0.76               | 0.77               | 0.87               | 0.58                 |
| Observations       | 105                | 59                 | 83                 | 88                 | 40                 | 62                   |

Sources: World Bank staff calculations, from IMF IFS, IMF Fiscal Affairs, and World Bank WDI databases.

Note: All variables are measured as percentages of GDP. All variables are in 5-year averages, with the exception of net foreign assets, which are the end-of-period values for the previous 5-year period. Standard errors robust to heteroskedasticity are reported in parentheses. Time fixed effects were included, but not reported.

\* indicates significance at the 10 percent level, \*\* indicates significance at the 5 percent level, and \*\*\* indicates significance at the 1 percent level.



be interpreted with caution. The Linkage model used in the growth forecasts does not account for differential growth rates in nominal variables, nor for policy choices that could lead to changes in these nominal variables. Measurement difficulties in national price data also mean that Harrod-Balassa-Samuelson effects may be underestimated.

### Annex 1.7: Detailed analysis of growth and external balance scenarios

Even under the baseline scenario, some fracturing between the growth rates among the high- and low-productivity potential growth poles is expected to occur (figure 1A.2).<sup>43</sup> This separation will be even more evident when compared against growth rates in the advanced economies, which not only have been historically lower, but also are facing possible headwinds from postfinancial-crisis malaise (Reinhart and Rogoff 2009). The *divergent productivity* scenario suggests that a two-track global economy is more than a possibility; indeed, if productivity differentials were to persist, a slowly divergent path for growth between advanced, low-productivity developing, and high-productivity developing economies could emerge.

The impact of this divergence on the overall shape of the multipolar world, however, will be limited, as this shape mostly depends

on the productivity paths of China and India. Furthermore, with China and India still relatively far away from the technological frontier, catch-up growth through technological adoption still may be possible within the 15-year forecast horizon. But the divergence raises a cautionary tale

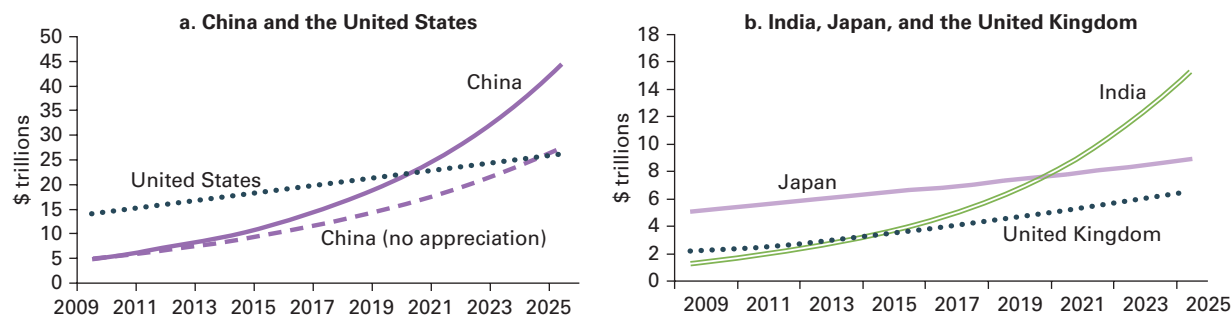
**TABLE 1A.6** Additional current account balances, potential poles, 2004–15

| Country        | 2004–08 | 2011 |
|----------------|---------|------|
| Argentina      | 1.8     | 0.0  |
| Indonesia      | 1.2     | 1.2  |
| Norway         | 16.3    | 14.3 |
| Israel         | 2.7     | 2.0  |
| Switzerland    | 11.0    | 10.7 |
| Malaysia       | 15.3    | 14.2 |
| Venezuela, RB  | 13.5    | 12.9 |
| Singapore      | 20.9    | 19.1 |
| Thailand       | 0.8     | 1.1  |
| South Africa   | -5.7    | -6.8 |
| Ukraine        | 0.2     | 0.6  |
| Sweden         | 7.7     | 7.1  |
| Czech Republic | -3.1    | -4.0 |

Sources: World Bank staff calculations, from IMF IFS, IMF Fiscal Monitor, USEIA IEO, and IEA WEO databases.

Note: All figures are percentages of GDP. The light-shaded region indicates projections; 2004–08 data are the historical period average, and 2011–15 data are the projected period average. Projections were performed using a current account model with the fiscal balance, official financial flows, net foreign assets, and net energy exports, with region-specific coefficients and calibrated to the actual current account balance for 2004–08.

**FIGURE 1A.1** Nominal GDP overtaking scenarios, selected emerging and advanced economy poles, 2009–25



Source: World Bank staff calculations, using the World Bank WDI database.

Note: 2009 nominal GDP values are values measured in terms of U.S. dollars. Real GDP growth rates from 2010 onward are based on forecasts from the baseline scenario. Inflation is assumed to be constant at 0 percent for Japan, 2 percent for the United States, 4 percent for both China and the United Kingdom, and 7 percent for India. Exchange rate appreciation, relative to the U.S. dollar, is assumed to be constant at 0 percent for China (no appreciation case), 2 percent for Japan, and 3 percent for China (appreciation case) and India.

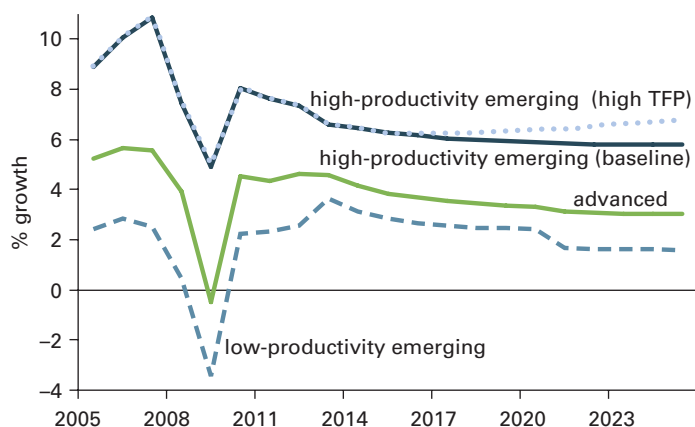
for other potential emerging economy growth poles, which must raise their TFP contributions to growth. By some indications, this change has already begun to occur, as exemplified by recent improvements in TFP performance in Argentina, Brazil, Indonesia, and Korea.

The messages from a possible failure to rebalance internally, as captured by the *unbalanced*

*internal growth* scenario, are somewhat more subtle. Continued low levels of consumption, for example, mean higher levels of domestic saving; to the extent that such saving is deployed toward productive investments, the economy may actually grow faster than with high domestic consumption. The risks here are twofold: First, that in a high-saving scenario, the surplus of domestic saving—absent a change in net capital outflows—will inevitably push the marginal productivity of capital downward. Indeed, returns to capital in this case would fall sharply, as illustrated for the case of China (figure 1A.3, panel a). Second, the material impact of such a failure to adjust domestically is affected by the size of a country’s current account surplus. Running a larger surplus when the economy has not realigned would mean not only lower levels of imports compared with a high-saving scenario alone, but also a decline in import absorption exceeding that of the baseline (figure 1A.3, panel b).

The takeaway from this scenario is that navigating the internal realignment process toward domestic sources of growth depends as much on successful external accounts management as it does on internal structural adjustment policies. This interdependence can lead to counterintuitive outcomes. For example, countries that are major exporters to China may find that a China that follows an internally unbalanced growth path would

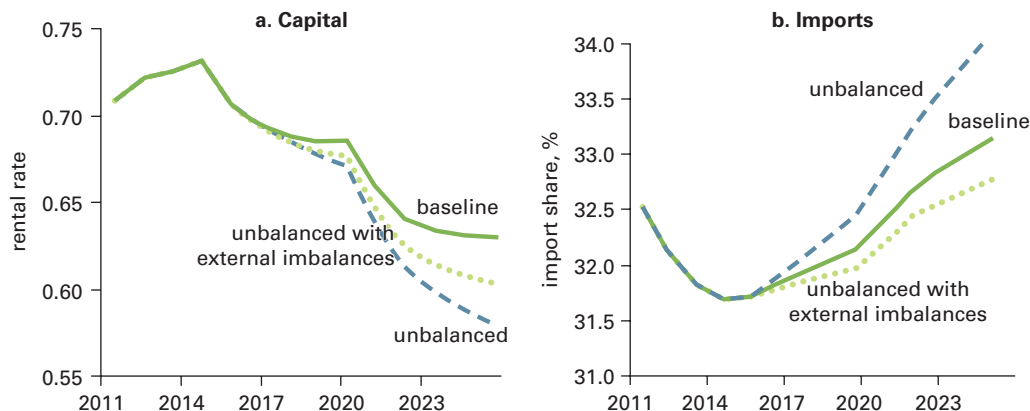
**FIGURE 1A.2 Real output growth in divergent productivity scenario, advanced economies and high- versus low-productivity emerging economies, 2005–25**



Source: World Bank staff calculations.

Note: The high-productivity emerging economies depicted are China, India, Poland, and the Russian Federation.

**FIGURE 1A.3 Marginal productivity of capital and imports under various unbalanced growth scenarios, China, 2011–25**



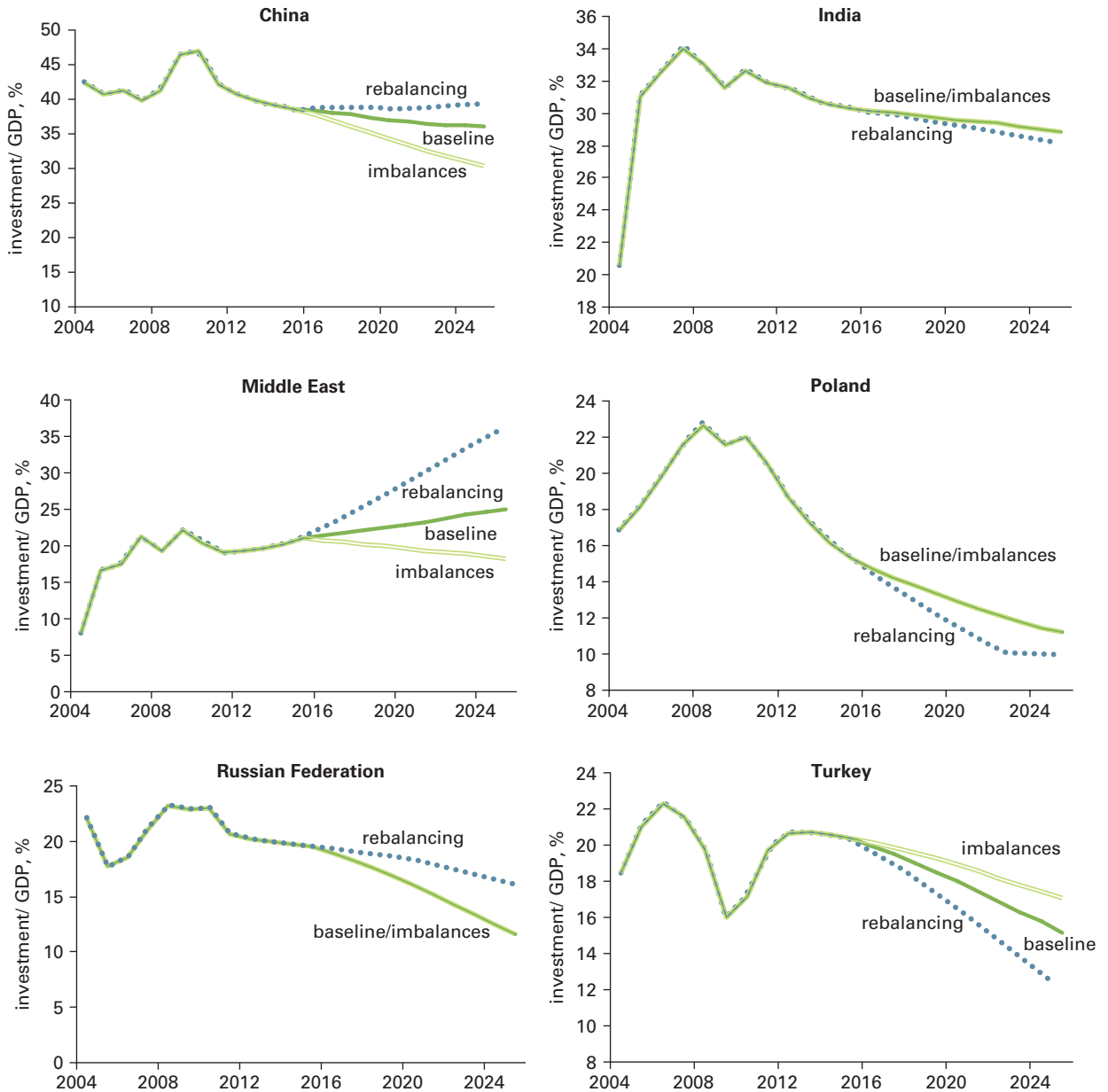
Source: World Bank staff calculations.

Note: Shares are computed from levels in terms of constant 2009 U.S. dollars.

import more, relative to the baseline. In contrast, when external imbalances are allowed to persist in tandem with internally unbalanced growth, imports are actually lower relative to the baseline.

These *global external balances* scenarios point to how the evolution of investment depends on the manner by which global imbalances unfold (figure 1A.4).<sup>44</sup> Several features are notable.

**FIGURE 1A.4 Investment share of output under various external balance scenarios, selected potential emerging economy poles, 2004–25**



Source: World Bank staff calculations.

Note: The baseline and continued imbalances scenarios overlap (as in the case of India) if current account balances in 2015 fall within the  $\pm 3$  percent band. The kink in the investment path for the rebalancing scenario in Poland is due to a model-imposed floor of 10 percent of GDP for investment (which is nonbinding if investment is below 10 percent to begin with).

First, the baseline tends to fall between the polar cases (of total rebalancing and continued imbalances). This outcome is to be expected, given that the baseline scenario adopts a compromise approach to the path of global external balances. Second, imposing a scenario of total rebalancing on surplus economies (such as China, Russia, and the oil-exporting economies of the Middle East) tends to result in a relatively slower rate of decline (or an actual increase) in the investment share. This outcome is also to be expected, as forcing a large surplus to zero, while holding saving constant, would induce reinvestment in the domestic economy. The converse holds true for deficit economies such as India, Poland, and Turkey; that is, the rebalancing scenario tends to exacerbate declines in investment. Third, while suppressing capital flight in this manner could, in principle, increase domestic investment in the surplus countries, there is a danger of also increasing either capital misallocation (into unproductive investments) or reducing consumer welfare (by limiting intertemporal consumption smoothing).

## Notes

1. The formal definitions and calculations are described in detail in annex 1.1.
2. The most well known among these are the Herfindahl-Hirschman and Ray-Singer (Ray and Singer 1973) indexes, which are measures of power concentration, and the Penrose-Banzhaf (Banzhaf 1965; Penrose 1946) and Shapley-Shubik (Shapley and Shubik 1954) indexes, which are measures of voting power. These two classes of power measures present their own drawbacks. The share of economic power, which is necessary for computing concentration indexes, often is not well defined. Voting indexes require a voting mechanism, and in many international economic interactions, this institution may not be operational or relevant.
3. Although these economies accounted for a large contribution to global growth, the extremely low rates of global growth between the years 1 and 1820 mean that the polarity index, which is normalized to the full 1–2001 time period, will tend to be lower for China and India, despite their relatively large contributions.
4. More precisely, the simple polarity index is calculated as the size-weighted growth rate of an economy. This measure essentially treats a country's economic size as a proxy for its channels of influence.
5. This correction accounts for the Harrod-Balassa-Samuelson effect of rising real exchange rates as a country's income level rises over time. Hence, a country experiencing a real depreciation (as was the case of in Japan in the 2000s) will have a relatively lower real growth rate; similarly, the real appreciation of the euro in the 2000s means that the euro area's real growth was actually higher over the period.
6. The measurement of concentration has various possible approaches, and this book uses the Herfindahl-Hirschman index as its measure. The reasons for this choice, and several alternatives, are discussed in greater detail in annex 1.2.
7. The minimum for the Herfindahl-Hirschman computed from the real and purchasing power parity indexes occurred in 1992, when the G-3 economies underwent a severe recession, significantly reducing their growth influence relative to the larger economies of the emerging world.
8. The sharp decline in the early 1970s deserves some comment. This fall is a function of several factors. Most crucially, the industrial economies underwent major recessions resulting from the first oil shock in 1973 (which was reinforced by the second in 1979). This negative shock was felt worldwide by all countries (apart from oil exporters), but the slowdown was more severe for the industrial world, which had relatively larger economies at the time. This resulted in a significant reduction in their respective growth polarities, and hence, a corresponding decrease in the multipolarity index. A secondary reason is that data coverage in the earlier years was not as comprehensive, and to the extent that higher polarity countries are omitted, the polarity share calculations used to compute the Herfindahl-Hirschman would have been affected. An examination of the distribution of the polarity index during this time suggests, however, that this latter concern is likely to be less of an issue, because the decline in the Herfindahl-Hirschman appears to be driven more by a significant reduction in the polarity value for the euro area and the United States than by the introduction of high-polarity economies as the sample coverage improved.
9. The consumption contribution fell to about one third for the period 2000–08 (consumption growth was 4.1 percent while GDP growth was 10.2 percent). Moreover, a significant share of this consumption growth was from the

- public sector—largely on educational and social services—and it is doubtful that such government consumption growth can be sustained indefinitely.
10. TFP contributions in Malaysia and Indonesia over the full period were 9 percent and 18 percent, respectively. It is important, however, to note that these computations apply the more standard (albeit naïve) approach of taking the residual from a Cobb-Douglas production function, assuming constant returns to scale and perfect competition. Adjustments of the form suggested by Klenow and Rodríguez-Clare (1997) raise the TFP contribution in some economies, sometimes dramatically, as does assuming a high elasticity of substitution among factors in a production function with constant elasticity of substitution. With the exception of Argentina and Indonesia, however, the corrections do not alter the *relative* performance of these economies vis-à-vis the leaders.
  11. TFP measures capture not just broad technological progress but also changes in technical efficiency, which comprise, among other things, the adoption of existing technologies, resource reallocations, and institutional improvements.
  12. Adoption, in turn, can be categorized according to adoption at the extensive margin (the fraction of farmers that grow hybrid corn) or the intensive margin (the amount of hybrid corn seed planted by each farmer). Both margins can generate economic gains, as the classic studies of Griliches (1957) and Clark (1987) attest.
  13. It is important to recognize that even with this relatively strong TFP performance, aggregate TFP in China and India continues to lag aggregate TFP of industrial economies such as the United States.
  14. Underlying this observation is the assumption that intellectual property is nonrivalrous but excludable, and so ideas and inventions generate growth, but any given innovation does not spill over perfectly to every other agent in the economy (in which case it would be the absolute, rather than per capita, number of patents and articles that matter).
  15. One may object to this choice of contrasting consumption versus exports, arguing instead that *net exports* is the more relevant metric. However, this metric was not used for two reasons. First, it is just as reasonable to subtract imports from consumption (for “domestic consumption”) as it is to group imports with exports. With no a priori reason to prefer one aggregation over another, the book treats each component in the national account separately. Second, regardless of the aggregation choice, the main message—which focuses on the *gap* between the domestic and external components of growth—remains unchanged.
  16. This statistic for China should, however, be interpreted with caution. While the value of exports is undoubtedly large in China, its role as a site for final assembly in many production chains means that export values would be lower, were one to account for only the domestic value-added component. Applying this correction would lower the export contribution by about half, which is nevertheless a large relative share.
  17. Indeed, the use of EOI versus ISI strategies has been repeatedly revisited in the development debate (World Bank 1979, 1987, 1993). Although the empirical results remain somewhat mixed, most evidence is broadly supportive of a positive link between openness and growth (Feyrer 2009; Frankel and Romer 1999; Jones and Olken 2008; Rodríguez and Rodrik 2000), which generally favors the pursuit of EOI as a growth strategy.
  18. While the export *share* of an export-oriented economy is inexorably tied to an increased outward orientation, nothing dictates that the *growth* of exports must increase after the initial trade expansion period. To see this, consider the decomposition of the GDP identity into  $y \equiv c + x + z$ , where  $z \equiv i + g - m$ , and  $c$ ,  $g$ ,  $i$ ,  $x$ , and  $m$  are private and public consumption, investment, exports, and imports, respectively. Taking time derivatives, dividing throughout by  $y$ , and simplifying, yields  $g_y = s_c g_c + s_x g_x + s_z g_z$ , where for a given component  $a$ ,  $s_a \equiv a/y$  and  $g_a \equiv (da/dt)/a$ . An economy that adopts EOI can reasonably expect  $s_x$  and  $g_x$  to rise *during* the transition period away from ISI, but there is nothing that requires  $g_x$  to remain high *after* the initial transition.
  19. Chinese saving rates have fluctuated but have not trended markedly up or down over the last two decades; the appearance in figure 1.11 of a discrete increase in saving in 2004 is at least partially due to a change in the approach of measuring enterprise saving (Bonham and Wiemer 2010). Regardless, both household and enterprise saving rates in China are very high, by any standard.
  20. In addition to these inevitable demographic pressures, household saving rates in China and India will also be pushed down by financial market development and strengthening of public provision of health care, education, and reliable social safety nets. This outcome, of course, depends in part on policy choices.

21. Correlations between consumption, investment, and exports with output are documented in annex 1.4 for current and potential poles.
22. The ICOR is a potentially controversial concept, relying on a somewhat dated Harrod-Domar model of the growth process. Rather than relying on the concept to describe growth in its entirety, ICOR is used here in a different sense, to provide a sense of the efficiency with which capital deployment supports growth.
23. Some caution should be exercised in the interpretation of this figure. R&D expenditures are likely to be endogenous to per capita incomes. Furthermore, the nonlinear distribution of expenditure and researcher shares at the cross-section is heavily influenced by the large mass of poorer countries at the low end of the distribution, and the large weights placed on China, India, and the United States, which raises the shares in their respective income brackets.
24. It is important to recognize that there is no consensual definition for what constitutes a global middle class, and the classification of any given household as middle class often depends on the specific definition employed. One central distinction is between a middle class measured relative to the distribution of the population of the entire world versus a middle class measured relative to the population distribution within each country. Because the focus of the analysis here is on growth polarities at the global level, the discussion is premised on the former definition, with incomes between \$2 and \$13 a day.
25. This fairly large number stems from the assumption that the global middle class is defined in the context of what constitutes a middle class in developing countries (Ravallion 2010). A more conservative definition, using the U.S. poverty line of \$13 a day as a lower bound, has 80 million people in the developing world joining the global middle class over the same time period.
26. It is important not to overstate the conclusions from this result. Analogous to the case for R&D expenditure and researcher shares, the nonlinear distribution of consumption shares at the cross-section is heavily influenced by the large mass of poorer countries at the low end of the distribution, and the large weights placed on China and the United States, which lower and raise the consumption shares in their respective income brackets.
27. This includes enabling consumer spending through policies, such as making improvements to the retail and service infrastructure, or increasing the uptake of consumer credit; these will have a direct effect via increasing the incentive to consume. Improvements to social protection and improving the efficiency of the financial system will also have an indirect effect via reducing the incentive to save.
28. Implicit in this assumption is also the fact that the current pursuit of divergent policy paths in the United States (stimulative at the expense of increased deficits and debt) and the euro area (austerity at the risk of economic malaise) do not generate wildly divergent medium and long-term economic outcomes between these two sets of economies.
29. This is consistent with the proposal for resolving global imbalances outlined in Goldstein (2010) and is similar to the  $\pm 4$  percent bands proposed by the U.S. Treasury.
30. Historically, China's growth rate has fluctuated with a 3.5 percent standard deviation. It is important to recognize that these projected growth rates depend on the assumptions of the baseline scenario and, hence, should not be interpreted literally as forecasts.
31. With a historical annual standard deviation of 3.1 percent.
32. India's average years of schooling for the population aged 15 and older was 5.1 in 2010 (Barro and Lee 2010).
33. It is important to note that these level output numbers are computed in real terms (using 2009 GDP as a base). Taking into account inflation and exchange rate adjustments presents a very different alternative picture, including several overtaking possibilities. These alternatives are explored in annex 1.6.
34. The projections are, however, consistent with forecasts from other potential output-based models, such as Jorgenson and Vu (2010).
35. This secular downward shift in consumption in the industrial economies more generally, driven primarily by demographic changes, is also implied by the extended period of deleveraging that typically follows major financial crises.
36. Data limitations in the projections preclude the computation of the full multidimensional polarity index. However, as the trade channel contributes the most to the direction of the multidimensional polarity index (as measured by the eigenvector loadings corresponding to the first principal component), the alternate index presented here may nonetheless serve as a reasonable proxy.

37. Caution is advised in directly comparing these numbers to the multipolarity index computed earlier. Because data limitations in the forecasts prevent a computation using all the channels comprising the full polarity index, the multipolarity values obtained from the forecast period differ from ones calculated earlier. The analysis that follows is based on a multipolarity index calculated entirely based on the simple polarity indexes, which can be extended back to 1968.
38. One cannot also rule out the possibility of the gradual emergence of a new unipolar or bipolar world. If the trend of the Herfindahl-Hirschman using the simple index were to continue beyond 2025, such an outcome seems to be a distinct possibility.
39. Operationalizing the migration channel is problematic for three reasons, which justifies the selective inclusion. First, there are significant data limitations. Emigration flow data currently are available only for two years, 2005 and 2010, and immigration data are end-of-period stock values, rather than in-period flows. Second, measurement issues abound. Because migrant stocks are affected by depreciation (through death), these stocks may change even if actual flows remain constant. Foreign-born residents often are classified as migrants, which is especially problematic for countries that have broken up over time. Third, migration may capture not only positive spillover effects from a sending nation but also other factors. Emigration may be due to the possibility of negative shocks in the sending nation, such as war, natural disasters, or economic crises, while the immigrant stock may reflect not only contemporaneous influences, but also the cumulative effect of migration decisions over all past periods (with the major changes perhaps having occurred long ago).
40. For example, the Herfindahl (Theil) index tends to be more sensitive to changes in larger (smaller) markets, and the Gini is a unidimensional measure of inequality in distribution.
41. For example, a coalition with very few members or a very large number of members will tend to dominate in the calculation of the Shapley-Shubik index, while the Penrose-Banzhaf index is criticized on the grounds that it treats voting behavior probabilistically rather than strategically.
42. Additional robustness checks, using additional variables (the initial level of development, military expenditure share, and regional dummies) as well as alternative measures of key variables (geography with malaria incidence, and institutional quality with Worldwide Governance Indicators measures) were performed, but not reported. The results for these regressions were qualitatively similar and are available on request.
43. Undoubtedly, this is a simplification, because any aggregation inevitably introduces the possibility that there may be outliers within a group. For example, Indonesia and Singapore are both forecast to grow in excess of 5 percent over the 2011–25 period, which exceeds the equivalent growth rates of Poland and Russia at their growth peaks. Nevertheless, the message—that divergent TFP growth patterns can lead to divergent growth outcomes—remains.
44. The broader macroeconomic paths are qualitatively similar, but investment, in particular, varied according to the external balance scenario being considered. This is hardly surprising given the fact that structural factors are likely to drive growth in the long run (with external balances playing only a secondary role), whereas the current account identity,  $cab \equiv s - i$ , necessitates a relationship between external balances and the patterns of saving and investment. Because saving is determined mainly by the demographic structure of the economy, investment changes bear the brunt of the adjustments required by the different scenarios.

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## The Changing Global Corporate Landscape

**T**HE SHIFT IN ECONOMIC AND financial power toward the developing world is having important implications for the global corporate environment. As they pursue growth opportunities outside the borders of their home countries, corporate players based in emerging markets are redefining the landscape of global investment and production. Emerging-market firms have become an important force behind new foreign direct investment (FDI) flows, in terms of both cross-border acquisitions and greenfield investments, and are growing participants in international capital markets. The transformation of firms based in Brazil, China, India, Malaysia, Mexico, the Russian Federation, and other major emerging economies into important foreign investors offers remarkable opportunities and challenges for the global economy. Moving forward, multinational firms based in emerging markets will become important agents of change on a global scale, pushing for more open policies at home and abroad and posing greater competition to advanced-country firms for natural resources, technology, and access to capital markets. At the same time, advanced economies will need to become more accustomed to receiving investments from countries with income levels and social practices very different from their own.

More than half a century of precedent defines the rise of modern multinational firms. Rapid overseas expansion of multinationals based in advanced countries in the postwar era had its origins in the technological superiority and supportive institutional environment of home countries, including ready access to financing for such expansion. In addition to technological and institutional strength, political power—whether exercised through gunboat diplomacy, as in colonial

times, or through economic diplomacy—also played an important role in expanding the footprint of advanced-country multinational firms. A voluminous body of interdisciplinary literature weaving together insights from international business, economics, sociology, and international politics has documented how multinational firms strategically locate themselves to exploit the relative technological advantages of home and host countries, how the firms serve as conduits for technology transfers, and how they influence the pace of globalization. The literature—from the influential product life-cycle hypothesis (Vernon 1966) to recent advances in the context of international fragmentation of production (Antràs 2005; Harrison and Scorse 2010)—has focused on the experiences of advanced-economy firms, with little attention paid to the behavior of multinational firms from emerging markets. But with emerging-market firms progressively gaining more political power and financing ability, this focus is set to change in the future.

This chapter provides a corporate perspective on the global trajectory toward increasing multipolarity. As the growth and institutional environments facing emerging-market firms change along this trajectory, the firms' behavior—namely, their strategic investment in global expansion, their choice of foreign investment in advanced economies versus in emerging economies, and the ways in which such firms access and use cross-border financing—signals both the changing status of their home countries and their evolving business and financing strategies. The main messages of chapter 2 are as follows:

- *As they pursue growth opportunities at a global level, emerging-market firms increasingly are becoming more prominent in the*